PowerBASIC Compiler for Windows Version 10

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Introducing PowerBASIC For Windows 10

Introducing PowerBASIC 10 for Windows

PowerBASIC for Windows is a native code compiler for Win95/98/ME, WinNT, Windows 2000, Windows XP, Windows Vista, and Windows 7. It creates applications with a Graphical User Interface (GUI), to provide the typical "Look and Feel" of Windows. It creates highly efficient executables and industry-standard DLLs for optimum flexibility. The machine code generated by PowerBASIC is among the most efficient in the industry, both in terms of size and speed. It compares most favorably with leading compilers of any dialect, Pascal, C++, Fortran, and others.

Our favorite slogan is "We put the Power in BASIC", and we sincerely believe you will find this to be true. With compilation speeds of 1 million lines per minute, unrivaled performance, and the smallest executables in the industry, PowerBASIC has become the new standard of comparison in Windows programming. **Thank you for joining us in the War on Bloatware!**

Features

- Create client COM applications and COM components using Dispatch, Direct, Automation, or Dual interfaces.
- Fast and Small 32-bit EXEs and DLLs for Microsoft Windows 95/98/ME/NT/2000/XP/Vista/Windows 7.
- Multi-threaded application support: Thread Object, Thread Functions, ThreadSafe Functions, ThreadSafe Subroutines, ThreadSafe Methods, ThreadSafe Properties, Thread Create, Thread Suspend, Thread Resume, Thread Status, and Thread Close.
- 32-bit protected mode code generation for maximum performance.
- Automatic unreferenced code removal.
- Total support for both ANSI and Unicode strings with automatic conversion.
- Dynamic Dialog Tools for easy creation of Graphic User Interface applications.
- A complete graphics package for easy development of graphic presentations, splash screens and more.
- Support for Windows only printers with the XPRINT statement and functions.
- Supports existing Line Printers, with PowerBASIC LPRINT statements and functions.
- A complete set of advanced string manipulation functions: VERIFY, REMOVE, REPLACE, EXTRACT, TALLY, REPEAT,

  , and many more.
- REGEXPR and REGREPL functions for regular expression search and replace.
- Array Sort and Scan, element Insert and Delete.
- MIN and MAX value Functions that work with both

  and data types.
- PEEK, POKE, PEEK$, POKE$ for direct memory access.

and Indexed Pointers for direct memory access.

- Matrix operations: Init, Identity, Transposition, Inversion, scalar, and matrix math.
- 80-bit Extended-precision math.
- Register Variables for increased performance: up to six unique register variables:
  (2) or (4).
- Unsigned integral types: BYTE (8-bit), WORD (16-bit) and DWORD (32-bit).
- Signed integral types: INTEGER (16-bit), LONG (32-bit) and QUAD (64-bit).
- Two Currency variable types.
- User-Defined TYPEs and UNIONs.
- FIELD variables for file I/O.
- Variant, GUID, and Object variables.
- Optional parameters in BASIC Subs, Functions, Methods, and Properties.
- Optional parameter passing to
  and procedures.
- Optional requirement that variables must be declared before use.
- Built-in 32-bit Inline Assembler with 80486, Pentium, and SIMD opcodes.
- Inline Assembler includes Floating-Point and MMX instructions.
- Direct export of Subs and Functions.
- Import Subs and Functions from the entire Win32 API or any 32-bit DLL.
- Client/Server Network Communications - TCP/UDP for E-mail, FTP, etc.
- High-speed Serial Communications support.
- True 32-bit code pointers, great for callbacks.
- Easy to use syntax highlighting Integrated Development Environment (IDE) and debugger.

See Also

The Integrated Development Environment

Running PB/Win

Debugging PB/Win Programs

What's New

New Statements and Functions

New Statements and Functions

- #COM CLASS metastatement allows you to add the COM attribute to a class defined elsewhere.
- #EXPORT metastatement declare a Sub/Function to have the EXPORT attribute.

- #LINK metastatement links a pre-compiled Static Link Library (SLL) into your host program.
- #OPTIMIZE CODE ON metastatement removes unreferenced code from the compiled program.
- #OPTIMIZE CODE OFF metastatement keeps unreferenced code in the compiled program.
- #OPTION LARGEMEM32 metastatement allows your application to use more than the original limit of 2 Gigabytes of memory.
- #OPTION WIN95 metastatement includes a complete Unicode emulation package in your EXE or DLL to allow them to run properly on Windows 95, 98, and ME.
- #OPTION ANSIAPI metastatement directs the internal runtime library to only use ANSI Windows API calls.
- #PAGE metastatement sets a page boundary for the PowerBASIC IDE.
- #RESOURCE BITMAP metastatement embeds a bitmap as Resource data into your program or DLL.
- #RESOURCE ICON metastatement embeds a icon as Resource data into your program or DLL.
- #RESOURCE MANIFEST metastatement embeds a manifest file into your program or DLL.
- #RESOURCE RCDATA metastatement embeds raw resource data into your program or DLL.
- #RESOURCE STRING metastatement embeds a
 as Resource data into your program or DLL.
- #RESOURCE TYPELIB metastatement embeds a type library as Resource data into your program or DLL.
- #RESOURCE PBR metastatement embeds a PowerBASIC compiled resource (.PBR) into your program or DLL.
- #RESOURCE RES metastatement embeds a compiled resource (.RES) file into your program or DLL.
- #RESOURCE WAVE metastatement embeds a wave file into your program.
- #RESOURCE VERSIONINFO metastatement embeds version information into your program or DLL.
- #UNIQUE metastatement specifies whether unique variable names are required.
- ASM ALIGN statement rounds up the instruction location to a power of two address.
- ASMDATA/END ASMDATA statements defines a block where primitive read-only data is stored.
- BITS$ function copies string contents without modification.
- CHRBYTES function determines the size of a single character in a string variable.
- CHR$$ function converts one or more numeric Unicode character codes, code ranges, and/or strings into a single string.
- ChrToOem$ function translates a string of ANSI/WIDE characters to OEM byte characters.
- ChrToUtf8$ function translates a string of ANSI/WIDE characters to UTF-8 byte characters.
- CLIP$ function deletes characters from a string.
- COLLECTION Object Group provides a convenient way to refer to a related group of items as a single object.
- COMM TIMEOUT statement places a limit on the time to complete a
 operation.

- CONTROL ADD HEADER statement adds a header control to a dialog.
- CONTROL HIDE statement makes a
  invisible.
- CONTROL NORMALIZE statement makes a control visible.
- DAYNAME$ function converts a Day-of-Week number to the associated name.
- DEC$ function converts an integral value to a decimal string.
- DIALOG DEFAULT FONT statement specifies the default font to be used for DDT Dialogs and Controls.
- DIALOG HIDE statement makes a Dialog invisible.
- DIALOG NONSTABLE statement makes a Dialog non-stable (closeable).
- DIALOG NORMALIZE statement makes a Dialog visible.
- DIALOG STABILIZE statement makes a Dialog stabilized (non-closeable).
- END statement terminates the program immediately.
- ENUM/END ENUM statements creates a group of logically related numeric equates.
- EXE.INST read-only user defined type returns the instance handle of the program which is currently executing.
- FASTPROC/END FASTPROC statements defines a FastProc code section.
- FOR EACH/NEXT statements defines a loop of program statements which can sequentially examine and act upon each member of a PowerCollection or LinkListCollection.
- GET$$ statement reads WIDE string data from a file opened in binary mode.
- GRAPHIC(CANVAS.X) function retrieves the writable width of the attached graphic target.
- GRAPHIC(CANVAS.Y) function retrieves the writable height of the attached graphic target.
- GRAPHIC(Cell.Size.X) function retrieves the character cell width including external leading.
- GRAPHIC(Cell.Size.Y) function retrieves the character cell height including external leading.
- GRAPHIC(Chr.Size.X) function retrieves the character width on the graphic target.
- GRAPHIC(Chr.Size.Y) function retrieves the character height on the graphic target.
- GRAPHIC(Client.X) function retrieves the client width of the attached graphic target.
- GRAPHIC(Client.Y) function retrieves the client height of the attached graphic target.
- GRAPHIC(Clip.X) function retrieves the width of the clip area.
- GRAPHIC(Clip.Y) function retrieves the height of the clip area.
- GRAPHIC(COL) function retrieves the next column print position, based upon the row and column position of a text cell.
- GRAPHIC(DC) function retrieves the handle of the DC (device context) for the selected graphic target.
- GRAPHIC(INSTAT) function determines whether a keyboard character is ready.
- GRAPHIC(LINES) function retrieves the number of text lines which will fit on the graphic target.
- GRAPHIC(LOC.X) function retrieves the horizontal location of the graphic target on the desktop.

- GRAPHIC(LOC.Y) function retrieves the vertical location of the graphic target on the desktop.
- GRAPHIC(MIX) function retrieves the color mix mode for the selected graphic target.
- GRAPHIC(OVERLAP) function retrieves the status of Graphic Overlap Mode.
- GRAPHIC(PIXEL...) function retrieves the color of the pixel at the specified point.
- GRAPHIC(POS.X) function retrieves the horizontal POS (last point referenced) by a GRAPHIC statement.
- GRAPHIC(POS.Y) function retrieves the vertical POS (last point referenced) by a GRAPHIC statement.
- GRAPHIC(PPI.X) function retrieves the horizontal resolution of the display device, in points per inch.
- GRAPHIC(PPI.Y) function retrieves the vertical resolution of the display device, in points per inch.
- GRAPHIC(ROW) function retrieves the next row print position, based upon the row and column position of a text cell.
- GRAPHIC(SCROLLTEXT) function retrieves the status of Graphic ScrollText Mode.
- GRAPHIC(SIZE.X) function retrieves the overall width of the selected graphic target.
- GRAPHIC(SIZE.Y) function retrieves the overall height of the selected graphic target.
- GRAPHIC(STRETCHMODE) function retrieves the default bitmap stretching mode for the attached DC.
- GRAPHIC(TEXT.SIZE.X...) function calculates the width of text to be printed.
- GRAPHIC(TEXT.SIZE.Y...) function calculates the height of text to be printed.
- GRAPHIC(View.X) function retrieves the horizontal position of the virtual graphic viewport.
- GRAPHIC(View.Y) function retrieves the vertical position of the virtual graphic viewport.
- GRAPHIC(WORDWRAP) function retrieves the status of Graphic WordWrap Mode.
- GRAPHIC(WRAP) function retrieves the status of Graphic Wrap Mode.
- GRAPHIC$(CAPTION) function retrieves the caption from a Graphic Window.
- GRAPHIC$(INKEY$) function reads a keyboard character if one is ready.
- GRAPHIC$(WAITKEY$) function reads a keyboard character or extended key, waiting until one is ready.
- GRAPHIC$ (WAITKEY$...) function reads a limited set of keyboard characters or extended keys, with an optional timeout value.
- GRAPHIC CELL SIZE statement retrieves the character cell size including external leading.
- GRAPHIC CELL statement sets or retrieves the next print position, based upon the row and column position of a text cell.
- GRAPHIC COL statement retrieves the next column print position, based upon the row and column position of a text cell.
- GRAPHIC GET CANVAS statement retrieves the buffer size of the attached graphic target.
- GRAPHIC GET CAPTION statement retrieves the caption from a Graphic Window.
- GRAPHIC GET CLIP statement retrieves the size of the clip area.

- GRAPHIC GET OVERLAP statement retrieves the status of Graphic Overlap Mode.
- GRAPHIC GET SCROLLTEXT statement retrieves the status of Graphic ScrollText Mode.
- GRAPHIC GET SIZE statement retrieves the overall size of the selected graphic target.
- GRAPHIC GET STRETCHMODE statement retrieves the default bitmap stretching mode for the attached DC.
- GRAPHIC GET VIEW statement retrieves the position of the virtual graphic viewport.
- GRAPHIC GET WORDWRAP statement retrieves the status of Graphic WordWrap Mode.
- GRAPHIC GET WRAP statement retrieves the status of Graphic Wrap Mode.
- GRAPHIC ROW statement retrieves the next row print position, based upon the row and column position of a text cell.
- GRAPHIC SET AUTOSIZE statement expands a graphic target into autosize mode.
- GRAPHIC SET CAPTION statement changes the caption on a Graphic Window.
- GRAPHIC SET CLIENT statement changes the size of a graphic control or graphic window to a specific client area size.
- GRAPHIC SET CLIP statement establishes margins around the outer edges of the graphic target.
- GRAPHIC SET FIXED statement restores a graphic target to standard fixed mode.
- GRAPHIC SET OVERLAP statement enables or disables Graphic Overlap Mode.
- GRAPHIC SET SCROLLTEXT statement enables or disables Graphic ScrollText Mode.
- GRAPHIC SET SIZE statement changes the overall size of a graphic control or graphic window.
- GRAPHIC SET STRETCHMODE statement sets the default bitmap stretching mode for the current DC.
- GRAPHIC SET VIEW statement changes the position of the viewport on a virtual graphic target.
- GRAPHIC SET VIRTUAL statement expands a graphic target into virtual mode.
- GRAPHIC SET WORDWRAP statement enables or disables Graphic WordWrap Mode.
- GRAPHIC SET WRAP statement enables or disables Graphic Wrap Mode.
- GRAPHIC SPLIT statement splits a string into two parts for display on a graphic target.
- GRAPHIC STRETCH PAGE statement copies and resizes a bitmap to the clip or client area of the selected graphic target.
- GRAPHIC WINDOW HIDE statement makes a graphic window invisible.
- GRAPHIC WINDOW MINIMIZE statement minimizes a graphic window.
- GRAPHIC WINDOW NONSTABLE statement makes a graphic window non-stable (closeable).
- GRAPHIC WINDOW NORMALIZE statement makes a graphic window visible.
- GRAPHIC WINDOW STABILIZE statement makes a graphic window stabilized (non-closeable).
- GRAPHIC WINDOW TEXT statement creates a new standalone window oriented more towards the display of text.
- HEADER statement manipulates a HEADER control in order to set/retrieve data.

- IMPORT ADDR statement loads a library (DLL) to access an imported procedure.
- IMPORT CLOSE statement frees a library.
- ILinkListCollection.ADD method adds am item to the end of the LinkListCollection.
- ILinkListCollection.CLEAR method removes all items from the LinkListCollection.
- ILinkListCollection.COUNT method returns the number of items currently in the LinkListCollection.
- ILinkListCollection.FIRST method sets the current index for the LinkListCollection to one (1) and returns the previous value.
- ILinkListCollection.INDEX method sets the current index for the LinkListCollection to the specified value and returns the previous value.
- ILinkListCollection.INSERT method adds the specified item to the specified index position.
- ILinkListCollection.ITEM method returns the item from the specified index position.
- ILinkListCollection.LAST method sets the index value to the last item and returns the previous value.
- ILinkListCollection.NEXT method returns the next item in the LinkListCollection.
- ILinkListCollection.PREVIOUS method returns the previous item in the LinkListCollection.
- ILinkListCollection.REMOVE method removes the item at the specified position from the LinkListCollection.
- ILinkListCollection.REPLACE method replaces the item at the specified position with a new item in the LinkListCollection.
- IPowerArray.ARRAYBASE method returns the address of the first element of the array.
- IPowerArray.ARRAYDESC method returns the address of the SAFEARRAY descriptor.
- IPowerArray.ARRAYINFO <Get> property retrieves the info string, if one is present.
- IPowerArray.ARRAYINFO <Set> property assigns the info string to the array.
- IPowerArray.CLONE method copies an exact duplicate of the SafeArray, and stores it in the specified PowerArray object.
- IPowerArray.COPYFROMVARIANT method copies an exact duplicate of the specified SafeArray and stores it in this PowerArray object.
- IPowerArray.COPYTOVARIANT method copies an exact duplicate of the SafeArray in this object and stores it in the specified Variant.
- IPowerArray.DIM method dimensions (creates) a new array.
- IPowerArray.ELEMENTPTR method retrieves the address of the specified data element.
- IPowerArray.ELEMENTSIZE method retrieves the storage size (in bytes) of each data element of the array.
- IPowerArray.ERASE method destroys the contained array and empties the object.
- IPowerArray.LBOUND method retrieves the lower bound number for the dimension specified.
- IPowerArray.LOCK method increments the lock count of the SAFEARRAY.
- IPowerArray.MOVEFROMVARIANT method transfers ownership of the specified SafeArray contained in the variant to the PowerArray object.
- IPowerArray.MOVETOVARIANT method transfers ownership of the SafeArray contained in this

PowerArray object to a variant parameter.

- IPowerArray.REDIM method allows the SafeArray to be erased and re-dimensioned to a new size.
- IPowerArray.REDIMPRESERVE method allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved.
- IPowerArray.RESET method sets all elements in the SafeArray back to their initial, default value.
- IPowerArray.SUBSCRIPTS method retrieves the number of dimensions (subscripts) for this array.
- IPowerArray.UBOUND method retrieves the upper bound number for the dimension specified.
- IPowerArray.UNLOCK method decrements the lock count of the SAFEARRAY.
- IPowerArray.VALUEGET method retrieves the value of the specified array element.
- IPowerArray.VALUESET method assigns the value to the specified array element.
- IPowerArray.VALUETYPE method retrieves the %VT code which describes the data contained in this array.
- IPowerCollection.ADD method adds an item and key to the end of the PowerCollection.
- IPowerCollection.CLEAR method removes all items and keys from the PowerCollection.
- IPowerCollection.CONTAINS method scans the PowerCollection for the specified key.
- IPowerCollection.COUNT method returns the number of data items currently contained in the PowerCollection.
- IPowerCollection.ENTRY method returns the PowerCollection item specified by the Index number.
- IPowerCollection.FIRST method sets the index to the first item and returns the previous value.
- IPowerCollection.INDEX method sets the index value and returns the previous value.
- IPowerCollection.ITEM method returns the item associated with the specified key in the PowerCollection.
- IPowerCollection.LAST method sets the index to the last item and returns the previous value.
- IPowerCollection.NEXT method returns the next item in the PowerCollection.
- IPowerCollection.PREVIOUS method returns the previous item in the PowerCollection.
- IPowerCollection.REMOVE method removes the item associated with the specified key from the PowerCollection.
- IPowerCollection.REPLACE method replaces the item associated with the specified key with a new item.
- IPowerCollection.SORT method sorts the data items in the PowerCollection based upon the text in the associated keys.
- IPowerThread.Close method releases the
  handle of this thread.
- IPowerThread.Equals method compares the specified object to determine if it references the same object as this object.
- IPowerThread.Handle method retrieves the handle of the thread for use with Windows API functions.
- IPowerThread.Id method retrieves the ID of the thread for use with Windows API functions.
- IPowerThread.IsAlive method checks the thread to see if it is currently "alive".

- IPowerThread.Join method waits for the specified thread object to complete before execution of this thread continues.
- IPowerThreadLaunch method begins execution of the thread object.
- IPowerThread.Priority property get retrieves the priority value for this thread.
- IPowerThread.Priority property set sets the priority value for this thread.
- IPowerThread.Result method retrieves the results value if the thread has ended.
- IPowerThread.Resume method resumes execution of a suspended thread.
- IPowerThread.StackSize property get retrieves the size of the stack for this thread.
- IPowerThread.StackSize property set sets the size of the stack for this thread to the value specified.
- IPowerThread.Suspend method suspends execution of the thread.
- IPowerThread.TimeCreate method retrieves the date and time-of-day of the thread creation.
- IPowerThread.TimeExit method retrieves the date and time-of-day of the thread exit
- IPowerThread.TimeKernel method retrieves the amount of time this thread has spent in kernel mode.
- IPowerThread.TimeUser method retrieves the amount of time this thread has spent in user mode.
- IPowerTime.AddDays method adds or subtracts a specified number of days to value of this object.
- IPowerTime.AddHours method adds or subtracts a specified number of hours to value of this object.
- IPowerTime.AddMinutes method adds or subtracts a specified number of minutes to value of this object.
- IPowerTime.AddMonths method adds or subtracts a specified number of months to value of this object.
- IPowerTime.AddMSeconds method adds or subtracts a specified number of milliseconds to value of this object.
- IPowerTime.AddSeconds method adds or subtracts a specified number of seconds to value of this object.
- IPowerTime.AddTicks method adds or subtracts a specified number of ticks to value of this object.
- IPowerTime.AddYears method adds or subtracts a specified number of years to value of this object.
- IPowerTime.DateDiff method compares the date component of an external PowerTime object to this objects date component.
- IPowerTime.DateString method returns the Date component of the object expressed as a string.
- IPowerTime.DateStringLong method returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name.
- IPowerTime.Day method returns the Day component of the object.
- IPowerTime.DayOfWeek method returns the Day-of-Week component of the object.
- IPowerTime.DayOfWeekString method returns the Day-of-Week of the object, expressed as a string (Sunday, Monday...).
- IPowerTime.DaysInMonth method returns the number of days which comprise the month of the date of the PowerTime object.
- IPowerTime.FileTime property get returns a Quad-Integer value of the PowerTime object as a

FileTime.

- IPowerTime.FileTime property set the FileTime Quad-Integer value specified is assigned as the PowerTime object value
- IPowerTime.Hour method returns the Hour component of the object.
- IPowerTime.IsLeapYear method returns true/false (-1/0) to tell if the object year is a leap year.
- IPowerTime.Minute method returns the Minute component of the object.
- IPowerTime.Month method returns the Month component of the object.
- IPowerTime.MonthString method returns the Month component of the object, expressed as a string (January, February...).
- IPowerTime.MSecond method returns the millisecond component of the PowerTime object.
- IPowerTime.NewDate method assigns a new value to the date component of the PowerTime object.
- IPowerTime.NewTime method assigns a new value to the time component of the PowerTime object.
- IPowerTime.Now method assigns the current local date and time on this computer to this object.
- IPowerTime.NowUTC method assigns the current Coordinated Universal date and time (UTC) to this object.
- IPowerTime.Second method returns the Second component of the object.
- IPowerTime.Tick method returns the Tick component of the object.
- IPowerTime.TimeDiff method compares the time component of an external PowerTime object with this objects time component.
- IPowerTime.TimeString method returns the Time component of the PowerTime object expressed as a string.
- IPowerTime.TimeString24 method returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.
- IPowerTime.TimeStringFull method returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.tt in 24-hour notation.
- IPowerTime.Today method the current local date on this computer is assigned to this PowerTime object.
- IPowerTime.ToLocalTime method converts the object to local time.
- IPowerTime.ToUTC method converts the object to Coordinated Universal Time (UTC).
- IPowerTime.Year method returns the Year component of the PowerTime object as a numeric value.
- IQueueCollection.CLEAR method removes all items from the QueueCollection.
- IQueueCollection.COUNT method returns the number of data items currently contained in the QueueCollection.
- IQueueCollection.DEQUEUE method returns the item at the "oldest" position in the QueueCollection.
- IQueueCollection.ENQUEUE method adds the specified item to the "newest" position in the QueueCollection.
- IStackCollection.CLEAR method removes all items from the StackCollection.
- IStackCollection.COUNT method returns the number of data items currently contained in the StackCollection.

- IStackCollection.POP method returns the item at the "Stack-Top" (the item most recently added).
- IStackCollection.PUSH method adds the specified item to the StackCollection at the "Stack-Top" position.
- IStringBuilderA.Add method appends an ANSI string to the object.
- IStringBuilderA.Capacity property get retrieves the size of the internal buffer.
- IStringBuilderA.Capacity property set sets the size of the internal buffer.
- IStringBuilderA.Char property get returns the numeric character code of the character at the specified position.
- IStringBuilderA.Char property set changes the numeric character code of the character at the specified position.
- IStringBuilderA.Clear method erases all data in the object.
- IStringBuilderA.Delete method deletes all data in the object.
- IStringBuilderA.Insert method inserts a string at a specified position.
- IStringBuilderA.Len method returns the number of characters stored in the object.
- IStringBuilderA.String method returns the ANSI string stored in the object.
- IStringBuilderW.Add method appends an WIDE string to the object.
- IStringBuilderW.Capacity property get retrieves the size of the internal buffer.
- IStringBuilderW.Capacity property set sets the size of the internal buffer.
- IStringBuilderW.Char property get returns the numeric character code of the character at the specified position.
- IStringBuilderW.Char property set changes the numeric character code of the character at the specified position.
- IStringBuilderW.Clear method erases all data in the object.
- IStringBuilderW.Delete method deletes all data in the object.
- IStringBuilderW.Insert method inserts a string at a specified position.
- IStringBuilderW.Len method returns the number of characters stored in the object.
- IStringBuilderW.String method returns the WIDE string stored in the object.
- ISNOTNULL function determines if a string is not nul (contains 1 or more characters).
- ISNULL function determines if a string is nul (zero-length).
- LISTVIEW GET HEADERID statement returns the handle of the LISTIVEW control and the ID of HEADER control.
- MEMORY COPY statement copies a specified number of bytes from one address to another.
- MEMORY FILL statement fills a specified address with a specified number of bytes with one or more copies of a specified string expression.
- MEMORY SWAP statement exchanges a specified number of bytes from at one address with the data at another address.
- MENU CONTEXT statement creates a floating context menu.

- METRICS function retrieves information or dimensions of system elements.
- MONTHNAME$ function converts a Month number to the associated name.
- OBJEQUAL function checks if object variables refer to the same object.
- OemToChr$ function translates a byte string of OEM characters into ANSI/WIDE characters.
- PLAY statement plays a wave file under program control.
- POKE$$ statement stores the characters of a string expression as consecutive 2-byte words of memory at a specific address.
- PEEK$$ function retrieves a specified count of consecutive 2-byte wide characters, and returns them as a wide character string.
- PowerArray object encapsulates the Windows SAFEARRAY structure.
- PowerTime object contains a date and time value, allowing easy calculations.
- PREFIX/END PREFIX statements execute a series of statements, each of which utilizes pre-defined source code.
- PUT$$ statement writes a WIDE Unicode string to a file opened in binary mode.
- RESOURCE$ function returns predefined resource data.
- RESUME FLUSH statement flushes the RESUME stack and program execution simply continues on the line immediately following the RESUME FLUSH.
- RETURN FLUSH statement removes the most recent return address from the system stack and program flow continues normally after the RETURN FLUSH.
- SHRINK$ function shrinks a string to use a consistent single character delimiter.
- SPLIT statement splits a string into two parts.
- STRINGBUILDER Object offers the ability to concatenate many string sections at a very high level of performance.
- STRING$$ function returns a Unicode string consisting of multiple copies of a specified character.
- TAB GET IMAGE statement retrieves the index of the image displayed on the specified TAB page.
- TAB GET PAGE statement retrieves the page number of the specified TAB page dialog.
- TAB GET SELECT statement returns the index of the currently selected TAB page.
- TAB GET TEXT statement retrieves the text displayed on the specified page tab.
- TAB SET IMAGE statement displays the specified image on the specified page tab.
- TAB SET TEXT statement displays the specified text on the specified page tab.
- THREAD Object offers a collection of methods which allow you to easily create and maintain additional threads of execution in your programs.
- TXT.CELL method sets or retrieves the cursor position.
- TXT.CLS method clears the Text Window and moves to caret to the upper left corner.
- TXT.COLOR method sets the foreground color.
- TXT.END method destroys and detaches the Text Window currently attached to your program from the process.

- TXT.INKEY$ method reads a keyboard character if one is ready.
- TXT.INSTAT method determines whether a keyboard character is ready.
- TXT.LINE.INPUT method reads an entire line from the keyboard.
- TXT.PRINT method writes text data to the TEXT WINDOW at the current caret location.
- TXT.WAITKEY$ method reads a keyboard character, waiting until one is ready.
- TXT.WINDOW method creates a new Text Window and attaches it to your program.
- UNWRAP$ removes paired characters from the beginning and end of a string.
- Utf8ToChr$ function translates a byte string of OEM characters into ANSI/WIDE characters.
- VAL statement converts a text string to a numeric value with additional information.
- VARIANT$(BYTE, *VrntVar*) function returns the contents of a Variant as a ANSI byte string. This result can be assigned to an ANSI string variable or a User-Defined Type.
- VARIANT$$ function returns the Unicode string value contained in a Variant variable.
- WINDOW GET HANDLE statement retrieves the handle of a Window.
- WINDOW GET STYLE statement retrieves the style of the Window.
- WINDOW GET STYLEX statement retrieves the extended-style of the Window.
- WINDOW GET USER statement retrieves the 32-bit user data value associated with the window.
- WINDOW SET ID statement changes the integral ID of the window.
- WINDOW SET STYLE statement changes the style of the Window.
- WINDOW SET STYLEX statement changes the extended-style of the Window.
- WINDOW SET USER statement changes the 32-bit user data value associated with the window.
- WRAP$ function adds paired characters to the beginning and end of a string.
- XPRINT(CANVAS.X) function retrieves the writable width of the host printer page.
- XPRINT(CANVAS.Y) function retrieves the writable height of the host printer page.
- XPRINT(Cell.Size.X) function retrieves the character cell width including external leading.
- XPRINT(Cell.Size.Y) function retrieves the character cell height including external leading.
- XPRINT(Chr.Size.X) function retrieves the character width on the host printer page.
- XPRINT(Chr.Size.Y) function retrieves the character height on the host printer page.
- XPRINT(Client.X) function retrieves the width of the client area (printable area) on the host printer page.
- XPRINT(Client.Y) function retrieves the height of the client area (printable area) on the host printer page.
- XPRINT(Clip.X) function retrieves the width of the clip area on the selected printer.
- XPRINT(Clip.Y) function retrieves the height of the clip area on the selected printer.
- XPRINT(COL) function retrieves the next column print position, based upon the row and column position of a text cell.
- XPRINT(COLLATE) function retrieves the XPRINT collate status.

- XPRINT(COLORMODE) function retrieves the XPRINT colormode status.
- XPRINT(COPIES) function retrieves the XPRINT copy count.
- XPRINT(DC) function retrieves the handle of the device context (DC) for the host printer page.
- XPRINT(DUPLEX) function retrieves the XPRINT duplex status.
- XPRINT(LINES) function retrieves the number of lines that can be printed.
- XPRINT(MIX) function retrieves the color mix mode for a host printer page.
- XPRINT(ORIENTATION) function retrieves the paper orientation for a host printer page.
- XPRINT(OVERLAP) function retrieves the status of XPrint Overlap Mode.
- XPRINT(PAPER) function retrieves the current paper size/type.
- XPRINT(PIXEL...) function retrieves the color of a pixel on a host printer page.
- XPRINT(POS.X) function retrieves the last horizontal point referenced (POS) by an XPRINT statement.
- XPRINT(POS.Y) function retrieves the last vertical point referenced (POS) by an XPRINT statement.
- XPRINT(PPI.X) function retrieves the horizontal resolution of the host printer page.
- XPRINT(PPI.Y) function retrieves the vertical resolution of the host printer page.
- XPRINT(ROW) function retrieves the next row print position, based upon the row and column position of a text cell.
- XPRINT(QUALITY) function retrieves the print quality setting for the host printer.
- XPRINT(SELECTION) function retrieves the status of the SELECTION flag.
- XPRINT(SIZE.X) function retrieves the width of the host printer page.
- XPRINT(SIZE.Y) function retrieves the height of the host printer page.
- XPRINT(STRETCHMODE) function retrieves the default bitmap stretching mode for the attached DC.
- XPRINT(TEXT.SIZE.X..) function calculates the width of text to be printed on a host printer.
- XPRINT(TEXT.SIZE.Y...) function calculates the height of text to be printed on a host printer.
- XPRINT(TRAY) function retrieves the active printer tray.
- XPRINT(WORDWRAP) function retrieves the status of XPRINT WordWrap Mode.
- XPRINT(WRAP) function retrieves the status of XPRINT Wrap Mode.
- XPRINT$(ATTACH) function returns the name of the attached host printer.
- XPRINT$(PAPERS) function retrieves a list of supported paper types.
- XPRINT$(TRAYS) function retrieves a list of supported paper trays.
- XPRINT CELL SIZE statement retrieves the character cell size including external leading.
- XPRINT CELL statement sets or retrieves the next print position, based upon the row and column position of a text cell.
- XPRINT GET ATTACH statement retrieves the name of the attached host printer.
- XPRINT GET CANVAS statement retrieves the buffer size of the attached host printer.

- XPRINT GET CLIP statement retrieves the size of the clip area on the selected printer.
- XPRINT GET OVERLAP statement retrieves the status of XPrint Overlap Mode.
- XPRINT GET PAGES statement retrieves the XPRINT page number limits for this print job.
- XPRINT GET SELECTION statement retrieves the status of the SELECTION flag.
- XPRINT GET STRETCHMODE statement retrieves the default bitmap stretching mode for the attached DC.
- XPRINT GET WORDWRAP statement retrieves the status of XPRINT WordWrap Mode.
- XPRINT GET WRAP statement retrieves the status of XPRINT Wrap Mode.
- XPRINT PREVIEW statement display a replica of a printed document on the screen.
- XPRINT PREVIEW CLOSE statement reverts XPRINT output back to the host printer.
- XPRINT SET CLIP statement establishes margins around the outer edges of the print page.
- XPRINT SET OVERLAP statement enables or disables XPRINT Overlap Mode.
- XPRINT SET PAGES statement sets the XPRINT page number limits for this print job.
- XPRINT SET STRETCHMODE statement sets the default bitmap stretching mode for the current DC.
- XPRINT SET WORDWRAP statement enables or disables XPRINT WordWrap Mode.
- XPRINT SET WRAP statement enables or disables XPrint Wrap Mode.
- XPRINT SPLIT statement splits a string into two parts for printing with XPRINT.
- XPRINT STRETCH PAGE statement copies and resizes a bitmap to the clip or client area of the print page.

See Also

Changes to existing Statements and Functions

New in the IDE

Additional Changes

Changes to existing Statements and Functions

Changes to existing Statements and Functions

- #COMPILE metastatement has been enhanced to support compiling of Static Link Libraries.
- %DEF operator has been expanded so that %PB_EXE returns false when compiling a Static Link Library.
- ARRAY DELETE and ARRAY INSERT statements now supports Variants, Objects, Guids, and UDT arrays.
- ARRAY SORT now uses CALL instead of USING when specifying a custom array sort function.
- ASC function has been improved to support Unicode as well as ANSI

  .
- ASC statement has been improved to support Unicode as well as ANSI strings.

- ASMDATA DD now supports sign-extended values.
- BIN$ function has been expanded to 64-bits with formatting and now supports adding leading and trailing spaces to the string result.
- CALL statement offers automatic conversion of numeric, string, and UDT parameters to variant parameters.
- CHOOSE, CHOOSE&, and CHOOSE$ functions have been enhanced with optional ELSE clause. The ELSE option allows an optional choice value to be returned when no match is made. For example:

  ```
  ChoiceVar$ = CHOOSE$(7,"ONE", "TWO" ELSE "NUL")
  ```

  In this case, the ELSE expression "NUL" is returned.

  CHOOSE and CHOOSE& also support an optional BIT clause where the selection is based upon the first bit set (lowest to highest) in the specified index. This is particularly valuable when used with an ENUMERATION which also uses the BIT option, to describe a set of attributes for an item in your program.

  The CHOOSE$ function now has an optional BITS clause that works in the same general fashion as the BIT clause, except the function may return multiple choices, as a concatenated string, if more than one bit is set. For example:

  ```
  x$ = CHOOSE$(BITS 5, "Computer ", "Laptop ", "Desktop ")
  ```

  Since the value 5 consists of 2 bits (the lowest and third-lowest) set, the first and third strings are concatenated and returned to the caller. In this case, "Computer Desktop " is the result.
- CLIPBOARD GET TEXT statement automatically converts the retrieved string to ANSI or Unicode to match the format of the target variable.
- CODEPTR function has been improved to return the address of a FASTPROC.
- COMBOBOX ADD and COMBOBOX INSERT statements now offer an optional TO clause that returns the index position of the added string.
- COMM function, COMM LINE, COMM OPEN, COMM PRINT, COMM RECV, COMM SEND, and COMM SET have been expanded to support ANSI and Unicode strings. COMM LINE, COMM OPEN, COMM PRINT, COMM RECV, and COMM SEND have been improved with an optional timeout (see COMM TIMEOUT) to complete the given COMM operation.
- CONTROL ADD GRAPHIC statement. Graphic controls may now be resized with CONTROL SET CLIENT, GRAPHIC SET CLIENT, CONTROL SET SIZE, or GRAPHIC SET SIZE.
- CONTROL SET CLIENT statement now resizes graphic controls.
- CONTROL SET FONT statement resets back to the default original font chosen by PowerBASIC when a font handle of zero is specified.
- CONTROL SET SIZE statement has been enhanced to support graphic controls.
- DECLARE statement has been updated to support the COMMON and THREADSAFE descriptors. A COMMON Sub or Function is one which may be referenced by and between linked unit modules (Main or SLL). With the THREADSAFE option, PowerBASIC automatically establishes a semaphore which allows only one thread to execute the Sub/Function at a time. Other callers must wait until the first thread exits the THREADSAFE procedure before they are allowed to begin.
- DIR$ function now supports Unicode file names and directories. The DIRDATA built-in UDT has been updated to return Unicode short and long filenames.
- EXIT statement has been improved to support exiting a FASTPROC immediately.
- FONT NEW statement now optionally supports creating fonts with external leading.
- FUNCTION/END FUNCTION statements have been expanded to support an optional THREADSAFE

descriptor. With the THREADSAFE option, PowerBASIC automatically establishes a semaphore which allows only one thread to execute the procedure at a time.

- GET$ statement reads ANSI string data from a file opened in binary mode, but if the data is read into a Unicode string it will be converted to Unicode before it is assigned.
- GRAPHIC COLOR statement now supports parameters of -3 to indicate that the existing color should not be changed.
- GRAPHIC GET CLIENT statement now returns the client area size in dialog units or pixels only. The size represents the physical size of the display area on the screen. This change was necessary because of the improved graphic functionality involving virtual windows, resizing of graphic windows, etc. Prior versions returned scaled sizes if a GRAPHIC SCALE was executed. Substitute GRAPHIC GET CANVAS for functionality which is fully compatible with the old format.
- GRAPHIC GET LOC and GRAPHIC SET LOC now only support Graphic Windows. For Graphic Controls use CONTROL GET LOC and CONTROL SET LOC.
- GRAPHIC SET FONT statement resets back to the default original font chosen by PowerBASIC when a font handle of zero is specified.
- GRAPHIC PRINT statement has been expanded to support POS(), SPC(), TAB(), commas, and semicolons. The POS(n) clause is an optional function used to set the POS to the horizontal page unit. Multiple uses of the POS function is permitted in a single statement. The SPC(n) clause is an optional function used to insert *n* spaces into the printed output. Multiple use of SPC is permitted in a single statement. The TAB(n) clause is an optional function used to tab to the *n*th column before printing the next expression. Multiple use of TAB is permitted in a single statement.
- GRAPHIC RENDER statement now supports icons as well as bitmaps.
- GRAPHIC WAITKEY$ statement has been improved with a optional KeyMask$ and TimeOut& expressions. If the optional KeyMask$ expression is included, only a limited set of keys are recognized. KeyMask$ may include any number of Sub-Masks, one for each key to observe. For example, GRAPHIC WAITKEY$("YyNn") will recognize upper-case or lower-case Y or N (for yes/no answers), while any other key will be ignored. If KeyMask$ is omitted, or evaluates to a zero-length string, any key event will be recognized. If the optional TimeOut& expression is included, it tells the maximum number of milliseconds to wait for a key. GRAPHIC WAITKEY$(5000) will wait a maximum of 5 seconds. The specified TimeOut period will only be approximate, so you should not rely upon precision accuracy. If the TimeOut period is exceeded, a zero-length string is returned. If the TimeOut& parameter is omitted, or evaluates to zero (0), it will wait an infinite length of time.
- GRAPHIC WINDOW statement has been expanded to support an optional font handle of the initial font to be used in the GRAPHIC WINDOW.
- GRAPHIC WINDOW END statement has been enhanced with an optional handle of the graphic window to close.
- HEX$ function now supports adding leading and trailing spaces to the string result.
- IPowerTime.DateDiff now reports invalid parameters through OBJRESULT.
- IPowerTime.TimeDiff now reports invalid parameters through OBJRESULT.
- IPowerTime.NewDate now reports invalid parameters through OBJRESULT.
- IPowerTime.NewTime now reports invalid parameters through OBJRESULT.
- LET statement (with Types) has been expanded to support assigning a Variant byte string to a UDT using the Variant$ function.
- LISTBOX ADD and LISTBOX INSERT statements now offer an optional TO clause that returns the index position of the added string.
- MENU ADD POPUP statement has been expanded with an optional AS id& clause. id& is a unique

numeric identifier for this popup menu. id& may be used later with a BYCMD option to reference this popup.

- MENU GET STATE statement has been enhanced to support the %MFS menu states equates.
- MENU SET STATE statement has been enhanced to support the %MFS menu states equates.
- METHOD/END METHOD statements have been expanded to support an optional THREADSAFE descriptor. With the THREADSAFE option, PowerBASIC automatically establishes a semaphore which allows only one thread to execute the procedure at a time.
- MID$ function and MID$ statement now support both a starting and ending position.
- OCT$ function has been expanded to 64-bits with formatting and now supports adding leading and trailing spaces to the string result.
- OPEN statement has been improved with the CHR clause. The CHR clause specifies the character mode for this file: ANSI or WIDE (Unicode). Since sequential files consist of text alone, the selected mode is enforced by PowerBASIC. All data read or written to the file is automatically forced to the selected mode, regardless of the type of variables or expressions used. With binary or random files, this specification has no effect, but it may be included in your code for self-documentation purposes.
- PATHNAME$ function has been enhanced to accept relative path names.
- POKE statement now supports multiple data items to be stored successively.
- PROPERTY/END PROPERTY statements have been expanded to support an optional THREADSAFE descriptor. With the THREADSAFE option, PowerBASIC automatically establishes a semaphore which allows only one thread to execute the procedure at a time.
- PUT$ statement has been expanded to support Unicode string expressions. If string expressions result is a Unicode string, it is converted to ANSI byte characters.
- SELECT CASE/END SELECT block has been improved with the CONST$$ modifier to enhance performance when the controlling expression is Unicode.
- SUB/END SUB statements have been expanded to support an optional THREADSAFE descriptor. With the THREADSAFE option, PowerBASIC automatically establishes a semaphore which allows only one thread to execute the procedure at a time.
- TOOLBAR ADD SEPARATOR statement has been improved with an optional unique numeric identifier. This identifier may be used later with a BYCMD option in TOOLBAR DELETE, TOOLBAR SET STATE, etc.
- TRIM$ function has been expanded to take a numeric expression and convert it to a string without any leading or trailing spaces along with an option specify the maximum number of significant digits.
- UCODEPAGE statement now supports the OEM code page. By default, the system ANSI code page, is used to map the character translation. If you are compiling a CONSOLE application or one which makes use of the high-order ANSI codes, CHR$(128) through CHR$(255) for line drawing and a few international characters, you should declare an OEM code page by placing UCODEPAGE OEM at the start of your
  function.
- VAL function has been enhanced with an optional parameter to specify the position in the string where the conversion should begin.
- VARIANT$ and VARIANT$$ used to return strings based on the contents of the variant. VARIANT$ now assumes the contents of the variant is a wide Unicode string and converts it to a ANSI string. VARIANT$$ assumes the contents of the variant is a wide Unicode string and returns the contents directly as a wide Unicode string. VARIANT$(BYTE, *VrntVar*) always returns the contents as an ANSI byte string. This result can be assigned to an ANSI string variable or a User-Defined Type.
- XPRINT ATTACH CHOOSE statement has been expanded to support optional numeric expression to

control the execution of the Printer Dialog.

- XPRINT COLOR statement now supports parameters of -3 to indicate that the existing color should not be changed.
- XPRINT PRINT statement has been expanded to support POS(), SPC(), TAB(), commas, and semicolons. The POS(n) clause is an optional function used to set the POS to the horizontal page unit. Multiple uses of the POS function is permitted in a single statement. The SPC(n) clause is an optional function used to insert *n* spaces into the printed output. Multiple use of SPC is permitted in a single statement. The TAB(n) clause is an optional function used to tab to the *n*th column before printing the next expression. Multiple use of TAB is permitted in a single statement.
- XPRINT SET FONT statement resets back to the default original font chosen by PowerBASIC when a font handle of zero is specified,

See Also

New Statements and Functions

New in the IDE

Additional Changes

Additional Changes

Additional changes

- Pre-Compiled modules and libraries are now supported.
- Unreferenced code is automatically removed from the compiled program to minimize the executable file size. This can be overridden using the #OPTIMIZE OFF metastatement.
- There is a dramatic improvement of execution speed in many/most DWORD expressions.
- Dramatic improvement in

  execution speed.
- Mask variable assignment expressions may contain any combination of LONG and DWORD values without error. Operators may include +, -, AND, OR, XOR.
- WSTRING, WSTRINGZ and WFIELD wide Unicode strings data types are now supported.
- Variant variables now recognize the %VT_DECIMAL data type and now may contain UDT data as a string of bytes (%VT_BSTR).
- Many new predefined numeric equates and string equates have been built-in to the compiler. One new equate is %PB_COMPILETIME which contains the date and time of compilation. See the Built-in string equates and Built-in numeric equates topics for a complete list.
- Run Time error code 98 added: XPRINT PREVIEW error
- Compiler error code 444 added: PREFIX clause expected. A PREFIX clause is expected in this statement.
- Compiler error code 461 changed: INSTANCE arrays must be declared. INSTANCE arrays must be declared before any CLASS code.
- Compiler error code 465 changed: May be defined only once. A program element which should only appear once was duplicated in your program. For example, two #STACK metastatements could cause this error to be generated. A common source of this problem is multiple #INCLUDE files which define the same term.

- Compiler error code 466 changed: This name is already in use. This name (identifier) is used for more than one purpose, causing a fatal conflict. For example, you might have used the name ABC as both a variable and a label. You must rename one or both uses of this particular name. PowerBASIC generates this error when it sees the second use of the name.
- Compiler error code 468 changed: This equate may not be redefined. A numeric or string equate is defined a second time with a different value. Equate definitions may appear more than once, but the value must remain constant.
- Compiler error code 500 update: Variable name must be unique. All Global, Threaded, and Instance variable names must be unique to guarantee access to a specific variable. If #UNIQUE VAR ON is specified, then all variable names must be unique.
- Compiler error code 503 changed: Invalid MAIN Function(s).

  / Function(s) do not match the target file type.
- Compiler error code 512 changed: Brackets not supported (use OPTIONAL). Brackets are no longer supported for optional parameters.
- Compiler error code 518 removed.
- Compiler error code 540 changed: Invalid operation with a register variable. This assembler opcode or operands are invalid using a register variable.
- Compiler error code 560 added: FASTPROC expected. A FASTPROC statement must precede other related statements like EXIT FASTPROC and END FASTPROC.
- Compiler error code 561 added: END FASTPROC expected. A FASTPROC statement must be matched with an associated END FASTPROC.
- Compiler error code 599 changed: Requires CLASS but outside of Interfaces. This item must be enclosed within a CLASS, but outside of Interfaces.
- Compiler error code 606 changed: PowerCollection / LinkListCollection required. FOR EACH loops require an object of a specific class.
- Compiler error code 607 added: New syntax requires GETCOM/NEWCOM/ANYCOM. The LET statement syntax for COM OBJECT creation has been changed. Previous syntax is no longer recognized.
- Compiler error code 609 added: Too many macro expansions. You have used more than 65,535 macros in this program.
- Compiler error code 610 added: Invalid within a FastProc. You have used a feature which is not supported within a FastProc.
- Compiler error code 611 added: FASTPROC params must be ByVal Long Integer. FASTPROC parameters must be ByVal Long Integer.
- Compiler error code 612 added: FASTPROC return may only be Long Integer. FASTPROC return value must be Long Integer or nothing.
- Compiler error code 613 added: Cannot compile - the program is now running. The program you are trying to compile is currently executing. You may have to use Task Manager to force the program to end.
- Compiler error code 614 added: Mismatched CHR Mode (ANSI/Wide). The string operand does not match the required ANSI or Wide mode.
- Compiler error code 615 added: PREFIX expected. A PREFIX statement must precede each END PREFIX statement.
- Compiler error code 616 added: END PREFIX expected. A PREFIX statement must be matched with an associated END PREFIX.

- Compiler error code 617 added: ASMDATA expected. An ASMDATA statement must precede each END ASMDATA statement.
- Compiler error code 618 added: END ASMDATA expected. An ASMDATA statement must be matched with an associated END ASMDATA.
- Compiler error code 619 added: ENUM expected. An ENUM statement must precede each END ENUM statement.
- Compiler error code 620 added: END ENUM expected. An ENUM statement must be matched with an associated END ENUM.
- Compiler error code 621 added:

  cannot inherit from itself. An interface cannot inherit from itself.
- Compiler error code 622 added: AS STRING required for variant conversion. Conversion from a UDT as a string requires AS STRING notation.
- Compiler error code 623 added: THREADPARM Instance variable required. THREAD Class must declare a THREADPARM Instance variable.
- Compiler error code 624 added: Invalid THREADPARM variable type. THREADPARM must be a LONG, DWORD, or UDT PTR INSTANCE variable.
- Compiler error code 625 added: THREAD Method required. THREAD Class must include a THREAD Method.
- Compiler error code 626 added: Duplicate THREAD Method. THREAD Class must have exactly one THREAD Method.
- Compiler error code 627 added: INHERIT IPowerThread expected. THREAD METHOD is only allowed with a threaded interface.
- Compiler error code 628 added: Not valid in a Static-Link-Library (SLL). This language element is invalid in a Static-Link-Library.
- Compiler error code 629 added: ALIAS disallows Private/Thread/Callback.
- Compiler error code 630 added: Link File Error. The SLL Link File is not valid for this compiler.
- Compiler error code 631 added: Nested Link Files. You cannot link an SLL file into an SLL file.
- Compiler error code 632 added: COMMON name is a duplicate. COMMON procedure name was previously defined.
- Compiler error code 633 added: COMMON signature is mismatched. COMMON procedure signature (params, return type...) is mismatched.
- Compiler error code 634 added: Undefined COMMON reference. COMMON item was referenced but not defined.
- Compiler error code 635 added: USING clause is required. USING <ProcName> is required to describe the function signature.
- Compiler error code 636 added: Invalid VersionInfo Resource.
- Compiler error code 637 added: This SLL requires CONSOLE (PB/CC only) or DDT support which is not available.
- Compiler error code 638 added: Please change AS STRING to AS WSTRING.
- Compiler error code 639 added: TYPE variable expected.
- Compiler error code 640 added: Invalid use of BYCOPY. The BYCOPY override may not be used with certain parameters (for example, entire arrays).

See Also

New Statements and Functions

Changes to existing Statements and Functions

New in the IDE

New in the IDE

New in the IDE

- Added support for the new #PAGE metastatement.
- Added Print Preview. This allows you to select a range of pages to print.
- The edit window is now based on tabs rather than MDI children. The tabs support hover, to see the complete filespec, and a context menu for tab actions. You can set the preferred maximum width of the displayed filespec.
- New toolbar icons support new sizes. You may turn off the toolbar or select icon sizes of 16x16, 24x24, and now 32x32 and 48x48.
- Projects now use the extension .PBprj. The old .PBP format supported only a list of files and a primary file. The new .PBprj format supports a list of files, their scrolling position and caret position, a primary file, the active tab, breakpoints, bookmarks, and the debug Watch list. When the IDE is closed, any open tabs are saved as a default project.
- Templates now may be defined as being for PBCC, for PBWIN, or for CCWIN. With CCWIN templates, lines that start with [PBCC] are used only for PB/CC, and lines that start with [PBWIN] are used only for PB/Win. Lines without a [target] will be used for either compiler.
- Quick context-sensitive syntax help is shown on the status bar. Hovering over the status bar shows additional information, if any. Clicking the status bar brings up context-sensitive help for the displayed syntax.
- Custom help files can have help keys that overlap with other custom help files. The user will get a pick list, in that case, allowing them to choose the most relevant help file.
- Find/Replace can now be set to wrap around the file, instead of stopping at the end (or the beginning, for upwards searches). Wrapping is off by default. The Find and Replace dialogs now supports finding and replacing across all loaded files
- Code Finder now has columns for dispatch IDs and filenames. Code Finder now works across all loaded files.
- Added a drop-down combobox for command-line parameters. The command lines are automatically restored when the IDE is reloaded. The Command Line dialog can now be resized.
- Ctrl+Alt+P can be used to open the Select Primary File dialog.
- The Open File dialog for source files now allows selecting multiple files at a time.
- The "Go To Bookmark" dialog now includes a column showing the bookmark number.
- The IDE may be limited to a single running instance.
- The Command Line dialog can now be resized. The dialog position and size are saved on exit and restored on the next use. The command lines are automatically restored when the IDE is reloaded.
- The Primary Source File dialog can now be resized. The files are shown in a full listbox, rather than a

drop-down.

- The Run menu has a new command, "Set Dll Test File", which lets you specify an .EXE file to run when you select "Compile and Execute" for a DLL. The .DLL will be copied to the .EXE's folder first, if the folders are different.
- The locations and sizes of the IDE and its edit windows are preserved when exiting the IDE and restored when you return.
- File backups can be customized. Rather than a .BAK extension, backup files are given a Backup prefix. This preserves normal file extension behavior. It also avoids conflicting backup files in cases where two source files differ only in the file extension, e.g., Test.Bas and Test.H. Backups may be numbered up to a selected maximum number, or saved with a timestamp code.
- Added /D command-line switch to launch the debugger as soon as files are loaded.
- Added a context menu to Register Watcher. This allows selecting which registers to watch.
- The Register Watcher can now display FPU registers. The registers to watch may be selected via the new context menu for the Register Watcher.
- An optional header may used with printed source code.
- Margins can now be set when printing source code.
- The Open File dialog for source files allows selecting multiple files at a time.
- Syntax Coloring can now be applied to

  .
- ALT+B accelerator for Toggling Bookmarks.
- The IDE now supports up to 36 bookmarks.
- Fixed an issue with fonts appearing clipped if Windows font smoothing (e.g., ClearType) was enabled.
- Variable Watcher properly restores the sizes of its listview columns.
- The display bounds checker fully supports the use of multiple monitors. The IDE will re-open on the appropriate display.
- Fixed Code Finder handling of PROPERTY SET. The Type information for PROPERTY now distinguishes between PROPERTY GET and PROPERTY SET.
- The colors of the Output Window match better with Windows Themes.
- Saving backup files with timestamps uses the correct timestamp again.
- Double-click in Variable Watcher is ignored for empty rows. Evaluate Variable is enabled only if there is a symbol name at the caret.
- The last specified file path is selected as the default path regardless of how the last file was loaded.
- Backups may now be done to a specified directory. The IDE will attempt to create the directory if it does not already exist. The default setting is ".\", the path of the saved file.
- Added Shift+Delete as "Cut" key.
- Ctrl+F4 added as "Close File" key.
- Compiler options now has a checkbox to specify if a .PBR file should be created when compiling an .RC file.
- File options now has a checkbox to select which files are included when saving a project.
- General options now has a check to select whether to display the IDE status bar.

See Also

[New Statements and Functions]

[Changes to existing Statements and Functions]

[Additional Changes]

Running PB/Win

Running PB/Win

Running PB/Win

The PowerBASIC for Windows Compiler (PB/Win) is comprised of two core applications: the Integrated Development Environment and the compiler itself. This chapter describes launching the compiler directly.

See Also

Running PB/Win From Windows

Running PB/Win From DOS

PB/Win Command Line Switches

The Integrated Development Environment

Running PB/Win From Windows

Running PB/Win From Windows

Double-click the PB/Win Compiler icon (PBWIN.EXE). A dialog box will appear asking for a file name and compile options:

Type the name of the BASIC source file, plus any desired options, and click the OK button. To abort, click the Cancel button. See below for command-line parameters that may be specified in the dialog box.

See Also

Running PB/Win From Windows

Running PB/Win From DOS

PB/Win Command Line Switches

The Integrated Development Environment

Running PB/Win From The Command Prompt

Running PB/Win From The Command Prompt

Run PBWIN.EXE from the command prompt, using a command-line with the following syntax:

```
PBWIN.EXE [/Ipath] [/L] [/Q] [/Cfilename] FileName
```

…where *FileName* is the name of the source file to compile. If you just type PBWIN (omitting *FileName*), you'll get a dialog box asking for the name of the file to compile.

PowerBASIC first attempts to open the source file using the *FileName* specified. If the file cannot be opened and *FileName* does not have an explicit .BAS extension, PowerBASIC appends .BAS to the specified file name, and attempts to open that file. If *FileName* is a Long File Name (LFN) or contains spaces, it must be enclosed in quotes.

PowerBASIC also supports Long File Names in all metastatements, for example:

```
#INCLUDE "C:\Program Files\PowerBASIC\LIBRARY.INC".
```

See Also

- Running PB/Win
- Running PB/Win From Windows
- PB/Win Command Line Switches
- The Integrated Development Environment

PB/Win Command Line Switches

PB/Win Command Line Switches

Include /I

The /I command-line option provides the compiler with a search path list when looking for #INCLUDE and #RESOURCE files. Multiple directories can be specified in this path list by separating each path with a semicolon (;).

During compilation, the compiler scans this path list for the necessary files before checking the current (default) directory. To ensure that the current (default) directory is searched ahead of this path list, specify a period followed by a backslash (\) at the beginning of the path list. For example:

```
/I.\;C:\PBWIN\WINAPI;D:\SOURCE
```

The Include parameter also works with Long File Name (LFN) paths, provided that individual LFNs are enclosed in quotes. For example:

```
/I"C:\Program files\My Applications\";C:\PB;"D:\Source Code\"
```

See #INCLUDE and #RESOURCE for additional details.

Log /L

The /L command-line option causes the compiler to generate a log file with all of the compile results, including error code and error line number, if an error occurs during compile-time.

Quiet /Q

The /Q command-line option causes the compiler not to display a message box when compiling is finished. This should only be used with the /L option.

Command /C

The /C command-line option specifies a filename that contains the complete command-line. This may be used to specify very long command lines to the compiler of up to 1024 bytes, which may otherwise exceed the operating system limits. This may be useful in situations where the /I path is very long, and the full path to the source file is very long. The /C option may not be used in conjunction with any other command-line options.

See Also

Running PB/Win

Running PB/Win From Windows

Running PB/Win From DOS

The PowerBASIC Integrated Development Environment

The PowerBASIC Integrated Development Environment

The PB/Win Integrated Development Environment

This topic will help you learn how to use all the options available in the PowerBASIC Integrated Development Environment (which we will refer to as the IDE). You will learn how to use the editor, move from window to window, menu to menu, and choose menu commands. See Debugging PB/Win Programs for information on the Integrated Debugger.

To launch the IDE, double-click the PBEDIT.EXE icon, type PBEDIT at the command-line, or use the START menu entry.

The PB/Win editor (PBEDIT.EXE) can also be launched from the command-line, and supports the following command-line options:

```
PBEDIT.EXE [/G:row,col:] [/P:MainFile] [/D filename] [Filename]
```

The command-line options may be prefixed with either a forward-slash (/) or a hyphen (-). Multiple files can be specified for the *Filename* parameter, each separated by space characters. Long file names should be enclosed in double-quote marks (").

Goto /G:

The /G: command-line option causes the IDE to move the caret to the row and column specified. For example, /G:10,20: cause the caret to start at line 10, column 20. The /G option must be terminated by a trailing colon.

```
PBEDIT.EXE /G:10,20: "Project Bluepad.bas"
```

Primary Source File /P:

The /P: command-line option specifies the name of the file that will be set as the Primary Source File. This option is useful when working on large applications that span multiple source code files, especially when loading multiple files at startup. When a compile/execute/debug operation begins, the IDE automatically uses the Primary Source File as the "main" file, regardless of which other files are loaded or have focus in the IDE.

The Primary Source File will be one of the files loaded into the IDE.

```
PBEDIT.EXE /P:Project.bas "Support Library.inc" Project.rc "Data file index.txt"
```

Debug File /D

The /D command-line option specifies the name of the file launch in the debugger when the IDE is loaded.

```
PBEDIT.EXE /D "My File.bas"
```

See Also

The PowerBASIC User Interface

Toolbar Buttons

Editor Hot Keys

IDE Context Menu

Custom Help Files

File Templates

Code Finder Dialog Box

Command Line Dialog Box

Debugger Evaluate Dialog Box

Find Dialog Box

Go to Line Dialog Box

Primary Source File Dialog Box

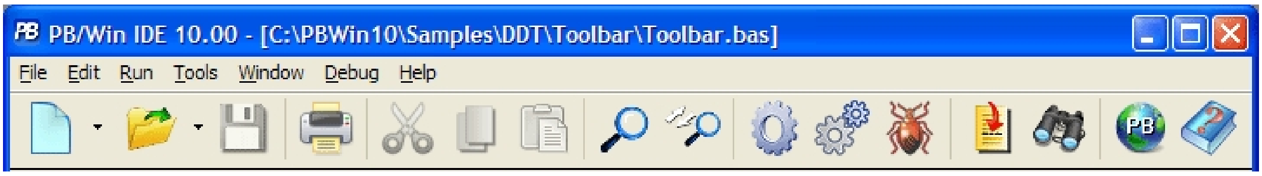
Replace Dialog Box

IDE Options

The PowerBASIC User Interface

The PowerBASIC User Interface

The PowerBASIC IDE was designed to provide you with the tools you need to quickly and intuitively develop high-performance applications. This section briefly describes each element of the IDE.

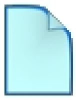


- File Menu
- Edit Menu

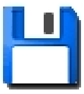
- Run Menu
- Tools Menu
- Window Menu
- Debug Menu
- Help Menu

Toolbar Buttons

Toolbar Buttons

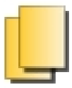
 Create a new empty document (file) in the editor.

 Use the Open File dialog box to load an existing document.

 Save the current document if it has been modified and unsaved.

 Print the current document to a printer.

 Cut the selected text from the document to the clipboard.

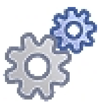
 Copy the selected text from the document to the clipboard.

 Copy the text from the clipboard into the current document.

 Search the current document for a word or phrase. See Find dialog for more information.

 Search the current document for a word or phrase and replace it. See Replace dialog for more information.

 Compile the current source document (or *Primary Source File* if specified).

 Compile and Execute the current (or Primary) source document

.

 Compile and Debug the current (or Primary) source document.

 Launch the Go to Line dialog to jump to a specific line in the current document.

 Launch the Code Finder dialog, which presents a list of Subs, Functions, Methods, Properties, and Macros in current document, to quickly jump to a selected section of code.

 Launches the PowerBASIC web site.

 Display the PowerBASIC or the WIN32.HLP file.

See Also

Debugger Toolbar Buttons

The PowerBASIC User Interface

Editor Hot Keys

Editor Hot Keys

Editor Hot Keys

The following table summarizes the hot-keys available in the PowerBASIC IDE Editor Window:

Keystroke	Description
F1	Dynamic Help
F2	Code Finder dialog
F3	Find dialog/Find next
SHIFT+F3	Find previous
F4	Duplicate current line
CTRL+F4	Close current document
ALT+F4	Exit PBEDIT
F5	Compile and debug (if in edit mode) or Run program (if in debug mode)
CTRL+F5	Animate program.
F6	Clear to end-of-line
CTRL+TAB	Switch to the next document window
CTRL+F6	Switch to the next document window
SHIFT+CTRL+TAB	Switch to the previous document window
CTRL+SHIFT+F6	Switch to the previous document window
F8	Step into next program line (when debugging)
CTRL+SHIFT+F8	Step out of current procedure (when debugging)
SHIFT+F8	Step over next program line (when debugging)
CTRL+F8	Run to caret (when debugging)
F9	Break (stop the program being debugged)
CTRL++	Increases the IDE's Font size
CTRL+-	Decreases the IDE's Font size
SHIFT+INSERT	Paste text from clipboard

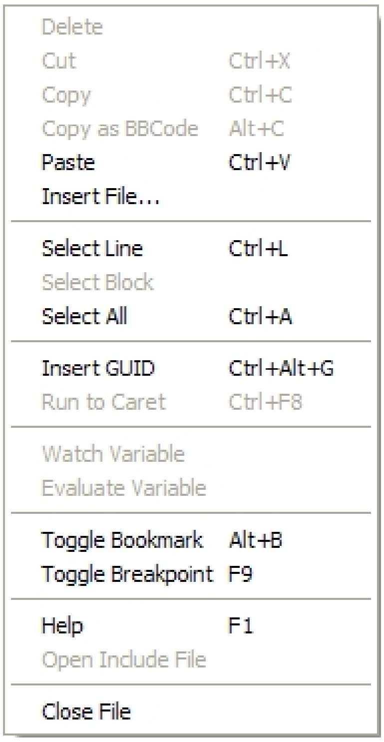
SHIFT+DELETE	Cut text to clipboard
CTRL+DELETE	Cut text to clipboard
CTRL+INSERT	Copy text to clipboard
CTRL+HOME	Move to start of document
CTRL+END	Move to end of document
CTRL+PAGEUP	Move to start of document, maintaining caret position on screen
CTRL+PAGEDOWN	Move to end of document, maintaining caret position on screen
CTRL+ALT+G	Insert a GUID
CTRL+ALT+O	Display the Open Project dialog box.
CTRL+ALT+P	Primary Source File Dialog
SHIFT+CTRL+S	Save all opened files
CTRL+0	Go to bookmark 0
ALT+0	Set bookmark 0
CTRL+1	Go to bookmark 1
ALT+1	Set bookmark 1
CTRL+2	Go to bookmark 2
ALT+2	Set bookmark 2
CTRL+3	Go to bookmark 3
ALT+3	Set bookmark 3
CTRL+4	Go to bookmark 4
ALT+4	Set bookmark 4
CTRL+5	Go to bookmark 5
ALT+5	Set bookmark 5
CTRL+6	Go to bookmark 6
ALT+6	Set bookmark 6
CTRL+7	Go to bookmark 7
ALT+7	Set bookmark 7
CTRL+8	Go to bookmark 8
ALT+8	Set bookmark 8
CTRL+9	Go to bookmark 9
ALT+9	Set bookmark 9
TAB	Indent marked block by one tab level
SHIFT+TAB	Outdent marked block by one tab level
SPACE	Indent marked block by one space
SHIFT+SPACE	Outdent marked block by one space
CTRL+A	Select all
ALT+B	Toggle Bookmark
CTRL+B	Go to Bookmark dialog
ALT+C	Copy text to the clipboard as BB Code for posting in the PowerBASIC Forums.
CTRL+C	Copy text to the clipboard
CTRL+D	Duplicate current line
CTRL+E	Build and Execute
CTRL+F	Find dialog
CTRL+G	Go to Line dialog
CTRL+I	Toggle auto-indent mode
CTRL+K	Clear to end-of-line
CTRL+L	Select current line
CTRL+M	Compile the current document (or primary source file, if any)
CTRL+N	Create a new document, using the default file template
CTRL+O	Open an existing document
CTRL+P	Print the current source document

CTRL+Q	Comment-out marked block
CTRL+SHIFT+Q	Uncomment-out marked block
CTRL+R	Find and Replace dialog
CTRL+S	Save the current document
CTRL+T	Delete the word at the caret
CTRL+U	Paste text from clipboard
CTRL+V	Paste text from clipboard
CTRL+X	Cut text to clipboard
CTRL+Y	Cut current line to clipboard
CTRL+Z	Undo last change

IDE Context Menu

IDE Context Menu

When editing a file in the PowerBASIC IDE, a popup context menu is available by right-clicking the mouse within the edit window. The available content of the menu is automatically determined by position and text located at the point where the context menu is activated. The full context menu looks like this:



Delete	Delete the currently selected block of text.
Cut	Copy the currently selected block of text to the clipboard, and delete the highlighted block from the file.
Copy	Copy the currently selected block of text to the clipboard.
Copy as BBCode	Copy text to the clipboard as BB Code for posting in the PowerBASIC Forums.
Paste	Paste the contents of the clipboard into the current file.
Insert File	Insert a document (file) at the caret position in the current document.
Select Line	Select (highlight) the complete line at the context-menu point.
Select Block	Select (highlight) a complete block of code. This menu item is available when the context menu is activated on the first line of a formal block. Formal blocks include those that begin with the #PBFORMS metastatement (PB/Win only), the FOR/NEXT and SELECT CASE blocks, plus the usual CALLBACK, CLASS,

	, FUNCTION, METHOD, PROPERTY, SUB, TYPE, and UNION statements.
Select All	Select all the text in the current document.
Insert GUID	Inserts a new unique GUID at the current insertion point.
Run to Caret	Run the program until execution reaches the current caret position (debug mode only).
Watch Variable	Add the variable at the current caret position to the Variable Watcher window (or remove it, if it's already there). The Variable Watcher window is visible only in debug mode.
Evaluate Variable	Evaluate or modify the variable at the current caret position (debug mode only).
Toggle Bookmark	Add or remove a bookmark at the current caret position.
Toggle Breakpoint	Add or remove a breakpoint at the current caret position. Breakpoints only work in debug mode.
Help	Launch context-sensitive help. If the context menu point is on a PowerBASIC keyword, the appropriate topic is displayed in the PowerBASIC help file. If the context point is not a recognized keyword, the WIN32.HLP file is launched instead. This feature is useful for context-sensitive help on both reserved keywords, and API functions and data structures, etc.
Open Include File	Open the file indicated in the #INCLUDE metastatement at the context menu point. The item is only enabled when the context menu point is targeting an #INCLUDE metastatement. Open File works even if the #INCLUDE metastatement is commented out.
Close File	Closes the current document.

See Also

The Integrated Development Environment

Debugging PB/Win Programs

File Templates

File Templates

A *file template* is the framework for a new file, which you can load into the IDE with the "New File As…" option. While a template can contain anything you like, it is typically used to automate the basic boilerplate needed for a new document. For example, the "Generic PB program" template creates a new file with the following information already filled out:

```
#COMPILE EXE
#DIM ALL

FUNCTION PBMAIN () AS LONG



END FUNCTION
```

What's more, the caret is conveniently placed in the middle of the FUNCTION block for you, letting you get right to programming!

You can readily build templates of your own, or modify the ones that come with the IDE. A template is simply a text file created according to a few simple rules. Let's look at the default template (you can load it into the IDE, NotePad, or any other text editor). PowerBASIC templates use ".PBTPL" for their file extension. The default template is "Default.pbtpl", then. You can find it in the Bin subdirectory for your compiler ("C:\Program Files\PBWin10\Bin", by default).

The first line starts out with a number:

```
2
```

This is the template version number, 2 (two). Version 1 (one) templates are still supported.

The second line contains the target. The target may be PBCC, PBWIN, or CCWIN. If it is CCWIN, any following lines that start with [PBCC] are used for PB/CC, any lines that start with [PBWIN] are used for PB/Win, and any lines without a [target] apply to both compilers.

The third line contains the file extension to apply to files that are created with this template:

```
.bas
```

The fourth and fifth lines gives the name of the template, which will be used in the "New File As…" menu:

```
[PBCC]Console program
[PBWIN]Generic PB program
```

The following lines give the text to be filled into the file created by the template. There is one special character, the "|" vertical bar or pipe symbol. This indicates where the caret should be placed after the text is filled in.

```
#COMPILE EXE
#DIM ALL

FUNCTION PBMAIN () AS LONG

    |

END FUNCTION
```

That's all there is to it!

After creating a new template, save the .PBTPL file in the Bin subdirectory for your compiler. The default location for this is, typically, "C:\Program Files\PBWin10\Bin\". Now, the next time you start the PowerBASIC IDE, your custom template will be available on the "New File As…" menu.

See Also

The Integrated Development Environment

Project Files

Project Files

Keyword Template

Purpose

Syntax

Remarks

See also

Example

Project Files

A project file is used to speed up the process of loading multiple source code files, especially when the source files are saved in different directories. Project files support a list of files, their scrolling position and caret position, a primary file, the active tab, breakpoints, bookmarks, command line list, and the debug Watch list. When the IDE is closed, any open tabs are saved as a default project. When you open a project file all the individual source code files are opened in the IDE. There is no limit to the number of files that may make up a project.

A project file is saved with an extension of .PBPRJ extension, unless the list of project file extensions has been modified, see the Editor Preferences topic for information on modifying the extensions used for project files.

See Also

The PowerBASIC Integrated Development Environment

File Templates

Custom Help Files

Custom Help Files

The PowerBASIC IDE has built-in context-sensitive help for PowerBASIC keywords. If the caret is placed on a keyword when you invoke help, you will get help for that specific keyword. Now, you can add context-sensitive help for your own help files. Here's how.

For each help file, create a text file with a name of your choice, with a file extension of .PBKeys (using the PowerBASIC IDE, NotePad, or any other text editor). The first line of the text file must contain the name of the help file, as it will be shown in the IDE's help menu, like so:

```
MenuName="PowerTree 1.1"
```

The next line of the PBKeys file specifies the name and location of the help file. If the help file is in the same directory as the .PBKeys file, you can specify just the filename, without the path. Otherwise, you must provide a fully-qualified absolute path:

```
HelpFile="C:\PTreeW11\PwrTree.hlp"
```

Each following line specifies a help keyword. This keyword must be present in the index of the help file, in order for context-sensitive help to work.

```
HelpKey="AccessBlock"
HelpKey="ptCreateIndex"
HelpKey="ptAdd"
…and so forth.
```

When you're done, save the .PBKeys file in the Bin subdirectory for your compiler. The default location for this is, typically, "C:\PBWIN10\Bin\". Now, the next time you start the PowerBASIC IDE, your custom keywords will be recognized by the context-sensitive help system. You will also be able to load the help file from the Help menu.

If your help file does not appear in the Help menu when you start the IDE, make sure the HelpFile line of the .PBKeys file specifies the correct location and name for your help file.

The complete PowerTree .PBKeys file, "PowerTree 1.1.PBKeys", is already installed in your compiler's Bin subdirectory. **Please note** that the custom help list is only loaded if you have PowerTree 1.1, and it's installed at the location specified in the HelpFile line of the PBKeys file.

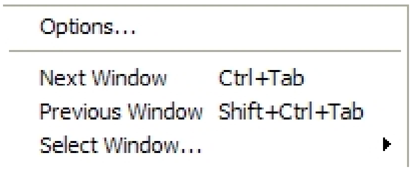
See Also

The Integrated Development Environment

IDE Options

IDE Options

IDE Options



The section describes the options that are available to customize the IDE environment, file paths, and compiler behavior. These options are divided into eight tabs:

Tab Name	Description
File tab	Settings for backups, tab compression, and most recently used file list.
Editor tab	Settings for file extensions, editor preferences, and Keyword case changes.
Fonts tab	Font settings for the source code tabs.
Color tab	Syntax color settings for editing and printing
Compiler tab	Settings for the compiler.
Debugger tab	Settings for the debugger.
General tab	General configuration settings and options.

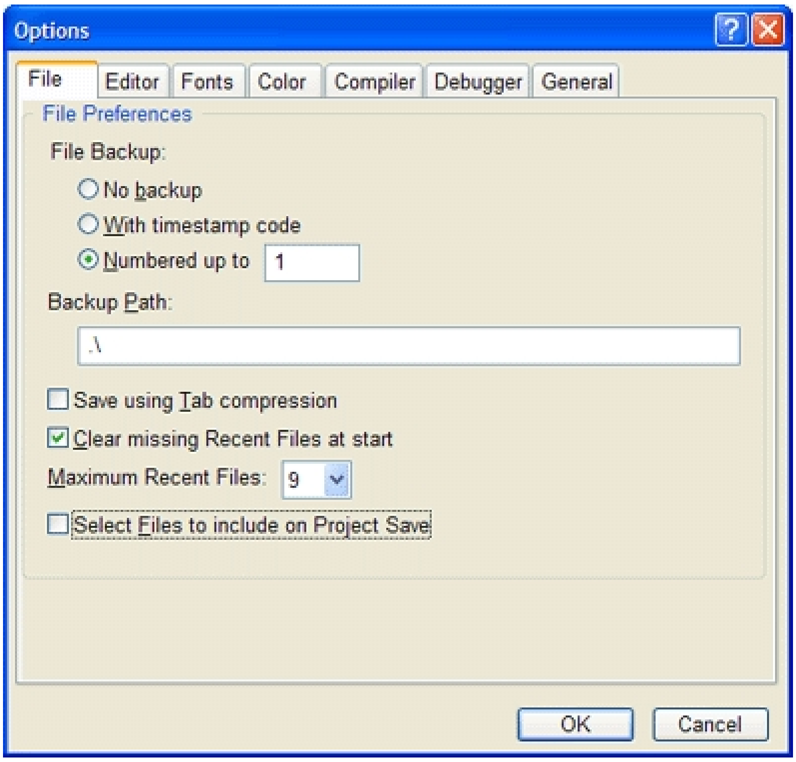
See Also

The Integrated Development Environment

Debugging PB/Win Programs

File tab

File Preferences



No Backup
When saving files, the IDE will create no backup.

With timestamp code
When saving files, the IDE will rename the previous disk file with Backup.*TimeStamp*. followed by the original filename and extension, and save the latest copy under the original filename. This option provides a simple method of preserving the previously saved versions of the source code.

Numbered up to
When saving files, the IDE will rename the previous disk file with Backup. #. followed by the original filename and extension, and save the latest copy under the original filename. You may specify the maximum number of backups to be from 0 to 99. This option provides a simple method of preserving the previously saved versions of the source code.

Backup Path
The default backup path is ".\", which is the current path of the file. That is, the backup file will go to the same location as the original file. You may enter either a relative path or absolute path here. For example, you may specify a backup path of "C:\Backup\" to place all of your backup files in the C:\Backup folder. Or, you might specify a backup path of ".\Backup\" to place all of your backup files in a Backup folder underneath the location of the original file. If the specified backup path does not exist, the IDE will attempt to create the path when it is needed.

Save using tab compression
When saving files, the IDE can compress leading spaces on every line into tabs, using the tab size specified under Editor Preferences. This helps maintain your preferred indentation levels when working with others who choose different tab sizes. It also reduces your source file size.

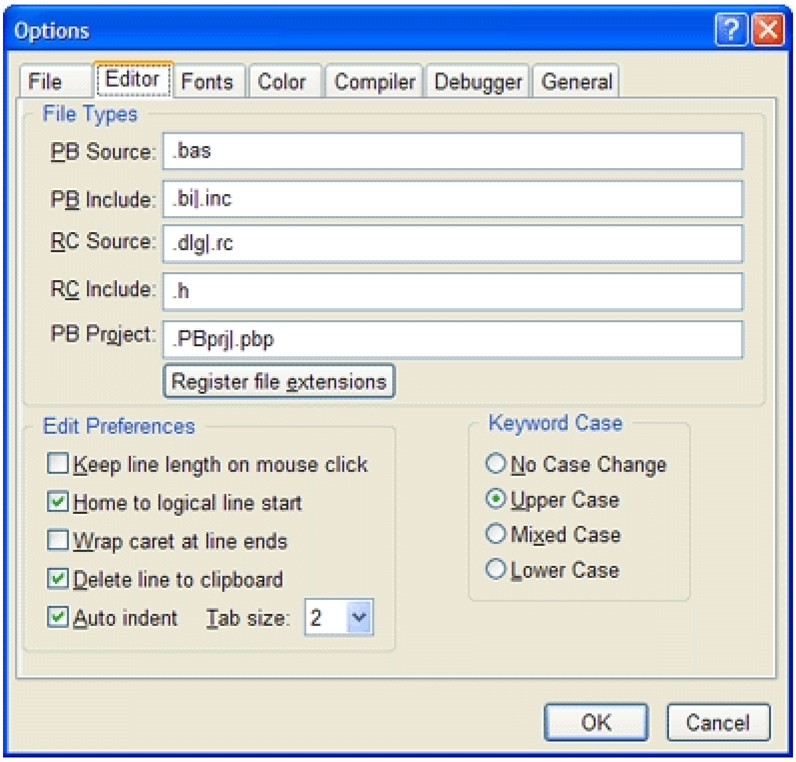
Clear missing recent files at start
The IDE checks the Recent Files list (located in the *File* menu) at start up. If any file cannot be located and read, the corresponding entry in the Recent Files list is automatically removed. Where files are located across a network or removable media, this option may need to be unchecked.

Maximum Recent files
Specifies the maximum number of Recent Files tracked in the File menu, in the range of 0 through 9. Select 0 to disable the Recent Files list; otherwise, the selected number of previous files is tracked between sessions. Also see Reload previous file set at start.

Select Files to include on Project Save
When this option is selected you will be prompted to select which files should be included in the project when saving a project.

Editor tab

Editor Preferences



PB Source
This is the file extension, or list of extensions, you expect to use for main PowerBASIC source code modules: programs you can compile directly. You may enter multiple extensions by separating each with the vertical bar or "pipe" character, "|". The default setting for PB Source is ".bas".

PB Include
This is the file extension, or list of extensions, you expect to use for PowerBASIC include files: bits of code that you will #include in a main module before compiling. You may enter multiple extensions by separating each with the vertical bar or "pipe" character, "|". The default setting for PB Include is ".bi|.inc".

RC Source
This is the file extension, or list of extensions, you expect to use for resource scripts: programs that are compiled with the RC.EXE resource compiler. You may enter multiple extensions by separating each with the vertical bar or "pipe" character, "|". The default setting for RC Source is ".dlg|.rc".

RC Include
This is the file extension, or list of extensions, you expect to use for your PowerBASIC include files: bits of code that you will #include in a resource script before compiling with the RC.EXE resource compiler. You may enter multiple extensions by separating each with the vertical bar or "pipe" character, "|". The default setting for RC Include is ".h".

PB Project
This is the file extension, or list of extensions, you expect to use for your PowerBASIC Project files. You may enter multiple extensions by separating each with the vertical bar or "pipe" character, "|". The default setting for a project file Include is ".PBprj|.prj".

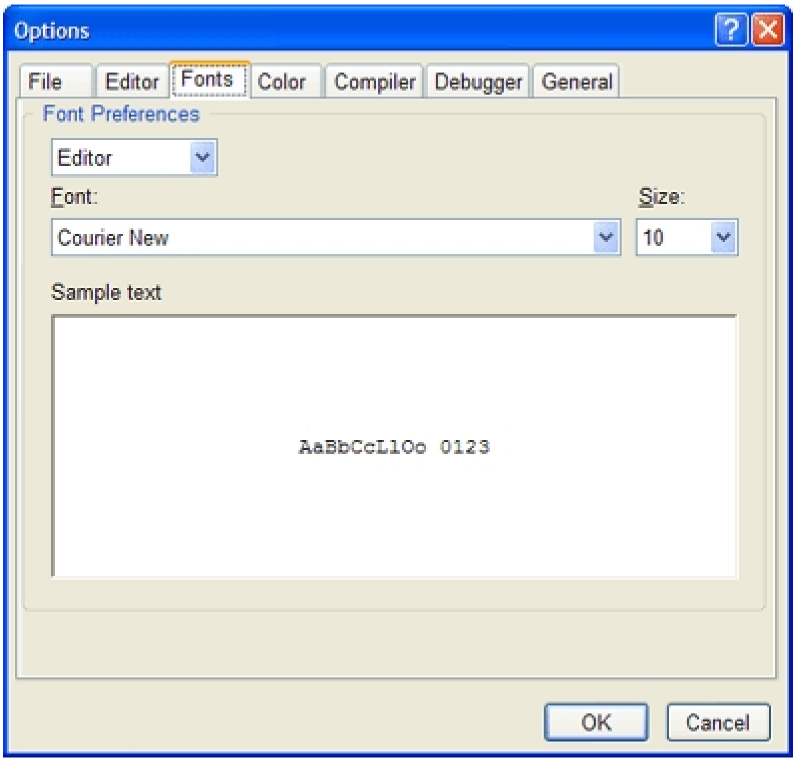
Register file extensions
Check this box to register your selected file extensions with Windows. This allows Windows to automatically load files with these extensions into the PowerBASIC IDE when you click on a file in Explorer, or launch it from the Start menu, for example.

Keep Line Length
Clicking the mouse cursor beyond the right-most character of a line does not extend the line beyond the end of the actual text content.

Home to logical line start	The Home key functions according to VB6 rules if this option is selected.
Wrap Caret at Line Ends	Check this box to have left-arrow wrap to the previous line, and right arrow wrap to the next line, instead of stopping at the start or end of the current line.
Delete line to clipboard	When this option is selected a line deleted from the source code is placed on the clipboard.
Auto Indent	The IDE provides automatic indenting when *ENTER* is pressed, in order to assist with writing visually structured code. The Indent depth depends on the context of the text on the preceding line. For example, if the previous line starts with the word FUNCTION, the following line is automatically indented. Auto-indent can be toggled from within the editor with the *CTRL+I* hot-key combination. See Tab Size.
Tab Size	The number of characters between "tab stops", in the range 1 through 8 inclusive. When the *TAB* key is pressed, the IDE substitutes space characters to move the caret to the next tab stop position. Tab Size also affects the Auto Indent depth.
Keyword Case	The IDE automatically sets the capitalization of reserved keywords as directed by this option. The use of capitalization can help readability of code. By default, the IDE applies keyword capitalization to BASIC source code files only, which are determined by the file extensions set under Compiler Preferences. Use care when applying capitalization to resource files (for example, .RC files, .H, and .DLG files) as these usually contain case-sensitive keywords. Custom keyword colors can be configured in the Color Preferences page, and the editor font can be configured on the Font Preferences page.

Fonts tab

Font Preferences

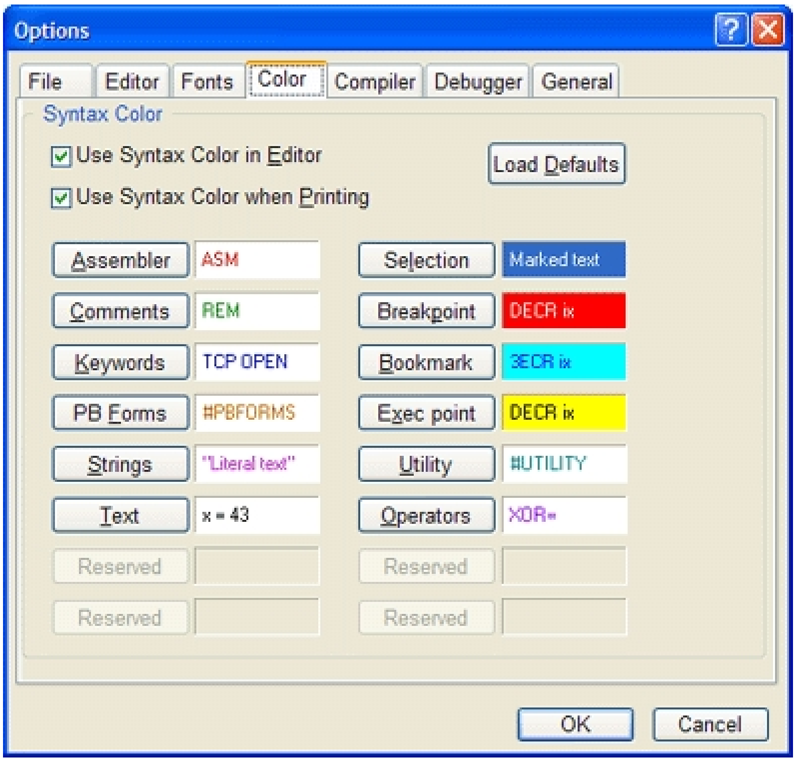


Combobox	Select the location (Editor, Dialogs, or Printer) of where you want to change the font.
Font	The currently selected font.
Size	The desired point size of the font.

Sample Text How the text will appear with the selected font and at the selected font size.

Color tab

Syntax Color Preferences



Use Syntax Color in Editor The IDE can show colored reserved keywords and other types of syntax in the source code file. Both the text (foreground) and background colors can be individually customized for each syntax type. The use of highlighting can increase readability of code. Also see *Use Syntax Color when Printing*.

Use Syntax Color when Printing The IDE can optionally print source code with coloring applied to the reserved keywords and other syntax types. Printing with syntax coloring enabled only affects the text (foreground) - background coloring is not printed. Also see *Use Syntax Color in Editor*.

Load Defaults Reset the syntax color table back to the default color scheme.

Assembler Launch the color selection dialog to choose the text (foreground) and background colors for inline assembler code.

Comments Comments and REM statement syntax color.

Keywords The syntax coloring applied to reserved keywords.

PB Forms The coloring applied to **PowerBASIC Forms™** named-block metastatements. Note: PowerBASIC Forms™ is a GUI visual design tool, and therefore IDE support for it is currently restricted to the PowerBASIC for Windows product line. In the Console Compiler's IDE, the PB Forms syntax option is disabled, and reserved for future use.

Strings The syntax coloring applied to literal strings.

Text The remaining types of syntax. Typically, this includes variable names, API function names, etc.

Selection The color used when selecting (highlighting) blocks of text, for example, in anticipation of clipboard operations such as Cut/Copy/Paste, etc.

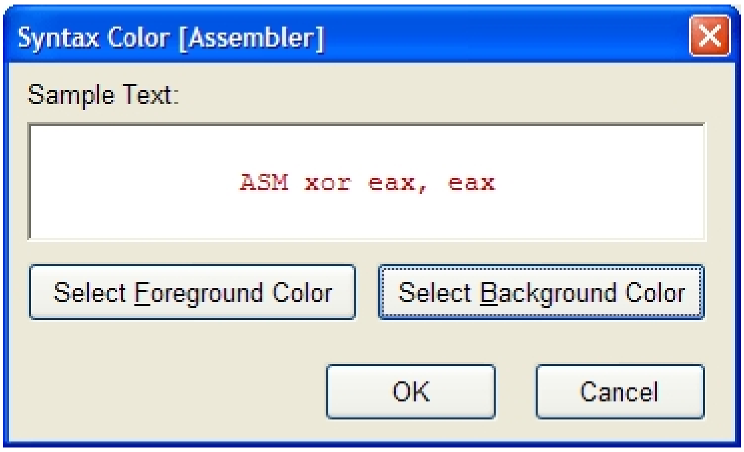
Breakpoint The color used to highlight a breakpoint.

Bookmark The color used to highlight a bookmark.

Exec point	The color used to highlight the execution point, which is the next line to be executed in the debugger.
Utility	The syntax coloring applied to #UTILITY metastatements.
Operators	The syntax coloring applied to .

Syntax Color Selector

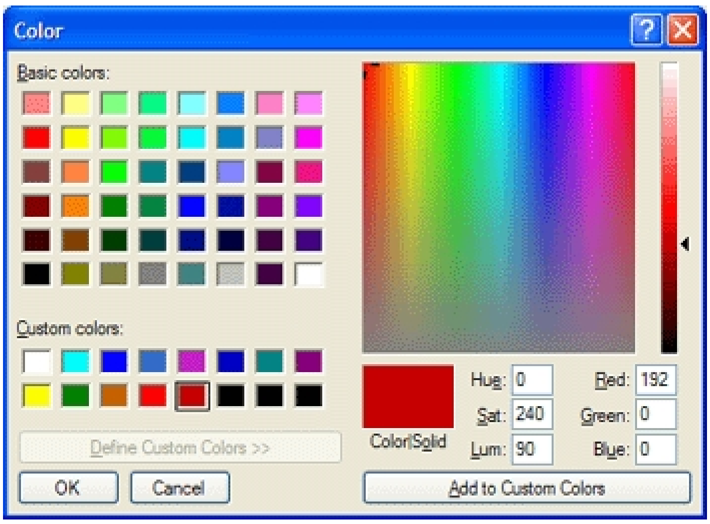
Syntax Color Selector



Sample Text	Preview of the current foreground and background color selected.
Select Foreground color	The launches the Syntax Custom Color Selector dialog to adjust the text color.
Select Background color	The launches the Syntax Custom Color Selector dialog to adjust the background colo
OK	Accept the current text and background color selections, and return to the Options dia
Cancel	Abort the Syntax Color Selector dialog without making any changes to the color settin

Syntax Custom Color Selector

Syntax Custom Color Selector

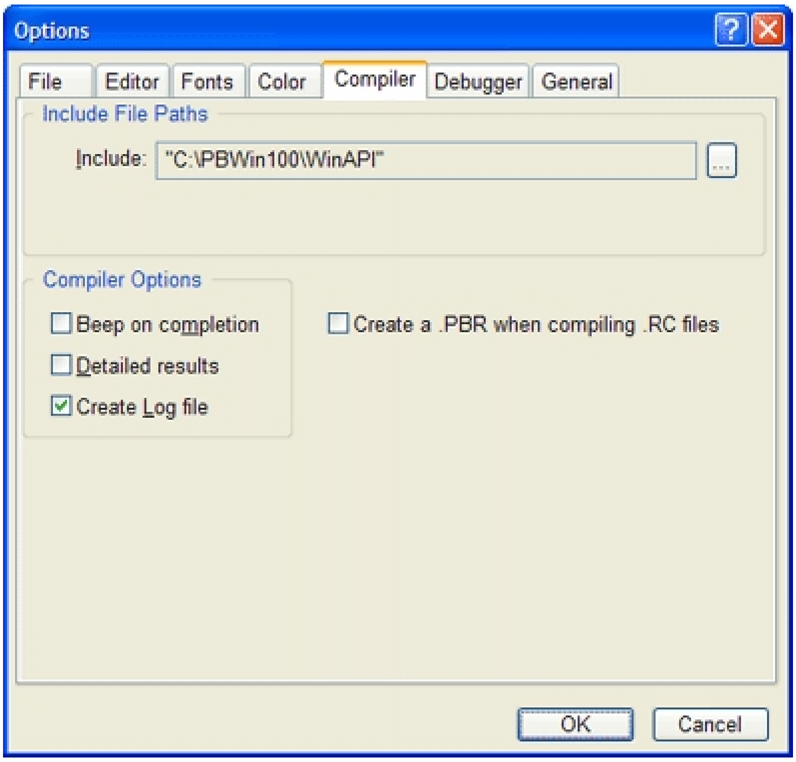


Basic Colors	Set of basic colors determined by the display driver.
Custom Colors	Displays any custom colors you have already defined. To Change a custom color,

	click on it and then click the Define Custom Colors button. When you have selected the color click the Add to Custom Colors button. To define a new custom color, click on an empty custom color and then click the Define Custom Colors button. Select the new color and then click the Add to Custom Colors button.
Define Custom colors	Displays the Color Map.
[*Color Map*]	A color map based on the current display color-depth, to facilitate easy selection of custom colors. To choose a color, click on the desired point in the color map.
Color|Solid	Displays the color selected in the Color Map.
Hue	Displays the hue of the color selected in the Color Map.
Sat	Displays the saturation of the color selected in the Color Map.
Lum	Displays the hue of the color selected in the Color Map.
Red	Displays the red value of the color selected in the Color Map.
Green	Displays the green value of the color selected in the Color Map.
Blue	Displays the blue value of the color selected in the Color Map.

Compiler tab

Compiler Preferences



Include File Paths

Include	The path (or paths) where the Compiler may search for source code files referenced in #INCLUDE metastatements, and PBR and RES files referenced with #RESOURCE metastatements. Multiple paths are automatically separated with semi-colons. Use the Ellipsis button (…) to adjust the Include path settings - see Browsing for Include folders for more information. Note that this field behaves identically to the /I command-line compiler parameter.

Compiler Options

Beep on completion The *default system sound* is played when compilation is completed successfully. The default system sound can be changed in Control Panel.

Detailed results After compilation of PowerBASIC source code, the output pane will display detailed compilation results, providing details on compiled code size, data and string literal size, code extracted, etc. With this option turned off only a successful compilation message or compile time error message will be displayed.

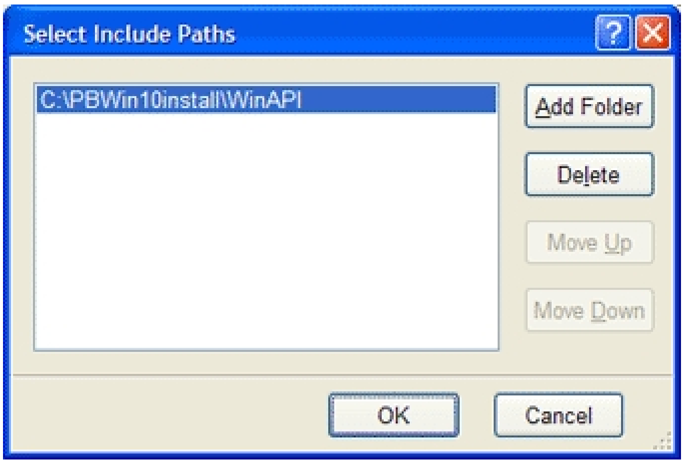
Create log file During compilation, a log file is created in the same directory as the primary source file. The log file contains the same information as the Display Results dialog discussed above. The file is assigned the same "base name" as the main source code file, but with the extension .LOG (i.e., PROJECT1.LOG). In case of a compile-time error, this log file will contain details of the nature of the error (in addition to the compile-time error message display produced by the compiler itself).

Create a .PBR when compiling .RC files Specify this option to create a .PBR file when compiling a .RC resource file.

Browsing for Include folders

Browsing for Include folders

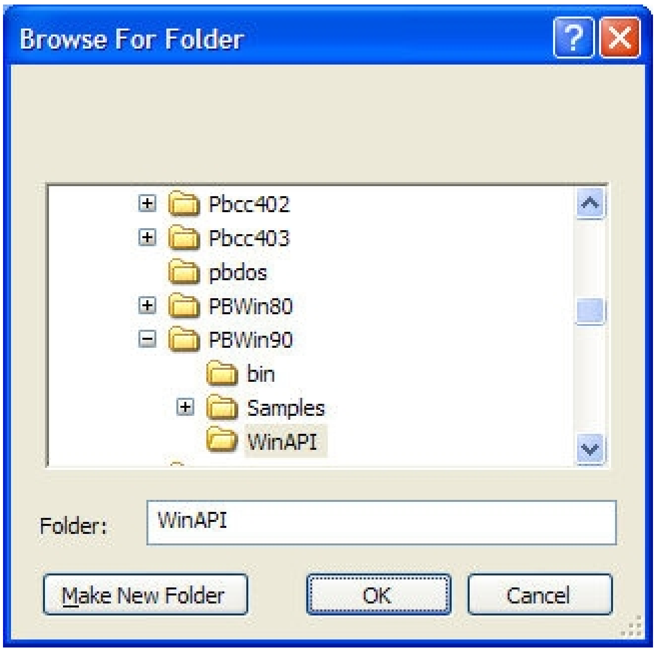
The Include Paths Selection dialog provides a simple method of creating an Include file list for the PowerBASIC compiler, and the Resource Compiler. The Include folder list specifies the search order that the compilers use to locate #INCLUDE and #include files. The Include Paths Selection Dialog box is launched by the Ellipsis buttons on the Compiler Preferences tab page.



Folder list The list of folders in a drag list control. The folders appear in the order in which the compiler search for #INCLUDE (PowerBASIC) or #include (Resource Compiler) files. There are two ways to rearrange the order of folders:

1. Click and drag the individual folder names up and down in the Folders List; or…
2. Select (highlight) a folder and use the Move Up and Move Down buttons to reposition the folder in the list.

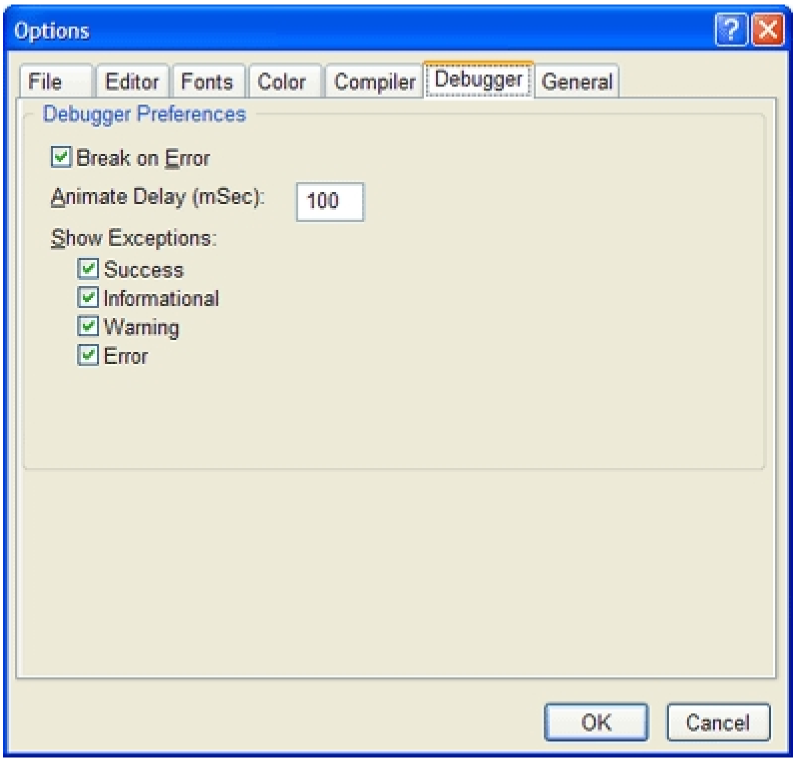
Add Folder Launch the standard Windows "Browse for Folder" dialog, where the folder tree can be navigated. The default folder is the currently selected folder in the Folders list to the left of the Add Folder button or the current folder if none are selected. The Browse for Folder dialog looks like this:



Delete	Delete the currently selected folder. If all folders are deleted, a new entry specifying the current folder is automatically created, ensuring at least one folder appears in the list.
Move Up	Move the currently selected folder up one position in the Folders List, increasing the search priority of the selected folder. The compilers search the Folders List in the order they appear.
Move Down	Move the currently selected folder up down position in the Folders List, decreasing the search priority of the selected folder. The compilers search the Folders List in the order they appear.
OK	Accept all changes to the Folders List, and return to the Compiler Preferences dialog.
Cancel	Cancel any changes made to the Folder List, and return to the Compiler Preferences dialog.

Debugger tab

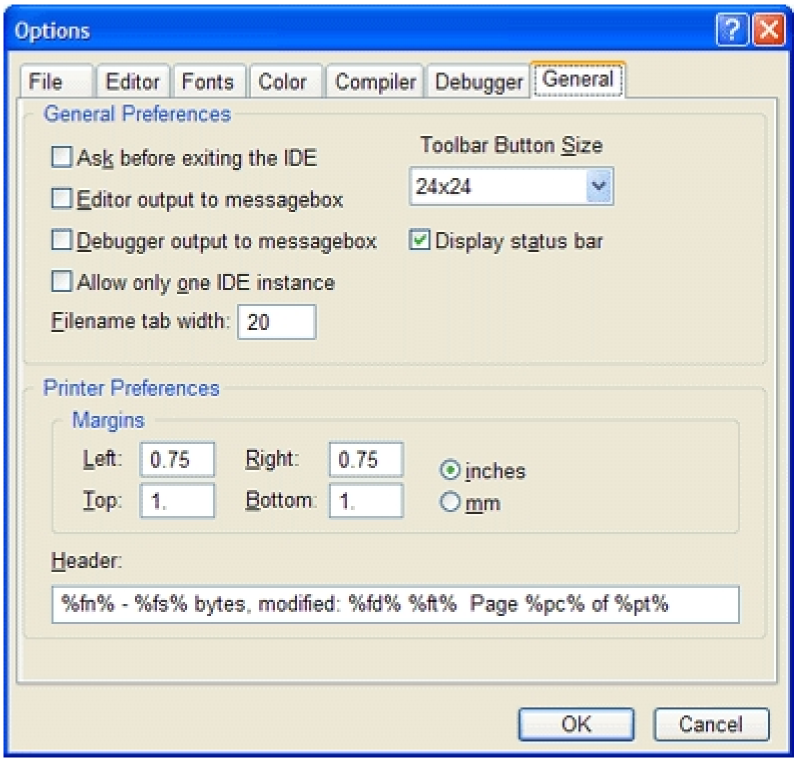
Debugger Preferences



Break on Error	Causes the debugger to stop after every statement to check the error status and then automatically halt program execution when an error occurs (non-zero ERR value). In debugging with this setting enabled, programmed with larger iteration counts can reduce debugging speed to unacceptable levels. For best results, it is instead recommend to enable #DEBUG ERROR ON in your program instead of this option.
Animate Delay	The debugger's *Animate* debug mode pauses for at least the given amount of time before execution of the next line of code occurs. Animation is very useful for watching the general flow of a program. The delay is specified in milliseconds (*mSec*). The larger the delay value, the greater the delay between execution of lines of code. The default value is set for 333 milliseconds (1/3 of a second).
Show Exceptions	Choose the exceptions (Success, Informational, Warning, Error) you want the debugger to display.

General tab

General Preferences



General Preferences

Ask before exiting

When selected, a confirmation dialog will appear when the IDE is about to be closed. Canceling the dialog will prevent the IDE from closing. The IDE will always prompt to save any files that have not been saved since their last

	modification, regardless of whether this option is selected.
Editor output to messagebox	When selected, editor output (such as error codes and compilation status) is displayed using message boxes as well as the output window.
Debugger output to messagebox	When selected, debugger output (such as errors and #DEBUG PRINT information) is displayed using message boxes as well as the output window.
Allow only one IDE instance	If specified only one instance of the IDE is allowed

	to be running at any one time.
Filename tab width	Specifies the width in characters that will be used to display the path and file name of the file loaded into a source code tab.
Toolbar button size	The IDE and [debugger toolbars]() are displayed with buttons and icons at the specified size (16x16, 24x24, 32x32, or 48x48) or even with no toolbar at all, allowing the maximum amount of screen *real estate* for the editor windows. If

	changed, this option comes into effect when the IDE is next launched.
Display status bar	Specifies if the IDE should display a status bar.

Printer Preferences

Margins	Sets the distance between the text and the edge of the printed page (in inches).
inches	When selected the margins are specified in inches.
mm	When selected the margins are specified in millimeters.
Header	Sets the header to be printed on every page. If this entry is set to an empty

string, no headers are printed. Otherwise, the header value may contain any printable characters plus any of the following special strings:

%pc%	Current page number
%pt%	Total number of pages
%fn%	File

	name
%fs%	Filesize
%ft%	Filetime (last modification time)
%fd%	Filedate (last modi

f
i
c
a
t
i
o
n
d
a
t
e
)

IDE Dialogs

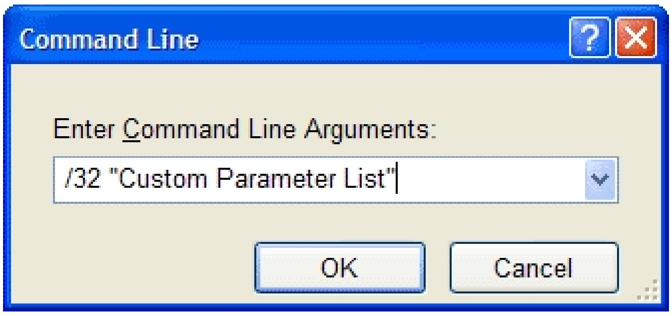
Code Finder Dialog

Command Line Dialog

Command Line Dialog Box

The Command Line Dialog allows the programmer to specify an arbitrary command-line parameter string that is passed to the application when the *Compile and Execute*, or *Compile and Debug* options are used.

The result can be read with COMMAND$ within the program, for the purposes of testing the application.



Arguments	An arbitrary string passed to the application in the COMMAND$ parameter.
OK	The text in the *Arguments* field is accepted and retained for the session.
Cancel	The previous command-line text, if any, is retained unaltered.

See Also

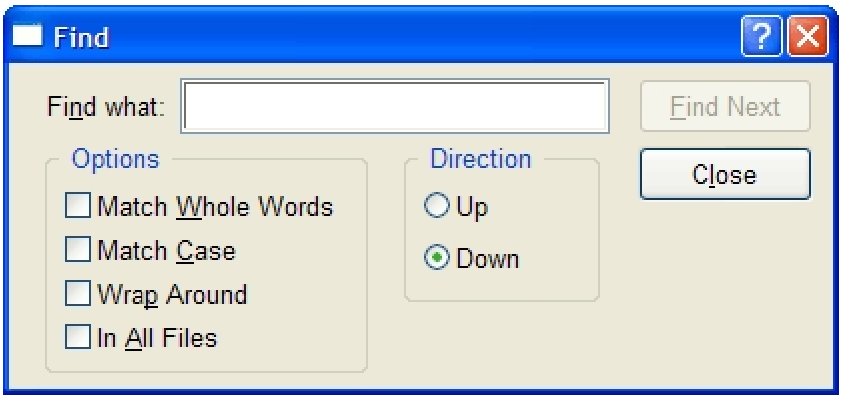
The Integrated Development Environment

Debugger Evaluate Dialog

Find Dialog

Find Dialog Box

The Find Dialog Box allows you to search the currently displayed source code file for a specific phrase or word. You can limit the number of matches by specifying options such as Match Whole Words or Match Case.



Find What	Enter the phrase or word to search for. For example, searching for PRINT will locate every instance of that word in the current file. The text should be entered as it is anticipated to be formatted in the current file. For example, the number of spaces between words must match the number specified in the Find What field. Do not include quotes unless the anticipated match also includes quotes.
Match Whole Words	This excludes matches that occur within a word. For example, with Match Whole Words enabled, searching for LOG will not match on DIALOG, but will match on LOG(x).
Match Case	When Match Case is enabled, the Find What text must exactly match the capitalization of the word or phrase in the current file. For example, searching for Print will match Print, but not PRINT or print.
Wrap Around	When enabled the Find what text you specify will be searched beginning at the place in the document where you are currently positioned, and will continue past the end (or beginning depending on the Direction specified), to the beginning (or end depending on the Direction specified) of the document. In other words, a wrap-around search will search the entire document irrespective of where you may be positioned within it.
In All Files	The Find what text is searched across all files currently loaded in the IDE.
Direction	By default, searching starts at the current caret position, and moves toward the end of the current file. The Direction options allow you to specify whether the search should proceed from the caret position upward toward the top of the file, instead of downward.
Find Next	Instructs the editor to locate the next match in the current file. If no further matches are located, a notification appears. If a match is made, the matching text is highlighted in the file.
Close	Cancel the Find Dialog. After the Find Dialog has been closed, you can repeat the last Find operation by pressing the F3 key, even if you have opened or switched to a new file. However, the Find What text is not preserved between sessions of the IDE.
Help	This help topic.

See Also

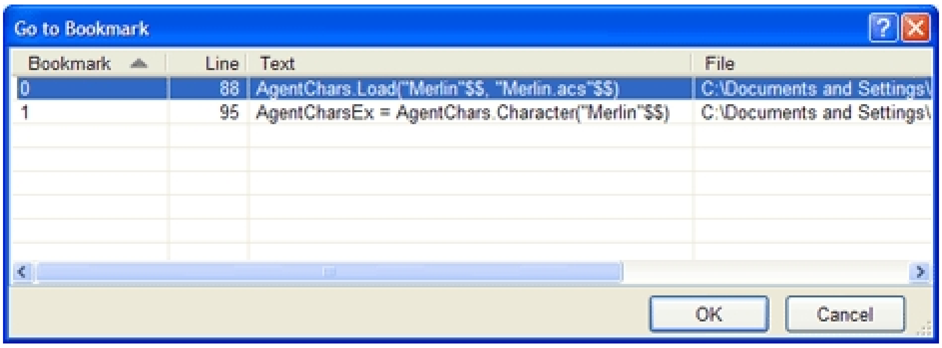
The Integrated Development Environment

Go to Line Dialog

Go to Bookmark Dialog

Go to Bookmark Dialog

The Code Finder Dialog works from within the editor and debugger, presenting a list of bookmarks that have been set with Toggle Bookmark.



Bookmark	The bookmark number.
Line	The source code line number that contains this bookmark.
Text	The source code text that contains this bookmark.
File	The path and source code filename that contains this bookmark.
OK	If valid, the IDE jumps to the line number indicated in the Line field, and the Go to Bookmark Dialog is dismissed. You can alternatively double click on a line and to jump to the indicated bookmark.
Cancel	The Go to Bookmark Dialog is canceled, and the Caret position remains unaltered.

See Also

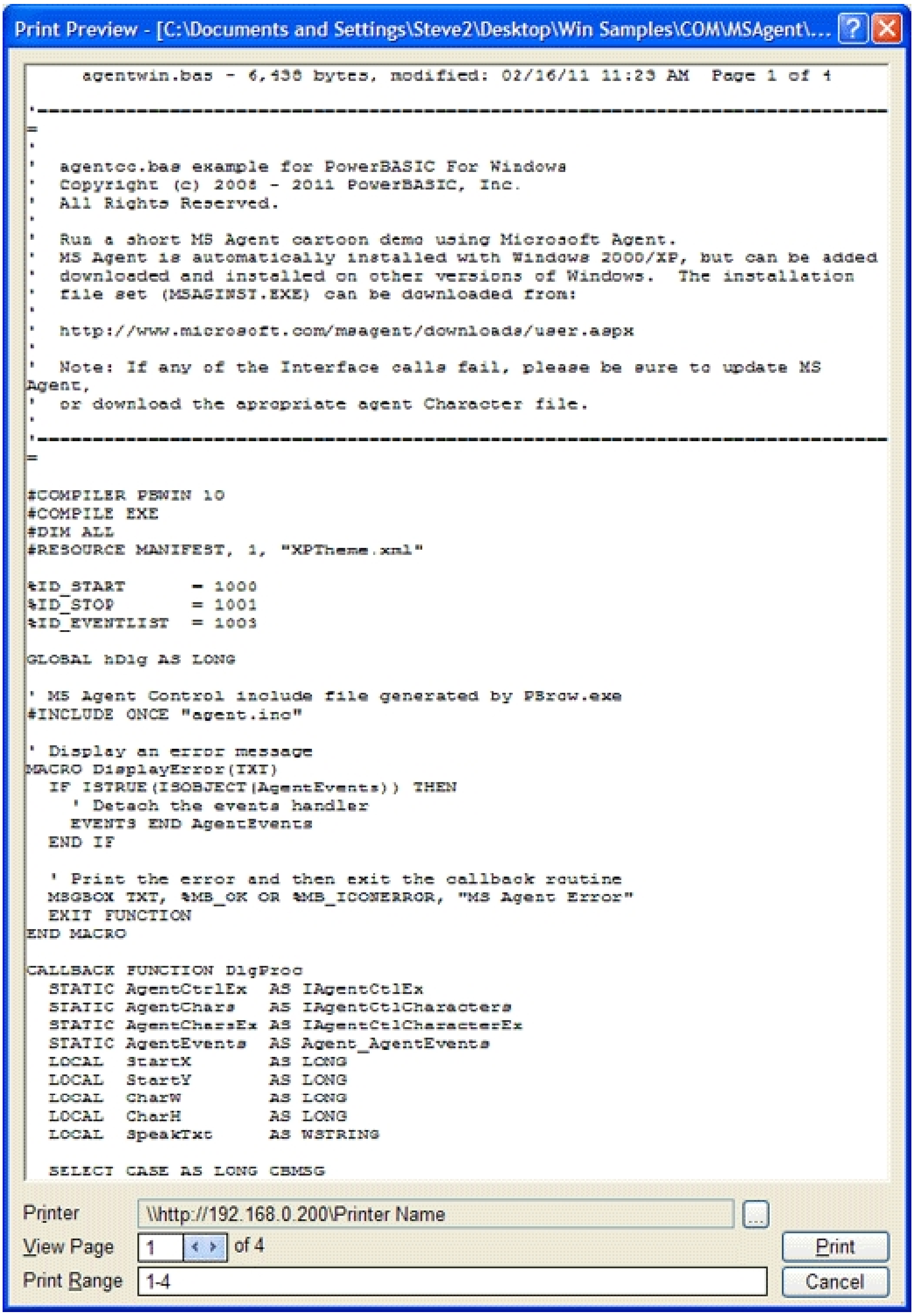
The Integrated Development Environment

Debugging PB/Win Programs

Print Preview Dialog

IDE Print Preview Dialog Box

The Print Preview dialog displays each page as it will look when printed.




```
     agentwin.bas - 6,438 bytes, modified: 02/16/11 11:23 AM   Page 1 of 4

'------------------------------------------------------------------------------
=
'
'  agentcc.bas example for PowerBASIC For Windows
'  Copyright (c) 2008 - 2011 PowerBASIC, Inc.
'  All Rights Reserved.
'
'  Run a short MS Agent cartoon demo using Microsoft Agent.
'  MS Agent is automatically installed with Windows 2000/XP, but can be added
'  downloaded and installed on other versions of Windows.  The installation
'  file set (MSAGINST.EXE) can be downloaded from:
'
'  http://www.microsoft.com/msagent/downloads/user.aspx
'
'  Note: If any of the Interface calls fail, please be sure to update MS
Agent,
'  or download the apropriate agent Character file.
'
'------------------------------------------------------------------------------
=

#COMPILER PBWIN 10
#COMPILE EXE
#DIM ALL
#RESOURCE MANIFEST, 1, "XPTheme.xml"

%ID_START      = 1000
%ID_STOP       = 1001
%ID_EVENTLIST  = 1003

GLOBAL hDlg AS LONG

' MS Agent Control include file generated by PBrow.exe
#INCLUDE ONCE "agent.inc"

' Display an error message
MACRO DisplayError(TXT)
  IF ISTRUE(ISOBJECT(AgentEvents)) THEN
    ' Detach the events handler
    EVENTS END AgentEvents
  END IF

  ' Print the error and then exit the callback routine
  MSGBOX TXT, %MB_OK OR %MB_ICONERROR, "MS Agent Error"
  EXIT FUNCTION
END MACRO

CALLBACK FUNCTION DlgProc
  STATIC AgentCtrlEx    AS IAgentCtlEx
  STATIC AgentChars     AS IAgentCtlCharacters
  STATIC AgentCharsEx   AS IAgentCtlCharacterEx
  STATIC AgentEvents    AS Agent_AgentEvents
  LOCAL  StartX         AS LONG
  LOCAL  StartY         AS LONG
  LOCAL  CharW          AS LONG
  LOCAL  CharH          AS LONG
  LOCAL  SpeakTxt       AS WSTRING

  SELECT CASE AS LONG CBMSG
```

[*Preview Window*]	Displays each page as it will look when printed.
Printer	Displays the name of the currently selected printer.
Ellipses button	Displays the Printer Properties dialog box to select a new printer or change the current printers settings.
View Range	Displays the currently previewed document page. Click the arrow buttons to preview a different page in the document.
Print Range	Allows you to limit the pages that are printed. For example 1-3 will only print pages 1, 2, and 3.
Print	Sends the selected range of pages to the printer.
Cancel	Cancels printing and closes the Preview window.

See Also

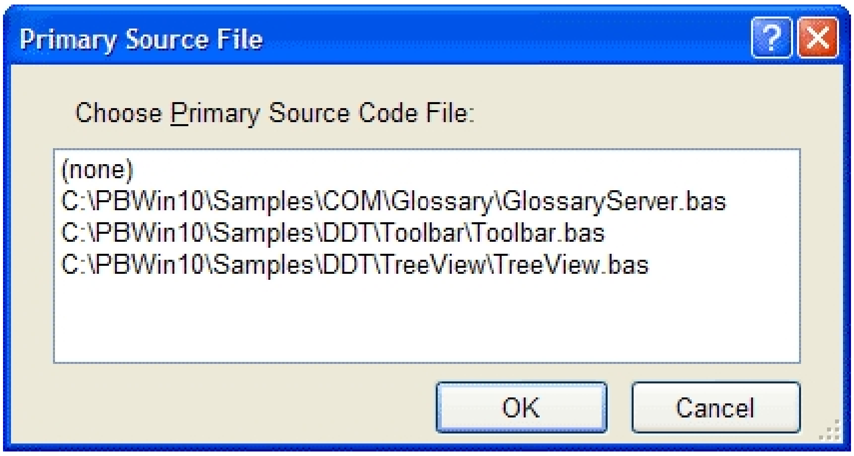
The Integrated Development Environment

Primary Source File Dialog

Primary Source File Dialog Box

The Primary Source File Dialog allows the programmer to define which source code module is regarded as the "main" program file. That is, when a compile/execute/debug operation begins, the IDE automatically uses the Primary Source File as the "main" file, regardless of which other files are loaded or have focus in the IDE.

The Primary Source File will be one of the files loaded into the IDE, and this can be via the Recent Files list (if the *Reload previous file set at start* IDE option is enabled).



Primary Source File	The name of the file designated to be the main file to compile and/or debug, even when multiple files are open. Choose None to disable the Primary Source File usage.
OK	The name in the Primary Source File list box is accepted and retained for the session as the "main" source code file.
Cancel	The previous Primary Source File, if any, remains unaltered.

See Also

The Integrated Development Environment

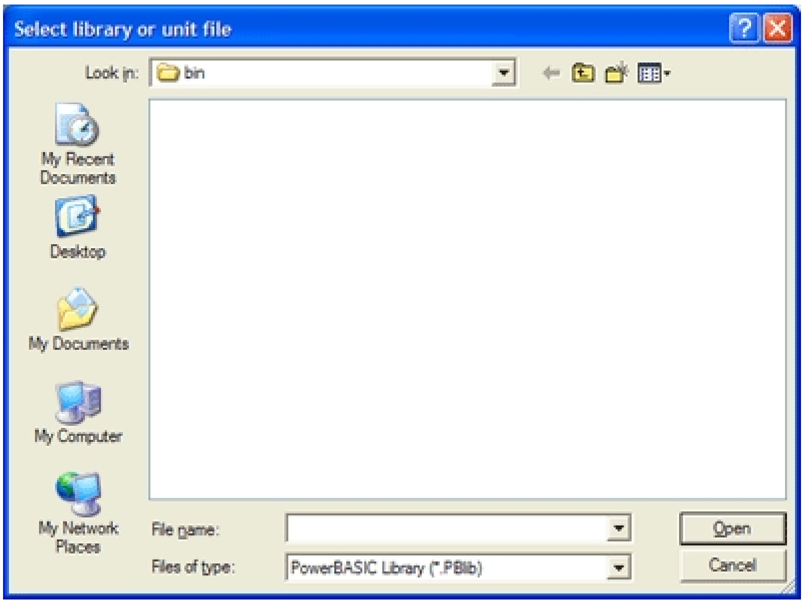
Replace Dialog Box

PowerBASIC Library Manager

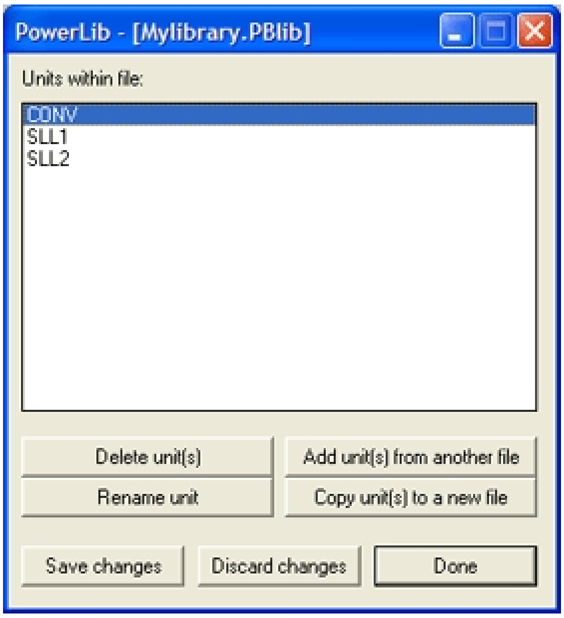
PowerBASIC Library Manager

For your convenience, multiple SLL modules may be collected into a Power Library, which is linked as a single item. You can readily add, remove, replace, or list the component SLL modules. However, the PowerBASIC Compiler treats the component modules individually, just as though they were each linked separately. A component SLL in a Power Library which is not needed is ignored entirely.

When you start the PowerBASIC Library manager you will be prompted to select a PowerBASIC Library (.PBLib) file. If you are creating a new Library file you enter the name of your new .PBLib file.



After specifying a new library or opening an existing one, you will be shown the Library Manager dialog.



Delete unit(s)	Removes the selected file(s) from the library.
Add unit(s) from another file	Adds either a .SLL or .PBLib file to the library. Adding a .PBLIB to the library causes all the individual units within the .PBLIB to be added to the library. If a unit is already within the library, the version within the library will be retained.
Rename unit	Renames a .SLL file in the library.
Copy unit(s) to a new file	Copies the selected SLL file out of the library and to a new SLL file name.
Save changes	Saves the changes to the library.
Discard changes	Discards any changes made in the Library Manager.
Done	Closes the Library Manager dialog.

Optionally, you can also use the supplied command-line librarian Plib.exe with the following syntax:

```
plib library[.PBLIB] [commands] [,listfile [,newlibrary.PBLIB]]
```

Commands:

+filename	Adds either a .SLL or .PBLib file to the library.

-unitname	Removes an SLL file from the library.
-+filename	Replace an SLL file in library with another SLL file.
***unitname**	Copy a SLL file out of the library.
-*unitname	Move a SLL file out of the library.
=oldunitname,newname	Renames a .SLL file in the library.

See Also

What is an SLL?

Creating a Static Link Library

Sll example

The PowerBASIC Integrated Development Environment

Writing Programs in PB/Win

Line numbers and Labels

Line numbers and Labels

Line numbers are

in the range 1 to 65535, which serve to identify program lines. PowerBASIC takes a relaxed stance toward line numbers. They can be freely interspersed with labels, and used in some parts of a program and not others. In fact, they do not even need to follow in numeric sequence. No two lines can have the same number, and no line can have both a label and a number. Line numbers are essentially labels.

While line numbers and labels serve the same purpose, their usage is slightly different. Line numbers are just a concession to compatibility with Interpretive BASIC. Line numbering can lead to bad programming style. Since the numbers themselves can be in any order, they give a false sense of structure to a program. We recommend that you avoid line numbers, and use labels instead.

Using labels instead of numbers allows you to make the flow of your program much more readable. For example:

```
GOSUB BuildQuarks
```

tells you much more than

```
GOSUB 1723
```

Each label must appear on a line by itself (though a comment may follow) and it serves to identify the statement immediately following it. Labels must begin with a letter and contain any number of letters, digits, and an underscore. Case is insignificant - *THISLABEL*, *thislabel*, and *ThisLabel* are all the same. A colon must follow a label, however, and statements that refer to the label must not include the colon.

```
MSGBOX "Now Sorting Invoices"
GOSUB SortInvoices
MSGBOX "All Done!"
EXIT FUNCTION

SortInvoices: ' This is a legal label
{sorting code goes here}
RETURN
```

The following is illegal, however:

```
ExitPoint: a = a + 1 ' a label must be on a line by itself
```

Finally, it should be noted that symbol names must be unique: a label may not share the name of any other symbol (Sub name, Function name, Method name, Property name, user-defined type or union definition, variable name, etc), and they are local to the Sub, Function, Method, or Property in which they appear.

See Also

- Long lines
- Statement separation
- Structured Programming
- Variables

Long lines

Long lines

The underscore character (_) can be used to split "logical" lines of source code, across physical lines in the source code file. The underscore character must be preceded by at least one white space character and is not supported in the ASM statement.

The effect of using a line continuation character is for "visual" appearance only - the compiler itself treats lines split this way as only one contiguous line of code.

For example, if we take the following line of code:

```
DECLARE FUNCTION Call32& LIB "CALL32.DLL" ALIAS "Call32" (Param1 AS ANY, BYVAL id&)
```

We could rewrite this line to place its component parts on separate lines of code for clarity:

```
DECLARE FUNCTION Call32& _
        LIB "CALL32.DLL" _
        ALIAS "Call32" _
        (Param1 AS ANY, BYVAL id&)
```

The compiler treats text that appears after the line continuation character as a remark. However, we still recommend that such comments are preceded by a REM or an apostrophe (**'**) symbol to clearly distinguish remarks from the actual code.

```
DECLARE FUNCTION Call32& _   ' The prototype declaration
        LIB "CALL32.DLL" _   ' The DLL name
        ALIAS "Call32" _     ' The exported function name
        (Param1 AS ANY, _    ' 1st parameter
        BYVAL id&)           ' 2nd parameter
```

See Also

- Line numbers and Labels
- Statement separation
- Structured Programming
- Variables

Statement separation

Statement separation

The colon character (**:**) can be used to separate multiple statements on a single (logical) line of source code. For example:

```
FOR x& = 1 TO 10 : INCR y& : NEXT x&
```

…is directly equivalent to:

```
FOR x& = 1 TO 10
  INCR y&
NEXT x&
```

In general, placing only one statement per line leads to more readable and maintainable source code; however, using the colon separator can be useful for combining statements on single-line IF/THEN statements, etc. For example

```
IF x! < 0 THEN INCR y# : INCR z# : DECR Count& : GOTO LastX
```

See Also

Line numbers and Labels

Long lines

Structured Programming

Variables

Variables

Variables

Variables represent

or values. Unlike constants, the value of a variable can change during program execution. Like labels, variable names must begin with a letter and can contain up to 255 letters and digits (although in practical terms you really cannot exceed the length of a line). Be generous in naming important variables. In PowerBASIC, long variable names ***do not*** steal run-time memory.

The Single-precision variables, *EndOfMonthTotals* and *emt,* both require exactly four bytes of run-time storage. A good rule of thumb is to preserve a balance, keeping variable names short enough so that statements can fit on one line. Many programmers use single-letter variables for

counters (i, j, k, l and x, y, z are favorites). However, you can use names like *count*, *total*, *index*, and so on for greater clarity, especially if you have nested loops.

PowerBASIC has many built-in variable types: Dynamic string; Fixed-length string; nul-terminated string; Field, Integer; Long integer; Quad integer; Byte, Word; Double word; Single; Double; and Extended floating point; Currency and CurrencyX; Variant, Object, Guid, plus Pointer, arrays, and Bit and Sbit bitfield subtypes.

Declaring a variable as a specific type:

Use the DIM statement to declare a variable and use the AS *type* syntax:

```
DIM iVar AS INTEGER
```

Appending a type-specifier to the variable name:

```
bat# = 1.312 ' bat# is a Double-precision variable
hat% = 3     ' hat% is an Integer variable
DEFINT c     ' Variables beginning with c are now Integer
cats = 16    ' cats is an Integer variable by DEFINT
```

Bear in mind that *cat?, cat%, cat&, cat&&, cat!, cat#, cat##, cat@, cat@@, and cat$* are ten separate variables. Although using *cat* over and over again to create different variables like this is legal, good programming practice suggests that you use somewhat different names for different variables. It is also much better to use descriptive and more easily understood names for your variables rather than single letters. It's extremely difficult to debug a program in which *x@* has been entered instead of *x!* or *x#*. Imagine the confusion of trying to distinguish *x&&* and *x&*. If you had used variable names like *count!, result#, remain##, and company$,* you would have had considerably less trouble keeping your variables (and their types) apart.

See Also

Default Variable Typing

Variable Scope

INSTANCE statement

Structured Programming

Structured Programming

For most applications, good programmers use an organized approach to programming called *structured programming*. The original interpreted BASICs did not really support this kind of programming. However, PowerBASIC, with its control structures and more advanced functions, subroutines, methods, and properties, is very well suited to structured programming style.

Structured programming is based on the theory that modularization makes for better programs. Modularization means grouping statements together (making modules) that have some relation to each other. In other words, you break up your program into logical functional sections. This makes it easier to write, debug, and understand the program.

Ideally, modules should be no more than a page long. This seemingly arbitrary constraint makes it easier to absorb the entire module at a glance. It is easier to understand a series of ten single-page modules than it is a single ten-page program.

For some projects, after this initial breakup, you're ready to write the program. More complicated problems might require you to break the modules into subsidiary pieces. This process continues until you have refined the material enough so that you can write the code that corresponds to your ideas. This entire process is often described in books as "top-down design", since you start with a general description and work toward a more specific one.

Once you have the logical organization, you can start to design the overall structure of your program. For short, simple programs, these steps may only take a few minutes. For complex programs, it could take months.

To summarize the steps of structured programming (also known as 'top-down programming' or 'top-down design'):

1. Plan your program on paper. Ask yourself the following questions:
   a. What is the overall purpose of the program?
   b. What kind of input will it need?
   c. How will it process that input?
   d. What kind of output will the program produce? To where (screen, printer, disk)?
   e. How should the input and output look?
   f. How can the program be broken up into discrete processes (modules?)
   g. How will those modules fit into the main program, and how will they communicate?
   h. Can those modules be broken up into even smaller functional segments?
2. Next, write your main program. Don't worry about writing the individual modules that you separated out earlier. Instead, write *stubs*: Dummy statements that allow the main program to continue. This allows you to test the logic of your main program.

3. Finally (and this step will actually be several steps), write the modules *one at a time*. Test and debug each module thoroughly before proceeding to the next. If you've broken your module into even smaller processes, write the code for those processes *first*, test and debug each process, and then put them together to build your module.

See Also

Line numbers and Labels

Long lines

Statement separation

Variables

Debugging PB/Win Programs

Creating Dynamic Link Libraries

What is a Dll?

What is a DLL?

A Dynamic Link Library (DLL) is a Windows executable library module containing one or more Subs, Functions, or classes that can be called by executables or other DLLs. Unlike executables, DLLs do not have a single entry point. Instead, like libraries, DLLs have multiple entry points, one for each exported Sub, Function, or classes.

To get a better idea of how a DLL works, it helps to understand the difference between static and dynamic linking. Static linking is the process of writing one or more modules, and then linking them, along with whatever other run-time, third-party, etc., libraries that may be needed to create a complete, stand-alone executable program. When a program uses a Sub or Function from a static-link library, a copy of that Sub or Functions code is statically linked into the programs executable file.

If two programs that are running concurrently use the same routine from a library, they would each have their own copy of that routine. It would be more efficient if the two programs could share a single copy of the routine. DLLs provide that capability by resolving your application's references to external procedures at run-time.

In contrast to a static-link library, the code in a DLL is not linked into a program that uses the DLL. Instead, a DLLs code and resources are in a separate executable file, usually with a .DLL extension. This file must be present when the application runs. You will still have to write one or more modules to implement the functions that are specific to your application.

However, the linking process is divided into two stages. You first place DECLARE statements into your application to temporarily satisfy the references your program makes to the DLL services, in order to create an EXE (or DLL) file. The second stage happens at run-time, when your program calls one of the DLLs services.

At that time, the Function calls in the program are dynamically linked to their entry points in the DLL(s). The operating system resolves external references by establishing a link between the application calls and the code, in the DLL, that implement the required functions. The Windows environment supports both static and dynamic linking.

See Also

Why use Dlls?

Creating a Dynamic Link Library

Private and Exported Procedures

Dll example

LibMain

What is an object, anyway?

Just what is COM?

What is a COM component?

Why use Dlls?

Why use DLLs?

There are a number of mitigating reasons to create a DLL. Among them are:

- **Performance**
  Parts of your code, while functional, might not execute as fast as you would like. Once you've isolated the bottleneck area(s), a machine code DLL is an obvious choice for optimizing just those areas of your application that are running too slowly.
- **Resources**
  Unlike conventional libraries, when a DLL is loaded into memory by the operating system, its Subs and Functions are accessible by all other programs (or DLLs). Only one copy of the DLL needs to be present in memory. This is possible because the library is not linked into any one of the programs permanently. It is present, in memory, making its services available to any program (or other DLL) which may need them.
- **Code re-use**
  You might have a set of procedures that are common to a number of different applications. Instead of having those procedures appear in every application that needs them, it is better to put them in a DLL where they can be accessed by all the applications. This reduces the size of your executables while giving you the flexibility of updating the DLL itself, without having to re-compile every application that uses its services.
- **Maintenance**
  A DLL can be updated and redistributed without having to re-compile any of the applications (or other DLLs) that use its services.

See Also

What is a Dll?

Creating a Dynamic Link Library

Private and Exported Procedures

Dll example

LibMain

What is an object, anyway?

Just what is COM?

What is a COM component?

Creating a Dynamic Link Library

Creating a Dynamic Link Library

A DLL contains one or more exported Classes, Subs, or Functions that may be called by applications or other DLLs. A DLL may also contain any number of private Subs or Functions that can only be called from within the library. Creating a DLL with PowerBASIC is straightforward. Below are the steps to follow to convert parts of a Visual Basic program to a DLL.

Step 1:	The first step is to identify the sections of your application that are used in multiple programs, or in the case of Visual Basic, Subs and Functions that you need to execute faster.
Step 2:	Save those Subs and Functions as text, and change the file extension to .BAS. This will become the source module that will be compiled into a DLL with PowerBASIC. You could also create the source file from scratch, if you so wish.
Step 3:	Launch PBEDIT.EXE (the PowerBASIC IDE) and add the EXPORT keyword to any Sub or Function in the DLL source code (that you wish to be made accessible to external applications). Add #COMPILE DLL to the top of the source code file, and make any other changes to your .BAS source module. See the SUB/END SUB and FUNCTION/END FUNCTION topics for more information on the exact syntax.
Step 4:	Click the compile button on the PowerBASIC IDE toolbar.

Any compile-time errors will be flagged at this point. Repeat steps 3 to 4 above until no more errors are reported. You are then ready to start testing and debugging your DLL. Debugging is done using the PowerBASIC symbolic Debugger built into the PowerBASIC IDE (PBEDIT.EXE). See the section on Debugging for more information.

See Also

What is a Dll?

Private and Exported Procedures

Dll example

LibMain

What is an object, anyway?

Just what is COM?

What is a COM component?

Private and Exported Procedures

Private and Exported Procedures

There are two basic types of procedures in a DLL: private and exported. Exported
 are those which are made available to applications and other DLLs. Private, or local, procedures are support-type routines, accessible only from within the DLL.

In the following example, the first procedure defines an exported Sub that accepts two arguments: a string and an Integer. The second procedure defines an exported function that accepts a single string argument, and returns an Integer. Finally, the third procedure defines a private Sub that accepts a single Integer argument. The first two routines are callable from an external .EXE or another DLL. The third one is not.

```
#COMPILE DLL
SUB MySub (sArg AS STRING, BYVAL iArg AS INTEGER) EXPORT
  ' Body goes in here
END SUB
FUNCTION MyFunc (sArg AS STRING) EXPORT AS INTEGER
  ' Body goes in here
END FUNCTION
SUB MyPrivateSub(BYVAL iArg AS INTEGER)
```

```
  ' Body goes in here
END SUB
```

Alternatively, you may specifically declare Subs and Functions as private, by using the PRIVATE keyword:

```
SUB MyPrivateSub(BYVAL iArg AS INTEGER) PRIVATE
  ' Body goes in here
END SUB
```

See Also

- What is a Dll?
- Creating a Dynamic Link Library
- Dll example
- LibMain
- What is an object, anyway?
- Just what is COM?
- What is a COM component?

Dll example

An Example

A very simple example is a DLL with a function that will add one to any Long-integer passed to it as a parameter:

```
#COMPILE DLL
FUNCTION AddOne ALIAS "AddOne" (BYVAL x AS LONG) EXPORT AS LONG
  AddOne = x + 1
END FUNCTION
```

The ALIAS keyword is used to indicate the capitalization that PowerBASIC will assign the function. In Win32, all exported (and imported) Sub and Function names are case-sensitive. If the ALIAS keyword was omitted, PowerBASIC will capitalize the exported name and this could cause " Missing DLL entry point" errors if the calling code did not match the capitalization exactly.

By default, all Subs and Functions in PowerBASIC are private, which means they cannot be seen outside of the DLL. The EXPORT keyword is used on the Sub or Function definition line to indicate that the routine is to be exported, i.e., made accessible to applications and other DLLs.

When compiled into a DLL, *AddOne* is visible to outside applications. A Visual Basic program needs only include a prototype, or a DECLARE statement for the function, in order to call it as if it were a VB function:

```
DECLARE FUNCTION AddOne LIB "ADDONE.DLL" ALIAS "ADDONE" (BYVAL x&) AS LONG
```

AddOne is then accessible from within your Visual Basic code:

```
a& = 4
b& = AddOne( a& ) ' returns 5
```

If *AddOne* were not exported, Visual Basic would generate a run-time error when the example code attempts to call it.

If the EXPORT keyword is not used in the Sub or Function definition, the procedure will not be visible to outside applications. See the Visual Basic documentation for more information on calling DLLs from within Visual Basic code.

By using the ALIAS keyword in the DLL source code, you can have PowerBASIC export the Sub or Function using any capitalization you want. You can use the ALIAS clause to export the Sub or Function with a completely different name, in order to enhance or disguise the internal Sub or Function name:

```
' Exported as "ADDONE1"
FUNCTION AddOne1 (BYVAL x&) EXPORT AS LONG
```

```
' Exported as "AddOne2"
FUNCTION AddOne2 ALIAS "AddOne2" (BYVAL x&) EXPORT AS LONG

' Exported as "ExprtFnctn1"
FUNCTION AddOne3 ALIAS "ExprtFnctn1" (BYVAL x&) EXPORT AS LONG
```

Because the name after the ALIAS keyword is in quotes, the compiler will not convert it to upper case. Note that the name in the ALIAS clause is the name that you would use to access the Sub or Function from Visual Basic. Likewise, when importing Subs and Functions from external DLLs into PowerBASIC, the ALIAS clause must exactly match the capitalization of the exported name in the DLL.

See Also

- What is a Dll?
- Creating a Dynamic Link Library
- Private and Exported Procedures
- LibMain
- What is an object, anyway?
- Just what is COM?
- What is a COM component?

LibMain

LIBMAIN

In addition to the functions you want to export (plus any supporting private routines), a DLL can contain an optional function called LIBMAIN (or its synonyms DLLMAIN and PBLIBMAIN). Windows calls LIBMAIN when a DLL is loaded into and unloaded from memory by an application. The use of LIBMAIN in your code is optional.

See Also

- What is a Dll?
- Creating a Dynamic Link Library
- Private and Exported Procedures
- Dll example
- What is an object, anyway?
- Just what is COM?
- What is a COM component?

Creating Static Link Libraries

What is an SLL?

What is an SLL?

An SLL is a Static Link Library. It consists of a set of Classes, Subs, and Functions which are compiled into a machine-code library. Since it is a library, the code cannot be executed standalone. It functions much like a DLL would, but the pre-compiled machine code is actually embedded into the final .EXE or .DLL to reduce the number of files in your project.

Why use SLLs?

A Static Link Library is the perfect vehicle for third-party code, because it creates a single final module while not requiring source code to be distributed. It allows you to create a group of your own libraries, which you know function correctly and don't require any further debugging. It also offers big advantages to larger group programming projects to control distribution of various elements.

See Also

Creating a Static Link Library

SLL example

Creating a Static Link Library

Creating a Static Link Library

Creation of an SLL couldn't be easier. All it takes is a single metastatement at the top of your module source code:

```
#COMPILE SLL
```

If your source code file is named "ABC.BAS", then your Static Link Library will automatically be named "ABC.SLL". (You can check the #COMPILE section for additional naming options.) When you wish to use the SLL code in a host program, you use:

```
#LINK "ABC.SLL"
```

and the contents are automatically embedded in the new .EXE or .DLL. It's just that simple.

Common Subs and Functions

A COMMON Sub or Function is one which is visible between the primary host program and one or more SLL unit modules. A Sub/Function is defined as COMMON by inserting that word as one of the descriptors:

```
FUNCTION MyFunc(Parm AS LONG) COMMON AS DOUBLE
  <Function code>...
END FUNCTION
```

When you create an SLL, you may find you need to reference a Sub or Function which is located in the main Host Module or another SLL. In that case, you must DECLARE it with the COMMON descriptor:

```
DECLARE FUNCTION MyFunc(Parm AS LONG) COMMON AS DOUBLE
```

It is not necessary to DECLARE a COMMON Sub or Function at all in the Host Module. If you choose to do so (for self-documentation or other reasons), it is generally advisable to omit the COMMON descriptor, as its presence will force the SLL to be linked, whether needed or not.

Of course, when the host module is compiled, all references to COMMON items must be resolved accurately, or an appropriate error will be generated. Any Sub/Function not defined as COMMON may not be shared between modules.

The EXPORT descriptor identifies a Sub/Function which may be accessed between Dynamic Link Libraries (DLLs), and/or the main executable which links them. If a procedure is not marked EXPORT, it is hidden from these other modules. Generally speaking, it's best not to mark a Sub/Function in an SLL as EXPORT. While it is syntactically acceptable, it may limit your future options when linking the SLL into host modules. PowerBASIC recommends that you mark them as COMMON in the SLL, and add the EXPORT attribute in the host module.

It's easy to create an SLL which can be linked into an executable program or a dedicated DLL for the same purpose. To add the EXPORT attribute to a linked Sub/Function, just add the word EXPORT to the DECLARE statement in the host module or add an #EXPORT metastatement.

```
#EXPORT MyFunc
DECLARE FUNCTION MyFunc(Parm AS LONG) COMMON EXPORT AS DOUBLE
```

Using this technique, your SLL can be linked directly into an application executable without publishing the Subs/Functions as EXPORT. However, you can also link the same SLL into a DLL host module which adds the EXPORT attribute to any or all of the COMMON Subs and Functions in the corresponding DECLARE statements.

For example, let's say you want to make a library which publishes the SUB named XXX. You want to provide it in two forms, a linkable SLL and an industry standard DLL. So, first just create the SLL:

```
#COMPILE SLL = "XXXLib.SLL"

SUB xxx() COMMON
  MSGBOX "Hello"
END SUB
```

Just compile it, and you're ready to link it into your application. But now you want to create a DLL, too, since it might be used with other applications. It's just this easy:

```
#COMPILE DLL = "XXXLib.DLL"

#EXPORT xxx
#LINK "XXXLib.SLL"
```

That's all there is to it. You now have an SLL and an equivalent DLL to do the job of the XXX procedure.

Common Classes and Objects

A COMMON Class is one which is visible between the primary host module and one or more SLL unit modules. A Class is defined as COMMON by inserting that word as a Class Descriptor:

```
CLASS MyClass $MyGuid COMMON
  <Class code>...
END CLASS
```

A class which is declared AS COM makes it available to external programs through the COM services of Windows. You can define a class to be both COM and COMMON by adding both descriptors. However, a COM Class is automatically considered to be COMMON as well.

```
CLASS MyClass $MyGuid COMMON AS COM
  <Class code>...
END CLASS
```

Unreferenced Code

Any code in an SLL marked COMMON, COM, or EXPORT is always included in your compiled SLL module. Any additional code referenced by them is also included. All other unused code is automatically extracted at the time the SLL is compiled. Keep in mind that the resulting SLL module is pre-compiled, and cannot be modified further.

When you link an SLL into a host module, it is examined carefully by the compiler. If it is determined that no code in the SLL is needed, the SLL is simply not linked. This can reduce the size of your final program substantially. However, if even one procedure in an SLL is used, the entire SLL is included. Therefore, it may be in your best interest to split up your code into multiple SLL modules. The PowerBASIC Compiler will pick and choose exactly which ones are needed and ignore the rest. This assures the smallest possible size of the resulting application.

Managing Multiple SLL Modules

For your convenience, multiple SLL modules may be collected into a Power Library, which is linked as a single item. However, the PowerBASIC Compiler treats the component modules individually, just as though they were each linked separately. A component SLL in a Power Library which is not needed is ignored entirely.

SLL modules are collected into a Power Library with the PowerLib utility librarian. This GUI application can readily add, remove, replace, or list the component SLL modules. Optionally, you can also use a command line librarian if that better serves your needs. The file extension for Power Libraries is ".PBLIB".

See Also

What is an Sll?

Sll example

PowerBASIC Library Manager

SLL example

SLL example

Below is a very simple example of a Static Link Library (SLL). This SLL unit module contains only one function that converts millimeters to inches.

```
#COMPILE SLL "conversion.sll"
#DIM ALL

FUNCTION MillimetersToInches(BYVAL mm AS DOUBLE) COMMON AS DOUBLE
  FUNCTION = mm * 0.03937#
END FUNCTION
```

The #COMPILE SLL metastatement tells the compiler to create an SLL named conversion.sll.

By default, all procedures in PowerBASIC are private, which means they cannot be seen outside of the SLL. The COMMON keyword is used on the procedure definition line to indicate that the procedure is to be visible to the host application. If the COMMON keyword is not used in the procedure definition, the procedure will not be visible to the host application. If the MillimetersToInches function did not contain the COMMON keyword any attempt to reference it from a host program would result in a Missing Declaration error when the host program is compiled.

Below is a sample host program that links in the compiled conversion.sll into our program.

```
#COMPILE EXE
#DIM ALL

#LINK "conversion.sll"

FUNCTION PBMAIN () AS LONG
  LOCAL Inches      AS DOUBLE
  LOCAL MilliMeters AS DOUBLE

  MilliMeters = 1000.0#
  Inches = MillimetersToInches(MilliMeters)
END FUNCTION
```

The #LINK metastatement is used to link the pre-compiled conversion.sll into our host program. Any procedure in the SLL that contains the COMMON keyword may be called by our host program. We call the MillimetersToInches function in the SLL just like any other function call.

See Also

What is an SLL?

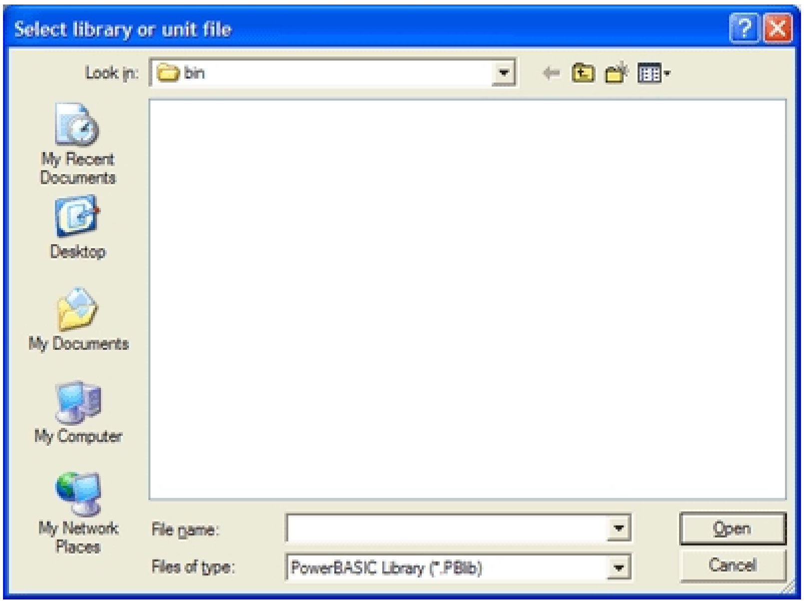
Creating a Static Link Library

PowerBASIC Library Manager

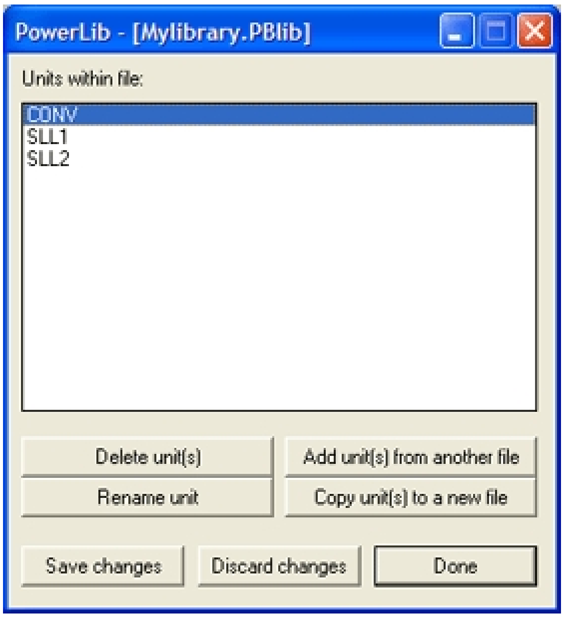
PowerBASIC Library Manager

For your convenience, multiple SLL modules may be collected into a Power Library, which is linked as a single item. You can readily add, remove, replace, or list the component SLL modules. However, the PowerBASIC Compiler treats the component modules individually, just as though they were each linked separately. A component SLL in a Power Library which is not needed is ignored entirely.

When you start the PowerBASIC Library manager you will be prompted to select a PowerBASIC Library (.PBLib) file. If you are creating a new Library file you enter the name of your new .PBLib file.



After specifying a new library or opening an existing one, you will be shown the Library Manager dialog.



Delete unit(s)	Removes the selected file(s) from the library.
Add unit(s) from another file	Adds either a .SLL or .PBLib file to the library. Adding a .PBLIB to the library causes all the individual units within the .PBLIB to be added to the library. If a unit

	is already within the library, the version within the library will be retained.
Rename unit	Renames a .SLL file in the library.
Copy unit(s) to a new file	Copies the selected SLL file out of the library and to a new SLL file name.
Save changes	Saves the changes to the library.
Discard changes	Discards any changes made in the Library Manager.
Done	Closes the Library Manager dialog.

Optionally, you can also use the supplied command-line librarian Plib.exe with the following syntax:

plib *library*[.*PBLIB*] [*commands*] [,*listfile* [,*newlibrary*.*PBLIB*]]

Commands:

+filename	Adds either a .SLL or .PBLib file to the library.
-unitname	Removes an SLL file from the library.
-+filename	Replace an SLL file in library with another SLL file.
***unitname**	Copy a SLL file out of the library.
-*unitname	Move a SLL file out of the library.
=oldunitname,newname	Renames a .SLL file in the library.

See Also

What is an SLL?

Creating a Static Link Library

Sll example

The PowerBASIC Integrated Development Environment

Debugging PB/Win Programs

Debugging PB/Win Programs

Debugging PowerBASIC Programs

Once your code is written, the next step is to test it to make sure it performs according to specifications. Regardless of the computer language used, certain programming errors are common: misspelled or misused variables, inverted logical tests, mistakes in syntax, and "reasonable" tests that cause disastrous failures when unreasonable data is supplied. Each language also has its own common errors, unique because of the peculiarities of its language.

Some of BASIC's unique problems include the free conversion of most

, side effects of global variables, default data types, and overuse of GOTO causing problems with incorrect branching. These are well known to the experienced BASIC programmer but are not generally found in other languages.

The PowerBASIC Integrated Development Environment (PBEDIT.EXE) can be used to find, and correct, both general programming errors and errors specific to BASIC. Nearly every program has bugs at least at first. To find them, you may need to check any statement in the program, display the value of any variable, and observe the program flow from line to line. PBEDIT has all these capabilities and more.

This section explains how to use PBEDIT to find and fix errors in a sample program, by providing a list of the debugging commands, a description of each, and then showing how each is invoked. If you follow certain guidelines when creating your program, you will find debugging easier (and less necessary). The procedures we describe here will help you form your own set of guidelines that will make your programs easier to write and maintain.

See Also

[How the integrated debugger works]
[The DEBUG Menu]
[Debugging a simple program]
[The Integrated Development Environment]
[Debugger Settings]

How the integrated debugger works

How the integrated debugger works

The integrated debugger works in conjunction with the PowerBASIC editor and is a part of the PowerBASIC environment. The debugger allows you to debug at the PowerBASIC level rather than at the machine level. That makes it a source-level debugger.

To debug a PowerBASIC program using the integrated debugger, first load the program into the editor and choose *Compile and Debug* from the toolbar or menu. Your program will be compiled, and if there are no compile-time errors, it will begin executing.

Breakpoints are places where the program will stop. In most cases, you will want to set one or more breakpoints in your program. The program executes up to (but not including) the line containing the breakpoint and then passes control of the debugger over to you. Breakpoints that you set remain in place until you clear them or exit the IDE.

Once at a breakpoint you can:

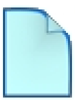
- Display the value of a variable (with the Evaluate Variable button or menu item)
- Set up a list of variables (in the Variable Watch window) and see how their values change as the program executes
- Clear breakpoints, set new ones, or both
- Single-step the program (run it one line at a time)
- Run the program to the next breakpoint

See Also

[Debugging PB/Win Programs]
[The DEBUG Menu]
[Debugging a simple program]
[Debugger Settings]

Debugger Toolbar Buttons

Debugger Toolbar Buttons



Create a new empty document (file) in the editor.

Use the Open File dialog box to load an existing document.

Print the current document to a printer.

Copy the selected text from the document to the clipboard.

Search the current document for a word or phrase. See Find dialog for more information.

Launch the Go to Line dialog to jump to a specific line in the current document.

Launch the Code Finder dialog, which presents a list of Subs, Functions, Methods, Properties, and Macros in current document, to quickly jump to a selected section of code.

Begin running the program. It will continue to run until the debugger either encounters a breakpoint, or runs out of code to execute. F5 is the hot-key for the Run option.

The debugger runs the program using an automated Step-Into technique. Execution continues until a breakpoint is reached, the Stop button is pressed, or the program completes. The Animate delay can be set through the IDE's Options Dialog.

The debugger executes the current line of code. If the line contains a reference to a Sub, Function, Method, or Property, the debugger executes that code without tracing into the procedure. SHIFT+F8 is the Step Over hot-key.

If the current line contains a call to a Sub, Function, Method, or Property, the debugger traces execution into that procedure. You cannot step into an API call, or into an external module. F8 is the Step Into hot-key.

The debugger runs the code until the current Sub, Function, Method, or Property exits. If the current function is PBMAIN or WINMAIN, the code is executed until the program is finished or another breakpoint is encountered. CTRL+SHIFT+F8 is the Step Out hot-key.

Halt the debugger. If the debugger is already halted, this has no effect.

Show or hide the Register Watcher window, which lets you see the state of the CPU registers and flags when debugging.

Show or hide the Variable Watcher window, which lets you see the state of the ERR function and any variables you choose to watch when debugging.

Halts the current program and terminates the debugger. The variable list in the Watch window is retained between debugging sessions, until the IDE is closed.

Launches the PowerBASIC web site.

Display the PowerBASIC or the WIN32.HLP file.

See Also

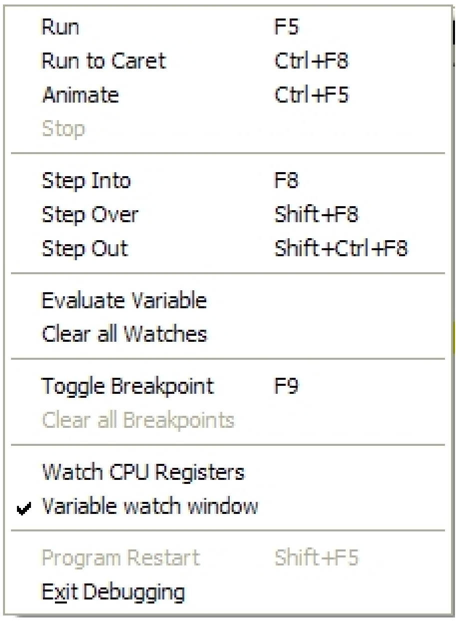
[Toolbar Buttons]

[The Debug Menu]

The Debug Menu

The DEBUG Menu

The Debug Menu provides the essential tools for debugging a PowerBASIC program. We will run through these in their order of appearance:



Run	Begin running the program. It will continue to run until the debugger either encounters a breakpoint, or runs out of code to execute. F5 is the hot-key for the Run option.
Run to Caret	Begin running the program. It continues to run until the debugger either reaches the current line, or encounters a breakpoint, etc. CTRL+F8 is the hot-key for the Run to Caret option.
Animate	The debugger runs the program using an automated Step-Into technique. Execution continues until a breakpoint is reached, the Stop button is pressed, or the program completes. The Animate delay can be set through the IDE's Options Dialog.
Stop	Halt the debugger. If the debugger is already halted, this has no effect.
Step Into	If the current line contains a call to a Sub, Function, Method, or Property, the debugger traces execution into that procedure. You cannot step into an API call, or into an external module. F8 is the Step Into hot-key.
Step Over	The debugger executes the current line of code. If the line contains a reference to a Sub, Function, Method, or Property, the debugger executes that code without tracing into the procedure. SHIFT+F8 is the Step Over hot-key.
Step Out	The debugger runs the code until the current Sub, Function, Method, or Property exits. If the current function is PBMAIN or WINMAIN, the code is executed until the program is finished or another breakpoint is encountered. CTRL+SHIFT+F8 is the Step Out hot-key.

Evaluate Variable	Evaluate or modify a variable, or add/remove a variable in the Watch window. It is not possible to use this to change the length of a string. Also see Watch CPU Registers.
Clear all Watches	Remove all variables from the Watch window.
Toggle Breakpoint	Set or release a breakpoint on the current line. F9 is the Toggle Breakpoint hot-key.
Clear all Breakpoints	Release all breakpoints in the program.
Watch CPU registers	Show or hide the Register Watcher window, which lets you see the state of the CPU registers and flags when debugging.
Variable watch window	Show or hide the Variable Watcher window, which lets you see the state of the ERR function and any variables you choose to watch when debugging.
Program Reset	If the current program is halted/stopped, the program will be reset, ready for debugging to commence again. SHIFT+F5 is the Reset hot-key.
Exit Debugger	Halts the current program and terminates the debugger. The variable list in the Watch window is retained between debugging sessions, until the IDE is closed.

See Also

Debugging PB/Win Programs

How the integrated debugger works

Debugger Toolbar Buttons

Debugging a simple program

Debugger Settings

Debugging a simple program

Debugging a simple program

Debugging a simple program

For our first example, we'll use a simple program designed to read a text file and display it. Along the way, the program counts the number of words and tabulates the lengths of all words found - how many words are one character long, how many are exactly two characters long, and so on. The sample program, TWORD.BAS (\PBWin10\Samples\TWord\TWORD.BAS), contains a number of bugs; you will be using the PowerBASIC integrated debugger to find each of them.

Be sure to make copies of the TWORD.DAT data file; TWORD.BAS reads that file and makes specific errors because of the data. While another data file may work as well, it is possible that one or more of the bugs will not occur if you use a different data file.

Here is a listing of the TWORD.BAS program.

When you have loaded TWORD.BAS into the editor, click on the Debugger button on the toolbar, or select Run from the menu, then Compile and Debug.

At this point, the debugger will have scrolled the program and highlighted the line containing the definition of the variable *MaxWordLen*, since that will be the first line executed when the program begins to run. The highlight is called the *execution bar* and marks the line of code at the execution position. In other words, that line will be executed next.

To make the program run, click on the Run button in the toolbar or press F5. The program's output appears in the User screen, which allows you to see how the program would look if you weren't using the debugger. If the User screen is not visible you may have to select it by using the Windows Taskbar, ALT+TAB, or by re-sizing the PowerBASIC IDE to a smaller size and different location until the User screen is visible. TWORD prompts you for the name of the file to read. Enter TWORD.DAT and press ENTER. TWORD displays the first line of the file then locks up because of one of the bugs in the program. To regain control, click on the Stop button. You can choose Program Reset (or press the SHIFT+F5 hot-key) to quit running the flawed program. Clicking the Run button lets you restart the program.

Next See: Setting and using breakpoints

See Also

- Debugging PB/Win Programs
- How the integrated debugger works
- The DEBUG Menu
- The Integrated Development Environment
- Debugger Settings

TWORD.bas Source Listing

TWORD.BAS

```
'==============================================================================
'
'  Test Word (Debugging) example for PowerBASIC for Windows
'  Copyright (c) 1998-2011 PowerBASIC, Inc.
'  All Rights Reserved.
'
'  Read a text file and count the number of words of length 1, 2, 3, and so
'  on. THIS PROGRAM CONTAINS INTENTIONAL BUGS. Use it in conjunction with the
'  PowerBasic On-line help (PBWIN.CHM - "Debugging PowerBASIC Programs") to
'  learn about the PowerBasic integrated debugger.
'
'==============================================================================
#COMPILER PBWIN 10
#COMPILE EXE
#IF NOT %DEF(%WINAPI)
    DECLARE FUNCTION GetModuleFileName LIB "KERNEL32.DLL" ALIAS
"GetModuleFileNameA" (BYVAL hModule AS LONG, lpFileName AS ASCIIZ, BYVAL nSize AS
LONG) AS LONG
    %MB_YESNO = &H00000004&
    %IDNO = 7
#ENDIF
DEFLNG A-Z
FUNCTION AppPath () AS STRING
    LOCAL p AS ASCIIZ * 256
    LOCAL ix AS LONG
    GetModuleFileName 0, p, SIZEOF(p)
    FOR ix = LEN(p) TO 1 STEP -1
        IF MID$(p, ix, 1) = "\" OR MID$(p, ix, 1) = "/" THEN
            FUNCTION = LEFT$(p, ix)
            EXIT FUNCTION
        END IF
    NEXT
  FUNCTION = ""
```

```
END FUNCTION
FUNCTION PBMAIN () AS LONG
    MaxWordLen = 16             ' count words up to a length of 16 characters
                                ' longer words will go into Overlong
    DIM WordLength(MaxWordLen)  ' the array used to hold the counts
    Blank$ = CHR$(32)           ' a space marks the end of a word.
    FilePath$ = AppPath
    IF LEN(FilePath$) THEN
        CHDRIVE FilePath$
        CHDIR FilePath$
    END IF
    WHILE InFile$ = ""
        InFile$ = INPUTBOX$("Enter the name of the input file: ")
        IF InFile$ <= SPACE$(LEN(InFile$)) THEN InFile$=""
        IF InFile$ = "" _
        AND MSGBOX ("No file name entered! Do you want to try again?", _
                      %MB_YESNO, _
                      "TWord input") = %IDNO THEN
           EXIT FUNCTION
        END IF
    WEND
    ERRCLEAR
    OPEN InFile$ FOR INPUT AS #1
    'If the file can't be opened, give the user an error message.
    IF ERR THEN
        MSGBOX InFile$,,"Unable to open file"
        EXIT FUNCTION
    END IF
    WHILE NOT(EOF(1))              ' read the file until nothing is left
        LINE INPUT #1,FirstString$ ' get a line
        MSGBOX FirstString$        ' display it
        WHILE FirstString$ <> ""
            GOSUB GetAWord         ' pull a word for FirstString$ and
                                   ' put it in SecondString$
            Test = LEN(SecondString$)
            IF Test <= 16 THEN
                WordLength(Test) = WordLength(Test) + 1
            ELSE
                Overlong = Overlong + 1
            END IF
        WEND
    WEND
    CLOSE 1
    MSGBOX "Length Count"
    FOR Count% = 1 TO 16
        MSGBOX FORMAT$(Count%) + STR$(WordLength(Count%))
    NEXT
    MSGBOX "Greater" + STR$(OverLong)
    EXIT FUNCTION
GetAWord:
    position = INSTR(FirstString$, Blank$) ' a word is a sequence of
                                           ' characters ended by a
                                           ' blank or the end of the line
    IF position = 0 THEN
        'the word is the remainder of the line
        SecondString$ = FirstString$
        FirstString$ = ""
    ELSE
        'pull the word from the line
        SecondString$ = LEFT$(FirstString$, position - 1)
```

```
    END IF
    RETURN
END FUNCTION
```

Setting and using breakpoints

Setting and using breakpoints

We know the program did not fail within the first few lines; it requested the name of the input file, and it successfully opened that file. Therefore, the problem must have been caused by something further along in the code.

The first suspicious line concerns the *GetAWord* subroutine. Set a breakpoint at the line reading:

```
position = INSTR(FirstString$, Blank$)
```

Use the arrow keys to move to that line. As you do, you'll notice that the execution bar doesn't move. That is because you are not executing the program; you are just using the source browser to move within the program source.

To set a breakpoint at the line to which you moved, double-click on it or press the F9 key. The line is highlighted, indicating that the breakpoint has been set. If you wanted to remove the breakpoint at that line, double-click on it or press the F9 key again. The breakpoint highlighting differs from the execution highlighting, and this difference helps you to avoid confusion over highlighted breakpoints and the current program position.

Once more, click on the Run button (or press F5). TWORD starts running again, and things happen just as before, with one exception: after the first line from the data file has been displayed on the User screen, TWORD halts and waits for further commands. PowerBASIC has reached the breakpoint. The caret and the execution bar are on the line containing the breakpoint.

The breakpoint line cannot be doubly highlighted, so the execution bar obscures the breakpoint highlighting until the program executes further. The program stops each time it reaches the breakpoint line.

You can also stop a program running within the debugger by clicking the Stop button. When you do this, the program executes the current line and stops at the beginning of the next. Control is then returned to the PowerBASIC debugger, and the execution bar highlights the next line to be executed. You may now use debugger commands to step through the program or resume execution.

Next See: Tracing execution

See Also

Debugging PB/Win Programs

How the integrated debugger works

The DEBUG Menu

Debugging a simple program

Debugger Settings

Tracing execution

Tracing execution

Now that you have executed TWORD to the first breakpoint, you can trace the execution one line at a time by pressing F8 or by clicking on the Step-Into button. When you press F8, the debugger runs the execution line and stops at the beginning of the next line.

Perhaps there is something wrong with that INSTR function call? You could not check the value of the variable *position* while the breakpoint line was highlighted, because the breakpoint line had not yet executed. After pressing F8 and executing the breakpoint line, the value of the variable *position* should be known. The value of *position* is critically important, so let's check it.

Next See: Evaluating a variable

See Also

- Debugging PB/Win Programs
- How the integrated debugger works
- The DEBUG Menu
- Debugging a simple program
- Debugger Settings

Evaluating a variable

Evaluating a variable

To see the value of *position* right-click on the variable and choose the Evaluate variable item from the context-menu - since this is a context-sensitive menu, it will actually read "Evaluate position". In either case, this opens the Evaluate dialog containing two data entry fields. The variable name *position* should be automatically filled in the Variable Name field, and the content of the variable shown in the *Value* field. In this case, *position* is expected to contain 3, and it does. There is no error so far. To return from the pop-up window to the main part of the debugger, click on the Close button or press ESCAPE.

The next few lines are supposed to remove the word from the beginning of the line and put the word into *SecondString$*. To check if that routine functions correctly, you should examine the values of *FirstString$* and *SecondString$* before and after the routine alters them. The debugger should display:

```
To be or not to be; that is the question.
```

From the appearance of the string, you can see that the first blank should appear in position 3, and that the program has correctly determined that position. The variable *SecondString$* ought to contain the last word processed and should have no value yet. You can check that by entering *SecondString$* in the *Variable Name* field; if you do, you will find no error.

Everything seems normal so far. Press ESCAPE to return to the main part of the debugger, then press F8 to step the program one more line. Since you already know *position* is not 0, you'll find out what you need to know by pressing F8 several more times, stopping when the execution bar is over the final END IF of that routine. At that point, both *FirstString$* and *SecondString$* have been processed.

Once more, evaluate *SecondString$*. This time, *SecondString$* does contain data: the word "To". This seems correct. When you ask to see the value of *FirstString$*, though, you get a surprise: *FirstString$* has not been changed at all! This explains the lockup for the first line; subroutine *GetAWord* was correctly supplying the first word, but was not removing that first word from the entry string. Therefore, the first line never actually became shorter, so it was being processed and reprocessed endlessly.

To correct the bug, exit the debugger and insert a routine in the editor that shortens *FirstString$* by the length of *SecondString$*. Insert a line reading something like:

```
FirstString$ = MID$(FirstString$, position + 1)
```

…immediately before the END IF in *GetAWord*. Make this correction, then save it. Click on the *Compile and Debug* icon in the toolbar and run the program through the debugger again.

Next See: Summary

See Also

Debugging PB/Win Programs

Debugging a simple program

Setting and using breakpoints

Tracing execution

Debugger Settings

Summary

Debugging TWORD.BAS Summary

TWORD fails because the program goes into an infinite
. The infinite loop was caused by the fact that the number of characters removed was not shortening the input .

While tracking down this bug, you learned to:

- Set and use breakpoints
- Run a program without stopping at each line
- Step through your source one line at a time
- Evaluate the values of variables

See Also

Debugging PB/Win Programs

How the integrated debugger works

The DEBUG Menu

Debugging a simple program

Debugger Settings

Data Types

Data Types

Data Types

The care of numbers constitutes an important part of every programming system. Fortunately, PowerBASIC allows you to ignore most technical considerations about internal number handling. If you never give a thought to such matters as calculation speed, precision, and memory requirements, your programs will usually continue to work as you expect. However, an understanding of the underlying issues will help when you need to write programs that are faster, more accurate, and require less memory.

For efficiency, PowerBASIC stores and processes data in different forms. It supports eleven unique numeric types, three string types, and also pointers. The following tables summarize the most important features and distinctions of these data types. The rest of this section explains these features in detail.

Numeric Data storage requirements and ranges

Data Type	Size	Decimal Range	Binary Range

Integer	16 bits (2 bytes), signed	-32,768 to 32,767	-2^15 to 2^15-1
Long-integer	32 bits (4 bytes), signed	-2,147,483,648 to 2,147,483,647	-2^31 to 2^31-1
Quad-integer	64 bits (8 bytes), signed	-9.22*10^18 to +9.22*10^18	-2^63 to 2^63-1
Byte	8 bits (1 byte), unsigned	0 to 255	0 to 2^8 -1
Word	16 bits (2 bytes), unsigned	0 to 65,535	0 to 2^16 -1
Double-word	32 bits (4 bytes), unsigned	0 to 4,294,967,295	0 to 2^32 -1
Single-precision	32 bits (4 bytes)	8.43*10^-37 to 3.40*10^38	
Double-precision	64 bits (8 bytes)	4.19*10^-307 to 1.79*10^308	
Extended-precision	80 bits (10 bytes)	3.4*10^-4932 to 1.2*10^4932	
Currency	64 bits (8 bytes)	-9.22*10^14 to +9.22*10^14	
Extended-currency	64 bits (8 bytes)	-9.22*10^16 to +9.22*10^16	
Variant	128 bits (16 bytes)	{data-dependent}	{data-dependent}

Variable type-specifiers and keywords

Variable type	Type specifier	Element size	DEF type	Type keyword
Pointer	N/A	4	N/A	PTR/POINTER
Integer	%	2	DEFINT	INTEGER
Long-integer	&	4	DEFLNG	LONG
Quad-integer	&&	8	DEFQUD	QUAD
Byte	?	1	DEFBYT	BYTE
Word	??	2	DEFWRD	WORD
Double-word	???	4	DEFDWD	DWORD
Single-Float	!	4	DEFSNG	SINGLE
Double-Float	#	8	DEFDBL	DOUBLE
Extended-Float	##	10	DEFEXT	EXT/EXTENDED
Currency	@	8	DEFCUR	CUR/CURRENCY
Extended-currency	@@	8	DEFCUX	CUX/CURRENCYX
String	$	4	DEFSTR	STRING
Fixed-length string	N/A	N/A	N/A	STRING * x
Null-terminated String	N/A	N/A	N/A	ASCIIZ, STRINGZ
FIELD string	$	16	N/A	FIELD
Wide String	$$	4	N/A	WSTRING
Wide Fixed length String	N/A	N/A	N/A	WSTRING * x
Wide Nul-Terminated String	N/A	N/A	N/A	WSTRINGZ
Wide Field String	N/A	16	N/A	WFIELD
Variant	N/A	16	N/A	VARIANT
GUID	N/A	16	N/A	GUID
IAUTOMATION	N/A	4	N/A	IAUTOMATION
IDISPATCH	N/A	4	N/A	IDISPATCH
IUNKNOWN	N/A	4	N/A	IUNKNOWN

Integral Data Types

Byte (?)

Byte (?)

Bytes are 8-bit (1 byte) unsigned integers ranging in value from 0 to 255 (0 to 2^8-1). The type-specifier character for a Byte is: ?.

Byte variables are identified by following the variable name with a question mark (i.e., *var?*), or by using the DEFBYT statement as described in the previous discussion of Integers. You can also declare Byte variables using the BYTE keyword with the DIM statement. For example:

```
DIM I AS BYTE
```

Byte variables are particularly useful for storing small, unsigned integral quantities like the number of days in a month. You should not use Byte variables in FOR/NEXT loops, as they are highly inefficient.

A PowerBASIC Byte variable is equivalent to a bool data type (in lowercase) used by most modern C compilers. A bool is a non-traditional 8-bit unsigned data type, whereas a BOOL data type (in capital letters) is equivalent to a Long-integer in PowerBASIC. Be aware that some older C compilers may freely interchange bool and BOOL keywords.

A Delphi byte is equivalent to a PowerBASIC Byte.

See Also

Double-word (???)

Integers (%)

Long integers (&)

Quad integers (&&)

Word (??)

Word (??)

Word (??)

Words are 16-bit (two byte) unsigned integers with a range of 0 to 65535 (0 to 2^16-1). The type-specifier character for a Word is: ??.

Word variables are identified by following the variable name with two question marks (i.e., *var??*), or by using the DEFWRD statement as described in the previous discussion of Integers. You can also declare word variables using the WORD keyword with the DIM statement. For example:

```
DIM I AS WORD
```

Word values effectively extend the positive range for Integer, but still only require two bytes for storage.

A C/C++ UINT16 and a Delphi word are equivalent to a PowerBASIC Word.

See Also

Byte (?)

Double-word (???)

Integers (%)

Long integers (&)

Quad integers (&&)

Integers (%)

Integers (%)

To PowerBASIC, an Integer is a number with no decimal point (what mathematicians would call whole numbers) with a range of -32,768 to +32,767 (-2^15 to 2^15 - 1). These values stem from the underlying 16-bit representation of an Integer: 32,768 is 2^15, and are therefore 2 bytes (16-bits) wide. The type-specifier character for Integer is: %.

Integers are identified by following the variable name with a percent sign (eg: *var%*), or by using the DEFINT statement. For example, if you use this declaration in your program code:

```
DEFINT I, J, K
```

…then all variables following this declaration that start with the letter I, J, or K will be an Integer by default. You can also declare an Integer variable using the INTEGER keyword with the DIM statement. For example:

```
DIM I AS INTEGER
```

A C/C++ short variable and a Delphi smallint are both equivalent to a PowerBASIC Integer.

See Also

- Byte (?)
- Double-word (???)
- Long integers (&)
- Quad integers (&&)
- Word (??)

Long integers (&)

Long integers (&)

Like regular Integers, Long integers cannot contain decimal points. However, they span a much greater range, from -2,147,483,648 to +2,147,483,647 (-2^31 to 2^31 - 1) yet occupy just 4 bytes (32-bits). The type-specifier character for a Long integer is: &.

Long integers are identified by following the variable name with an ampersand (i.e., *var&*) or by using the DEFLNG statement as described in the previous discussion of Integers. You can also declare Long-integer variables using the LONG keyword with the DIM statement. For example:

```
DIM I AS LONG
```

Long integers are the most efficient

data type in PowerBASIC and should be used in all cases where speed is important and a greater numeric range is not required. (Using Byte and Integer variables in FOR/NEXT loops is actually slower than using a Long integer.)

A PowerBASIC Long-integer variable is equivalent to the BOOL data type (in capital letters) commonly used by C/C++ compilers. Note that a bool (lowercase) is a non-traditional data type, equivalent to a Byte in PowerBASIC. Be aware that some older C compilers may freely interchange bool and BOOL keywords.

A C/C++ int and a Delphi longint variable are also equivalent to a PowerBASIC Long integer.

See Also

- Byte (?)
- Double-word (???)
- Integers (%)
- Quad integers (&&)
- Word (??)

Double-word (???)

Double-word (???)

Double-words are 32-bit (four byte) unsigned

with a range of 0 to 4,294,967,295 (0 to 2^32-1). The type-specifier character for a Double-word is: ???.

Double-word variables are identified by following the variable name with three question marks (i.e., *var???*), or by using the DEFDWD statement as described in the previous discussion of Integers. You can also declare Double word variables using the DWORD keyword with the DIM statement. For example:

```
DIM I AS DWORD
```

As for Word values and Integers, Double-word values have a larger positive range than a Long-integer, and still require only four bytes. Double-word values are useful for indicating absolute memory addresses, such as may be used to store pointer values.

A PowerBASIC Double-word is equivalent to a UINT32 in C/C++. In 32-bit C/C++ code, a UINT is also equivalent to a PowerBASIC Double-word variable. Note that 16-bit C/C++ code uses UINT to describe a 16-bit Word variable.

A C++ unsigned int and a Delphi longword are equivalent to a PowerBASIC Double-word.

See Also

- Array Data Types
- Bit Data Types
- Constants and Literals
- GUID Data Types
- Object Data Types
- Pointers
- User Defined Types
- Unions
- Variant Data Types

Quad integers (&&)

Quad integers (&&)

Quad-integers are 64-bit (8 byte) signed integers (twice as many bits as Long integers) with a range of -9.22x10^18 to 9.22x10^18 (-2^63 to 2^63 -1). The type-specifier character for a Quad integer is: &&.

Quad-integer variables are identified by following the variable name with two ampersands (i.e., *var&&*), or by using the DEFQUD statement as described in the previous discussion of Integers. You can also declare Quad-integer variables using the QUAD keyword with the DIM statement. For example:

```
DIM I AS QUAD
```

Although a Quad integer actually has 19 digits of precision, only 18 digits of accuracy can be "displayed" with STR$. A 19-digit value will be rounded to 18 digits in scientific notation when used with STR$. STR$ works with up to 16 significant digits by default, so the enhanced form of STR$ (eg: STR$(*var*,18)), must be used to generate the 17th and 18th digits of a Quad integer for display purposes.

A C/C++ LARGE_INTEGER and a Delphi int64 are both equivalent to a PowerBASIC Quad integer.

See Also

Byte (?)

Double-word (???)

Integers (%)

Long integers (&)

Word (??)

Floating Point Data Types

Single-precision floating-point (!)

Single-precision floating-point (!)

Single-precision floating-point numbers (or more simply, Single-precision) may be the most versatile numeric type supported by PowerBASIC. Single-precision values can contain decimal points and have a range of +/- 8.43*10^-37 to 3.40*10^38. The type-specifier character for a Single-precision floating-point is: !.

Single-precision variables are identified by following the variable name with an exclamation point (i.e., *var!*) or by using the DEFSNG statement as described in the previous discussion of integrals. You can also declare Single-precision variables using the SINGLE keyword with the DIM statement. For example:

```
DIM I AS SINGLE
```

While Single-precision numbers can represent both enormous and microscopic values, they are limited to six digits of precision. In other words, Single-precision does a good job with figures like $451.21 and $6,411.92, but $671,421.22 cannot be represented exactly because it contains too many digits. Neither can 234.56789 or 0.00123456789. A Single-precision representation will come as close as it can in six digits: $671,421, or 234.568, or 0.00123457. Depending on your application, this rounding off can be a trivial or crippling deficiency. Like most modern compilers, PowerBASIC uses the IEEE standard for all floating-point arithmetic.

C/C++, Delphi, and Visual Basic all offer a single data type that is identical to the PowerBASIC Single-precision variable.

See Also

Currency (@) and Extended-currency (@@)

Double-precision floating-point (#)

Extended-precision floating-point (##)

Double-precision floating-point (#)

Double-precision floating-point (#)

Double-precision floating-point numbers are to Single-precision numbers what Long-integers are to Integers. They take twice as much space in memory (8 bytes versus 4 bytes), but have a greater range (+/- 4.19*10^-307 to 1.79*10^308) and a greater accuracy (15 to 16 digits of precision versus the 6 digits of Single-precision). A Double-precision, 5,000-element array requires 40,000 bytes. An Integer array with the same number of elements occupies only 10,000 bytes. The type-specifier character for a Double-precision floating-point is: #.

Double-precision variables are identified by following the variable name with a Number symbol (i.e., *var#*) or by using the DEFDBL statement as described in the previous discussion of Integers. You can also declare Double-precision variables using the DOUBLE keyword with the DIM statement. For example:

```
DIM I AS DOUBLE
```

C/C++, Delphi, and Visual Basic all offer a double data type that is identical to the PowerBASIC Double-precision variable.

See Also

- Array Data Types
- Bit Data Types
- Constants and Literals
- GUID Data Types
- Object Data Types
- Pointers
- User Defined Types
- Unions
- Variant Data Types

Extended-precision floating-point (##)

Extended-precision floating-point (##)

Extended-precision

numbers are the basis of computation in PowerBASIC. The type-specifier character for an Extended-precision floating-point is: ##. In PowerBASIC, all floating point calculations are performed in extended precision for maximum accuracy. Extended-precision has also been provided as a declarable variable type, so you can take advantage of its extra exponent range and precision.

Extended-precision variables require 10 bytes of storage each. They have a range of approximately +/- 3.4*10^-4932 to 1.2*10^4932, and offer 18 digits of precision. All 18 digits can be "displayed" using the extended STR$ format (eg, STR$(*var*##,18)).

Extended-precision variables are identified by adding two Number symbols following a variable name (i.e., *var*##) or by using the DEFEXT statement.. You can also declare Extended-precision variables using the EXT or EXTENDED keywords with the DIM statement. For example:

```
DIM I AS EXT
DIM J AS EXTENDED
```

See Also

- Array Data Types
- Bit Data Types
- Constants and Literals
- GUID Data Types
- Object Data Types
- Pointers
- User Defined Types
- Unions
- Variant Data Types

Currency (@) and Extended-currency (@@)

Currency variables are 8 byte binary representations of

numbers, which are considered to always have a fixed number of digits to the right of the decimal point. Currency numbers have a range of approximately -9.22*10^14 to +9.22*10^14, and Extended-currency have a range of -9.22*10^16 to +9.22*10^16.

The type-specifier character for Currency and Extended-currency floating-point is: @ and @@ respectively.

You can also use the DEFCUR or DEFCUX statement as described under Integers. They can also be declared using the CUR/CURRENCY or CUX/CURRENCYX keywords with the DIM statement. For example:

```
DIM I AS CUR
DIM J AS CURRENCYX
```

Currency variables (@) have up to 4 digits of precision after the decimal point, and are useful for prices and quantities where fractions of a cent are desired. Extended-currency variables (@@) have two digits of precision after the decimal point. They are optimized for financial calculations where fractions of a cent are *not* required.

The currency data types are especially useful for financial calculations, as they avoid the round-off errors associated with Single, Double, and Extended-precision numbers (which must be an exact power of two in order to be represented exactly). While many numbers can be represented exactly as a power of two, there are also many that cannot. For example, 1.10000002384185791 is the closest power of two to 1.1, in single precision.

So, when assigning numeric literal values to a Currency or Extended-currency variable, we recommend using a type specifier to ensure the value is given the intended precision. For example:

```
DIM x1 AS CUR
x1 = 1.0001@

DIM x2 AS CUX
x2 = 1.01@@
```

Internally, Currency and Extended-currency numbers are stored as Quad-integers with an implied decimal point (at 4 places for Currency, and at 2 places for Extended-currency). This approach ensures that all of the digits of the variables can be represented exactly.

Currency and Extended Currency perform a similar role as BCD variables in some BASIC dialects to ensure monetary values can be represented exactly; however, the internal storage of BCD variables and CUR/CUX differs substantially.

Delphi and Visual Basic both offer a *currency* data type that is identical to the PowerBASIC Currency variable.

See Also

- Array Data Types
- Bit Data Types
- GUID Data Types
- Object Data Types
- Pointers
- User Defined Types
- Unions
- Variant Data Types

String Data Types

Characters, Strings, and Unicode

Characters, Strings, and Unicode

A

consists of a set of zero or more characters. A character is an alphabetic letter, a number, a punctuation mark, or even non-printing control codes, which usually aid in formatting the text. On a computer, a character is represented by a specific number associated with it. For example, the character "A" is usually represented by the number 65, while the character "3" is usually associated with the number 51.

This representation is convenient, since a string of text characters can be readily stored as a series of small integral numbers. For example, the word "Hello" is stored as 72, 105, 108, 108, 111. Couldn't be any simpler. How are the numbers assigned and associated? It's just a matter of mutual consent by those who use them. As long as everyone agrees on the associations, the system works well. That said, we have experienced a certain amount of growing pains over the years. With the global growth of computer use, larger character sets are needed to represent the necessary characters. We have clearly reached the point where every programmer must consider alternate character sets for his applications. Failure to do so can carry severe penalties. When you find you can no longer read data files from an outside source, or can no longer read text from the Internet, it will be too late. The following sections describe the most-common and most-used character sets.

ASCII

ASCII was the first character set to be used on small computers. In fact, all of the other sets described here use ASCII codes as-is for a base. ASCII is a set of 128 characters, numbered from 0 to 127. It was designed for American English, so it defines only unaccented letters, numbers, punctuation, and control codes. As long as you only need English text, ASCII works fairly well.

ASCII needs just 7 bits of storage per character, so it was convenient to store each character in a byte. The last bit was simply ignored. Of course, that meant that the values from 128 to 255 were unused. That void wouldn't last long.

OEM

OEM is the acronym for "Original Equipment Manufacturer". IBM introduced the IBM PC in 1981. Along with it came their version of an expanded character set. It's been known as the OEM character set ever since. In fact, that character set is still the default for the Windows Console Device on the very latest version of Windows.

The first 128 characters are identical to ASCII. However, IBM decided to use the remaining 128 characters for other purposes. They defined them for the most common accented characters, line drawing characters, and special symbols and punctuation. Of course, this was an improvement, but many characters in non-English languages were unavailable. This led to new OEM character sets (German, Cyrillic...), with many different interpretations for that second set of character codes. Of course, this caused a good amount of confusion trying to understand the contents of strings from an external source. Not an ideal solution.

ANSI

Some time later, the ANSI character set evolved. Once again, the first 128 characters are the same as ASCII. But there are many ways to handle the second set. The decoding system, called "code pages", handles these items accurately, even if cumbersome. In reality, many languages need hundreds or thousands of characters. Clearly, the character codes can't possibly be squeezed into a byte. The solution? Multi-byte characters. Some characters are one byte, and some are more. If a particular character needs a multi-byte representation, a special ID byte is inserted, followed by the identifying data. A multi-byte character may consist of two, three, or even more bytes. That special ID byte determines what data will follow.

Multi-byte ANSI imposes a unique problem. You can't just scan your way through a string, byte-by-byte. Some characters are multi-byte! You must use care to treat them accurately, or your data will be destroyed. A word of warning... it's virtually impossible to scan backwards through a multi-byte string. That's because ANSI uses the same numeric values for both the ID byte, and the data which follows. When you look backwards and find an ID value, you can't tell if it's an ID or data. It just won't work well.

UNICODE

Unicode was created to represent every language into a single character set. While there are several Unicode formats, we'll concentrate on the only two varieties with real usage: UTF-8 and UTF-16. PowerBASIC uses UTF-16, which stores each character as a two-byte unsigned word. UTF-16 is used natively by Windows, COM, Visual Basic, Java, etc.

UTF-16 UNICODE

Just as before, the first 128 values represent ASCII characters. Other characters, primarily in non-English languages, have been assigned the higher values. At this time, and for the foreseeable future, UTF-16 is the character set of choice for all of your applications. It is the best way to store all of your data to keep it secure and understandable.

UTF-8 UNICODE

UTF-8 is somewhat of a hybrid between ANSI and UTF-16. It is used when the size of the text is of utmost importance. That makes it an obvious choice for downloading from the Internet. UTF-8 uses the same single byte characters for ASCII values. Further, it even uses the identical algorithm for multi-byte character, with one glowing exception: the ID byte and the data bytes are always unique! With that knowledge in hand, it is possible to scan backwards from any position. PowerBASIC does not support the use of UTF-8 within standard code. That's because UTF-8 is much slower in performance than UTF-16. That said, PowerBASIC does provide conversion functions to/from UTF-8, so you have it readily available for all of your Internet applications. UTF-8 files are byte orientated and should be opened as an ANSI file (CHR=ANSI).

See Also

- #OPTION metastatement
- ACODE$ function
- ChrToOem$ function
- ChrToUtf8$ function
- OemToChr$ function
- UCODE$ function
- UCODEPAGE statement
- Utf8ToChr$ function
- Dynamic (Variable-length) strings ($)
- FIELD strings
- Fixed-length strings
- Nul-Terminated Strings

Dynamic (Variable-length) strings ($)

Dynamic (Variable-length) strings ($) ($$)

Dynamic

variables (also known as variable-length) may contain an arbitrary number of characters. Internally, each variable uses four bytes that contain a handle number, which is used to identify and locate information about the string. The type-specifier character is $ for an ANSI dynamic string, or $$ for a wide Unicode string.

String variables are automatically declared when the variable name is followed by one or two dollar signs ($). You can also declare dynamic string variables using the STRING or WSTRING keywords with the DIM statement. For example:

```
DIM MyStr AS WSTRING
```

PowerBASIC allocates strings using the Win32 OLE string engine. This allows you to pass strings from your program to DLLs, or API calls that support OLE strings. The address of the contents of a non-empty string can be obtained with the STRPTR function. The address of the string handle can be obtained with VARPTR function. An empty (null) string may not return a valid STRPTR value. Dynamic strings move in memory with each assignment statement: that is, STRPTR will return a different address when the content of the string is changed. However, the associated string handle obtained by VARPTR stays constant for the duration of the life (scope) of the string variable.

LOCAL dynamic string memory and handles are released when the associated Sub, Function, Method, or Property ends. Subsequent calls to a routine will result in new storage locations for both the handle and the string data. The address of the handle of a STATIC or GLOBAL dynamic string stays constant for the duration of the module. Dynamic strings and field strings cannot be part of UDT (User-Defined Type) or UNION structures. In C/C++, a dynamic wide string ($$) is referred to as a BSTR data type.

See Also

Nul-Terminated Strings

FIELD strings

Fixed-length strings

String expressions

FIELD strings

FIELD strings

Field strings are a special form of dynamic string, which have all the capabilities of a dynamic string, but may also represent a defined part of a random file buffer or a defined part of a dynamic string.

Field strings must always be declared using DIM, INSTANCE, LOCAL, STATIC, GLOBAL, or THREADED. They may be used in the same manner as a dynamic string variable, or they can be bound to a file buffer for an *open* random-access file *or* a dynamic string using a corresponding FIELD statement. Each field string occupies sixteen bytes of memory, and requires slightly more general overhead than a regular dynamic string variable. As with other strings, FIELD variables may be declared as either ANSI characters (FIELD) or wide, Unicode characters (WFIELD).

When used with a file

A random-access file buffer is automatically created for use when GET or PUT statements are used without a target variable. In this case, the file data is read or written using this file buffer, and the buffer is accessed with one or more field strings.

If a field is defined by a single field (*nSize*) parameter, it represents the length of the field, with the start position implied by the preceding field within the statement. If two parameters are used, they represent the start (*nStart*) and end (*nEnd*) positions, indexed to one.

If a string value shorter than the declared size is assigned to a field string, it is padded with blank spaces and placed into the file buffer. There is no requirement to use LSET for assignment. When used with a file buffer, the field string is only valid when the nominated file is open. Once the file has been closed, field strings bound to the file buffer will be empty (zero length), rather than a string of the length defined in the FIELD statement. For example:

```
LOCAL fld1, fld2, fld3 AS FIELD
OPEN "test.dat" FOR RANDOM AS #1 LEN = 30
FIELD #1, 5 AS fld1, 10 AS fld2, 15 AS fld3
fld1 = "Bob"       ' Stores "Bob  "
CSET fld2 = "Zale" ' Stores "   Zale   "
RSET fld3 = "#1"   ' Stores "             #1"
? STR$(LEN(fld1))  ' Displays 5
? STR$(LEN(fld2))  ' Displays 10
? STR$(LEN(fld3))  ' Displays 15
CLOSE #1
? STR$(LEN(fld1))  ' Displays 0
```

When used with a dynamic string

A field variable bound to a dynamic string works very much like a

, so the programmer must use care in field variable selection. For example, if you bind a GLOBAL FIELD variable to a LOCAL string variable, then attempt to reference the global string after the local is destroyed (i.e., released when the owning Sub/Function/Method/Property exits), a fatal exception error (GPF) is likely to occur. The same could happen after an array has been erased, or a REDIM is used to change the memory allocation. To avoid problems with scope, it is suggested that field variables be bound only with strings within the same scope (LOCAL, GLOBAL, etc.).

In addition, the dynamic string must contain data for the bound field strings to reference the data. For example:

```
LOCAL x$, sFirst AS FIELD, sSecond AS FIELD
FIELD x$, 3 AS sFirst, 3 AS sSecond
x$ = ""
? STR$(LEN(sFirst))  ' Displays 0 since x$ is empty
x$ = SPACE$(6)       ' Allocate data to the string
sFirst = "111"
sSecond = "222"
? STR$(LEN(sFirst))  ' Displays 3 as x$ now contains data
```

Field strings and dynamic strings cannot be part of UDT (User-Defined Type) or UNION structures.

See Also

Nul-Terminated Strings

Dynamic (Variable-length) strings ($)

Fixed-length strings

String expressions

Fixed-length strings

Fixed-length strings

As their name implies, fixed-length

 have a pre-defined length, and any attempt to assign a string longer than the defined length will result in truncation. If you assign a string to a fixed-length string that is shorter than the defined length, the string will be padded on the right with spaces. The major difference between dynamic strings and fixed-length strings is that once defined, the length of a fixed-length string cannot be changed. It is "fixed" for the duration of program execution.

You declare fixed-length string variables using STRING * x (for ANSI characters) or WSTRING * x (for WIDE characters). For example

```
DIM MyStr1 AS STRING  * 10  ' occupies 10 bytes
DIM MyStr2 AS WSTRING * 10  ' occupies 20 bytes
```

The declared length refers to the number of characters, not the number of bytes. Unlike dynamic strings, the length of fixed-length strings is determined at compile-time, not run-time. In addition, unlike dynamic strings, fixed-length strings do not use handles. When you pass a fixed-length string to a

as a parameter, you are actually passing a to the string data.

In PowerBASIC (and most versions of BASIC), new fixed-length strings (and all variables) are initialized by filling with nuls, CHR$(0). When you assign a value, that text is padded to the right with the fill character, which defaults to a space).

A declaration of a fixed-length string or fixed-length string pointer must explicitly state the length of the variable, because the compiler must know it to allocate memory, and to pad the variable with spaces upon assignment.

The address of the contents of a fixed length string can always be obtained with the VARPTR function. LOCAL fixed-length string memory is released when the associated Sub, Function, Method, or Property ends. Subsequent calls to the routine will result in new storage locations for the fixed-length string data; however, the location of a LOCAL fixed-length string does not move until the string memory is released when the routine terminates.

LOCAL fixed-length strings are created on the stack frame, so LOCAL fixed-length strings will be limited to available stack space. Typically this is less than 1 MB unless a larger stack frame has been allocated with the #STACK metastatement. If larger fixed-length strings are required, it is advisable to make them INSTANCE, STATIC, or GLOBAL, since those are not created within the stack frame.

The address of the contents of STATIC and GLOBAL fixed-length strings stays constant for the duration of the module. STATIC and GLOBAL Scalar (non-array) fixed-length strings may be up to 16,777,216 bytes each.

See Also

- Nul-Terminated Strings
- Dynamic (Variable-length) strings ($)
- FIELD strings
- String expressions

Nul-Terminated Strings

Nul-Terminated Strings

A Nul-Terminated

is called a STRINGZ with ANSI characters, or WSTRINGZ with WIDE, Unicode characters. When declared with ANSI characters, they are commonly known as ASCIIZ strings. You can think of NulTerm strings as fixed-length strings where the last character is always a nul (binary zero) terminator. This allows the data to be variable length, but only up to a predefined maximum. Any attempt to assign a string longer than the defined length will result in truncation.

If you assign a string that is shorter than the defined length, the string will not be padded on the right. The contents of the remainder of the string buffer are undetermined. Because a NulTerm string requires a NUL terminator, they are usually defined with a length of at least two characters.

You declare STRINGZ variables using the STRINGZ or WSTRINGZ keywords with the DIM statement. For example:

```
DIM MyStr1 AS STRINGZ * 40
DIM MyStr2 AS WSTRINGZ * 40
```

This creates a 40 byte STRINGZ (ASCIIZ) string named MyStr1, and an 80 byte WSTRINGZ string named MyStr2. The declared size always refers to the number of characters, not the number of bytes. The number of characters you can actually store is always one less than the defined length of the string. One character position is used to hold the NUL terminator. Therefore, MyStr1 and MyStr2 can each hold up to 39 characters.

When assigning string data to a NulTerm string, the assignment will stop if an embedded CHR$(0) (nul) is encountered. For example:

```
DIM a AS STRING
DIM b AS STRINGZ * 10
a = "ABC" + CHR$(0) + "DEF"
b = a  ' b will contain "ABC"
```

Like Fixed-Length strings, the length of NulTerm strings is determined at compile-time, not run-time. In addition, unlike dynamic strings, NulTerm strings do not use handles. When you pass a NulTerm string to a

as a parameter, you are actually passing a pointer to the string data.

The address of the contents of a NulTerm string can always be obtained with the VARPTR function. LOCAL NulTerm string memory is released when the enclosing procedure ends. Subsequent calls to the procedure will result in new storage locations for them. However, the location of a LOCAL STRINGZ or WSTRINGZ does not move until the string memory is released when the procedure terminates.

LOCAL NulTerm strings are created on the stack frame, so they will be limited to the available stack space. Typically this is less than 1MB, unless a larger stack frame has been allocated with the #STACK metastatement. If larger NulTerm strings are required, it is advisable to make them INSTANCE, STATIC or GLOBAL since those are not created within the stack frame.

The address of STATIC and GLOBAL NulTerm strings stays constant for the duration of the module. STATIC and GLOBAL Scalar (non-array) NulTerm strings may be up to 16,777,216 bytes each.

See Also

Dynamic (Variable-length) strings ($)

FIELD strings

Fixed-length strings

String expressions

String expressions

String expressions

A string expression consists of string literals,

, and string functions, optionally combined with the concatenation operators (+ or &). String expressions always produce strings as their result. Note that when the ampersand (&) is used as a string concatenation operator, it must be surrounded by white space, to differentiate it from the Long-integer type-specifier (i.e., *LongVar&*) and the number base prefix (i.e. &H0FF, &O77). Examples of string expressions include:

```
"Cats and dogs"               ' string constant
firstname$                    ' string variable
firstname$ + lastname$        ' string concatenation
a$ = "Cats " & "and " & "dogs" ' string concatenation
LEFT$(a$ + z$,7)              ' string function
a$ + MID$("Cats and dogs",5,3)
RIGHT$(MID$(a$ + z$,1,6),3)
```

Note that fixed-length strings are always a fixed length (defined in the corresponding DIM statement), string concatenation involving these strings works differently than you might expect. For instance, the following program fragment:

```
DIM Greeting AS STRING * 40
Greeting = "hello"
Greeting = greeting + "there"
```

This appends (adds) the five-character string "*there*" to the 40-character fixed-length string ("*hello*", followed by 35 spaces), but the result is truncated to 40 characters (the predefined length of the string variable Greeting), which causes the newly appended string to be lost. One solution to this problem is to use the RTRIM$ function to remove the trailing spaces from "*hello*" before appending "*there*":

```
DIM Greeting AS STRING * 40
Greeting = "hello"
Greeting = RTRIM$(Greeting) + " there"
```

Variables of user-defined types may be used as string operands without any need to specify the individual UDT members:

```
TYPE MyType
  ItemOne AS STRING * 10
  ItemTwo AS STRING * 10
END TYPE
DIM SomeData AS MyType
SomeData.ItemOne = "hello"
SomeData.ItemTwo = "world!"
X$ = "Look at this!" + $CRLF + SomeData
```

See Also

Nul-Terminated Strings

Dynamic (Variable-length) strings ($)

FIELD strings

Fixed-length strings

String Operations

String Operations Commands

String Operations

The following functions manipulate and manage data:

ACODE$	Translate a Unicode string into an ANSI string.
ARRAY ASSIGN	Assign a number of values to successive elements of an array.
ARRAY DELETE	Delete a single item from a given array.
ARRAY INSERT	Insert a single item into a given array.
ARRAY SCAN	Scan all or part of an array for a given value.
ARRAY SORT	Sort all or part of a given array.
BIN$	Return a string with the binary (base 2) representation of a value.
BITS$	Copies string contents without modification.
BUILD$	Concatenate multiple strings with high efficiency.
CHOOSE$	Return one of several values, based upon the value of an index.
CHR$	Convert one or more character codes into ASCII character(s).
CHR$$	Convert one or more character codes into Unicode character(s).
CHRBYTES	Determine the size of a single character in a string variable.
ChrToOem$	Translates a string of ANSI/WIDE characters to OEM byte characters.
ChrToUtf8$	Translates a string of ANSI/WIDE characters to UTF-8 byte characters.

CLIP$	Deletes characters from a string.
CLSID$	Return a 16-byte (128-bit) GUID string containing a CLSID.
COMM LINE	Receive a CR/LF terminated "line" of data from a serial port.
COMM PRINT	Send a "line" of binary data through a serial port.
COMM RECV	Receive binary data from a serial port.
COMM SEND	Send a string of binary data through a serial port.
COMMAND$	Return the command-line used to start the program.
CSET	Center a string within the space of another string or UDT.
CSET$	Return a string containing a centered (padded) string.
CURDIR$	Return the current directory for a given drive.
DATA	Declare an array of constants to be read by READ$.
DATACOUNT	Return the total count of the number of local data items.
DATE$	Set and retrieve the system date.
DEC$	Convert an integral value to a decimal string.
DIM	Declare and dimension arrays, scalar variables, and pointers.
DIR$	Return a filename that matches the given mask.
DIR$ CLOSE	Force the release the operating system FindNext handle.
ENVIRON	Modify the current program's environment table..
ENVIRON$	Retrieve strings from the operating system's environment table.
ERASE	Deallocate array memory.
ERL$	Return the last label, line number, or procedure name executed prior to the most recent
ERROR$	Return a string containing the descriptive name of an error.
EXTRACT$	Return up to the first occurrence of a specified character.
EXE	Return the path and/or name of the executing program.
FIELD	Bind a field string variable to a particular sub-section of a random file buffer or a dynamic variable.
FIELD RESET	Reset the FIELD string to a nul (zero-length) dynamic string.
FIELD STRING	Change the FIELD string to a dynamic string, but first assigns the current sub-section
FILENAME$	Return the file-system name of an open file.
FORMAT$	Return a string containing formatted numeric data.
FUNCNAME$	Return the name of the current Sub/Function/Method/Property.
GET	Read a record from a random-access file.
GET$	Read a string from a file opened in binary mode.
GET$$	Reads WIDE string data from a file opened in binary mode.
GRAPHIC SPLIT	Splits a string into two parts for display on a graphic target.
GUID$	Return a 16-byte (128-bit) Globally Unique Identifier GUID.
GUIDTXT$	Return a 38-byte human-readable GUID/UUID string.
HEX$	Hexadecimal (base 16) string representation of an argument.
IIF$	Return one of two values based upon a True/False evaluation.
INPUT#	Load variables with data from a sequential file.
INPUTBOX$	INPUTBOX$ displays a dialog box containing a prompt.
INSTR	Search a string for the first occurrence of a character or string.
ISNOTNULL	Determine if a string is not nul (contains 1 or more characters).
ISNULL	Determine if a string is nul (zero-length).
IStringBuilderA.Add	Appends an ANSI string to the object.
IStringBuilderA.Capacity <Get>	Retrieves the size of the internal buffer.
IStringBuilderA.Capacity <Set>	Sets the size of the internal buffer.
IStringBuilderA.Char <Get>	Returns the numeric character code of the character at the specified position.
IStringBuilderA.Char <Set>	Changes the numeric character code of the character at the specified position.
IStringBuilderA.Clear	All data in the object is erased.
IStringBuilderA.Delete	Deletes a specified number of characters starting at a specified position.
IStringBuilderA.Insert	Inserts a string at a specified position.
IStringBuilderA.Len	Returns the number of characters stored in the object.
IStringBuilderA.String	The ANSI string stored in the object is returned to the caller.
IStringBuilderW.Add	Appends an WIDE string to the object.
IStringBuilderW.Capacity <Get>	Retrieves the size of the internal buffer.

IStringBuilderW.Capacity <Set>	Sets the size of the internal buffer.
IStringBuilderW.Char <Get>	Returns the numeric character code of the character at the specified position.
IStringBuilderW.Char <Set>	Changes the numeric character code of the character at the specified position.
IStringBuilderW.Clear	All data in the object is erased.
IStringBuilderW.Delete	Deletes a specified number of characters starting at a specified position.
IStringBuilderW.Insert	Inserts a string at a specified position.
IStringBuilderW.Len	Returns the number of characters stored in the object.
IStringBuilderW.String	The WIDE string stored in the object is returned to the caller.
JOIN$	Return a string consisting of all of the strings in a string array.
LCASE$	Return a lowercase version of a string argument.
LEFT$	Return the left-most *n* characters of a string.
LEN	Return the logical length of a variable, UDT, or Union.
LET	Assign a value to a variable.
LET (with Types)	Assign data to a user-defined type variable.
LET (with Variants)	Assign a value or an object reference to a variant variable.
LINE INPUT#	Read line(s) from a sequential file into a string variable or array.
LPRINT	Output text and data to a printer device.
LPRINT$	Return the current printer device used for LPRINT operations.
LSET	Left-align a string within the space of another string or UDT.
LSET$	Return a string containing a left-justified (padded) string.
LTRIM$	Return a string with leading characters or strings removed.
MAX$	Return the argument with the largest (maximum) value.
MCASE$	Return a mixed case version of a string argument.
MID$	Return a portion of a string.
MID$	Replace characters in a string with characters from another string.
MIN$	Return the argument with the smallest (minimum) value.
MKBYT$	Convert a Byte value into a binary encoded string.
MKCUR$	Convert a Currency value into a binary encoded string.
MKCUX$	Convert an Extended Currency value into a binary encoded string.
MKD$	Convert a Double-precision value into a binary encoded string.
MKDWD$	Convert a Double-word value into a binary encoded string.
MKE$	Convert an Extended-precision value into a binary encoded string.
MKI$	Convert a integral value into a binary encoded string.
MKL$	Convert a Long-integer value into a binary encoded string.
MKQ$	Convert a Quad-integer value into a binary encoded string.
MKS$	Convert a Single-precision value into a binary encoded string.
MKWRD$	Convert a Word value into a binary encoded string.
MKDIR	Create a subdirectory/folder (like the DOS MKDIR command).
NUL$	Return a string containing a specified number of $NUL characters.
OBJRESULT$	Returns a string which describes an OBJRESULT (hResult) code.
OCT$	Return a string that is a octal (base 8) representation of a value.
OemToChr$	Translates a byte string of OEM characters into ANSI/WIDE characters.
PARSE	Parse a string and extract all delimited fields into an array.
PARSE$	Return a delimited field from a string expression.
PARSECOUNT	Return the count of delimited fields in a string expression.
PATHNAME$	Parse a path/file name to extract component parts.
PATHSCAN$	Find a file on disk and return the path and/or file name parts..
PEEK$	Returns consecutive 1-byte characters starting at a specific memory location.
PEEK$$	Returns consecutive 2-byte wide characters starting at a specific memory location.
POKE$	Store a sequence of bytes starting at a specific memory location.
POKE$$	Store a sequence as 2-byte wide characters starting at a specific memory location.
PRINT#	Write a complete array to a sequential file.
PROGID$	Return the alphanumeric PROGID string (text) of a given CLSID.
PUT	Write a record to a random-access file or variable to a binary file.
PUT$	Writes an ANSI string to a file opened in binary mode.
PUT$$	Writes a WIDE Unicode string to a file opened in binary mode.

READ$	Retrieve string data from a local DATA list.
REGEXPR	Scan a string for a matching "wildcard" or regular expression.
REGREPL	Scan a "wildcard" match in a string with a new string.
REMAIN$	Returns the portion of a string which follows the first occurrence of a character or group
REMOVE$	Return a copy of a string with characters or strings removed.
REPEAT$	Return a string consisting of multiple copies of a specified string.
REPLACE	Replace all occurrences of one string with another string.
RESET	Clear a string, string array subscript, or an entire array.
RESOURCE$	Returns predefined resource data.
RETAIN$	Return a string with all non-specified characters removed.
RIGHT$	Return the rightmost *n* characters of a string.
RSET	Right justify a string into the space of a string variable or UDT.
RSET$	Return a string containing a right-justified (padded) string.
RTRIM$	Return a copy of a string with trailing characters/strings removed.
SHRINK$	Shrinks a string to use a consistent single character delimiter.
SIZEOF	Return the total or physical length of any PowerBASIC variable.
SPACE$	Return a string consisting of a specified number of spaces.
SPLIT	Splits a string into two parts.
STR$	Return the string representation of a number in printable form.
STRDELETE$	Delete a specified number of characters from a string expression.
STRING$	Returns an ANSI string consisting of multiple copies of a specified character.
STRING$$	Returns a WIDE string consisting of multiple copies of a specified character.
STRINSERT$	Insert a string at a specified position within another string.
STRPTR	Return the address of the data held by a variable length string.
STRREVERSE$	Reverse the contents of a string expression.
SWAP	Exchange the values of two strings, pointers, or pointer targets.
SWITCH$	Return one item of a series based upon a True/False evaluation.
TAB$	Return a string with TAB characters expanded with spaces.
TALLY	Count the number of occurrences of specified characters/strings.
TIME$	Read and/or set the system time.
TRIM$	Return a string with leading and trailing characters removed.
TYPE SET	Assign the value of a UDT or string expression to a UDT.
UCASE$	Return an all-uppercase (capitalized) version of a string.
UCODE$	Translate an ANSI string into a Unicode string.
UCODEPAGE	Set the default codepage used for ANSI / UNICODE conversions.
UNWRAP$	Removes paired characters from the beginning and end of a string.
USING$	Format string/numeric expressions using a mask string.
Utf8ToChr$	Translates a byte string of OEM characters into ANSI/WIDE characters.
VAL function	Returns the equivalent of a string argument.
VAL statement	Converts a text string to a numeric value with additional information.
VARIANT$	Returns the ANSI dynamic string contained in a Variant variable.
VARIANT$$	Returns the Unicode dynamic string contained in a Variant variable.
VARPTR	Return the 32-bit address of a string handle.
VERIFY	Determine if each character of a string is in another string.
WRAP$	Adds paired characters to the beginning and end of a string.

Array Data Types

Array Data Types

Array Data Types

It is often useful to treat a set of variables as a group. This lets you perform repetitive operations more easily. An array is a group of or data sharing the same variable name. The individual values that make up an array are called elements. An element of an array can be used in a statement or expression wherever you would use a regular string or numeric variable. In other words, each element of an array is itself a variable.

PowerBASIC provides several statements that perform operations on an array as a whole, allowing you to sort its contents, scan its contents for data that matches a certain condition, and insert data into or delete data from the existing structure.

You can think of an array as a row of boxes, numbered from zero to a predetermined number: four, in the example figure below. Each box holds a distinct value, which may or may not differ from the values in the other boxes. The boxes and their numbers are represented by parentheses surrounding a number; for example, *item%(3)* represents box number three of the array *item%*. Thus, if the *value* held within box number 3 is 1952, the statement *total%=item%(3)* would place the value 1952 into the variable *total%*.

item%(n)

item%(0)	item%(1)	item%(2)	item%(3)	item%(4)
50	10	-5	1952	104

Dimensioning a dynamic array with DIM or REDIM also clears each element, unless the PRESERVE option is present. Each element of each numeric array is set to zero; string arrays are set to the null string ("", length zero). Declaring the name and type of an array, as well as the number and organization of its elements, is performed by the DIM statement. For example:

```
DIM payments(55) AS CURRENCYX
```

…creates an array variable *payments*, consisting of 56 Extended-currency elements, numbered 0 through 55. Array *payments* and an Extended-currency variable also named *payments* are separate variables. If this is confusing, you'll understand why we suggest that you use different variable names.

See Also

Subscripts

String arrays

Multidimensional arrays

Array storage requirements

Internal representations of arrays

Arrays within User-Defined Types

Array operations

POWERARRAY Object

Subscripts

Subscripts

Individual array elements are selected with subscripts or index numbers, which are Long-integer expressions within parentheses to the right of an array variable's name. For example, *payments*(3) and *payments*(44) are two of *payments* 56 elements. Normally, the first element of an array has a subscript value of zero, although this can be changed with the DIM statement. Some examples follow:

```
' This DIM statement declares a 56-element array
' with subscript bounds of 0 TO 55.
DIM payments1(55) AS CURRENCY

' This DIM statement declares a 56-element array
' with subscript bounds of 1 TO 56
DIM payments2(1 TO 56) AS CURRENCYX
```

You must DIM all arrays before you can use them. This is a different approach then that used by some

BASIC dialects, which assume that an array contains 10 elements (0 to 9) if the array is not explicitly dimensioned.

PowerBASIC allows you to define a range of subscript values rather than just setting an upper limit. The statement:

```
DIM clouds(50 TO 60, 25 TO 45) AS LONG
```

creates the two-dimensional Long-integer array named *clouds*, containing 231 (11 * 21) elements. PowerBASIC's subscript range declaration capability allows you to model a programs data structures more closely to the problem at hand.

For example, consider a program tracking 19th-century birth statistics. This program's central data structure is a Long-Integer array of 100 elements that contain the number of babies born in each year of the last century. Ideally, you would create an array that used subscript values equal to the year in which the births occurred (for example, *births*(1851) represents how many babies came into the world in 1851), so that a code passage like:

```
DIM births(1899) AS LONG
FOR year& = 1800 TO 1899
  INCR Total&, births(year&)
NEXT year&
```

would be as straightforward as possible. Unfortunately, DIM births(1899) AS LONG creates a 1900-element array (from 0 to 1899), of which the first 1800 are wasted. Traditionally, BASIC programmers have tackled this problem by declaring the array as:

```
DIM births&(99)
```

and by playing games with subscripts:

```
FOR year& = 1800 TO 1899
  INCR Total&, births&(year&-1800)
NEXT year&
```

While this sort of thing works, it complicates things and slows programs down because suddenly there are 100 subtractions that weren't there before. It's better to declare a range, like this:

```
DIM births&(1800 TO 1899)' array births has subscripts
                         ' ranging from 1800 to 1899
FOR year& = 1800 TO 1899
  Total& = Total& + births&(year&)
NEXT year&

DIM birth1&(99)       ' Array has 100 elements from 0 TO 99
DIM birth2&(1 TO 99) ' Array has  99 elements from 1 TO 99
DIM birth3&(3 TO 99) ' Array has  97 elements from 3 TO 99
```

See Also

[Array Data Types]

[String arrays]

[Multidimensional arrays]

[Array storage requirements]

[Internal representations of arrays]

[Arrays within User-Defined Types]

[Array operations]

[POWERARRAY Object]

String arrays

String arrays

The elements of

arrays hold strings instead of . Each string can be a different length. For example DIM words$(50) creates a sequence of 51 independent string variables:

```
DIM words$(50)
words$(0) = "Daniel likes cats."      ' 18-character string
words$(1) = ""                        ' a null string
words$(2) = "Nicki is a sweet child." ' 23-character string
' assign more array values here
words$(50) = SPACE$(200)              ' 200-character string
```

See Also

- Array Data Types
- Multidimensional arrays
- Array storage requirements
- Internal representations of arrays
- Arrays within User-Defined Types
- Array operations
- POWERARRAY Object

Multidimensional arrays

Multidimensional arrays

Arrays can have one or more dimensions, up to a maximum of eight. A one-dimensional array such as payments is a simple list of values. A two-dimensional array represents a table of numbers with rows and columns of information. Some examples of multidimensional arrays are:

```
DIM one!(15)        ' a one-dimensional list
DIM two!(15,20)     ' a two-dimensional table
DIM three!(7,9,1)   ' an 8 by 10 game board with room in the third
                    ' dimension for 2 items: piece type and color
```

Arrays of four to eight dimensions are possible, but they become more difficult to conceptualize and keep straight. You can define:

```
DIM five%(5,5,10,20,3)  ' a five-dimensional array
```

…but it's probably better to redesign this array into several smaller ones with fewer dimensions, or use an array of User-Defined Types.

See Also

- Array Data Types
- Subscripts
- String arrays
- Array storage requirements
- Internal representations of arrays
- Arrays within User-Defined Types
- Array operations

[POWERARRAY Object]

Array storage requirements

Array storage requirements

A PowerBASIC [array] may contain up to 4,294,967,295 elements, and the data may occupy as much as all available memory. However, all individual index numbers must fall within the range of a Long-integer variable (-2,147,483,648 to +2,147,483,647).

PowerBASIC stores array data in main memory for all array types (including [LOCAL] arrays). Therefore, there is no arbitrary array size limit imposed by the amount of free [stack] space, such as can be experienced with large LOCAL [nul-terminated], and [Fixed-length string] variables. The availability of main memory is the prime consideration (typically up to 2 Gb can be used). However, LOCAL arrays do require the storage of around 128 bytes on the stack for the array descriptor table.

See Also

- [Array Data Types]
- [Subscripts]
- [String arrays]
- [Multidimensional arrays]
- [Internal representations of arrays]
- [Arrays within User-Defined Types]
- [Array operations]
- [POWERARRAY Object]

Internal representations of arrays

Internal representations of arrays

PowerBASIC stores [arrays] in column-major order: *Array*(0,0) is first (lowest) in memory, then *Array*(1,0), then *Array*(2,0), and so on through all the rows of the array. After the rows are taken care of, the next column is stored.

While PowerBASIC supports lower boundary values that are non-zero, PowerBASIC generates the most efficient code if the lower boundary parameter is omitted (i.e., the array uses the default lower boundary of zero).

Array boundary values can be obtained at run-time via the [LBOUND] and [UBOUND] functions. Descriptive attributes of an array can be retrieved with the [ARRAYATTR] function. These attributes include such information as the

and the number of [dimensions], etc.

See Also

- [Array Data Types]
- [Subscripts]
- [String arrays]

[Multidimensional arrays](#)

[Array storage requirements](#)

[Arrays within User-Defined Types](#)

[Array operations](#)

[POWERARRAY Object](#)

Arrays within User-Defined Types

Arrays within User-Defined Types

In prior versions of this compiler, arrays could not be part of a UDT structure. However, we now support both one and two-dimensional arrays of variables that have a fixed-length (for each element) - this includes nul-terminated strings, fixed-length strings, and all numeric variable classes. Individual arrays within a UDT may be up to 16 Megabytes each (although UDTs themselves are limited to 16 Megabytes).

Two-dimensional arrays within Types work exactly as do any other array in PowerBASIC, except that their dimensions are specified by positive numeric constant values, and are therefore not dynamically alterable. That is, the dimension sizes must be specified with numeric equates or numeric literal values, and these cannot be altered at run-time.

Like conventional arrays, the default lower array boundary is zero, but positive non-zero values may be used to specify a specific range of subscript index values for the array, separated from the upper array boundary subscript with the TO keyword. Additionally, both the lower and upper subscript index values must be zero or greater (ie, negative subscript values are not permitted). Examples of valid syntax follow:

```
TYPE MYTYPE
  id AS INTEGER             ' Scalar UDT member
  Styles(6)         AS DWORD '  7 elements (0 TO 6)
  Yrs(1980 TO 2010) AS LONG  ' 31 elements
  Team(100 TO 101)  AS BYTE  '  2 elements
  Rating(1 TO 10)   AS DWORD ' 10 elements
  X(1 TO 5, 0 TO 5) AS EXT   ' 30 elements (5x6)
  Y(4,3)            AS QUAD  ' 20 elements (5x4)
END TYPE
```

See Also

[Array Data Types](#)

[Subscripts](#)

[String arrays](#)

[Multidimensional arrays](#)

[Array storage requirements](#)

[Internal representations of arrays](#)

[Array operations](#)

[POWERARRAY Object](#)

Array operations

Array Operations

The following functions can be used to manipulate and manage arrays:

#DEBUG ERROR	Control generation of error checking code
#DIM	Specify if variables must be declared before use
ARRAY ASSIGN	Assign a number of values to successive elements of an array
ARRAY DELETE	Delete a single item from a given array
ARRAY INSERT	Insert a single item into a given array
ARRAY SCAN	Scan all or part of an array for a given value
ARRAY SORT	Sort all or part of a given array
ARRAYATTR	Return descriptive attributes of a given array
BIT CALC	Set or reset a bit in an implied bit-array
BIT	Return the value of a particular bit in an implied bit-array
BIT	Manipulate individual bits of an implied bit-array
DATA	Declare an array of constants to be read by READ$
DATACOUNT	Return the total count of the number of local data items
DIM	Declare and dimension arrays, scalar variables, and pointers
ERASE	Deallocate array memory
FILESCAN	Rapidly scan an open file, before loading into an array with GET
GET	Read a complete array from a binary file
IPowerArray.ARRAYBASE	Returns the address of the first element of the array.
IPowerArray.ARRAYDESC	Returns the address of the SAFEARRAY descriptor.
IPowerArray.ARRAYINFO <Get>	Retrieves the info string, if one is present.
IPowerArray.ARRAYINFO <Set>	Assigns the info string.
IPowerArray.CLONE	An exact duplicate of the SafeArray is created, and stored in the specified PowerArray object.
IPowerArray.COPYFROMVARIANT	An exact copy is made of the specified SafeArray and stored in this PowerArray object.
IPowerArray.COPYTOVARIANT	An exact copy is made of the SafeArray in this object and stored in the specified Variant.
IPowerArray.DIM	Dimensions (creates) a new array.
IPowerArray.ELEMENTPTR	Retrieves the address of the specified data element.
IPowerArray.ELEMENTSIZE	Retrieves the storage size (in bytes) of each data element of the array.
IPowerArray.ERASE	Destroys the contained array and empties the object.
IpowerArray.LBOUND	Retrieves the lower bound number for the dimension specified.
IPowerArray.LOCK	Increments the lock count of the SAFEARRAY.
IPowerArray.MOVEFROMVARIANT	Transfers ownership of the specified SafeArray to the PowerArray object.
IPowerArray.MOVETOVARIANT	Transfers ownership of the SafeArray contained in this PowerArray object to a variant parameter.
IPowerArray.REDIM	Allows the SafeArray to be erased and re-dimensioned to a new size.
IPowerArray.REDIMPRESERVE	Allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved.
IPowerArray.RESET	All elements in the SafeArray are set back to their initial, default value.
IPowerArray.SUBSCRIPTS	Retrieves the number of dimensions (subscripts) for this array.
IPowerArray.UBOUND	Retrieves the upper bound number for the dimension specified.
IPowerArray.UNLOCK	Decrements the lock count of the SAFEARRAY.
IPowerArray.VALUEGET	Retrieves the value of the specified array element.
IPowerArray.VALUESET	Assigns the specified value to the specified array element.
IPowerArray.VALUETYPE	Retrieves the %VT code which describes the data contained in this array.
JOIN$	Return a consisting of all of the strings in a string array

LBOUND	Return the lowest subscript of an array's specific dimension
LET	Assign a Variant to an array or an array to a Variant
LINE INPUT#	Read line(s) from a sequential file into a string variable or array
MAT	Matrix calculations on arrays
PARSE	Parse a string and extract all delimited fields into an array
PRINT#	Write a complete array to a sequential file
PUT	Write a complete array to a binary file
READ$	Retrieve string data from a local DATA list
REDIM	Declare dynamic arrays, allocate, reallocate, deallocate memory
RESET	Set an array subscript or an entire array to zero or null/empty
UBOUND	Return the highest subscript of an array's specific dimension

POWERARRAY Object

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose

The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2       %vt_ui4          = 19
%vt_i4          = 3       %vt_i8           = 20
%vt_r4          = 4       %vt_int          = 22
%vt_r8          = 5       %vt_uint         = 23
%vt_cy          = 6       %vt_ptr          = 26
%vt_date        = 7       %vt_userdefined  = 29
%vt_bstr        = 8       %vt_filetime     = 64
%vt_dispatch    = 9       %vt_astr         = 201
%vt_bool        = 11      %vt_stringfix    = 203
%vt_variant     = 12      %vt_wstringfix   = 204
%vt_unknown     = 13      %vt_stringz      = 205
%vt_decimal     = 14      %vt_wstringz     = 206
```

```
%vt_i1          = 16          %vt_type        = 211
%vt_ui1         = 17          %vt_ext         = 221
%vt_ui2         = 18          %vt_curx        = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds                TYPE PowerBound
  Elements1 AS LONG               Elements AS LONG
  LowBound1 AS LONG               LowBound AS LONG
  Elements2 AS LONG             END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

User-Defined Types and Unions

User-Defined Types (UDTs)

User-Defined Types (UDTs)

Arrays are useful when you need to treat a set of similar variables as a unit. For instance, ten test scores or ten student names. But what if you need to store several unrelated data types and be able to treat *them* as a unit? That is where User-Defined Types come in. When you define a User-Defined Type (UDT), you are actually defining a template for a new variable Type.

Once created, you can define as many variables of your new Type as you please. Moreover, since User-Defined Types can be associated with a random file's buffer, this provides you with a whole new way to access your random files.

PowerBASIC's User-Defined Type is similar to a C struct or Pascal record. The elements of a User-Defined Type may include any of PowerBASIC's data types, with the exception of dynamic (variable-length) strings, field strings, and *arrays* of dynamic strings.

To get an idea of the power of the User-Defined Type, imagine you are a teacher who needs a program to keep track of student grades. Since your school is on a very tight budget (and what schools aren't these days?), you decide to write the program yourself in PowerBASIC. For each student in the class you need to track the following information:

- The student's name
- A student number
- A mailing address
- The name and phone of the person to contact in case of an emergency
- The relationship of the contact person to the student

Currently these records are being kept in a small file box. The information about each student is contained on a single file card. How do you transfer this information to the computer? Simple. Define a *Student Record* Type that will contain all the information about a single student.

The variables you create as User-Defined Types are often called *records* or *record variables*, since each variable of that Type contains one record, or *one set of related information*. The individual elements are referred to as *fields* or *members*. In the example above, each set of student information is a record, and each piece of information within that record (the last name for example) is a field.

See Also

Accessing the fields of a User-Defined Type

Nesting User-Defined Types

Arrays within User-Defined Types

Using arrays of User-Defined Types

Using User-Defined Types with procedures and functions

Storage requirements and restrictions

Unions

Defining User-Defined Types

Defining User-Defined Types

The definition of a User-Defined Type begins with the reserved word TYPE and ends with the keywords END TYPE. In between, you define the names and

of the member elements (fields) that are to be part of the new Type. For example:

```
TYPE StudentRecord
  LastName     AS STRING * 20 ' A 20-character string
  FirstName    AS STRING * 15 ' A 15-character string
  IDnum        AS LONG        ' Student ID, a Long-integer
  Contact      AS STRING * 30 ' Emergency contact person
  ContactPhone AS STRING * 14 ' Their phone number
  ContactRel   AS STRING * 8  ' Relationship to student.
  AverageGrade AS SINGLE      ' Single-precision % grade
END TYPE
```

Remember that the definition of a User-Defined Type does not set aside memory for storing data of that Type. Rather, it defines a template for the new Type *StudentRecord*. Then when the compiler encounters a statement declaring (or creating) a variable of the new Type, it will "know" how many bytes of storage to set aside for the variable. In order to use this new Type, you must declare variables of that Type with the DIM statement:

```
DIM Student AS StudentRecord
```

See Also

User-Defined Types (UDTs)

Accessing the fields of a User-Defined Type

Nesting User-Defined Types

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Storage requirements and restrictions

Unions

Accessing the fields of a User-Defined Type

Accessing the fields of a User-Defined Type

To work with the individual fields within a record variable, separate the field name from the variable name with a period. Here are some examples using the *Student* variable in the above DIM statement:

```
Last$     = Student.LastName
Message$  = "Id number is: " + STR$(Student.IdNum)
Student.FirstName = "Bob"
```

```
Student.LastName  = "Smith"
Fullname$ = Student.LastName + " " + Student.FirstName
Fullname$ = RTRIM$(Student.LastName) + ", " + RTRIM$(Student.FirstName)
```

Note that the last two statements above produce slightly differing results. The former produces a string that contains the text plus any $SPC (space) characters that pad the text in each of the Student.LastName and Student.FirstName members. Comparatively, the latter statement returns a string with these padding characters removed. In many cases, it can be easier to use a nul-terminated string members to alleviate the need to frequently trim such fixed-length strings, but allowance must be made for the additional $NUL terminator byte required by nul-terminated strings.

See Also

User-Defined Types (UDTs)

Defining User-Defined Types

Accessing the fields of a User-Defined Type

Nesting User-Defined Types

Arrays within User-Defined Types

Using arrays of User-Defined Types

Using User-Defined Types with procedures

Storage requirements and restrictions

Unions

Nesting User-Defined Types

Nesting User-Defined Types

The fields within a User-Defined Type can be made up of other User-Defined Types. Just like a set of Chinese boxes, with each box containing a smaller box, you can nest one User-Defined Type within another. The result is that you create data structures that have a hierarchy similar to the directory tree structure of your hard drive.

Instead of storing the student names as two separate fields, we could instead define a Type called *NameRec* as follows:

```
TYPE NameRec
  Last    AS STRING * 20
  First   AS STRING * 15
  Initial AS STRING * 1
END TYPE
```

Then, when we define our *Student Record* Type, we can define the field containing the individual student's name as *NameRec*:

```
TYPE StudentRecord
  FullName     AS NameRec
  IdNum        AS LONG
  Contact      AS NameRec
  ContactPhone AS STRING * 14
  ContactRel   AS STRING * 8
  AverageGrade AS SINGLE
END TYPE
```

You could, of course carry this idea a step further, and define other components of the student record as nested records. For instance, a *ContactRecord* or even a *PhoneRec* but we'll leave that refinement up to you. To access the fields of a nested record, simply extend the dot notation. Just as the backslash (\) is used to separate the individual subdirectory names in a path (i.e., C:\PROJECTS\PROGRAM), the period is used within record variable names to separate the member elements from the base Type. For instance:

```
StudentRecord.FullName
```

refers to the *FullName* field (which happens to be of Type *NameRec*) within *Student Record*, and:

```
StudentRecord.FullName.First
```

refers to the sub-field *First* within the *FullName* field.

You can nest User-Defined Types as deeply as you want to, as long as the entire name used to refer to a field is within the maximum identifier length of 255 characters. In practical terms however, you probably would not want to carry nesting beyond two or, at most, three levels. Beyond that, it becomes clumsy, difficult to remember, and you are more likely to make typing errors. Note that User-Defined Types cannot contain circular references - for example, a UDT called *StudentRecord* cannot contain a field of Type *StudentRecord*.

See Also

User-Defined Types (UDTs)

Defining User-Defined Types

Accessing the fields of a User-Defined Type

Arrays within User-Defined Types

Using arrays of User-Defined Types

Using User-Defined Types with procedures

Storage requirements and restrictions

Unions

Arrays within User-Defined Types

Arrays within User-Defined Types

In prior versions of this compiler, arrays could not be part of a UDT structure. However, we now support both one and two-dimensional arrays of variables that have a fixed-length (for each element) - this includes nul-terminated strings, fixed-length strings, and all numeric variable classes. Individual arrays within a UDT may be up to 16 Megabytes each (although UDTs themselves are limited to 16 Megabytes).

Two-dimensional arrays within Types work exactly as do any other array in PowerBASIC, except that their dimensions are specified by positive numeric constant values, and are therefore not dynamically alterable. That is, the dimension sizes must be specified with numeric equates or numeric literal values, and these cannot be altered at run-time.

Like conventional arrays, the default lower array boundary is zero, but positive non-zero values may be used to specify a specific range of subscript index values for the array, separated from the upper array boundary subscript with the TO keyword. Additionally, both the lower and upper subscript index values must be zero or greater (ie, negative subscript values are not permitted). Examples of valid syntax follow:

```
TYPE MYTYPE
  id AS INTEGER             ' Scalar UDT member
  Styles(6)         AS DWORD '  7 elements (0 TO 6)
  Yrs(1980 TO 2010) AS LONG  ' 31 elements
  Team(100 TO 101)  AS BYTE  '  2 elements
  Rating(1 TO 10)   AS DWORD ' 10 elements
  X(1 TO 5, 0 TO 5) AS EXT   ' 30 elements (5x6)
  Y(4,3)            AS QUAD  ' 20 elements (5x4)
END TYPE
```

See Also

Array Data Types

Using arrays of User-Defined Types

Using arrays of User-Defined Types

You can create arrays of User-Defined Types just as you can create arrays of

or or any of PowerBASIC's other data types. For example:

```
DIM Class(1 TO 30) AS StudentRecord
```

To access the individual elements of the *Class* array, you use subscript index values just as you do with any other array. The third student record is *Class(3)*, for instance. The period separator and the field name follows the array subscript:

```
Class(3).FullName.First
```

This would access the first name of the third student in the class array. Think of it this way: the array is made up of elements of the Type *Student Record*, so the subscript belongs with the name of the variable as a whole.

You can create multidimensional arrays of User-Defined Types just as you can with any other PowerBASIC data type. The limit on the number of elements and dimensions in such arrays is governed by the same rules as well: The limits are defined by the amount of data storage required for each element. Additionally, arrays within structures must contain a static subscript list, defined at compile-time. Therefore, arrays within structures cannot be redimensioned at run-time.

See Also

Using User-Defined Types with procedures

Using User-Defined Types with procedures

Subroutines, functions, Methods, and Properties can process User-Defined Types as well as any other data type. This topic covers the following topics:

- Passing fields as arguments
- Passing records as arguments
- Passing record arrays as arguments

Passing fields as arguments

Members in User-Defined Types that are one of the built-in PowerBASIC types (INTEGER, WORD, STRING, and so on) can be passed to procedures and functions as if they were simple variables. For example, given the User-Defined Type *PatientRecord*, as follows:

```
TYPE PatientRecord
  FullName  AS STRING * 32
  AmountDue AS DOUBLE
  IdNum     AS LONG
END TYPE
DIM Patient AS PatientRecord
```

…you could use a procedure *PrintStatement*:

```
SUB PrintStatement(Id AS LONG, AmountPastDue AS DOUBLE)
  ' access Id and AmountPastDue
END SUB
```

…like this:

```
CALL PrintStatement(Patient.IdNum, Patient.AmountDue)
```

Passing records as arguments

You can also write your procedures to accept arguments of User-Defined Types. This is especially useful if you want to pass many arguments; rather than have a long argument list, you can pass a single User-Defined Type. For example, given the *PatientRecord* User-Defined Type discussed in the previous section, you could write your *PrintStatement* procedure as follows:

```
SUB PrintStatement(Patient AS PatientRecord)
  ' access Patient.IdNum and Patient.AmountDue
END SUB
```

You'd call *PrintStatement* like this:

```
CALL PrintStatement(Patient)
```

Passing record arrays as arguments

Procedures can accept arrays of records as easily as they can accept arrays of other Types. For example, if you had an array of *PatientRecord*s, each containing a patient record with an amount due, you could write a function that returns the total amount due for all the patient records in the array:

```
FUNCTION TotalAmountDue(Patients() AS PatientRecord)
  DIM total AS DOUBLE
  RESET total
  FOR ix = LBOUND(Patients) TO UBOUND(Patients)
    total = total + Patients(ix).AmountDue
  NEXT
  TotalAmountDue = total
END FUNCTION
```

You might call the function like this:

```
DIM Patients(1 TO 100) AS PatientRecord
' more code here
x$ = "Total amount due:" + STR$(TotalAmountDue(Patients()))
```

See Also

User-Defined Types (UDTs)

Storage requirements and restrictions

Unions

Storage requirements and restrictions

Storage requirements and restrictions

You can determine the amount of storage required for a variable of a User-Defined Type using the LEN function. To determine the requirements for a student record, for example, use:

```
RecordSize = LEN(Student)
```

The address of a record variable, as returned by the VARPTR function, is the address in memory of the first byte of data in the record. You can also obtain the starting address of the fields within the record by passing the full name of the field (*Student.IdNum*, for example) to the VARPTR function.

A single UDT structure is limited to 16 MB (16,777,216 bytes). Locally dimensioned UDT structures are limited to the amount of free stack space available, typically less than 1 MB. If larger UDT structures are required, use a STATIC or GLOBAL declaration instead (since these are not stored on the stack). The same rules apply to Unions (and LOCAL fixed-length and nul-terminated strings).

Note that the

statements cannot be directly used on arrays within UDTs. However, you can use DIM..AT to define an array (of the same data type) at the address of the UDT array, and employ ARRAY statements on that array. The ARRAY statements can be used on arrays *of* UDT structures. An individual array within a UDT may occupy as much as the full 16 MB UDT size limit.

See Also

User-Defined Types (UDTs)

Unions

Built-in User Defined Types

Built-in User-Defined Types

The compiler provides a set of built-in User-Defined Types, including:

```
TYPE DispParams
  VariantArgs AS VARIANT
  NamedDispID AS VARIANT
  CountArgs   AS DWORD
  CountNamed  AS DWORD
END TYPE
```

DispParams is used internally by the compiler to send parameters to Dispatch methods and properties.

```
TYPE DirData
  FileAttributes AS DWORD
  CreationTime   AS QUAD
  LastAccessTime AS QUAD
  LastWriteTime  AS QUAD
  FileSizeHigh   AS DWORD
  FileSizeLow    AS DWORD
  Reserved0      AS DWORD
  Reserved1      AS DWORD
  FileName       AS WStringZ * 260
  ShortName      AS WStringZ *  14
END TYPE
```

DirData is used with the DIR$ function to retrieve file or directory information.

```
TYPE Point
  x AS LONG
  y AS LONG
END TYPE
```

Used with various API routines.

```
TYPE NMHDR
  HwndFrom AS DWORD
  IdFrom   AS DWORD
  Code     AS LONG
END TYPE
```

NMHDR is used with CB.NMHDR and contains information about notification messages.

```
TYPE NMCHAR
  Hdr        AS NMHDR
  Ch         AS DWORD
  dwItemPrev AS DWORD
  dwItemNext AS DWORD
END TYPE
```

NMCHAR is used with CB.NMHDR and contains information about a character notification messages.

```
TYPE NMKEY
  Hdr    AS NMHDR
  nVKey  AS DWORD
  uFlags AS DWORD
END TYPE
```

NMKEY is used with CB.NMHDR and contains information about key notification messages.

```
TYPE NMMOUSE
  Hdr        AS NMHDR
  dwItemSpec AS DWORD
  dwItemData AS DWORD
  Pt         AS POINT
  dwHitInfo  AS LONG
END TYPE
```

NMMOUSE is used with CB.NMHDR and contains information about key notification messages.

```
TYPE NMTOOLTIPSCREATED
  Hdr          AS NMHDR
  HwndToolTips AS DWORD
END TYPE
```

NMTOOLTIPSCREATED is used with CB.NMHDR and contains information about %
NM_TOOLTIPSCREATED messages.

```
TYPE PowerBounds
  Elements1     AS LONG
  LowBound1     AS LONG
  Elements2     AS LONG
  LowBound2     AS LONG
  Elements3     AS LONG
  LowBound3     AS LONG
  Elements4     AS LONG
```

```
  LowBound4     AS LONG
END TYPE
```

PowerBounds is used with a PowerArray Object to dimension the array.

See Also

Built-in numeric equates

Built-in string equates

Built-in RGB Color Equates

Unions

Unions

Unions

If you have ever programmed in Pascal or C, you may be familiar with the concept of a Union. A Union is similar in some ways to a User-Defined Type. Both have data fields that can be made up of any of PowerBASIC's data types, including records and other Unions, and except for the UNION keyword, they are defined the same way. The major difference between User-Defined Types and Unions, is that each field within a Union occupies the same memory location as all the others.

While the concept may appear abstract, Unions provide an avenue to freely convert data from one format to another, simply by writing the data into the Union as one data format, and reading the data back as another. Combining the versatility of a UDT with the flexibility of a Union can extend this functionality dramatically, such as splitting data into its component parts.

For example, the following definition would create a Union called *WordFld* and a *WordFld* variable called *MyVar*:

```
TYPE HiLo
  Lo AS BYTE
  Hi AS BYTE
END TYPE

UNION WordFld
  Whole AS WORD
  Part  AS HiLo
END UNION

DIM MyVar AS WordFld

MyVar.Whole = &HBC1F      'assign a value to the entire word
a$ = HEX$(MyVar.Part.Hi)  'returns Hi byte of the word
b$ = HEX$(MyVar.Part.Lo)  'returns Lo byte of the word
```

When you access the field *MyVar.Whole*, you are reading the entire contents of the Union as a word. On the other hand, when you refer to *MyVar.Part.Hi*, you are referring to the high byte of *MyVar*.

See Also

User-Defined Types (UDTs)

Union Storage requirements and restrictions

Storage requirements and restrictions

Storage requirements and restrictions

A single Union structure is limited to 16 MB (16,777,216 bytes). Locally dimensioned Union structures are limited to the amount of free stack space available, typically less than 1 MB. If larger UDT structures are required, use a STATIC, GLOBAL, or INSTANCE declaration instead, since these are not created on the stack. The same rules apply to User-Defined Types (and LOCAL fixed-length and nul-terminated strings). An individual array within a Union may occupy as much as the full 16 MB Union size limit.

See Also

User-Defined Types (UDTs)

Unions

Pointer Data Types

Pointers (@)

Pointers (@)

A pointer is a variable that holds the 32-bit (4 byte) address of code or data located elsewhere in memory. It is called a pointer because it literally *points* to that location. The location pointed to is known as the *target* of the pointer.

Pointers represent a powerful addition to the BASIC programmer's arsenal. The address is defined at run-time, so your program can reference any memory location as if it were a standard variable. When a pointer is used to access a memory location, it is called "indirect addressing".

Pointers are declared using the DIM statement, and the type of the target must be specified. The keywords PTR and POINTER are synonymous.

```
DIM i AS INTEGER PTR 'declares i as a pointer to an Integer
```

or:

```
DIM i AS INTEGER POINTER
```

The above example declares `i` as an Integer pointer. Before it can be used, `i` must be initialized with an actual address of a variable (easily done with the VARPTR function; or STRPTR for

). When you assign a value to a pointer variable, you are giving it an address to use later when you wish to reference the actual target. A pointer's name alone references the pointer variable. A pointer's name with an at sign (@) prefix, references the pointer's target:

```
DIM Ptr1 AS BYTE PTR ' declares Ptr1 as a byte pointer
DIM Ptr2 AS BYTE PTR ' declares Ptr2 as a byte pointer
DIM Byte1 AS BYTE    ' Declares Byte1 as a byte variable
DIM Byte2 AS BYTE    ' Declares Byte2 as a byte variable
Ptr1 = VARPTR(Byte1) ' Ptr1 points to Byte1
@Ptr1 = 36           ' Sets Byte1 to the value 36
Ptr2 = VARPTR(Byte2) ' Ptr2 points to Byte2
@Ptr2 = @Ptr1 + 4    ' Sets Byte2 to 40 (36 + 4)
```

In summary, when you reference a pointer variable *without* an at-sign, you are referencing the 32-bit address contained in it. When you precede the name *with* an at-sign, you are referencing the target data located at the address "pointed to" by the pointer.

By assigning the address of another pointer to a pointer, we can set up another level of indirection. *Pointers to pointers* are useful when setting up linked lists in memory. You can then access the target by adding a second at-sign in front of the pointer's name:

```
DIM y AS STRING POINTER
```

```
DIM z AS STRING POINTER
DIM TmpStr AS STRING
y = VARPTR(TmpStr)   ' y points to TmpStr
z = VARPTR(y)        ' z points to y
@y = "A"             ' put an "A" in TmpStr
@@z = "B"            ' overwrite it with a "B"
Display @y           ' display the target value of y
```

PowerBASIC supports up to 200 levels of indirection. For each level, you add another preceding at-sign to the pointer name. You can only use the (@) prefix with pointer variables.

A pointer with a value of zero (0) is considered a null-pointer by PowerBASIC. Windows will generate a General Protection Fault (GPF) if you attempt to access data at an invalid pointer address. See the section on assembler programming for more information.

The true power of pointers resides in their speed and flexibility. Traditionally, to access memory, a BASIC programmer had to use combinations of PEEK and POKE. This allowed the programmer to address memory as bytes. If the target data took any other form, conversion was necessary. Pointers allow you to address the target data in any fashion you desire, even as a user-defined structure. Moreover, because the setup of calling PEEK and POKE is no longer necessary, access is much faster.

Let's say that we want to scan all the characters in a buffer, replacing all upper case "A"s with lower case "a"s. The code might look something like this:

```
SUB Lower(zStr AS STRING)
  DIM s AS BYTE PTR, ix AS INTEGER
  s = STRPTR(zStr) ' Access the dynamic string directly
  FOR ix = 1 TO LEN(zStr)
    IF @s = 65 THEN @s = 97  ' "A" -> "a"
    INCR s
  NEXT
END SUB
```

When using a pointer to a structure, the prefix is placed before the structure name when you wish to access an element of the structure. The structure name by itself refers to its address. This distinction is extremely important when treating structures as a whole. The following example shows two ways of doing a simple bubble sort of an array of User-Defined Types. The first uses conventional BASIC methods, the second uses pointers to illustrate their speed and efficiency.

```
'-- Example 1 --------------
#COMPILE EXE
#DIM ALL
TYPE NameRec
  Last   AS STRING * 20   ' Last name
  First  AS STRING * 20   ' First name
END TYPE
FUNCTION PBMAIN () AS LONG
    DIM Rec(1 TO 10) AS NameRec
    DIM RP AS NameRec POINTER
    DIM ix AS LONG, ij AS LONG
    DIM hFile AS DWORD
    '-- Put some data in the records --
    FOR ix = 1 TO 10
        Rec(ix).First = CHOOSE$(ix,"Jacob","Michael","Joshua","Matthew","Ethan", _
                                "Emily","Emma","Madison","Abigail","Olivia")
        Rec(ix).Last  = CHOOSE$(ix,"SMITH","JOHNSON","WILLIAMS","JONES","BROWN", _
                                "DAVIS","MILLER","WILSON","MOORE","TAYLOR")
    NEXT ix
    '-- Sort UDT array in ascending order using a bubble sort
    '-- ARRAY SORT Rec(),FROM 1 TO 20,ASCEND  will do this as well
    FOR ix = 9 TO 1 STEP -1
        FOR ij = 1 TO ix
```

```
            IF Rec(ij-1).Last > Rec(ij).Last THEN
                SWAP Rec(ij-1), rec(ij)
            END IF
        NEXT ij
    NEXT ix
   #IF %DEF(%PB_CC32)
        FOR ix = 1 TO 10
            PRINT TRIM$(Rec(ix).Last)+ ", " +TRIM$(Rec(ix).First)
        NEXT ix
        PRINT
        PRINT "Press any key to quit ... "
        WAITKEY$
   #ELSE
       DIM msg AS STRING
       FOR ix = 1 TO 10
           msg = msg + TRIM$(Rec(ix).Last)+ ", " +TRIM$(Rec(ix).First) + $CRLF
           MSGBOX msg
       NEXT ix
   #ENDIF
END FUNCTION

'-- Example 2 --------------
' The difference between example 1 and this example is
' that we're manipulating pointers (4 bytes) instead
' of whole records (40 bytes).
#COMPILE EXE
#DIM ALL
TYPE NameRec
  Last   AS STRING * 20   ' Last name
  First  AS STRING * 20   ' First name
END TYPE
FUNCTION PBMAIN () AS LONG
    DIM Rec(1 TO 10) AS NameRec
    DIM RP AS NameRec POINTER
    DIM ix AS LONG, ij AS LONG
    DIM hFile AS DWORD

    '-- Put some data in the records --
    FOR ix = 1 TO 10
        Rec(ix).First = CHOOSE$(ix,"Jacob","Michael","Joshua","Matthew","Ethan", _
                                "Emily","Emma","Madison","Abigail","Olivia")
        Rec(ix).Last  = CHOOSE$(ix,"SMITH","JOHNSON","WILLIAMS","JONES","BROWN",
_
                                "DAVIS","MILLER","WILSON","MOORE","TAYLOR")
    NEXT ix
    '-- Sort UDT array in ascending order using a bubble sort with pointers
    '-- note a bubble sort is not recommended for large collections
    '-- and note ARRAY SORT Rec(),FROM 1 TO 20,ASCEND  will do this as well
    '-- so this is only to show pointers to UDT arrays in action!
    RP = VARPTR(Rec(1))
    FOR ix = 9 TO 1 STEP -1
        FOR ij = 1 TO ix
            'note pointers to array elements use zero based subscripts in brackets!
            IF @RP[ij-1].Last > @RP[ij].Last THEN
                SWAP @RP[ij-1], @RP[ij]
            END IF
        NEXT ij
    NEXT ix
   #IF %DEF(%PB_CC32)
        FOR ix = 1 TO 10
```

```
            PRINT TRIM$(Rec(ix).Last)+ ", " +TRIM$(Rec(ix).First)
        NEXT ix
        PRINT
        PRINT "Press any key to quit ... "
        WAITKEY$
   #ELSE
       DIM msg AS STRING
       FOR ix = 1 TO 10
           msg = msg + TRIM$(Rec(ix).Last)+ ", " +TRIM$(Rec(ix).First) + $CRLF
           MSGBOX msg
       NEXT ix
   #ENDIF
END FUNCTION
```

If you declare a member of a structure as a pointer, the @ prefix is used with the member name, not the structure name. The previous example could be improved by adding a couple of pointers to the structure to point to the previous and next record, respectively. This lets you allocate memory for a record only when needed, instead of pre-allocating a fixed-size array of records. The modified structure would look something like this:

```
TYPE NameRec
  Last AS STRING * 20   ' Last name
  First AS STRING * 20  ' First name
  Nxt AS NameRec PTR    ' Pointer to next record
  Prv AS NameRec PTR    ' Pointer to previous record
END TYPE
DIM Rec AS NameRec
```

The pointer members are then accessed like this:

```
Rec.@Nxt    ' next record
Rec.@Prv    ' previous record
```

Putting the @ prefix in front of the structure name (i.e., *@Rec*) would cause a compile-time error, as *Rec* itself is not a pointer.

When calculating the length of the Type, all pointers are internally stored as Double-word (DWORD) variables, so *NameRec* is 48 bytes long (20 + 20 + 4 + 4). If you need to know the length of a Type, it is easier to let PowerBASIC calculate it for you using the LEN function than doing it yourself:

```
length = LEN(structure)
```

See Also

Pointers to nul-terminated and fixed-length strings

Pointers to arrays

Pointers to arrays with dual indexes

Pointers to Nul-Terminated and fixed-length strings

Pointers to Nul-Terminated and fixed-length strings

A declaration of an Nul-Terminated or fixed-length string must explicitly state the maximum length of the string, in order for the compiler to allocate memory accordingly. When declaring pointers to fixed-length strings, you may also state the maximum length of the string. This will allow INCR and DECR to move the pointer to the next or previous string, respectively. If you do not supply the length for a fixed-length string pointer, INCR and DECR will move the pointer by one byte.

However, with an Nul-Terminated string pointer, the length limit may be explicitly stated, or it may be left as an ambiguous value, by skipping the length clause entirely. For example, the following lines are valid:

```
DIM x AS ASCIIZ   PTR * 41
```

```
DIM y AS STRINGZ  PTR * 2
DIM z AS WSTRINGZ PTR
```

This rule applies to scalar pointers, arrays of pointers, pointers as function parameters, and pointers as members of a User-Defined Type or Union. If the optional length limit is specified, PowerBASIC will always truncate a string assignment to fit correctly in the memory allocated to the variable.

If the length is ambiguous, it becomes the programmer's responsibility to ensure the target buffer is not overflowed leading to memory corruption or General Protection Faults (GPF). Use caution in this case.

See Also

Pointers (@)

Pointers to arrays

Pointers to arrays with dual indexes

Pointers to arrays

Pointers to arrays

In order to work with arrays created by other languages, such as VB arrays, PowerBASIC supports an extension of the pointer syntax, called "Pointer Indexing". As noted above, a pointer allows you access a data element at specific address in memory. An index pointer allows you to access data elements beyond the memory address in the base pointer. Consider an array with 6 elements:

```
DIM x%(0 TO 5)
```

The address of the first element, x%(0), is the base with the remaining elements stored in memory, one after the other. To access the array using an index pointer, you simply assign the address of the first element to your base pointer:

```
DIM xPtr AS INTEGER POINTER
xPtr = VARPTR(x%(0))

@xPtr[0] = 0      ' same as x%(0)
@xPtr[1] = 1      ' same as x%(1)
@xPtr[2] = 2      ' same as x%(2)
@xPtr[3] = 3      ' same as x%(3)
@xPtr[4] = 4      ' same as x%(4)
@xPtr[5] = 5      ' same as x%(5)
```

Note the syntax used to access the elements of the array. It consists of the pointer's name, with the @ prefix, and followed by the array index in square brackets. The number used inside of the brackets is a multiplier. The number inside the brackets is multiplied by the size of the target data (a two byte Integer in this case) to calculate the target address.

The primary differences between arrays and index pointers are than index pointers do not allocate any memory of their own - they use memory which has already been allocated elsewhere. Their lower bound is always zero. For example, you can dimension your six-element array from 1990 to 1995. However, to access the array data using an index pointer, you will still need to use 0 through 5:

```
x%(1990 TO 1995)
DIM xPtr AS INTEGER PTR
xPtr = VARPTR(x%(1990))

@xPtr[0] = 0      ' same as x%(1990)
@xPtr[1] = 1      ' same as x%(1991)
@xPtr[2] = 2      ' same as x%(1992)
@xPtr[3] = 3      ' same as x%(1993)
@xPtr[4] = 4      ' same as x%(1994)
@xPtr[5] = 5      ' same as x%(1995)
```

Consider the following VB code:

```
Sub Sum_Click()
  ReDim PriceData!(1 TO TotalElements%)
  Call FillSumArray(PriceData!())
  Total! = GetSum(PriceData!(1), TotalElements%)
End Sub
```

When the "Sum" button is pressed, a dynamic array is created and filled. *FillSumArray()* is VB code to read the price data from a database file and place it into the array. *GetSum()* is PowerBASIC code to add up all of the prices and return the total, since PowerBASIC handles calculations faster than VB does.

```
FUNCTION GetSum!(Price!, BYVAL TotalElements%) EXPORT
  DIM PriceData AS SINGLE PTR
  DIM Total!
  DIM k%
  PriceData = VARPTR(Price!)
  FOR k% = 0 TO TotalElements% - 1
    Total! = Total! + @PriceData[k%]
  NEXT
  GetSum! = Total!
END FUNCTION
```

In the above example, *GetSum!* takes the Visual Basic array, adds up all the values, and returns the total as a result. Since a pointer is a memory address, we need the memory address of the first element in the array. In VB, you can pass the memory address of a variable by passing it "by reference", or

. This tells Visual Basic not to pass the *value* of a variable to a Sub, Function, Method, or Property, but to pass the *address* in memory where the variable is located. This is handled through the DECLARE statement in Visual Basic.

```
DECLARE FUNCTION GetSum! LIB "SUMS.DLL" (Prices!, BYVAL Elements%)
```

By not using the

keyword before the variable *Prices!*, we've told Visual Basic to pass a memory address to the variable. You'll notice in the DECLARE statement that the variable *Prices!* does not include any parentheses to indicate that it is an array. If we were to change it to *Prices!()*, VB would pass a handle to an array descriptor, not an address to the array data. The PowerBASIC code also needs to know how many elements there are in the array, so that is passed as the second parameter.

Since only the first element of the array is passed to *GetSum!*, we'll need to use a pointer to access the remainder of the elements.

```
DIM PriceData AS SINGLE PTR
```

Remember that all pointers are initialized to null (zero). To access the array, we need to assign the memory address for the element passed. VARPTR is used to get the address of the passed element.

```
PriceData = VARPTR(Price!)
```

An indexed pointer can then be used to access all of the elements in the array. The VB array was dimensioned from *1 to TotalElements*; however indexed pointers in PowerBASIC all start with a subscript of zero. So to reconcile the difference, we subtract the lower bound (1) from *TotalElements* in our FOR/NEXT loop. A DIM statement is not required to access an array using this method.

```
FOR k% = 0 TO Elems% - 1
  Total! = Total! + @PriceData[k%]
NEXT
```

It is also possible to use indexed-pointers with dynamic string arrays. For example:

```
DIM Arr1(1 TO 3) AS STRING
DIM pArr1 AS STRING POINTER

Arr1(1) = "a1"
Arr1(2) = "a2"
Arr1(3) = "a3"
PArr1 = VARPTR(Arr1(1)) ' The 1st array element
DisplayText @pArr1[2]   ' This references Arr1(3)
```

Indexed pointers make it easy to manipulate arrays created by other languages such as VB, Delphi, C/C++, etc.

See Also

Pointers (@)

Pointers to nul-terminated and fixed-length strings

Pointers to arrays with dual indexes

Pointers to arrays with dual indexes

Pointers to arrays with dual indexes

Indexed pointers with dual indexes require an "OF *limit*" clause on both indexes. While simple arrays (arrays with one index) store data sequentially, dual indexes interleave each row of data. The *OF* clause is used by the compiler to calculate the size of each row and column. *limit* is the upper bound of the index (zero-based):

```
DIM DataPtr AS INTEGER PTR
DIM z%(0 TO 8, 0 TO 3)
DataPtr = VARPTR(z%(0, 0))
FOR y = 0 TO 3
  FOR x = 0 TO 8
    Value% = @DataPtr[x OF 8, y OF 3]
  NEXT x
NEXT y
```

The following example uses a lower bound other than zero:

```
DIM DataPtr AS INTEGER PTR
DIM z%(1990 TO 1998, -1 TO 3)
DataPtr = VARPTR(z%(1990, -1))
FOR y = 0 TO 4
  FOR x = 0 TO 8
    Value% = @DataPtr[x OF 8, y OF 4]
  NEXT x
NEXT y
```

If you subtract the lower bound from itself and the upper bound (to get a lower bound of zero), you get 8 for the upper bound, which is then used for *limit* after the *OF* keyword.

See Also

Pointers (@)

Pointers to nul-terminated and fixed-length strings

Pointers to arrays

Constants

Constants and Literals

Constants and Literals

PowerBASIC programs process two distinct classes of data: *variables* and *constants*. A variable is allowed to change its value as a program runs. A constant's value is fixed at compile-time, and cannot change during program execution (hence, it remains constant). PowerBASIC supports four types of constants: string literals, numeric literals, string equates and numeric equates.

- String literals
- Numeric literals
- Integral constants in binary, octal, and hexadecimal
- Numeric Equates
- String Equates

See Also

Defining Constants

Array Data Types

Bit Data Types

GUID Data Types

Object Data Types

Pointers

User Defined Types

Unions

Variant Data Types

Defining Constants

Defining Constants

PB/Win constants (also known as equates) are defined by prefixing the name of the constant with a "%" character. MSBASIC and VB define constants with the CONST keyword. The MSBASIC/VB compiler then does type conversions at the point of use, if the constant's type was not specified. That overhead does not happen (and is not necessary) with PB/Win. String equates are specified with a leading "$" character.

However, the MACRO facilities in PB/Win offer a way to retain the CONST syntax in your code, while maintaining the low overhead advantage of PowerBASIC. For example:

```
MACRO CONST = MACRO
[statements]
CONST Something = 1&
CONST Something_Else = 2???
CONST AppTitle = "My Application"
[statements]
MSGBOX FORMAT$(Something), ,AppTitle
```

During compilation, the CONST keyword is replaced by the MACRO word, which dynamically creates a new macro that, in turn, defines a constant.

See Also

Constants and Literals

Numeric Equates

Built-in numeric equates

Built In RGB Color Equates

String Equates

Built-in string equates

Numeric Equates

Numeric Equates

PowerBASIC allows you to refer to numeric constants by name. Be aware that equates have global scope; that is, they are visible throughout your program. Unlike variables, you can use an equate on the left side of an assignment statement only once, and only a constant value (or a simple constant/literal expression) may be assigned to it. If an expression is used, all parts of the expression must consist of constants, numeric equates; bitwise operators like AND, OR; and NOT; the arithmetic operators +, -, *, /, and \, and the relational operators >, <, >=, <=, <>, =; and the CVQ function. For example, the following are all legal equate definitions:

```
%X = 1
%Y = 1 + 1
%Z = %X * %Y
%Q = (1& OR 2&) + (NOT 0)
%R = (%Q <> 100&)
%S = CVQ("DemoOnly")
```

A value must be assigned to each equate before it is referenced, even if that value is zero. If you fail to define an equate, an error will be generated during compilation. Numeric equates must be created outside of any SUB, FUNCTION, METHOD, or PROPERTY. All equates are global, and may be referenced anywhere in the module. For readability, we suggest placing equates at the top of your code.

A numeric equate name must always begin with a leading percent sign (%) and a letter (A-Z). This is optionally followed by any combination of letters (A-Z), numbers (0-9), and underscores (_). Equates created within an ENUM structure may also contain one period (.), which is inserted by the compiler as a delimiter. All other characters are illegal.

If you are using a version of PowerBASIC which creates COM servers, you can easily include numeric equates in your type library; just append the words AS COM to the equate definitions:

```
%SCROLL_FLAG = 99 AS COM
```

You can also use equates to reduce the incidence of "magic numbers" in your programs. Magic numbers are mysterious values that mean something to you when you first write a program, but not when you come back to it six months later. Equates are particularly well suited for making programs more readable. For example, consider an array to track chess pieces. If we define:

```
%MAXPIECES = 32
%NPARAM    = 3
%NTYPE     = 1
%RANK      = 2
%FILE      = 3
%KING      = 1
%PAWN      = 2
```

…we can then define an array of pieces and make statements like the following:

```
DIM piece(1:%MAXPIECES, 1:%NPARAM)
piece(1, %NTYPE) = %KING
piece(1, %RANK)  = 4
piece(1, %FILE)  = 1
```

This sets up a 32 x 3 array for piece information. The first element is the type of unit, the second and third give its current position on the board. Note how much more readable this is than:

```
DIM piece(1:32, 1:3)
piece(1, 1) = 1
piece(1, 2) = 4
piece(1, 3) = 1
```

We could achieve a similar effect by using comments, but there is no way to ensure that when the program changes, the comments will be updated. Using equates reduces the need for comments.

Besides being more readable, equates allow us to easily change a program by changing only the definition of a single equate, rather than changing every occurrence of a particular value. For example: say you run a preschool, and you want to keep track of some data that depends on how many kids you have. Furthermore, you have to print out reports each week. Rather than type the number in several places, only to have to change it every week, you can assign the number to a constant.

```
%NUMKIDS = 28
```

Then, you can use the constant, *%NUMKIDS,* throughout your program.

```
' Calculate income; the enrollment fee is $85 a week;
' Parents pay whether their kids miss days or not
income% = %NUMKIDS * 85
' Calculate actual attendance
attend% = %NUMKIDS - absent%
' Calculate how much the lunches cost per kid; note the
' use of another constant for cost; it may vary too!
perkid% = %LUNCHCOST / attend%
' Calculate net profit per kid after paying for lunches (you'd
' actually have far more overhead than this, but we'll keep it simple)
net% = (income% - perkid%) / %NUMKIDS
' and so on
```

If your enrollment stays stable, you still have a program that is much easier to follow. Moreover, if your enrollment changes, you only need to change the constant assignment statements to run a revised program. Think of the time you will save - enough to take the kids on an extra field trip.

You might also want to assign the value of an equate conditionally, using the #IF metastatement. For example:

```
%BIGCLASS = 1
#IF %BIGCLASS
  %NUMKIDS = 40
#ELSE
  %NUMKIDS = 20
#ENDIF
```

Equates make SELECT statements more readable too:

```
SELECT CASE piece(x, %NTYPE)
  CASE %KING
    ' process king moves
  CASE %PAWN
    ' process pawn moves
  CASE %QUEEN
    ' process queen moves
END SELECT
```

This code will continue to make sense when you return to it after a long absence.

Numeric equates may be assigned a specific

if the literal value has a type-specifier appended. For example:

```
%MAX_BYTE      = 255?
%MAXIMUM_INT   = 32767%
%MAXIMUM_DWORD = &HFFFFFFFF???
%MAXIMUM_LONG  = &H7FFFFFFF&
%MINIMUM_LONG  = &H80000000&
```

Numeric equates which are derived from an equation are pre-calculated by PowerBASIC during the compilation process, to ensure that unnecessary calculations are eliminated from the executable code. If this optimization was not performed, PowerBASIC code would need to perform the same calculation every time the equate was used in the code. Examples of numeric equates derived from expressions follows:

```
%WHATEVER1 = 10
%WHATEVER2 = (%WHATEVER1 * 3) + 1
%DEBUG     = -1&
```

```
%RELEASE    = NOT %DEBUG
%DEMO       = %RELEASE AND (NOT %DEBUG)
```

During compilation the actual numeric value of %WHATEVER2 is pre-calculated as 31, and the values of %RELEASE and %DEMO are calculated from the value of %DEBUG. Note that operators like AND and OR work as bitwise operators, rather than logical operators, in numeric equate assignments.

Duplicate definitions of both numeric and string equates are permitted by PowerBASIC, provided the actual equate content is identical. If the content is not identical, a compile-time Error 468 ("Duplicate Equate") will occur.

If you need a set of equates which are logically related, you can define them as a group in an enumeration. This provides meaningful names for the enumeration, its members, and therefore the name by which it is referenced.

When an equate is created in an enumeration, its name is composed of a leading percent sign (%), the enumeration name, a period (.), and then the member name. For example:

```
ENUM abc
  count = 7
END ENUM
```

In the above example, the equate is referenced as *%abc.count*, and returns the value seven (7).

Each member of an enumeration may be assigned a specific integral value (in the range of a 64-bit quad integer) by using the optional [=*value*] syntax. In this case, only a constant value (or a simple constant/literal expression) may be assigned to it. If an expression is used, all of the terms in the expression must be constants; numeric equates; bitwise operators like AND, OR, NOT; arithmetic operators +, -, *, /, \; the relational operators >, <, >=, <=, <>, =; and the CVQ function.

If the [=*value*] option is omitted, each member of the enumeration is assigned an integral value in sequence beginning with the value 0. If one or more equates are assigned an explicit value, equates which follow are assigned the next value in the sequence. For example:

```
ENUM abc
  direction
  count = 8
  scope
END ENUM
```

In the above example, *%abc.direction* = 0, *%abc.count* = 8, and *%abc.scope* = 9.

See Also

- Constants and Literals
- Defining Constants
- Built-in numeric equates
- String Equates
- Built-in string equates
- ENUM/END ENUM statements

Built-in numeric equates

Built-in numeric equates

The compiler provides a convenient set of built-in numeric equates.

The first to consider should be the group which determines the compiler version and the supported feature level. Additional information may be found with the %DEF equate operator.

Compiler Version:

```
%PB_CC32, %PB_DLL32, %PB_EXE, %PB_REVISION, %PB_REVLETTER, %PB_WIN32
```

Compile-Time information:

%PB_COMPILETIME

At each compile, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTime Class to convert it to a text equivalent for use in your application.

For use with #RESOURCE FILEFLAGS:

%VS_FF_DEBUG, %VS_FF_INFOINFERRED, %VS_FF_PATCHED, %VS_FF_PRERELEASE, %VS_FF_PRIVATEBUILD, %VS_FF_SPECIALBUILD

For use with ARRAYATTR:

%VARCLASS_BYT, %VARCLASS_WRD, %VARCLASS_DWD, %VARCLASS_INT, %VARCLASS_LNG, %VARCLASS_QUD, %VARCLASS_SNG, %VARCLASS_DBL, %VARCLASS_EXT, %VARCLASS_CUR, %VARCLASS_CUX, %VARCLASS_VRNT, %VARCLASS_IFAC, %VARCLASS_TYPE, %VARCLASS_GUID, %VARCLASS_ASC, %VARCLASS_STRZ %VARCLASS_FIX, %VARCLASS_STR, %VARCLASS_FLD, %VARCLASS_WSTRZ, %VARCLASS_WFIX, %VARCLASS_WSTR, %VARCLASS_WFLD

For use with BUTTONS:

%BN_CLICKED, %BN_DBLCLK, %BN_DISABLE, %BN_DOUBLECLICKED, %BN_HILITE, %BN_KILLFOCUS, %BN_PAINT, %BN_SETFOCUS, %BN_UNHILITE, %IDOK, %IDCANCEL, %IDABORT, %IDRETRY, %IDIGNORE, %IDYES, %IDNO, %IDCLOSE, %IDHELP, %IDTRYAGAIN, %IDCONTINUE, %BS_TEXT, %BS_PUSHBUTTON, %BS_DEFPUSHBUTTON, %BS_DEFAULT, %BS_CHECKBOX, %BS_AUTOCHECKBOX, %BS_RADIOBUTTON, %BS_3STATE, %BS_AUTO3STATE, %BS_GROUPBOX, %BS_USERBUTTON, %BS_AUTORADIOBUTTON, %BS_OWNERDRAW, %BS_LEFTTEXT, %BS_ICON, %BS_BITMAP, %BS_LEFT, %BS_RIGHT, %BS_CENTER, %BS_TOP, %BS_BOTTOM, %BS_VCENTER, %BS_PUSHLIKE, %BS_MULTILINE, %BS_NOTIFY, %BS_FLAT, %BS_RIGHTBUTTON

For use with Callback functions:

%NM_OUTOFMEMORY, %NM_CLICK, %NM_DBLCLK, %NM_RETURN, %NM_RCLICK, %NM_RDBLCLK, %NM_SETFOCUS, %NM_KILLFOCUS, %NM_CUSTOMDRAW, %NM_HOVER, %NM_NCHITTEST, %NM_KEYDOWN, %NM_RELEASEDCAPTURE, %NM_SETCURSOR, %NM_CHAR, %NM_TOOLTIPSCREATED, %NM_LDOWN, %NM_RDOWN, %NM_THEMECHANGED, %SC_SIZE, %SC_MOVE, %SC_MINIMIZE, %SC_MAXIMIZE, %SC_NEXTWINDOW, %SC_PREVWINDOW, %SC_CLOSE, %SC_VSCROLL, %SC_HSCROLL, %SC_MOUSEMENU, %SC_KEYMENU, %SC_ARRANGE, %SC_RESTORE, %SC_TASKLIST, %SC_SCREENSAVE, %SC_HOTKEY, %SC_DEFAULT, %SC_MONITORPOWER, %SC_CONTEXTHELP, %WM_ACTIVATE, %WM_ACTIVATEAPP, %WM_CANCELMODE, %WM_CAPTURECHANGED, %WM_CHAR, %WM_CLOSE, %WM_COMMAND, %WM_CREATE, %WM_DESTROY, %WM_DRAWITEM, %WM_HELP, %WM_HSCROLL, %WM_INITDIALOG, %WM_KEYDOWN, %WM_KEYUP, %WM_KILLFOCUS, %WM_LBUTTONDBLCLK, %WM_LBUTTONDOWN, %WM_LBUTTONUP, %WM_MBUTTONDBLCLK, %WM_MBUTTONDOWN, %WM_MBUTTONUP, %WM_MOUSEACTIVATE, %WM_MOUSEFIRST, %WM_MOUSEHOVER, %WM_MOUSELAST, %WM_MOUSELEAVE, %WM_MOUSEMOVE, %WM_MOUSEWHEEL, %WM_MOVE, %WM_NCACTIVATE, %WM_NCCALCSIZE, %WM_NCCREATE, %WM_NCDESTROY, %WM_NCHITTEST, %WM_NCLBUTTONDBLCLK, %WM_NCLBUTTONDOWN, %WM_NCLBUTTONUP, %WM_NCMBUTTONDBLCLK, %WM_NCMBUTTONDOWN, %WM_NCMBUTTONUP, %WM_NCMOUSEMOVE, %WM_NCPAINT, %WM_NCRBUTTONDBLCLK, %WM_NCRBUTTONDOWN, %WM_NCRBUTTONUP, %WM_NCXBUTTONDBLCLK, %WM_NCXBUTTONDOWN, %WM_NCXBUTTONUP, %WM_NOTIFY, %WM_NULL, %WM_PAINT, %WM_QUIT, %WM_RBUTTONDBLCLK, %WM_RBUTTONDOWN, %WM_RBUTTONUP, %WM_SETFOCUS, %WM_SIZE, %WM_SYSKEYDOWN, %WM_SYSKEYUP, %WM_TIMER, %WM_VSCROLL, %WM_USER

For use with CONTROL SHOW STATE and DIALOG SHOW STATE:

%SW_HIDE, %SW_SHOWNORMAL, %SW_NORMAL, %SW_SHOWMINIMIZED, %SW_SHOWMAXIMIZED, %SW_MAXIMIZE, %SW_SHOWNOACTIVATE, %SW_SHOW, %SW_MINIMIZE, %SW_SHOWMINNOACTIVE, %SW_SHOWNA, %SW_RESTORE, %SW_SHOWDEFAULT, %SW_FORCEMINIMIZE, %SW_MAX

For use with COMBOBOXES:

%CBS_SIMPLE, %CBS_DROPDOWN, %CBS_DROPDOWNLIST, %CBS_OWNERDRAWFIXED, %CBS_OWNERDRAWVARIABLE, %CBS_AUTOHSCROLL, %CBS_OEMCONVERT, %CBS_SORT, %CBS_HASSTRINGS, %CBS_NOINTEGRALHEIGHT, %CBS_DISABLENOSCROLL, %CBS_UPPERCASE, %CBS_LOWERCASE, %CBN_CLOSEUP, %CBN_DBLCLK, %CBN_DROPDOWN, %CBN_EDITCHANGE, %CBN_EDITUPDATE, %CBN_ERRSPACE, %CBN_KILLFOCUS, %CBN_SELENDCANCEL, %CBN_SELCHANGE, %CBN_SELENDOK, %CBN_SETFOCUS

For use with DIALOG and/or CONTROL styles:

%DLGC_WANTARROWS, %DLGC_WANTTAB, %DLGC_WANTALLKEYS, %DLGC_WANTMESSAGE, %

DLGC_HASSETSEL, %DLGC_DEFPUSHBUTTON, %DLGC_UNDEFPUSHBUTTON, %DLGC_RADIOBUTTON, %DLGC_WANTCHARS, %DLGC_STATIC, %DLGC_BUTTON, %DS_ABSALIGN, %DS_SYSMODAL, %DS_3DLOOK, %DS_FIXEDSYS, %DS_NOFAILCREATE, %DS_LOCALEDIT, %DS_SETFONT, %DS_MODALFRAME, %DS_NOIDLEMSG, %DS_SETFOREGROUND, %DS_CONTROL, %DS_CENTER, %DS_CENTERMOUSE, %DS_CONTEXTHELP, %DS_SETFOREGROUND, %WS_OVERLAPPED, %WS_POPUP, %WS_CHILD, %WS_MINIMIZE, %WS_VISIBLE, %WS_DISABLED, %WS_CLIPSIBLINGS, %WS_CLIPCHILDREN, %WS_MAXIMIZE, %WS_CAPTION, %WS_BORDER, %WS_DLGFRAME, %WS_VSCROLL, %WS_HSCROLL, %WS_SYSMENU, %WS_THICKFRAME, %WS_GROUP, %WS_TABSTOP, %WS_MINIMIZEBOX, %WS_MAXIMIZEBOX, %WS_TILED, %WS_ICONIC, %WS_SIZEBOX, %WS_OVERLAPPEDWIN, %WS_OVERLAPPEDWINDOW, %WS_TILEDWINDOW, %WS_POPUPWINDOW, %WS_CHILDWINDOW, %WS_EX_DLGMODALFRAME, %WS_EX_NOPARENTNOTIFY, %WS_EX_TOPMOST, %WS_EX_ACCEPTFILES, %WS_EX_TRANSPARENT, %WS_EX_TOOLWINDOW, %WS_EX_SMCAPTION, %WS_EX_WINDOWEDGE, %WS_EX_CLIENTEDGE, %WS_EX_CONTEXTHELP, %WS_EX_RIGHT, %WS_EX_LEFT, %WS_EX_RTLREADING, %WS_EX_LTRREADING, %WS_EX_LEFTSCROLLBAR, %WS_EX_RIGHTSCROLLBAR, %WS_EX_CONTROLPARENT, %WS_EX_STATICEDGE, %WS_EX_APPWINDOW, %WS_EX_OVERLAPPEDWINDOW, %WS_EX_PALETTEWINDOW, %WS_EX_LAYERED, %WS_EX_NOINHERITLAYOUT, %WS_EX_LAYOUTRTL, %WS_EX_COMPOSITED, %WS_EX_NOACTIVATE

For use with the DIALOG NEW statement:

%HWND_DESKTOP, %DS_SHELLFONT

For use with the DIR$ function:

%NORMAL, %HIDDEN, %SYSTEM, %VLABEL, %SUBDIR

For use with the DISPLAY BROWSE statement:

%BIF_RETURNONLYFSDIRS, %BIF_DONTGOBELOWDOMAIN, %BIF_RETURNFSANCESTORS, %BIF_EDITBOX, %BIF_NEWDIALOGSTYLE, %BIF_USENEWUI, %BIF_BROWSEINCLUDEURLS, %BIF_UAHINT, %BIF_NONEWFOLDERBUTTON, %BIF_NOTRANSLATETARGETS, %BIF_BROWSEINCLUDEFILES, %BIF_SHAREABLE

For use with the DISPLAY COLOR statement:

%CC_FULLOPEN, %CC_PREVENTFULLOPEN, %CC_SHOWHELP

For use with the DISPLAY FONT statement:

%CF_SCREENFONTS, %CF_PRINTERFONTS, %CF_BOTH, %CF_SHOWHELP, %CF_INITTOLOGFONTSTRUCT, %CF_USESTYLE, %CF_EFFECTS, %CF_APPLY, %CF_ANSIONLY, %CF_SCRIPTSONLY, %CF_NOVECTORFONTS, %CF_NOSIMULATIONS, %CF_LIMITSIZE, %CF_FIXEDPITCHONLY, %CF_WYSIWYG, %CF_FORCEFONTEXIST, %CF_SCALABLEONLY, %CF_TTONLY, %CF_NOFACESEL, %CF_NOSTYLESEL, %CF_NOSIZESEL, %CF_SELECTSCRIPT, %CF_NOSCRIPTSEL, %CF_NOVERTFONTS

For use with the DISPLAY OPENFILE and DISPLAY SAVEFILE statements:

%OFN_ALLOWMULTISELECT, %OFN_CREATEPROMPT, %OFN_DONTADDTORECENT, %OFN_ENABLESIZING, %OFN_EXPLORER, %OFN_EXTENSIONDIFFERENT, %OFN_FILEMUSTEXIST, %OFN_FORCESHOWHIDDEN, %OFN_HIDEREADONLY, %OFN_LONGNAMES, %OFN_NODEREFERENCELINKS, %OFN_NOLONGNAMES, %OFN_NONETWORKBUTTON, %OFN_NOREADONLYRETURN, %OFN_NOTESTFILECREATE, %OFN_NOVALIDATE, %OFN_OVERWRITEPROMPT, %OFN_PATHMUSTEXIST, %OFN_READONLY, %OFN_SHAREAWARE, %OFN_SHOWHELP

For use with ERR and ERRCLEAR:

%ERR_NOERROR, %ERR_ILLEGALFUNCTIONCALL, %ERR_OVERFLOW (reserved), %ERR_OUTOFMEMORY, %ERR_SUBSCRIPTPOINTEROUTOFRANGE, %ERR_DIVISIONBYZERO (reserved), %ERR_DEVICETIMEOUT, %ERR_INTERNALERROR, %ERR_BADFILENAMEORNUMBER, %ERR_FILENOTFOUND, %ERR_BADFILEMODE, %ERR_FILEISOPEN, %ERR_DEVICEIOERROR, %ERR_FILEALREADYEXISTS, %ERR_DISKFULL, %ERR_INPUTPASTEND, %ERR_BADRECORDNUMBER, %ERR_BADFILENAME, %ERR_TOOMANYFILES, %ERR_DEVICEUNAVAILABLE, %ERR_COMMERROR, %ERR_PERMISSIONDENIED, %ERR_DISKNOTREADY, %ERR_DISKMEDIAERROR, %ERR_RENAMEACROSSDISKS, %ERR_PATHFILEACCESSERROR, %ERR_PATHNOTFOUND, %ERR_OBJECTERROR, %ERR_GLOBALMEMORYCORRUPT (formerly %ERR_FARHEAPCORRUPT), %ERR_STRINGSPACECORRUPT, %ERR_DIVISIONBYZERO, %ERR_FARHEAPCORRUPT, %ERR_GLOBALMEMORYCORRUPT, %ERR_OVERFLOW

For use with GRAPHIC COPY, GRAPHIC GET MIX, GRAPHIC SET MIX, GRAPHIC STRETCH, XPRINT COPY, XPRINT GET MIX, XPRINT SET MIX, and XPRINT STRETCH (some statements may accept only a subset of these equates):

%MIX_BLACKNESS, %MIX_NOTMERGESRC, %MIX_MASKNOTSRC, %MIX_NOTCOPYSRC, %MIX_MASKSRCNOT, %MIX_NOT, %MIX_XORSRC, %MIX_NOTMASKSRC, %MIX_MASKSRC, %MIX_NOTXORSRC, %MIX_NOP, %MIX_MERGENOTSRC, %MIX_COPYSRC, %MIX_MERGESRCNOT, %MIX_MERGESRC, %MIX_WHITENESS, %

BLACKONWHITE, %WHITEONBLACK, %COLORONCOLOR, %HALFTONE

For use with GRAPHIC IMAGELIST and XPRINT IMAGELIST:

%ILD_NORMAL, %ILD_TRANSPARENT, %ILD_MASK, %ILD_BLEND25, %ILD_BLEND50, %ILD_IMAGE, %ILD_ROP, %ILD_OVERLAYMASK

For use with LABELS and GRAPHIC CONTROLS:

%SS_LEFT, %SS_CENTER, %SS_RIGHT, %SS_ICON, %SS_BLACKRECT, %SS_GRAYRECT, %SS_WHITERECT, %SS_BLACKFRAME, %SS_GRAYFRAME, %SS_WHITEFRAME, %SS_USERITEM, %SS_SIMPLE, %SS_LEFTNOWORDWRAP, %SS_NOWORDWRAP, %SS_OWNERDRAW, %SS_BITMAP, %SS_ENHMETAFILE, %SS_ETCHEDHORZ, %SS_ETCHEDVERT, %SS_ETCHEDFRAME, %SS_REALSIZECONTROL, %SS_NOPREFIX, %SS_NOTIFY, %SS_CENTERIMAGE, %SS_RIGHTJUST, %SS_REALSIZEIMAGE, %SS_REALSIZE, %SS_SUNKEN, %SS_ENDELLIPSIS, %SS_PATHELLIPSIS, %SS_WORDELLIPSIS, %SS_ELLIPSISMASK

For use with HEADERS:

%HDM_GETITEMCOUNT, %HDM_INSERTITEM, %HDM_INSERTITEMW, %HDM_DELETEITEM, %HDM_GETITEM, %HDM_GETITEMW, %HDM_SETITEM, %HDM_SETITEMW, %HDM_LAYOUT, %HDM_HITTEST, %HDM_GETITEMRECT, %HDM_SETIMAGELIST, %HDM_GETIMAGELIST, %HDM_ORDERTOINDEX, %HDM_CREATEDRAGIMAGE, %HDM_GETORDERARRAY, %HDM_SETORDERARRAY, %HDM_SETHOTDIVIDER, %HDM_SETBITMAPMARGIN, %HDM_GETBITMAPMARGIN, %HDM_SETUNICODEFORMAT, %HDM_GETUNICODEFORMAT, %HDM_SETFILTERCHANGETIMEOUT, %HDM_EDITFILTER, %HDM_CLEARFILTER, %HDN_FIRST, %HDN_ITEMCHANGING, %HDN_ITEMCHANGINGW, %HDN_ITEMCHANGED, %HDN_ITEMCHANGEDW, %HDN_ITEMCLICK, %HDN_ITEMCLICKW, %HDN_ITEMDBLCLICK, %HDN_ITEMDBLCLICKW, %HDN_DIVIDERDBLCLICK, %HDN_DIVIDERDBLCLICKW, %HDN_BEGINTRACK, %HDN_BEGINTRACKW, %HDN_ENDTRACK, %HDN_ENDTRACKW, %HDN_TRACK, %HDN_TRACKW, %HDN_GETDISPINFO, %HDN_GETDISPINFOW, %HDN_BEGINDRAG, %HDN_ENDDRAG, %HDN_FILTERCHANGE, %HDN_FILTERBTNCLICK, %HHT_NOWHERE, %HHT_ONHEADER, %HHT_ONDIVIDER, %HHT_ONDIVOPEN, %HHT_ONFILTER, %HHT_ONFILTERBUTTON, %HHT_ABOVE, %HHT_BELOW, %HHT_TORIGHT, %HHT_TOLEFT, %HDF_BITMAP, %HDF_BITMAP_ON_RIGHT, %HDF_CENTER, %HDF_IMAGE, %HDF_JUSTIFYMASK, %HDF_LEFT, %HDF_OWNERDRAW, %HDF_RIGHT, %HDF_RTLREADING, %HDF_SORTDOWN, %HDF_SORTUP, %HDF_STRING, %HDFT_HASNOVALUE, %HDFT_ISNUMBER, %HDFT_ISSTRING, %HDI_BITMAP, %HDI_DI_SETITEM, %HDI_FILTER, %HDI_FORMAT, %HDI_HEIGHT, %HDI_IMAGE, %HDI_LPARAM, %HDI_ORDER, %HDI_TEXT, %HDI_WIDTH, %HDS_BUTTONS, %HDS_DRAGDROP, %HDS_FILTERBAR, %HDS_FLAT, %HDS_FULLDRAG, %HDS_HIDDEN, %HDS_HORZ, %HDS_HOTTRACK

For use with LISTBOXES:

%LBN_DBLCLK, %LBN_ERRSPACE, %LBN_KILLFOCUS, %LBN_SELCANCEL, %LBN_SELCHANGE, %LBN_SETFOCUS, %LBS_NOTIFY, %LBS_SORT, %LBS_NOREDRAW, %LBS_MULTIPLESEL, %LBS_OWNERDRAWFIXED, %LBS_OWNERDRAWVARIABLE, %LBS_HASSTRINGS, %LBS_USETABSTOPS, %LBS_NOINTEGRALHEIGHT, %LBS_MULTICOLUMN, %LBS_WANTKEYBOARDINPUT, %LBS_EXTENDEDSEL, %LBS_DISABLENOSCROLL, %LBS_NODATA, %LBS_NOSEL, %LBS_STANDARD

For use with LISTVIEWS:

%LVN_BEGINDRAG, %LVN_BEGINLABELEDIT, %LVN_BEGINRDRAG, %LVN_COLUMNCLICK, %LVN_DELETEALLITEMS, %LVN_DELETEITEM, %LVN_ENDLABELEDIT, %LVN_GETDISPINFO, %LVN_INSERTITEM, %LVN_ITEMCHANGED, %LVN_ITEMCHANGING, %LVN_KEYDOWN, %LVN_SETDISPINFO, %LVS_ALIGNLEFT, %LVS_ALIGNTOP, %LVS_ALIGNMASK, %LVS_AUTOARRANGE, %LVS_EDITLABELS, %LVS_OWNERDRAWFIXED, %LVS_NOCOLUMNHEADER, %LVS_NOSORTHEADER, %LVS_ICON, %LVS_REPORT, %LVS_SMALLICON, %LVS_LIST, %LVS_TYPEMASK, %LVS_SINGLESEL, %LVS_SORTASCENDING, %LVS_SORTDESCENDING, %LVS_SHAREIMAGELISTS, %LVS_NOLABELWRAP, %LVS_EDITLABELS, %LVS_OWNERDATA, %LVS_NOSCROLL, %LVS_OWNERDRAWFIXED, %LVS_SHOWSELALWAYS, %LVS_EX_GRIDLINES, %LVS_EX_SUBITEMIMAGES, %LVS_EX_CHECKBOXES, %LVS_EX_TRACKSELECT, %LVS_EX_HEADERDRAGDROP, %LVS_EX_FULLROWSELECT, %LVS_EX_ONECLICKACTIVATE, %LVS_EX_TWOCLICKACTIVATE, %LVS_EX_FLATSB, %LVS_EX_REGIONAL, %LVS_EX_INFOTIP, %LVS_EX_UNDERLINEHOT, %LVS_EX_UNDERLINECOLD, %LVS_EX_MULTIWORKAREAS, %LVS_EX_LABELTIP, %LVS_EX_BORDERSELECT, %LVS_EX_DOUBLEBUFFER, %LVS_EX_HIDELABELS, %LVS_EX_SINGLEROW, %LVS_EX_SNAPTOGRID, %LVS_EX_SIMPLESELECT, %LVNI_ALL, %LVNI_FOCUSED, %LVNI_SELECTED, %LVNI_CUT, %LVNI_DROPHILITED, %LVNI_ABOVE, %LVNI_BELOW, %LVNI_TOLEFT, %LVNI_TORIGHT, %LVM_GETSELECTEDCOLUMN, %LVM_ISGROUPVIEWENABLED, %LVM_GETOUTLINECOLOR, %LVM_SETOUTLINECOLOR, %LVM_CANCELEDITLABEL, %LVM_MAPINDEXTOID, %LVM_MAPIDTOINDEX, %LVM_SETTILEVIEWINFO, %LVM_GETTILEVIEWINFO, %LVM_SETTILEINFO, %LVM_GETTILEINFO, %LVM_SETINSERTMARK, %LVM_GETINSERTMARK, %LVM_INSERTMARKHITTEST, %LVM_GETINSERTMARKRECT,

%LVM_SETINSERTMARKCOLOR, %LVM_GETINSERTMARKCOLOR, %LVM_SETINFOTIP, %LVM_GETHOVERTIME, %LVM_SETTOOLTIPS, %LVM_GETTOOLTIPS, %LVM_SORTITEMSEX, %LVM_SETSELECTEDCOLUMN, %LVM_SETTILEWIDTH, %LVM_SETVIEW, %LVM_GETVIEW, %LVM_GETSUBITEMRECT, %LVM_SUBITEMHITTEST, %LVM_SETCOLUMNORDERARRAY, %LVM_GETCOLUMNORDERARRAY, %LVM_SETHOTITEM, %LVM_GETHOTITEM, %LVM_SETHOTCURSOR, %LVM_GETHOTCURSOR, %LVM_APPROXIMATEVIEWRECT, %LVM_GETSELECTIONMARK, %LVM_SETSELECTIONMARK. %LVM_SETBKIMAGE, %LVM_GETBKIMAGE, %LVM_SETHOVERTIME, %LVM_GETTOPINDEX, %LVM_GETCOUNTPERPAGE, %LVM_GETORIGIN, %LVM_UPDATE, %LVM_SETITEMSTATE, %LVM_GETITEMSTATE, %LVM_SETITEMTEXT, %LVM_GETITEMTEXT, %LVM_SETITEMCOUNT, %LVM_SORTITEMS, %LVM_SETITEMPOSITION32, %LVM_GETSELECTEDCOUNT, %LVM_GETITEMSPACING, %LVM_GETISEARCHSTRING, %LVM_SETICONSPACING, %LVM_SETEXTENDEDLISTVIEWSTYLE, %LVM_GETEXTENDEDLISTVIEWSTYLE, %LVM_ARRANGE, %LVM_EDITLABEL, %LVM_GETEDITCONTROL, %LVM_GETCOLUMN, %LVM_SETCOLUMN, %LVM_INSERTCOLUMN, %LVM_DELETECOLUMN, %LVM_GETCOLUMNWIDTH, %LVM_SETCOLUMNWIDTH, %LVM_GETHEADER, %LVM_CREATEDRAGIMAGE, %LVM_GETVIEWRECT, %LVM_GETTEXTCOLOR, %LVM_SETTEXTCOLOR, %LVM_GETTEXTBKCOLOR, %LVM_SETTEXTBKCOLOR, %LVM_GETITEM, %LVM_SETITEM, %LVM_INSERTITEM, %LVM_DELETEITEM, %LVM_DELETEALLITEMS, %LVM_GETCALLBACKMASK, %LVM_SETCALLBACKMASK, %LVM_GETNEXTITEM, %LVM_FINDITEM, %LVM_GETITEMRECT, %LVM_SETITEMPOSITION, %LVM_GETITEMPOSITION, %LVM_GETSTRINGWIDTH, %LVM_HITTEST, %LVM_ENSUREVISIBLE, %LVM_SCROLL, %LVM_REDRAWITEMS, %LVM_GETBKCOLOR, %LVM_SETBKCOLOR, %LVM_GETIMAGELIST, %LVM_SETIMAGELIST, %LVM_GETITEMCOUNT, %LVSIL_NORMAL, %LVSIL_SMALL, %LVSIL_STATE, %LVM_EDITLABELW, %LVM_ENABLEGROUPVIEW, %LVM_FINDITEMW, %LVM_GETBKIMAGEW, %LVM_GETGROUPINFO, %LVM_GETGROUPMETRICS, %LVM_GETISEARCHSTRINGW, %LVM_GETITEMTEXTW, %LVM_GETITEMW, %LVM_GETNUMBEROFWORKAREAS, %LVM_GETSTRINGWIDTHW, %LVM_GETWORKAREAS, %LVM_HASGROUP, %LVM_INSERTGROUP, %LVM_INSERTGROUPSORTED, %LVM_INSERTITEMW, %LVM_MOVEGROUP, %LVM_MOVEITEMTOGROUP, %LVM_REMOVEALLGROUPS, %LVM_REMOVEGROUP, %LVM_SETBKIMAGE, %LVM_SETBKIMAGEW, %LVM_SETCOLUMNW, %LVM_SETGROUPINFO, %LVM_SETGROUPMETRICS, %LVM_SETITEMTEXTW, %LVM_SETITEMW, %LVM_SETSELECTIONMARK, %LVM_SETWORKAREAS, %LVM_SORTGROUPS, %LVN_BEGINLABELEDITW, %LVN_ENDLABELEDITW, %LVN_GETDISPINFOW, %LVN_SETDISPINFOW

For use with MENU CONTEXT:

%TPM_BOTTOMALIGN, %TPM_CENTERALIGN, %TPM_LEFTALIGN, %TPM_LEFTBUTTON, %TPM_RIGHTALIGN, %TPM_RIGHTBUTTON, %TPM_TOPALIGN, %TPM_VCENTERALIGN, %TPM_HORIZONTAL, %TPM_NONOTIFY, %TPM_RETURNCMD, %TPM_VERTICAL

For use with MENU ADD POPUP, MENU ADD STRING, MENU GET STATE, and MENU SET STATE:

%MF_CHECKED, %MF_ENABLED, %MF_GRAYED, %MF_DISABLED, %MF_UNHILITE, %MF_HILITE, %MF_UNCHECKED, %MFS_CHECKED, %MFS_DEFAULT, %MFS_DISABLED, %MFS_ENABLED, %MFS_GRAYED, %MFS_HILITE, %MFS_UNCHECKED, %MFS_UNHILITE

For use with

:

%MB_OK, %MB_OKCANCEL, %MB_ABORTRETRYIGNORE, %MB_YESNOCANCEL, %MB_YESNO, %MB_RETRYCANCEL, %MB_CANCELTRYCONTINUE, %MB_ICONHAND, %MB_ICONQUESTION, %MB_ICONEXCLAMATION, %MB_ICONASTERISK, %MB_USERICON, %MB_ICONWARNING, %MB_ICONERROR, %MB_ICONINFORMATION, %MB_ICONSTOP, %MB_DEFBUTTON1, %MB_DEFBUTTON2, %MB_DEFBUTTON3, %MB_DEFBUTTON4, %MB_APPLMODAL, %MB_SYSTEMMODAL, %MB_TASKMODAL, %MB_HELP, %MB_NOFOCUS, %MB_SETFOREGROUND, %MB_DEFAULT_DESKTOP_ONLY, %MB_TOPMOST, %MB_RIGHT, %MB_RTLREADING, %MB_SERVICE_NOTIFICATION, %MB_SERVICE_NOTIFICATION_NT3X, %MB_TYPEMASK, %MB_ICONMASK, %MB_DEFMASK, %MB_MODEMASK, %MB_MISCMASK

For use with OBJRESULT and IDISPINFO:

%S_OK, %S_FALSE, %E_UNEXPECTED, %E_NOTIMPL, %E_NOINTERFACE, %E_POINTER, %E_ABORT, %E_FAIL, %E_ACCESSDENIED, %E_HANDLE, %E_OUTOFMEMORY, %E_INVALIDARG, %DISP_E_ARRAYISLOCKED, %DISP_E_BADINDEX, %DISP_E_BADPARAMCOUNT, %DISP_E_BADVARTYPE, %DISP_E_EXCEPTION, %DISP_E_MEMBERNOTFOUND, %DISP_E_NONAMEDARGS, %DISP_E_OVERFLOW, %DISP_E_PARAMNOTFOUND, %DISP_E_TYPEMISMATCH, %DISP_E_UNKNOWNINTERFACE, %DISP_E_UNKNOWNLCID, %DISP_E_UNKNOWNNAME, %DISP_E_PARAMNOTOPTIONAL

For use with PowerArray:

%VT_I2, %VT_UI4, %VT_I4, %VT_I8, %VT_R4, %VT_INT, %VT_R8, %VT_UINT, %VT_CY, %VT_PTR, %

VT_DATE, %VT_USERDEFINED, %VT_BSTR, %VT_FILETIME, %VT_DISPATCH, %VT_ASTR, %VT_BOOL, %VT_STRINGFIX, %VT_VARIANT, %VT_WSTRINGFIX, %VT_UNKNOWN, %VT_STRINGZ, %VT_DECIMAL, %VT_WSTRINGZ, %VT_I1, %VT_TYPE, %VT_UI1, %VT_EXT, %VT_UI2, %VT_CURX

For use with PROCESS GET PRIORITY and PROCESS SET PRIORITY:

%HIGH_PRIORITY_CLASS, %IDLE_PRIORITY_CLASS, %NORMAL_PRIORITY_CLASS, %REALTIME_PRIORITY_CLASS

For use with PROGRESSBARS:

%PBS_SMOOTH, %PBS_VERTICAL

For use with SCROLLBARS::

%SB_HORZ, %SB_VERT, %SB_CTL, %SB_BOTH, %SB_LINEUP, %SB_LINELEFT, %SB_LINEDOWN, %SB_LINERIGHT, %SB_PAGEUP, %SB_PAGELEFT, %SB_PAGEDOWN, %SB_PAGERIGHT, %SB_THUMBPOSITION, %SB_THUMBTRACK, %SB_TOP, %SB_LEFT, %SB_BOTTOM, %SB_RIGHT, %SB_ENDSCROLL, %SBS_HORZ, %SBS_VERT, %SBS_TOPALIGN, %SBS_LEFTALIGN, %SBS_BOTTOMALIGN, %SBS_RIGHTALIGN, %SBS_SIZEBOXTOPLEFTALIGN, %SBS_SIZEBOXBOTTOMRIGHTALIGN, %SBS_SIZEBOX, %SBS_SIZEGRIP, %SIF_RANGE, %SIF_PAGE, %SIF_POS, %SIF_DISABLENOSCROLL, %SIF_TRACKPOS, %SIF_ALL, %SBARS_SIZEGRIP, %SBARS_TOOLTIPS

For use with STATUSBARS:

%SBT_OWNERDRAW, %SBT_NOBORDERS, %SBT_POPOUT, %SBT_RTLREADING, %SBT_TOOLTIPS, %SBT_NOTABPARSING

For use with TAB Controls:

%TCHT_NOWHERE, %TCHT_ONITEMICON, %TCHT_ONITEMLABEL, %TCHT_ONITEM, %TCIF_TEXT, %TCIF_IMAGE, %TCIF_RTLREADING, %TCIF_PARAM, %TCIF_STATE, %TCIS_BUTTONPRESSED, %TCIS_HIGHLIGHTED, %TCN_KEYDOWN, %TCN_SELCHANGE, %TCN_SELCHANGING, %TCN_GETOBJECT, %TCN_FOCUSCHANGE, %TCS_SCROLLOPPOSITE, %TCS_FLATBUTTONS, %TCS_FORCEICONLEFT, %TCS_FORCELABELLEFT, %TCS_HOTTRACK, %TCS_TABS, %TCS_BUTTONS, %TCS_FIXEDWIDTH, %TCS_RAGGEDRIGHT, %TCS_FOCUSONBUTTONDOWN, %TCS_OWNERDRAWFIXED, %TCS_TOOLTIPS, %TCS_FOCUSNEVER, %TCS_EX_FLATSEPARATORS, %TCS_EX_REGISTERDROP

For use with TCP NOTIFY:

%FD_ACCEPT, %FD_CLOSE, %FD_CONNECT, %FD_READ, %FD_WRITE

For use with TEXTBOXES:

%EN_CHANGE, %EN_ERRSPACE, %EN_HSCROLL, %EN_KILLFOCUS, %EN_MAXTEXT, %EN_SETFOCUS, %EN_UPDATE, %EN_VSCROLL, %ES_LEFT, %ES_CENTER, %ES_RIGHT, %ES_MULTILINE, %ES_UPPERCASE, %ES_LOWERCASE, %ES_PASSWORD, %ES_AUTOVSCROLL, %ES_AUTOHSCROLL, %ES_NOHIDESEL, %ES_OEMCONVERT, %ES_READONLY, %ES_WANTRETURN, %ES_NUMBER, %EN_ALIGN_LTR_EC, %EN_ALIGN_RTL_EC

For use with THREAD GET PRIORITY and THREAD SET PRIORITY:

%THREAD_PRIORITY_ABOVE_NORMAL, %THREAD_PRIORITY_BELOW_NORMAL, %THREAD_PRIORITY_HIGHEST, %THREAD_PRIORITY_IDLE, %THREAD_PRIORITY_LOWEST, %THREAD_PRIORITY_NORMAL, %THREAD_PRIORITY_TIME_CRITICAL

For use with TOOLBARS:

%CCS_ADJUSTABLE, %CCS_BOTTOM, %CCS_LEFT, %CCS_NODIVIDER, %CCS_NOMOVEX, %CCS_NOMOVEY, %CCS_NOPARENTALIGN, %CCS_NORESIZE, %CCS_RIGHT, %CCS_TOP, %CCS_VERT, %BTNS_AUTOSIZE, %BTNS_BUTTON, %BTNS_CHECK, %BTNS_GROUP, %BTNS_CHECKGROUP, %BTNS_DROPDOWN, %BTNS_NOPREFIX, %BTNS_SEP, %BTNS_SHOWTEXT, %BTNS_WHOLEDROPDOWN, %TBSTYLE_AUTOSIZE, %TBSTYLE_BUTTON, %TBSTYLE_CHECK, %TBSTYLE_GROUP, %TBSTYLE_CHECKGROUP, %TBSTYLE_DROPDOWN, %TBSTYLE_SEP, %TBSTYLE_TOOLTIPS, %TBSTYLE_FLAT, %TBSTYLE_LIST, %TBSTYLE_TRANSPARENT, %TBSTYLE_WRAPABLE, %TBSTATE_CHECKED, %TBSTATE_DISABLED, %TBSTATE_ELLIPSES, %TBSTATE_ENABLED, %TBSTATE_HIDDEN, %TBSTATE_INDETERMINATE, %TBSTATE_MARKED, %TBSTATE_PRESSED, %TBSTATE_WRAP, %TBN_BEGINADJUST, %TBN_BEGINDRAG, %TBN_CUSTHELP, %TBN_ENDADJUST, %TBN_ENDDRAG, %TBN_GETBUTTONINFO, %TBN_QUERYDELETE, %TBN_QUERYINSERT, %TBN_RESET, %TBN_TOOLBARCHANGE, %TB_ADDBITMAP, %TB_ADDBUTTONS, %TB_ADDBUTTONSW, %TB_ADDSTRING, %TB_ADDSTRINGW, %TB_AUTOSIZE, %TB_BUTTONCOUNT, %TB_BUTTONSTRUCTSIZE, %TB_CHANGEBITMAP, %TB_CHECKBUTTON, %TB_COMMANDTOINDEX, %TB_CUSTOMIZE, %TB_DELETEBUTTON, %TB_ENABLEBUTTON, %TB_GETANCHORHIGHLIGHT, %TB_GETBITMAP, %TB_GETBUTTON, %TB_GETBUTTONINFO, %TB_GETBUTTONINFOW, %TB_GETBUTTONSIZE,

%TB_GETBUTTONTEXT, %TB_GETBUTTONTEXTW, %TB_GETDISABLEDIMAGELIST, %TB_GETEXTENDEDSTYLE, %TB_GETHOTIMAGELIST, %TB_GETHOTITEM, %TB_GETIMAGELIST, %TB_GETINSERTMARK, %TB_GETINSERTMARKCOLOR, %TB_GETITEMRECT, %TB_GETMAXSIZE, %TB_GETMETRICS, %TB_GETOBJECT, %TB_GETPADDING, %TB_GETRECT, %TB_GETROWS, %TB_GETSTATE, %TB_GETSTRING, %TB_GETSTRINGW, %TB_GETSTYLE, %TB_GETTEXTROWS, %TB_GETTOOLTIPS, %TB_HIDEBUTTON, %TB_HITTEST, %TB_INDETERMINATE, %TB_INSERTBUTTON, %TB_INSERTBUTTONW, %TB_INSERTMARKHITTEST, %TB_ISBUTTONCHECKED, %TB_ISBUTTONENABLED, %TB_ISBUTTONHIDDEN, %TB_ISBUTTONHIGHLIGHTED, %TB_ISBUTTONINDETERMINATE, %TB_ISBUTTONPRESSED, %TB_LOADIMAGES, %TB_MAPACCELERATOR, %TB_MAPACCELERATORW, %TB_MARKBUTTON, %TB_MOVEBUTTON, %TB_PRESSBUTTON, %TB_REPLACEBITMAP, %TB_SAVERESTORE, %TB_SAVERESTOREW, %TB_SETANCHORHIGHLIGHT, %TB_SETBITMAPSIZE, %TB_SETBUTTONINFO, %TB_SETBUTTONINFOW, %TB_SETBUTTONSIZE, %TB_SETBUTTONWIDTH, %TB_SETCMDID, %TB_SETDISABLEDIMAGELIST, %TB_SETDRAWTEXTFLAGS, %TB_SETEXTENDEDSTYLE, %TB_SETHOTIMAGELIST, %TB_SETHOTITEM, %TB_SETIMAGELIST, %TB_SETINDENT, %TB_SETINSERTMARK, %TB_SETINSERTMARKCOLOR, %TB_SETMAXTEXTROWS, %TB_SETMETRICS, %TB_SETPADDING, %TB_SETPARENT, %TB_SETROWS, %TB_SETSTATE, %TB_SETSTYLE, %TB_SETTOOLTIPS, %TBN_GETBUTTONINFOW, %TBSTYLE_ALTDRAG, %TBSTYLE_CUSTOMERASE, %TBSTYLE_EX_DOUBLEBUFFER, %TBSTYLE_EX_DRAWDDARROWS, %TBSTYLE_EX_HIDECLIPPEDBUTTONS, %TBSTYLE_EX_MIXEDBUTTONS, %TBSTYLE_NOPREFIX, %TBSTYLE_REGISTERDROP

For use with TREEVIEWS:

%TVS_HASBUTTONS, %TVS_HASLINES, %TVS_LINESATROOT, %TVS_EDITLABELS, %TVS_DISABLEDRAGDROP, %TVS_SHOWSELALWAYS, %TVS_RTLREADING, %TVS_NOTOOLTIPS, %TVS_CHECKBOXES, %TVS_TRACKSELECT, %TVS_SINGLEEXPAND, %TVS_INFOTIP, %TVS_FULLROWSELECT, %TVS_NOSCROLL, %TVS_NONEVENHEIGHT, %TVS_NOHSCROLL, %TVI_ROOT, %TVI_FIRST, %TVI_LAST, %TVI_SORT, %TVE_COLLAPSE, %TVE_EXPAND, %TVE_TOGGLE, %TVE_EXPANDPARTIAL, %TVE_COLLAPSERESET, %TVN_BEGINDRAG, %TVN_BEGINLABELEDIT, %TVN_BEGINRDRAG, %TVN_DELETEITEM, %TVN_ENDLABELEDIT, %TVN_GETDISPINFO, %TVN_ITEMEXPANDED, %TVN_ITEMEXPANDING, %TVN_KEYDOWN, %TVN_SELCHANGED, %TVN_SELCHANGING, %TVN_SETDISPINFO, %TVN_BEGINDRAGW, %TVN_BEGINLABELEDITW, %TVN_BEGINRDRAGW, %TVN_DELETEITEMW, %TVN_ENDLABELEDITW, %TVN_GETDISPINFOW, %TVN_ITEMEXPANDEDW, %TVN_ITEMEXPANDINGW, %TVN_SELCHANGEDW, %TVN_SELCHANGINGW, %TVN_SETDISPINFOW

For use with VARIANTVT:

%VT_EMPTY, %VT_NULL, %VT_I2, %VT_I4, %VT_R4, %VT_R8, %VT_CY, %VT_DATE, %VT_BSTR, %VT_DISPATCH, %VT_ERROR, %VT_BOOL, %VT_VARIANT, %VT_DECIMAL, %VT_UNKNOWN, %VT_I1, %VT_UI1, %VT_UI2, %VT_UI4, %VT_I8, %VT_UI8, %VT_INT, %VT_UINT, %VT_VOID, %VT_HRESULT, %VT_PTR, %VT_SAFEARRAY, %VT_CARRAY, %VT_USERDEFINED, %VT_LPSTR, %VT_LPWSTR, %VT_RECORD, %VT_FILETIME, %VT_BLOB, %VT_STREAM, %VT_STORAGE, %VT_STREAMED_OBJECT, %VT_STORED_OBJECT, %VT_BLOB_OBJECT, %VT_CF, %VT_CLSID, %VT_VECTOR, %VT_ARRAY, %VT_BYREF

For use with XPRINT ATTACH CHOOSE:

%PD_ALLPAGES, %PD_SELECTION, %PD_PAGENUMS, %PD_NOSELECTION, %PD_NOPAGENUMS, %PD_COLLATE, %PD_PRINTTOFILE, %PD_PRINTSETUP, %PD_NOWARNING, %PD_RETURNDC, %PD_RETURNIC, %PD_RETURNDEFAULT, %PD_SHOWHELP, %PD_ENABLEPRINTHOOK, %PD_ENABLESETUPHOOK, %PD_ENABLEPRINTTEMPLATE, %PD_ENABLESETUPTEMPLATE, %PD_ENABLEPRINTTEMPLATEHANDLE, %PD_ENABLESETUPTEMPLATEHANDLE, %PD_USEDEVMODECOPIES, %PD_USEDEVMODECOPIESANDCOLLATE, %PD_DISABLEPRINTTOFILE, %PD_HIDEPRINTTOFILE, %PD_NONETWORKBUTTON, %PD_CURRENTPAGE, %PD_NOCURRENTPAGE, %PD_EXCLUSIONFLAGS, %PD_USELARGETEMPLATE, %PD_RESULT_CANCEL, %PD_RESULT_PRINT, %PD_RESULT_APPLY, %PDERR_PRINTERCODES, %PDERR_SETUPFAILURE, %PDERR_PARSEFAILURE, %PDERR_RETDEFFAILURE, %PDERR_LOADDRVFAILURE, %PDERR_GETDEVMODEFAIL, %PDERR_INITFAILURE, %PDERR_NODEVICES, %PDERR_NODEFAULTPRN, %PDERR_DNDMMISMATCH, %PDERR_CREATEICFAILURE, %PDERR_PRINTERNOTFOUND, %PDERR_DEFAULTDIFFERENT

For use with the XPRINT GET COLLATE and XPRINT SET COLLATE statements:

%DMCOLLATE_FALSE, %DMCOLLATE_TRUE

For use with the XPRINT GET COLORMODE and XPRINT SET COLORMODE statements:

%DMCOLOR_MONOCHROME, %DMCOLOR_COLOR

For use with the XPRINT GET DUPLEX and XPRINT SET DUPLEX statements:

%DMDUP_SIMPLEX, %DMDUP_VERTICAL, %DMDUP_HORIZONTAL

For use with the XPRINT GET PAPER, XPRINT GET PAPERS, and XPRINT SET PAPER statements:

```
%DMPAPER_LETTER, %DMPAPER_TABLOID, %DMPAPER_LEDGER, %DMPAPER_LEGAL, %
DMPAPER_STATEMENT, %DMPAPER_EXECUTIVE, %DMPAPER_A3, %DMPAPER_A4, %DMPAPER_A5, %
DMPAPER_B4, %DMPAPER_B5, %DMPAPER_FOLIO, %DMPAPER_QUARTO, %DMPAPER_10X14, %
DMPAPER_11X17, %DMPAPER_NOTE, %DMPAPER_ENV_9, %DMPAPER_ENV_10
```

For use with the XPRINT GET TRAY, XPRINT GET TRAYS, and XPRINT SET TRAY statements:

```
%DMBIN_UPPER, %DMBIN_LOWER, %DMBIN_MIDDLE, %DMBIN_MANUAL, %DMBIN_ENVELOPE, %
DMBIN_ENVMANUAL, %DMBIN_AUTO, %DMBIN_TRACTOR, %DMBIN_SMALLFMT, %DMBIN_LARGEFMT, %
DMBIN_LARGECAPACITY, %DMBIN_CASSETTE, %DMBIN_FORMSOURCE
```

For use with Miscellaneous API routines:

```
%BIF_VALIDATE, %CF_BITMAP, %CF_DIB, %CF_DIBV5, %CF_DIF, %CF_ENHMETAFILE, %CF_HDROP, %
CF_LOCALE, %CF_METAFILEPICT, %CF_OEMTEXT, %CF_PALETTE, %CF_PENDATA, %CF_RIFF, %
CF_SYLK, %CF_TEXT, %CF_TIFF, %CF_UNICODETEXT, %CF_WAVE, %CS_BYTEALIGNCLIENT, %
CS_BYTEALIGNWINDOW, %CS_CLASSDC, %CS_DBLCLKS, %CS_DROPSHADOW, %CS_GLOBALCLASS, %
CS_HREDRAW, %CS_IME, %CS_KEYCVTWINDOW, %CS_NOCLOSE, %CS_NOKEYCVT, %CS_OWNDC, %
CS_PARENTDC, %CS_SAVEBITS, %CS_VREDRAW, %MAX_FNAME, %MAX_PATH, %MAXIMUM_WAIT_OBJECTS,
%OFN_NOCHANGEDIR, %SND_ALIAS, %SND_ALIAS_ID, %SND_APPLICATION, %SND_ASYNC, %
SND_FILENAME, %SND_LOOP, %SND_MEMORY, %SND_NODEFAULT, %SND_NOSTOP, %SND_NOWAIT, %
SND_PURGE, %SND_RESOURCE, %SND_VALID, %TCS_BOTTOM, %TCS_MULTILINE, %TCS_MULTISELECT, %
TCS_RIGHT, %TCS_RIGHTJUSTIFY, %TCS_SINGLELINE, %TCS_VERTICAL, %WS_EX_MDICHILD
```

See Also

- Built-in RGB Color Equates
- Constants and Literals
- Numeric Equates
- String Equates
- Built-in string equates
- Built-in Interfaces
- Built-in User Defined Types

Built In RGB Color Equates

Built-in RGB Color Equates

The following is a list of RGB color equates built into the compiler, which can be used with routines that accept RGB color values.

Red Colors

%RGB_INDIANRED	= &H5C5CCD
%RGB_LIGHTCORAL	= &H8080F0
%RGB_SALMON	= &H7280FA
%RGB_DARKSALMON	= &H7A96E9
%RGB_LIGHTSALMON	= &H7AA0FF
%RGB_CRIMSON	= &H3C14DC
%RGB_RED	= &H0000FF
%RGB_FIREBRICK	= &H2222B2
%RGB_DARKRED	= &H00008B

Pink Colors

%RGB_PINK	= &HCBC0FF
%RGB_LIGHTPINK	= &HC1B6FF
%RGB_HOTPINK	= &HB469FF
%RGB_DEEPPINK	= &H9314FF
%RGB_MEDIUMVIOLETRED	= &H8515C7
%RGB_PALEVIOLETRED	= &H9370DB

Orange Colors

%RGB_LIGHTSALMON	= &H7AA0FF
%RGB_CORAL	= &H507FFF
%RGB_TOMATO	= &H4763FF
%RGB_ORANGERED	= &H0045FF
%RGB_DARKORANGE	= &H008CFF
%RGB_ORANGE	= &H00A5FF

Yellow Colors

%RGB_GOLD	= &H00D7FF
%RGB_YELLOW	= &H00FFFF
%RGB_LIGHTYELLOW	= &HE0FFFF
%RGB_LEMONCHIFFON	= &HCDFAFF
%RGB_LIGHTGOLDENRODYELLOW	= &HD2FAFA
%RGB_PAPAYAWHIP	= &HD5EFFF
%RGB_MOCCASIN	= &HB5E4FF
%RGB_PEACHPUFF	= &HB9DAFF
%RGB_PALEGOLDENROD	= &HAAE8EE
%RGB_KHAKI	= &H8CE6F0
%RGB_DARKKHAKI	= &H6BB7BD

Purple Colors

%RGB_LAVENDER	= &HFAE6E6
%RGB_THISTLE	= &HD8BFD8
%RGB_PLUM	= &HDDA0DD
%RGB_VIOLET	= &HEE82EE
%RGB_ORCHID	= &HD670DA
%RGB_MAGENTA	= &HFF00FF
%RGB_MEDIUMORCHID	= &HD355BA
%RGB_MEDIUMPURPLE	= &HDB7093
%RGB_BLUEVIOLET	= &HE22B8A
%RGB_DARKVIOLET	= &HD30094
%RGB_DARKORCHID	= &HCC3299
%RGB_DARKMAGENTA	= &H8B008B
%RGB_PURPLE	= &H800080
%RGB_INDIGO	= &H82004B
%RGB_SLATEBLUE	= &HCD5A6A
%RGB_DARKSLATEBLUE	= &H8B3D48
%RGB_MEDIUMSLATEBLUE	= &HEE687B

Green Colors

%RGB_GREENYELLOW	= &H2FFFAD
%RGB_CHARTREUSE	= &H00FF7F
%RGB_LAWNGREEN	= &H00FC7C
%RGB_LIME	= &H00FF00
%RGB_LIMEGREEN	= &H32CD32
%RGB_PALEGREEN	= &H98FB98
%RGB_LIGHTGREEN	= &H90EE90
%RGB_MEDIUMSPRINGGREEN	= &H9AFA00
%RGB_SPRINGGREEN	= &H7FFF00
%RGB_MEDIUMSEAGREEN	= &H71B33C
%RGB_SEAGREEN	= &H578B2E
%RGB_FORESTGREEN	= &H228B22
%RGB_GREEN	= &H008000
%RGB_DARKGREEN	= &H006400
%RGB_YELLOWGREEN	= &H32CD9A
%RGB_OLIVEDRAB	= &H238E6B
%RGB_OLIVE	= &H008080
%RGB_DARKOLIVEGREEN	= &H2F6B55
%RGB_MEDIUMAQUAMARINE	= &HAACD66
%RGB_DARKSEAGREEN	= &H8FBC8F
%RGB_LIGHTSEAGREEN	= &HAAB220
%RGB_DARKCYAN	= &H8B8B00
%RGB_TEAL	= &H808000

Blue Colors

%RGB_CYAN	= &HFFFF00
%RGB_LIGHTCYAN	= &HFFFFE0
%RGB_PALETURQUOISE	= &HEEEEAF
%RGB_AQUAMARINE	= &HD4FF7F
%RGB_TURQUOISE	= &HD0E040
%RGB_MEDIUMTURQUOISE	= &HCCD148
%RGB_DARKTURQUOISE	= &HD1CE00
%RGB_CADETBLUE	= &HA09E5F
%RGB_STEELBLUE	= &HB48246
%RGB_LIGHTSTEELBLUE	= &HDEC4B0
%RGB_POWDERBLUE	= &HE6E0B0
%RGB_LIGHTBLUE	= &HE6D8AD
%RGB_SKYBLUE	= &HEBCE87
%RGB_LIGHTSKYBLUE	= &HFACE87
%RGB_DEEPSKYBLUE	= &HFFBF00
%RGB_DODGERBLUE	= &HFF901E
%RGB_CORNFLOWERBLUE	= &HED9564
%RGB_MEDIUMSLATEBLUE	= &HEE687B
%RGB_ROYALBLUE	= &HE16941
%RGB_BLUE	= &HFF0000
%RGB_MEDIUMBLUE	= &HCD0000

%RGB_DARKBLUE	= &H8B0000
%RGB_NAVY	= &H800000
%RGB_MIDNIGHTBLUE	= &H701919

Brown Colors

%RGB_CORNSILK	= &HDCF8FF
%RGB_BLANCHEDALMOND	= &HCDEBFF
%RGB_BISQUE	= &HC4E4FF
%RGB_NAVAJOWHITE	= &HADDEFF
%RGB_WHEAT	= &HB3DEF5
%RGB_BURLYWOOD	= &H87B8DE
%RGB_TAN	= &H8CB4D2
%RGB_ROSYBROWN	= &H8F8FBC
%RGB_SANDYBROWN	= &H60A4F4
%RGB_GOLDENROD	= &H20A5DA
%RGB_DARKGOLDENROD	= &H0B86B8
%RGB_PERU	= &H3F85CD
%RGB_CHOCOLATE	= &H1E69D2
%RGB_SADDLEBROWN	= &H13458B
%RGB_SIENNA	= &H2D52A0
%RGB_BROWN	= &H2A2AA5
%RGB_MAROON	= &H000080

White Colors

%RGB_WHITE	= &HFFFFFF
%RGB_SNOW	= &HFAFAFF
%RGB_HONEYDEW	= &HF0FFF0
%RGB_MINTCREAM	= &HFAFFF5
%RGB_AZURE	= &HFFFFF0
%RGB_ALICEBLUE	= &HFFF8F0
%RGB_GHOSTWHITE	= &HFFF8F8
%RGB_WHITESMOKE	= &HF5F5F5
%RGB_SEASHELL	= &HEEF5FF
%RGB_BEIGE	= &HDCF5F5
%RGB_OLDLACE	= &HE6F5FD
%RGB_FLORALWHITE	= &HF0FAFF
%RGB_IVORY	= &HF0FFFF
%RGB_ANTIQUEWHITE	= &HD7EBFA
%RGB_LINEN	= &HE6F0FA
%RGB_LAVENDERBLUSH	= &HF5F0FF
%RGB_MISTYROSE	= &HE1E4FF

Gray Colors

%RGB_GAINSBORO	= &HDCDCDC
%RGB_LIGHTGRAY	= &HD3D3D3
%RGB_SILVER	= &HC0C0C0
%RGB_DARKGRAY	= &HA9A9A9
%RGB_GRAY	= &H808080
%RGB_DIMGRAY	= &H696969

%RGB_LIGHTSLATEGRAY	= &H998877	
%RGB_SLATEGRAY	= &H908070	
%RGB_DARKSLATEGRAY	= &H4F4F2F	
%RGB_BLACK	= &H000000	

See Also

- Built-in numeric equates
- Built-in string equates
- Built-in Interfaces
- Built-in User Defined Types
- Constants and Literals
- Numeric Equates
- String Equates

String Equates

String Equates

You can create a

equate by prefixing $ (for ANSI) or $$ (for WIDE) to the equate name. The value on the right side of the equate assignment must be a string literal, or an expression created from string literals. The string literal expression can be constructed from combinations of other string equates or quoted string literals, the CHR$ function, SPACE$ function, and the STRING$ function when used with numeric parameters. ANSI string equates can also use the GUID$ function. For example:

```
$Name      = "John Smith"
$$Fullname = "John"$$  &  " Smith"$$
$$UserNam  = $$First & $$Last
$PrintCode = CHR$(27, 34, "E") + SPACE$(10) + CHR$(65 TO 90)
$AppGuid   = GUID$("{01234567-89AB-CDEF-FEDC-BA9876543210}")
```

A string equate can include the double-quote character, simply by doubling the character within the string. For example:

```
$ABC = "This is a ""string"""
```

ANSI string equates are each limited to 255 characters, while WIDE equates are limited to 127 characters. An attempt to create a longer string equate will trigger a compile-time Error 489 ("Invalid string length").

As with numeric equates, PowerBASIC pre-calculates the string equate content during compilation to limit calculations at run-time. Duplicate definitions of both numeric and string equates are permitted by PowerBASIC, provided the actual content is identical. If the content is not identical, a compile-time Error 468 ("Duplicate Equate") will be generated.

A string equate name must always begin with one or two leading dollar signs ($) and a letter (A-Z). This is optionally followed by any combination of letters (A-Z), numbers (0-9), and underscores (_). All other characters are illegal.

String equates must be created outside of any SUB, FUNCTION, METHOD, or PROPERTY. String equates are global, and may be referenced anywhere in the module. For readability, we suggest placing equates at the top of your code.

See Also

Constants and Literals

Defining Constants

Numeric Equates

Built-in numeric equates

Built In RGB Color Equates

Built-in string equates

Built-in string equates

Built-in string equates

The compiler also provides a set of built-in string equates. These offer convenience as well as self-documentation.

The following table shows the ANSI form, each of which begins with a single dollar-sign ($). The compiler also includes and offers a wide Unicode version of each of them, identified by a double dollar-sign ($$). For example, $NUL returns a byte with the character code zero (0), while $$NUL returns a word with the character code zero (0).

ANSI	Character(s)	Definition
$NUL	CHR$(0)	Null
$BEL	CHR$(7)	Bell
$BS	CHR$(8)	Back Space
$TAB	CHR$(9)	Horizontal Tab
$LF	CHR$(10)	Line Feed
$VT	CHR$(11)	Vertical Tab
$FF	CHR$(12)	Form Feed
$CR	CHR$(13)	Carriage Return
$CRLF	CHR$(13,10)	CR and LF
$EOF	CHR$(26)	End-of-File
$ESC	CHR$(27)	Escape
$SPC	CHR$(32)	Space
$DQ	CHR$(34)	Double-Quote
$DQ2	CHR$(34,34)	Two Double-Quotes ("")
$SQ	CHR$(39)	Single-Quote
$SQ2	CHR$(39,39)	Two Single-Quotes ('')
$QCQ	CHR$(34, 44, 34)	Double-Quote, Comma, Double-Quote
$WHITESPACE	CHR$(32, 9, 13, 10)	Space, Tab, CR, LF

See Also

Constants and Literals

Numeric Equates

Built-in numeric equates

Built-in string equates

String Equates

Built-in Interfaces

Built-in User Defined Types

[Built-in RGB Color Equates]

Bit Data Types

Bit Data Types

[TYPE] and [UNION] structures may contain bit variables, which are named [BIT] (unsigned values) or [SBIT] (signed values). Each bit variable may occupy from 1 to 31 bits. When used in a TYPE, bit variables are packed one after another up to a total of 32 bits per bit field. When used in a UNION, all bit variables overlay each other, starting at the first bit position.

Bit variables may only be used as TYPE or UNION members, not as scalar, array, or pointer variables. The size of a bit variable is defined as:

```
var AS BIT * nlit [IN BYTE|WORD|DWORD]
```

where the term "* nlit" defines the number of bits (1 to 31), and the optional term "IN BYTE|WORD|DWORD", if present, defines the start of a new bit field of 1, 2, or 4 bytes.

```
TYPE abcd
  valu AS BIT * 31 IN DWORD
  sign AS SBIT * 1
  nybl2 AS BIT * 4 IN BYTE
  nybl1 AS BIT * 4
END TYPE
```

The example type above is 5 bytes in size, containing a 4-byte bit field and a 1-byte bit field. In this case, each contain 2 bit variables of varying size. The range of values which may be stored depends upon the number of bits available. For example, "BIT * 4" has a range of 0 to 15, "SBIT * 1" has a range of -1 to 0, and "SBIT * 5" has a range of -16 to +15. BIT and SBIT variables may not be used with SHIFT or ROTATE statements.

```
UNION abcde
  Part1 AS BIT * 8 IN DWORD
  Part2 AS BIT * 16
END UNION
```

The example union above is 2 bytes in size, containing an 8-bit field and an overlapping 16-bit field.

See Also

[TYPE/END TYPE block]

[UNION/END UNION statements]

GUID data types

GUID Data Types

PowerBASIC introduces another new [variable] class: GUID variables. These are a special form of 16-[byte] string that are used to contain a 128-bit Globally Unique Identifier (GUID), primarily for use with [COM Objects].

Generally speaking, a GUID variable is assigned a value with the [GUID$] function, or with a [string equate], and that value usually remains constant throughout the program. The GUID variable is typically used only as a parameter, rather than as a term in an expression.

GUID variables must be explicitly declared with [DIM], [LOCAL], etc, and are used in much the same way as a 16-byte [fixed-length string] or a [user-defined type] of that size. A GUID variable is only valid as a parameter when its 16 bytes of data are in an appropriate format. For example:

```
$idNull = STRING$(16,0)
' code here
DIM abc AS LOCAL GUID
DIM def AS LOCAL STRING
DIM xyz AS GLOBAL GUID
abc = $idNull
abc = GUID$("{00000000-0000-0000-C000-000000000046}")
xyz = abc
def = GUIDTXT$(xyz)
' def contains "{00000000-0000-0000-C000-000000000046}"
```

See Also

GUID$ function

What is an object, anyway?

Just what is COM?

How are GUID's used with objects?

Object Data Type

Object Data Types

Object variables are used to access an object. Object variables contain a pointer to the desired object, so they are considered to contain an "Object Reference". They contain no other value of any kind. Object variables are declared by the name of the interface they represent. This could be the generic IDISPATCH, IUNKNOWN, and IAUTOMATION interfaces, or one that is explicitly defined with an INTERFACE structure. For example:

```
' Generic IDispatch Object variable
DIM oWord AS IDISPATCH
LET oWord = NEWCOM "Word.Application"

' Generic IUnknown Object variable
DIM MyObj as IUNKNOWN
DIM oWord as Int_Application
LET MyObj = NEWCOM "Word.Application"
LET oWord = MyObj

' Interface-specific Object variable
DIM oWord AS Int_Application
LET oWord = NEWCOM "Word.Application"
```

An object variable may only be used in specific situations, such as execution of an Object Method. It is never legal to reference Object variables in normal

or string expressions, nor is it possible to even output their value without the use of the special new functions like OBJPTR. Methods are executed by using an object variable with a Method name. For example, to call the Method ABC in an interface represented by the object variable MyObject, you would

write:

```
CALL MyObject.abc()
```

See Also

What is an object, anyway?

Just what is COM?

How do you create an object?

How do you call a Direct Method?

How do you call a DISPATCH METHOD?

Late Binding

ID Binding

Variant Data Types

Variant Data Types

Variant variables are now supported by PowerBASIC, but their use is limited to that of a parameter assignment for conversion of data, for compatibility with other languages and applications, especially COM Objects.

Although notoriously lacking in efficiency, Variants are commonly used as COM Object parameters due to their flexibility. You can think of a Variant as a kind of container, which can hold a variable of most any data type,

, , or even an entire array. This simplifies the process of calling procedures in a COM Object Server, as there is little need to worry about the myriad of possible data types for each parameter.

This flexibility comes at a great price in performance, so PowerBASIC limits their use to data storage and parameters only. You may assign a numeric value, a string value, or even an entire array to a Variant with the LET statement, or its implied equivalent. In the same way, you may assign one Variant value to another Variant variable, or even assign an array contained in a Variant to a compatible PowerBASIC array, or the reverse.

You may extract a simple scalar value from a Variant with the VARIANT# function for numeric values (regardless of the internal numeric data type), or with the VARIANT$ and VARIANT$$ functions for string values. You may determine the type of data a Variant variable contains with the VARIANTVT function. The following table summarizes the predefined (built-in) equates that can be used to examine a Variant:

Result	Equate	Content Type
0	%VT_EMPTY	An Empty Variant
1	%VT_NULL	Null value
2	%VT_I2	Integer
3	%VT_I4	Long-Integer
4	%VT_R4	Single
5	%VT_R8	Double
6	%VT_CY	Currency
7	%VT_DATE	Date
8	%VT_BSTR	Dynamic String
9	%VT_DISPATCH	IDispatch
10	%VT_ERROR	Error Code
11	%VT_BOOL	Boolean
12	%VT_VARIANT	Variant
13	%VT_UNKNOWN	IUnknown
14	%VT_DECIMAL	Decimal
16	%VT_I1	Byte (signed)
17	%VT_UI1	Byte (unsigned)

18	%VT_UI2	Word
19	%VT_UI4	DWORD
20	%VT_I8	Quad (signed)
21	%VT_UI8	Quad (unsigned)
22	%VT_INT	Long-Integer
23	%VT_UINT	DWord
24	%VT_VOID	A C-style void type
25	%VT_HRESULT	COM result code
26	%VT_PTR	Pointer
27	%VT_SAFEARRAY	VB Array
28	%VT_CARRAY	A C-style array
29	%VT_USERDEFINED	User Defined Type
30	%VT_LPSTR	ANSI string
31	%VT_LPWSTR	Unicode string
64	%VT_FILETIME	A FILETIME value
65	%VT_BLOB	An arbitrary block of memory
66	%VT_STREAM	A stream of bytes
67	%VT_STORAGE	Name of the storage
68	%VT_STREAMED_OBJECT	A stream that contains an object
69	%VT_STORED_OBJECT	A storage object
70	%VT_BLOB_OBJECT	A block of memory that represents an object
71	%VT_CF	Clipboard format
72	%VT_CLSID	Class ID
&H1000	%VT_VECTOR	An array with a leading count
&H2000	%VT_ARRAY	Array
&H4000	%VT_BYREF	A reference value

Variants may not be used in an expression, be directly output (PRINT#, etc), or used as a member of a structure such as a User-Defined Type (UDT) or UNION, etc. Instead, you must first extract the value with one of the above conversion functions, and use that acquired value for calculations.

Internally, a Variant is always 16-bytes in size, and may be passed as either a BYVAL or a BYREF parameter, at the programmer's discretion. However, when a BYREF Variant is required as a parameter, only an explicit Variant variable may be passed by the calling code - a BYCOPY expression is not allowed.

All dynamic strings contained in a Variant must be Wide/Unicode, and PowerBASIC handles these conversions automatically through the LET statement and its implied equivalent.

There may be some cases where you wish to manipulate the internal structure of a Variant directly. Though possible, you must exercise caution or a serious memory leak could occur. Since a Variant could be the owner of a string, array, etc., you must always reset a Variant ([LET] *VrntName* = EMPTY) prior to manipulation with POKE, or pointers, etc.

When you use the standard PowerBASIC assignment syntax, for example: [LET] *VrntName* = 21, all this "housekeeping" is completely automatic and handled by PowerBASIC for you.

Every Variant variable must be explicitly declared with an appropriate statement such as:

```
DIM xyz AS VARIANT or LOCAL xyz AS VARIANT
```

See Also

What is an object, anyway?

Just what is COM?

What is a COM component?

Comparative Data Types

C/C++

Comparative Data Types C/C++

When dealing with C, intrinsic types are in lowercase. Defined types are in all caps by convention. C data types are case-sensitive. Integer-class types can take a modifier of "signed" or "unsigned", and are signed by default.

C arrays are defined by the number of elements and are indexed from zero:

"char foo[32]" translates to DIM foo(0 TO 31) AS BYTE, or DIM foo AS STRING * 32, depending on the context of the code.

C arrays are stored in row-major order whereas PowerBASIC arrays are stored in column-major order. Bear in mind that when accessing C arrays the following C code:

```
k = arr[i,j]
```

…would translate to PowerBASIC as:

```
k = arr(j,i)
```

C arrays are accessed as follows:

```
(0,0), (0,1), (0,2), ...
(1,0), (1,1), (1,2), ...
```

…whereas PowerBASIC arrays are accessed:

```
(0,0), (1,0), (2,0), ...
(0,1), (1,1), (2,1), ...
```

Commonly, C/C++ code prefixes data types with "LP" which indicates a pointer. Therefore, items with the LP prefix usually correspond to a pointer in PowerBASIC; however, the size of the pointer's target will depend on the data type.

More information on C/C++ syntax can be found on the Internet, such as at http://www.open-std.org/jtc1/sc22/wg14/www/docs/n1124.pdf and http://www.open-std.org/JTC1/SC22/WG21/

C/C++ Data Types

Type	Language	Format	PowerBASIC
bool	C++	unsigned 8-bit	BYTE *(2)*
char	C/C++	signed 8-bit	BYTE *(2)*
char*	C/C++	char pointer	STRINGZ *(1)*
double	C/C++	8-byte float	DOUBLE
float	C/C++	4-byte float	SINGLE
int	C/C++	signed 32-bit	LONG *(3)*
long	C/C++	signed 32-bit	LONG
short	C/C++	signed 16-bit	INTEGER
void	C/C++	(no return value)	SUB
void *	C/C++	pointer	(ANY) [PTR] *(1)*

Defined types (SDK types)

Type	Format	PowerBASIC
ATOM	unsigned 16-bit	WORD
BOOL	signed 32-bit	LONG
boolean	8-bit integer	BYTE
Boolean	signed 16-bit	INTEGER

BOOLEAN	8-bit integer	BYTE
BSTR	dynamic string	WSTRING {unicode}
BYTE	unsigned 8-bit	BYTE
COLORREF	unsigned 32-bit	DWORD
DWORD	unsigned 32-bit	DWORD
HANDLE	unsigned 32-bit	DWORD
HWND/HDC/…	unsigned 32-bit	DWORD
INT32	signed 32-bit	LONG
INT64	signed 64-bit	QUAD
LARGE_INTEGER	signed 64-bit	QUAD
LPARAM	signed 32-bit	LONG
LP…	pointer	(ANY) [PTR] *(4)*
LPCSTR	STRINGZ pointer	STRINGZ [PTR]
LPDWORD	DWORD pointer	DWORD [PTR]
LPINT	LONG pointer	LONG [PTR]
LPSTR	STRINGZ pointer	STRINGZ [PTR]
LPUINT	DWORD pointer	DWORD [PTR]
LPVOID	32-bit pointer	(ANY) [PTR]
LPWSTR	WSTRINGZ pointer	WSTRINGZ [PTR]
LRESULT	signed 32-bit	LONG
NULL	32-bit	0 or %NULL
PASCAL	{calling convention}	/STDCALL
QWORD	unsigned 64-bit	QUAD *(2)*
STDCALL	{calling convention}	SDECL/STDCALL
UCHAR	unsigned 8-bit	BYTE
UINT	unsigned 32-bit	DWORD *(3)*
UINT16	unsigned 16-bit	WORD
UINT32	unsigned 32-bit	DWORD
UINT64	unsigned 64-bit	QUAD *(2)*
VOID	SUB	{no return value}
VOID *	pointer	(ANY) [PTR] *(1)*
WINAPI	{calling convention}	SDECL/STDCALL
WORD	unsigned 16-bit	WORD
WPARAM	signed 32-bit	LONG

Delphi

Comparative Data Types Delphi

Delphi uses integer conventions similar to C, although the names are case-insensitive, as with BASIC. That is, a Delphi INTEGER value may be either a PowerBASIC INTEGER or LONG, depending on whether the Delphi code is 16-bit or 32-bit.

The elements of multi-dimensional arrays, in Delphi, are not necessarily stored in a straightforward order in memory. Such arrays are not compatible with other languages.

Delphi Data Types

Type	Format	PowerBASIC
ansistring	dynamic ANSI string	STRING
boolean	unsigned 8-bit	BYTE
byte	unsigned 8-bit	BYTE
bytebool	unsigned 8-bit	BYTE
cardinal	unsigned 16/32-bit	WORD/DWORD *(5)*
comp	signed 64-bit	QUAD
currency	8-byte fixed point	CURRENCY
double	8-byte floating point	DOUBLE

extended	10-byte floating point	EXT
int64	signed 64-bit	QUAD
integer	signed 16/32-bit	INTEGER/LONG (5)
longbool	signed 32-bit	LONG
longint	signed 32-bit	LONG
longword	unsigned 32-bit	DWORD
pchar	STRINGZ string	STRINGZ
shortint	signed 8-bit	BYTE (2)
shortstring	2 to 256 byte string	STRING * 256
single	4-byte float	SINGLE
smallint	signed 16-bit	INTEGER
variant	data-dependent	VARIANT
wstring	dynamic Unicode string	WSTRING
word	unsigned 16-bit	WORD
wordbool	unsigned 16-bit	WORD

Visual Basic 6

Comparative Data Types Visual Basic 6

Visual Basic Data Types

Type	Format	PowerBASIC
Boolean	signed 16-bit	INTEGER
Byte	unsigned 8-bit	BYTE
Const	numeric constant	{Equate} (2)
Currency	8-byte fixed point	CURRENCY
Double	8-byte float	DOUBLE
Integer	signed 16-bit	INTEGER
Long	signed 32-bit	LONG
Single	4-byte float	SINGLE
String	dynamic string	STRING
String * *n*	fixed-length string	STRING * *n*
Variant	data-dependent	VARIANT

Variables and Variable Scope

Variables

Variables

Variables represent

or values. Unlike constants, the value of a variable can change during program execution. Like labels, variable names must begin with a letter and can contain up to 255 letters and digits (although in practical terms you really cannot exceed the length of a line). Be generous in naming important variables. In PowerBASIC, long variable names ***do not*** steal run-time memory.

The Single-precision variables, *EndOfMonthTotals* and *emt,* both require exactly four bytes of run-time storage. A good rule of thumb is to preserve a balance, keeping variable names short enough so that statements can fit on one line. Many programmers use single-letter variables for

counters (i, j, k, l and x, y, z are favorites). However, you can use names like *count*, *total*, *index*, and so on for greater clarity, especially if you have nested loops.

PowerBASIC has many built-in variable types: Dynamic string; Fixed-length string; nul-terminated string; Field, Integer; Long integer; Quad integer; Byte, Word; Double word; Single; Double; and Extended floating point; Currency and CurrencyX; Variant, Object, Guid, plus Pointer, arrays, and Bit and Sbit bitfield subtypes.

Declaring a variable as a specific type:

Use the DIM statement to declare a variable and use the AS *type* syntax:

```
DIM iVar AS INTEGER
```

Appending a type-specifier to the variable name:

```
bat# = 1.312 ' bat# is a Double-precision variable
hat% = 3     ' hat% is an Integer variable
DEFINT c     ' Variables beginning with c are now Integer
cats = 16    ' cats is an Integer variable by DEFINT
```

Bear in mind that *cat?, cat%, cat&, cat&&, cat!, cat#, cat##, cat@, cat@@, and cat$* are ten separate variables. Although using *cat* over and over again to create different variables like this is legal, good programming practice suggests that you use somewhat different names for different variables. It is also much better to use descriptive and more easily understood names for your variables rather than single letters. It's extremely difficult to debug a program in which *x@* has been entered instead of *x!* or *x#*. Imagine the confusion of trying to distinguish *x&&* and *x&*. If you had used variable names like *count!, result#, remain##, and company$,* you would have had considerably less trouble keeping your variables (and their types) apart.

See Also

Default Variable Typing

Variable Scope

INSTANCE statement

Default Variable Typing

Default Variable Typing

In most older versions of BASIC (including PowerBASIC for DOS), all variables without a TypeID (%, !, &, etc.) are automatically considered to be single precision floating point. Other compilers have chosen other defaults (for example, VB defaults to Variant).

To avoid this ambiguity, PowerBASIC asks you to make this determination instead. You can use the DEF statement to specify your preferred default variable type to be applied to untyped variable names. For example, to mimic the single precision default of PB/DOS, simply add a DEFSNG statement to the top of your program:

```
DEFSNG A-Z
```

See Also

Variables

Variable Scope

Variable scope

Variable Scope

The scope of a variable is defined as its visibility and its lifetime. Visibility means what parts of your program can access it. Lifetime defines when it is created and when it is destroyed. In PowerBASIC, there are many choices of scope to afford the maximum flexibility. You may choose any scope which best fits the needs of your program. When any variable is created in PowerBASIC, it is automatically initialized.

variables are initialized to zero (0). Dynamic strings, Field strings, and nul-terminated strings are initialized to a length of zero (no characters). Fixed-length strings and UDTs are filled with CHR$(0). PowerBASIC automatically destroys every variable at the appropriate time, so you never need worry about this type of memory leak.

LOCAL	Local variables are only accessible within a single SUB, FUNCTION, METHOD, or PROPERTY. They are automatically created and initialized each time you enter the procedure. They are automatically destroyed when you exit the procedure. This is the default variable scope unless you declare otherwise.
STATIC	Static variables are only accessible within a single SUB, FUNCTION, METHOD, or PROPERTY. They are initialized when your program starts, but retain their value regardless of how many times the procedure is entered and exited. They are destroyed only when the program ends.
INSTANCE	Instance variables are accessible from any method or property in a class. Each object will have its own unique copy of them. They are created and initialized when an object is created. They are destroyed when the object is destroyed.
THREADED	Threaded variables are accessible from anywhere in your program, but each thread within your program will have its own unique copy of them. They are created and initialized when a thread is created. They are destroyed when the thread ends. Threaded variables are commonly called Thread Local Storage (TLS). They serve a purpose similar to global variables, but never require synchronization since they can't be accessed across threads.
GLOBAL	Global variables are accessible from anywhere in your program. They are initialized when your program starts and are destroyed when the program ends.

Variable Precedence

In PowerBASIC, variables have a defined precedence based upon their scope. Therefore, if two or more variables are created with the same name, the programmer can know, with certainty, which variable is being accessed when the name is referenced. For example, you might use *abc%*, *abc#*, and *abc$* in the same function using default typing defined by the Type ID character. You could even create a local variable named "*counters*" and a global variable also named "*counters*".

So, when you reference a variable name in your program, which variable is actually used? Depending upon the location of the reference, the compiler chooses the variable with the smallest scope. The precedence of variable scopes is:

1. Local or Static
2. Instance
3. Global or Threaded

By Default, PowerBASIC first tries to find a LOCAL or STATIC. Next, an INSTANCE, and finally a GLOBAL or THREADED. It selects the first one it finds, in that sequence. Of course, you cannot use the same name for a LOCAL and a STATIC, unless you use a Type ID character to differentiate them. You can never use the same name for a GLOBAL and a THREADED, as it would be impossible to tell them apart. While this method offers the most flexibility, it can be confusing, and can lead to the creation of insidious, hard-to-find errors in your program. When you accidentally reference the wrong variable, the results can be disastrous.

If you prefer to avoid name duplication, PowerBASIC offers an optional metastatement to enforce that concept. If #UNIQUE VAR ON is enabled, PowerBASIC will require that variable names be unique. The can make your job a good deal easier, as it removes the ambiguity found with identifier reuse. There are a few exceptions to the uniqueness rule, which are designed to improve readability in your code:

1. Local, Static, and Parameter names may be reused in other Subs, Functions, and Methods.
2. Instance names may reused in other Classes.
3. Scalar and array names may co-exist if they are the same data type and scope.

Additional Scope Considerations

LOCAL variables are stored on the stack frame of the procedure, so the address will change throughout the program. Therefore, it may not be safe to rely upon a pointer to them. Likewise, INSTANCE and THREADED variables exist only as long as the object or

is active, though their lifetime is generally somewhat longer. STATIC and GLOBAL variables are stored in main memory, so their address remains constant for the entire program.

The stack has a defined size limit. It defaults to 1 MB, but can be expanded with the #STACK metastatement. You should use care with very large local data items, like fixed or nul-terminated strings and user defined types, as they could overflow the stack. Local dynamic strings do not pose the same problem, as they require just 4 bytes of stack space each for an identifier handle.

Similarly, each local array has an associated "array descriptor". This small table is stored on the stack frame, but the actual array data is stored in main memory. Therefore, local arrays also have a small impact on the stack frame.

See Also

Variables

Default Variable Typing

Operators

Arithmetic Operators

Arithmetic Operators

Arithmetic operators perform normal mathematical operations. Several of these operators merit a word of explanation. The backslash (\) represents integral division. Integral division rounds its operands to an integral value, to produce a truncated quotient with no remainder. For example, 5 \ 2 evaluates to 2, and 9 \ 10 evaluates to 0. Integral division is also faster than floating-point division when using integral-class variables or expressions.

The remainder of an integral division can be determined with the MOD (modulo) operator (MOD is valid for all numeric types). MOD is similar to integer division except that it returns the remainder of the division rather than the quotient. For example, 5 MOD 2 returns the value 1, and 9 MOD 10 returns the value 9.

The ISTRUE operator returns TRUE only if its operand is TRUE (non-zero). ISTRUE is guaranteed to return -1 as its TRUE value, whereas the operators can return any non-zero value.

The ISFALSE operator returns TRUE only if its operand is FALSE (zero). ISFALSE is guaranteed to return -1 as its TRUE value, where the operators can return any non-zero value.

PowerBASIC arithmetic operators

Operator	Action	Example
^	Exponentiation	10^4
-	Negation	-16
*	Multiplication	45 * 19
/	Floating-point division	45 / 19
\	Integral division	45 \ 19

+	Add	45 + 19
-	Subtract	45 - 19
MOD	Modulo	45 MOD 19
ISFALSE	Boolean False	ISFALSE 45
ISTRUE	Boolean True	ISTRUE 19
NOT, AND, OR, XOR, EQV, IMP	Bit manipulation operations	NOT 0, 45 AND 19 45 OR 19, 45 XOR 19 45 EQV 19, 45 IMP 19

Note: PowerBASIC does not trap numeric overflow or underflow errors in equation and expression evaluation. Please refer to the topics Errors and Error Trapping for more information.

It is recommended that this table be read in conjunction with the Mathematical Order of Operator Precedence table, and the effects that operator precedence has on the evaluation of numeric expressions.

See Also

Relational Operators

Operator Precedence

LET statement

Relational Operators

Relational Operators

Relational operators allow you to compare the values of two expressions, to obtain a Boolean result of TRUE or FALSE. Although they can be used in any

expression (for example, a = (b > c) / 13), the numeric results returned by relational operators are generally used in an or other decision statements, to make a judgment regarding program flow.

PowerBASIC relational operators

Operator	Relation	Example
=	Equality	5 = 5
<>, ><	Inequality	5 <> 6
<	Less than	5 < 6
>	Greater than	6 > 5
<=, =<	Less than or equal to	5 <= 6
>=, =>	Greater than or equal to	6 >= 5

When arithmetic and relational operators are combined in an expression, arithmetic operations are always evaluated first. For example, 4 + 5 < 4 * 3 evaluates to TRUE (non-zero), because the arithmetic operations (addition and multiplication) are carried out before the relational operation. This then tests the truth of the assertion 9 < 12.

Strings and relational operators

PowerBASIC lets you compare

data. String expressions can be tested for equality, as well as for "greater than" and "less than" alphanumeric ordering.

Two string expressions are equal if *and only if* they contain exactly the same characters in exactly the same order. For example:

```
a$ = "CAT"
```

```
x1% = (a$ = "CAT") : x2% = (a$ = "CATS") : x3% = (a$ = "cat")
```

String ordering is based on two criteria: first, the ASCII values of the characters they contain, and second, the length of the strings.

For example, the letter *A* is less than the letter *B* because the ASCII code for *A*, 65, is less than the code for *B*, 66. Note, however, that *B* is less than *a* because the ASCII code for each lowercase letter is *greater* than the corresponding uppercase character (exactly 32 greater). When comparing mixed uppercase and lowercase information, use the UCASE$ or LCASE$ functions to keep case differences from interfering with the test.

```
city1$ = "Seattle"
city2$ = "Tucson"
IF UCASE$(city1$) > UCASE$(city2$) THEN
  city$ = city1$
ELSE
  city$ = city2$
END IF
city1$ = UCASE$(city1$)
city2$ = UCASE$(city2$)
IF city1$ > city2$ THEN
  city$ = city1$
ELSE
  city$ = city2$
END IF
```

Note the difference between the two sets of statements. In the first case, the string variables *city1$* and *city2$* are converted to uppercase for the comparison only, so the first IF/THEN returns Tucson. In the second case, the conversion is performed on the variables themselves, so the result will be TUCSON.

Length is important only if both strings are identical up to the length of the shorter string, in which case the shorter one evaluates as less than the longer one; for example, *CAT* is less than *CATS*.

The ARRAY SORT and ARRAY SCAN statements allow you to specify whether lower case characters are to be treated as uppercase for comparison purposes. You can also specify a string that explicitly determines the sorting order for all 256 ASCII characters.

See Also

Arithmetic Operators

Operator Precedence

Operator Precedence

Mathematical order of Operator Precedence

- parentheses ( )
- exponentiation (^)
- negation (-)
- multiplication (*),
  division (/)
  division (\)
- modulo (MOD)
- addition (+), subtraction (-)
- relational operators (<, <=, =, >=, >, <>)
- NOT, ISFALSE, ISTRUE
- AND

- OR, XOR (exclusive OR)
- EQV (equivalence)
- IMP (implication)

For example, the expression 3+6 / 3 evaluates to 5, not 3. Division has a higher priority than addition, so the division operation (6 / 3) is performed first. Even though the compiler will not get confused, people still could, so a better programming style might be to use 3 + (6 / 3) or 3 + 6/3, either using parentheses or spacing to make the intent clear. Otherwise it is easy to misread the statement as (3 + 6) / 3.

To handle operations of the same priority, PowerBASIC proceeds from left to right. For example, in the expression 4 - 3 + 6, the subtraction (4 - 3) is performed before the addition (3 + 6), producing the intermediate expression 1 + 6.

Operations inside parentheses are of the highest priority and are always evaluated first. Within parentheses, standard precedence is used. Use parentheses like garlic: generously, but not to excess.

Another example of the effect of Order of Precedence on an expression follows:

```
x = -1^2
```

At first glance, the result of 1 may be the expected result (since -1 * -1 = 1); however, the unary negation operator has a lower precedence than exponentiation, so the expression is evaluated as x& = -(1^2) which gives a result value of -1. As noted above, the use of parentheses can clarify the intended expression:

```
x = (-1)^2
```

See Also

Arithmetic Operators

Relational Operators

Errors and Error Trapping

Error Overview

Error Overview

Unlike the DOS versions of PowerBASIC, Windows versions of PowerBASIC employ a completely different philosophy: to generate the smallest and fastest possible code. Consequently, error handling is placed firmly in the hands of the programmer. PowerBASIC does not stop your program when a run-time error occurs. It is responsibility of the programmer to check for any conceivable errors that may occur after executing a statement. This is especially true with disk access routines. This section describes the types of errors that may be encountered, and follows on with a discussion on error detection and error handling techniques.

Compile-time errors

Compile-time errors are generated when the compiler cannot resolve a problem in your source code while it is compiling. Examples include: typographical errors; assigning incorrect values to variables (such as "x$ = 5"); and attempting to use a variable name which has not been dimensioned when OPTION EXPLICIT (or #DIM ALL) has been turned on.

When a compile-time error is detected, PowerBASIC will display a message box indicating the error code, plus a brief description, along with the line number in the code where the error occurred. The offending line of code will also be displayed. If you are using the PowerBASIC IDE, the caret will move to the offending line once the error dialog has been dismissed.

Run-time errors

Run-time errors are generated when execution of a particular code statement or function results in an error condition being set. Run-time errors caught by PowerBASIC include Disk access violations (i.e., trying to write data to a full disk), out of bounds array and pointer access, and Memory allocation failures. Array bounds and null-pointer checking is only performed when #DEBUG ERROR ON is used.

Run-time errors can be trapped; that is, you can cause a designated error-handling subroutine to get control should an error occur. Use the ON ERROR statement to accomplish this. This routine can "judge" what to do next based on the type of error that occurs. File-system errors (for example, disk full) in particular are prime candidates for run-time error-handling routines. They are the only errors that a thoroughly debugged program should have to deal with.

The ERROR statement (which simulates run-time errors) can be used to debug your error-handling routines. It allows you to deliberately cause an error condition to be flagged. Avoid using error numbers higher than 240, as they are reserved for use in critical error situations which can never be trapped with ON ERROR. Run-time error values are restricted to the range 1 through 255, and the compiler reserves codes 0 through 150, and 241 through 255 for predefined errors. Attempting to set an error value (with the ERROR statement) outside of the valid range 1 to 255 will result in a run-time Error 5 ("Illegal function call") instead. In addition to the predefined run-time errors, you may also set your own customized run-time error codes in the range 151 through 240. These error codes may be useful to signal specific types of errors in your own applications, ready to be handled by your error trapping code.

In the situation where an undocumented run-time error occurs, the chief suspect is memory corruption. This can typically be cause by writing beyond an array boundary, improper use of pointers, bad Inline Assembly code, etc.

Disk Errors

Disk and I/O errors are *always* trapped at run-time by PowerBASIC. If a run-time Disk or I/O error is detected, the error code is placed in the ERR system variable. If ON ERROR is enabled, code execution will branch to the designated local error handler.

All error handling in PowerBASIC is local to each Sub, Function, Method, and Property. You cannot create a global error handler routine as you can in some DOS BASICs.

When an error occurs in PowerBASIC, an error code is placed into the ERR system variable. If Error Trapping has been enabled, execution branches to the error trap. Otherwise, execution continues. If an error occurs and your code does not take care of it, either by using an error trap or by explicitly testing the ERR or ERRCLEAR variables, your program may produce unpredictable results. For example, in the following code, several problems can occur which would cause the code to fail, and possibly even trigger a General Protection Fault (GPF) in Windows:

```
SUB ReadFile(Filnam$, buffer$(), Lines%)
  RESET Lines%
  OPEN Filnam$ FOR INPUT AS #1
  WHILE ISFALSE EOF(1)
    INCR Lines%
    LINE INPUT #1, buffer$(Lines%)
  WEND
  CLOSE #1
END SUB
```

Here, the ERR variable is not checked after the OPEN statement to see if it was successful. If the file does not exist or has been locked by another process, a run-time error can occur. In this case, EOF(1) will never be able to return TRUE (non-zero) since the file was not able to be opened, and therefore the end of the file cannot be determined. Further, checking the EOF of a file that has not been opened will trigger yet another run-time error.

The result is that without adequate error testing, this small loop will begin to run continuously.

While certainly a flaw in the code, no harm will come to the program for period. However, a fatal error in the LINE INPUT# statement is imminent if the *Lines%* variable value exceeds the UBOUND of the *buffer$()* array. A fatal error could also occur if *buffer$()* was not previously dimensioned, or it wasn't dimensioned with enough elements to store the entire file (that is, assuming the file was opened successfully).

In these cases, a General Protection Fault (GPF) is quite likely to occur, as soon as invalid memory addresses begin to be accessed in an attempt to store the string data. You can prevent the array boundary

GPF by turning on error checking using the #DEBUG ERROR ON metastatement. However, if the array was not previously dimensioned or does not have enough space, the code will still fail in its overall objective.

A more robust version of this example code follows:

```
#DEBUG ERROR ON
SUB ReadFile(Filnam$, buffer$(), Lines%)
  LOCAL Temp$
  ON ERROR RESUME NEXT

  RESET Lines%
  OPEN Filnam$ FOR INPUT AS #1
  IF ERR THEN                         'error opening file
    EXIT SUB
  END IF

  WHILE ISFALSE EOF(1)
    INCR Lines%
    LINE INPUT #1, Temp$
    IF ERR then EXIT SUB              'abort if disk error
    buffer$(Lines%) = Temp$
    IF ERR = 9 THEN                   'subscript out of range
      REDIM PRESERVE buffer$(Lines%) 'increase array size
      buffer$(Lines%) = Temp$
    END IF
  WEND
  CLOSE #1
END SUB
```

Numeric Errors

In order to generate tight, fast code, we have eliminated quite a bit of error checking that was done in earlier compilers (such as Division-by-Zero, Numeric Overflow, and most other numeric checking errors). While this results in code that is considerably smaller and faster than any other Windows compiler product, it does put more of an onus on the programmer to write code that is bug-free, or code that does its own error checking and validation of its data.

For example, an application that performs exponentiation of a negative value to a fractional power (-5^1.9) will not trigger a run-time error, but the result of the expression will be undefined. Therefore, it makes sense for the application to make some attempt to validate or restrict the numeric range of the arguments of this kind of expression.

See Also

Error Trapping

Error Trapping

Error Trapping

Error Trapping

Error traps let you intercept and deal with run-time errors, rather than having programs unceremoniously abort or ignore a fatal error, possibly causing loss of data.

There are three steps you must take to trap errors, as described in the following sections:

1. **Set the error trap**. Use the ON ERROR GOTO statement.
2. **Write the error-handling routine**. The error-handling routine receives control when an error occurs.
3. **Exit the error-handling routine**. You exit the error handler using the RESUME statement so execution can continue at an appropriate location in the code.

For example, here is a piece of code that fills an array with the filenames from a directory. This section will add complete Error Trapping to prevent run-time errors when the user chooses a directory that does not have any files or a drive that is not ready.

```
SUB GetFileNames(File() AS STRING)
  DIM CurrentDir AS STRING
  DIM fName AS STRING, Mask AS STRING
  DIM X AS INTEGER

  Mask = "*.*"
  CurrentDir = CURDIR$
  Path  = AskUserForPath$()
  fName = DIR$(RTRIM$(Path) + Mask)
  IF LEN(fName) = 0 THEN EXIT SUB
  X = 1

  WHILE LEN(fName)
    Files(X) = fName
    fName = DIR$
    INCR X
  WEND
END SUB
```

See Also

Error Overview

How error traps work

Setting an error trap

Writing an error handler

Exiting an error handler

Error Trapping Summary

How error traps work

How error traps work

In PowerBASIC, error codes - returned by the ERR or ERRCLEAR functions - and error traps are local to each Sub, Function, Method, or Property. An error trap will only trap errors that occur within the procedure where it is defined.

PowerBASIC uses the following steps to determine what to do when a run-time error occurs:

- Does an error trap exist? If so, PowerBASIC uses it.
- If no error trap exists, PowerBASIC places an error code in the ERR and ERRCLEAR system variables and continues execution.

Consider the following:

```
SUB Proc1
  ON ERROR GOTO ErrorTrap
  ' some code goes in here
  CALL Proc2
```

```
    ' some more code goes in here

  Proc1Resume:
    EXIT SUB

  ErrorTrap:
    ' Error-handling code goes in here
    RESUME Proc1Resume
  END SUB
```

See Also

- Error Overview
- Error Trapping
- Setting an error trap
- Writing an error handler
- Exiting an error handler
- Error Trapping Summary

Setting an error trap

Setting an error trap

To enable an error trap, use the ON ERROR GOTO statement where you want trapping enabled within the . The error-handling code must be within that procedure. An error trap is enabled only while the procedure is executing. Use the ON ERROR GOTO 0 statement where you want trapping disabled within the procedure.

See Also

- Error Overview
- Error Trapping
- How error traps work
- Writing an error handler
- Exiting an error handler
- Error Trapping Summary

Writing an error handler

Writing an error handler

When an error occurs and an error trap invokes your error-handling routine, the first thing the code should do is to determine which error occurred. PowerBASIC's ERR and ERRCLEAR functions return the code of the most recent error. You can use one of PowerBASIC's control structures (like SELECT CASE) to take appropriate action based on the error code. The ERROR$ function can be used to help formulate a suitable error message to log or report to the user.

See Also

[Error Overview](#)

[How error traps work](#)

[Setting an error trap](#)

[Exiting an error handler](#)

[Error Trapping Summary](#)

Exiting an error handler

Exiting an error handler

You must exit an error handler with the RESUME *LABEL* statement. Execution branches immediately to the specified local label, and the original error trap operation is restored ready to catch the next run-time error.

In the sample program, you want to use RESUME to a specific line. Put the line label **before** the line that requests user input to give the user another chance to enter a correct path.

Here is the sample program, complete with Error Trapping:

```
SUB GetFileNames(File() AS STRING)
  DIM CurrentDir AS STRING
  DIM fName AS STRING, Mask AS STRING
  DIM X AS INTEGER
  ON ERROR GOTO ErrorTrap
  Mask = "*.*"
  CurrentDir = CURDIR$

GetPath:
  Path  = AskUserForPath$()
  fName = DIR$(RTRIM$(Path) + Mask)
  IF LEN(fName) = 0 THEN EXIT SUB
  X = 1
  WHILE LEN(fName)
    Files(X) = fName
    fName = DIR$
    INCR X
  WEND
  EXIT SUB

ErrorTrap:
  SELECT CASE ERRCLEAR
    CASE 53   : ErrorMsg "No files in this directory."
    CASE 71   : ErrorMsg "Drive not ready."
    CASE 76   : ErrorMsg "That path doesn't exist."
    CASE ELSE : ErrorMsg "Unknown error!"
  END SELECT
  RESUME GetPath
END SUB
```

See Also

[Error Overview](#)

[Error Trapping](#)

[How error traps work](#)

[Setting an error trap](#)

Writing an error handler

Error Trapping Summary

Error Trapping Summary

Error Trapping Summary

Error Trapping is a useful and powerful feature of PowerBASIC. Many programmers avoid trapping errors because of the substantial penalties other BASIC dialects impose when Error Trapping is turned on. Fortunately, PowerBASIC's hit is much lower. Still, having Error Trapping turned on may increase the size of your executable. You may wish to investigate other ways to accomplish the same results, whilst ensuring the stability of your code.

Finally, PowerBASIC now includes the following list of predefined (built-in) equates to assist in the creation of more verbose error handling code. They include:

```
%ERR_NOERROR                        = 0
%ERR_ILLEGALFUNCTIONCALL            = 5
%ERR_OVERFLOW                       = 6 (reserved)
%ERR_OUTOFMEMORY                    = 7
%ERR_SUBSCRIPTPOINTEROUTOFRANGE     = 9
%ERR_DIVISIONBYZERO                 = 11 (reserved)
%ERR_DEVICETIMEOUT                  = 24
%ERR_INTERNALERROR                  = 51
%ERR_BADFILENAMEORNUMBER            = 52
%ERR_FILENOTFOUND                   = 53
%ERR_BADFILEMODE                    = 54
%ERR_FILEISOPEN                     = 55
%ERR_DEVICEIOERROR                  = 57
%ERR_FILEALREADYEXISTS              = 58
%ERR_DISKFULL                       = 61
%ERR_INPUTPASTEND                   = 62
%ERR_BADRECORDNUMBER                = 63
%ERR_BADFILENAME                    = 64
%ERR_TOOMANYFILES                   = 67
%ERR_DEVICEUNAVAILABLE              = 68
%ERR_COMMERROR                      = 69
%ERR_PERMISSIONDENIED               = 70
%ERR_DISKNOTREADY                   = 71
%ERR_DISKMEDIAERROR                 = 72
%ERR_RENAMEACROSSDISKS              = 74
%ERR_PATHFILEACCESSERROR            = 75
%ERR_PATHNOTFOUND                   = 76
%ERR_OBJECTERROR                    = 99
%ERR_GLOBALMEMORYCORRUPT            = 241 (Previously %ERR_FARHEAPCORRUPT)
%ERR_STRINGSPACECORRUPT             = 242
```

See Also

Error Overview

Error Trapping

How error traps work

Setting an error trap

Writing an error handler

Exiting an error handler

Compile Time Errors

Error 401 Expression too long/complex

Error 401 - Expression too long/complex

Expression too long/complex - The expression contained too many
; break it down into two or more simplified expressions.

Error 402 - Statement too long/complex

Error 402 - Statement too long/complex

Statement too long/complex - The statement complexity caused an overflow of the internal compiler buffers; break the statement down into two or more simplified statements. This error can also occur if a SELECT CASE structure using the AS CONST optimization causes the internal jump table to exceed the maximum size (approximately 3200 entries or 12 Kb).

Error 403 - #IF nesting overflow

Error 403 - #IF nesting overflow

#IF nesting overflow - Conditional compilation blocks (#IF/#ELSE/#ENDIF) can only be nested up to 16 levels deep.

Error 404 - #INCLUDE file/Macro nesting overflow

Error 404 - #INCLUDE file/Macro nesting overflow

#INCLUDE file/Macro nesting overflow - Include files and macros may be nested up to twelve levels deep. The most common cause of this error stems from excessive nesting and/or circular references. For example, a nested #INCLUDE file that includes itself or an ancestor file that in turn includes the file again, etc. Likewise, a macro that references itself either directly or indirectly can cause a circular reference. See the MACRO statement for more information on the limits of macro expansions.

Error 405 - Block nesting overflow

Error 405 - Block nesting overflow

Block nesting overflow - Your program has too many statement block structures nested within each other. In PowerBASIC block structures may be nested 64 levels deep.

Error 406 - Compiler out of memory

Error 406 - Compiler out of memory

Compiler out of memory - Available compiler memory for symbol space, buffers, and so on, has been exhausted.

If no more memory is available, separate your program into a small main program which uses the #INCLUDE metastatement to include the rest of your program. You can also try the following steps:

- Remove unnecessary line numbers and labels.
- Shorten your variable and procedure names.
- If your code includes WIN32API.INC: Try adding the "code exclusion" equates such as %NOGDI = 1 to your code to cause the compiler to ignore large sections of the API file. Please review the first few pages of notes in WIN32API.INC for more information.

Alternatively, create a customized version of WIN32API.INC that contains just the definitions and declarations actually used by your code. The latter solution, whilst more work initially, will have the added benefit of much faster compilation times, and make your code more resistant to changes in subsequent releases of WIN32API.INC.

Error 407 - Source line too long

Error 407 - Source line too long

Source line too long - The line of code is too long for the compiler to process. This can also occur if the file contains lines of source code that are not CR/LF delimited. Try breaking the line of code up into smaller logical lines with the use of line continuation characters, and ensure that the file is using the Win32 standard of CR/LF line delimiting. If you are using a 3rd-party editor, try opening the source code file in the PowerBASIC IDE and examine the lines where the error occurred -- merged lines here will be a good indication of invalid line delimiting.

Error 408 - Wrong compiler for this program

Error 408 - Wrong compiler for this program

Wrong compiler for this program - The compiler you are using is not compatible with the compiler version specified by the #COMPILER metastatement. Use the compiler specified by the #COMPILER metastatement. Another approach would be to change the #COMPILER settings to match your compiler but, this should be done with caution, since the program may no longer work the same way (or at all) with a different compiler.

Error 409 - Sub/Function is too large

Error 409 - Sub/Function/Method/Property is too large

Sub/Function/Method/Property is too large - There is a reasonable limit for the physical size of a single Sub, Function, Method, or Property. The limit is imposed for practical reasons (such as the size of internal compiler buffers), but also for logical suitability. A huge block of code is very difficult to maintain. In the current version of PowerBASIC, this absolute limit is set at approximately 12,000 lines of source code per procedure. PowerBASIC recommends that each procedure perform one logical function, with a general goal of no more than perhaps 100 lines of source code. If you encounter this error, just break up your code into two or more procedures.

Error 411 - "," expected

Error 411 - "," expected

"," expected - The statement's syntax requires a comma (,).

Error 412 - ";" expected

Error 412 - ";" expected

";" expected - The statement's syntax requires a semicolon (;).

Error 413 - "(" expected

Error 413 - "(" expected

"(" expected - The statement's syntax requires a left parenthesis (().

Error 414 - ")" expected

Error 414 - ")" expected

")" expected - The statement's syntax requires a right parenthesis ()). The compiler encountered text or symbols where a right parenthesis was expected, or a parenthesis is missing. This error can also occur when attempting to pass more than 32 parameters to a Sub, Function, Method, or Property.

Error 415 - "=" expected

Error 415 - "=" expected

"="expected - The statement's syntax requires an equal sign (=).

Error 416 - "-" expected

Error 416 - "-" expected

"-" expected - The statement's syntax requires a hyphen (-).

Error 417 - "*" expected

Error 417 - "*" expected

"*" expected - The statement's syntax requires an asterisk (*).

Error 418 - Statement expected

Error 418 - Statement expected

Statement expected - A PowerBASIC statement was expected. Some character could not be identified as a statement, metastatement, or variable.

Error 419 - Label/line number expected

Error 419 - Label/line number expected

Label/line number expected - A valid label or line-number reference was expected in an , GOTO, GOSUB, or statement.

Error 420 - Relational operator expected

Error 420 - Relational operator expected

Relational operator expected - The compiler has found a
 operand in a position where a operand should be, or a type mismatch has been detected.
For example, the statement X& = Y$ triggers an error because a string cannot be assigned or compared to numeric variable, hence the compiler expected to find an additional operator that would return a numeric result. For example, X& = Y$ > Z$.

Error 421 - String operand expected

Error 421 - String operand expected

String operand expected - The compiler expected a string expression and found something else; for example, X$ = A$ + 3.

Error 422 - Scalar variable expected

Error 422 - Scalar variable expected

Scalar variable expected - The compiler expected a scalar variable as a formal parameter to a user-defined function. Scalar variables are non-array variables.

Error 423 - Array variable expected

Error 423 - Array variable expected

Array variable expected - An array variable was expected in a DIM statement.

Error 424 - Numeric variable expected

Error 424 - Numeric variable expected

Numeric variable expected - A
 variable was expected, such as in an INCR or DECR.

Error 425 - String variable expected

Error 425 - String variable expected

String variable expected - A

variable was expected, such as in a PUT$ or a GET$ statement.

Error 426 - Variable expected

Error 426 - Variable expected

Variable expected - A variable was expected, but not found. A common cause for this error is the use of a reserved keyword as a variable.

Error 427 - Integer constant expected

Error 427 - Integer constant expected

Integer constant expected - An

constant, numeric literal, or numeric equate was expected, such as in a named constant assignment.

This error can occur when attempting to use a numeric variable to dictate the size of the target of a fixed-length or Nul-Terminated string pointer. For example:

```
DIM X AS STRING PTR * Y&
```

…is not permitted as this statement could only be evaluated at run-time. However:

```
DIM X AS STRING PTR * 1024
```

…is acceptable as the target size is known at compile-time.

Another cause of this error is specifying a non-integral CASE argument in a SELECT CASE AS CONST block.

Error 428 - Positive integer constant expected

Error 428 - Positive integer constant expected

Positive integer constant expected - A positive

constant was expected, but not found.

Error 429 - String constant expected

Error 429 - String constant expected

String constant expected - A string constant was expected, but not found. For example, this error can occur when in a SELECT CASE AS CONST$ block when a non-string CASE argument is specified.

Error 430 - Integer variable expected

Error 430 - Integer variable expected

Integer variable expected - An

variable was expected, but not found

Error 431 - Numeric scalar variable expected

Error 431 - Numeric scalar variable expected

Numeric scalar variable expected - The counter variable in a FOR/NEXT counter variable is a parameter passed to the Sub/Function/Method/Property, a target, a THREADED variable, an array variable (non-scalar), or the counter variable is not a data type. Scalar variables are non-array variables.

Error 432 - Long-integer variable expected

Error 432 - Long-integer variable expected

Long-integer variable expected - A Long-integer variable is expected.

Error 433 - Matrix array expected (integer/float)

Error 433 - Matrix array expected (integer/float)

Matrix array expected (integer/float) - Matrix arrays may only be of or types.

See Also

MAT Statement

Error 434 - End of line expected

Error 434 - End of line expected

End of line expected - No characters are allowed on a line (except for a comment) following a metastatement, END SUB, or a label.

Error 435 - #IF expected

Error 435 - #IF expected

#IF expected - An #ENDIF conditional compilation metastatement is missing its accompanying #IF. Look for all #ENDIF metastatements and figure out where to put the associated #IF.

Error 436 - #ENDIF expected

Error 436 - #ENDIF expected

#ENDIF expected - An #IF conditional compilation metastatement is missing its accompanying #ENDIF. Examine all #IF metastatements to determine where to put the associated #ENDIF.

Error 437 - AS expected

Error 437 - AS expected

AS expected - The AS reserved word is missing, such as in a variable declaration.

Error 438 - Member name expected

Error 438 - Member name expected

Member name expected - The compiler encountered a statement or other text where a structure member name was expected.

Error 439 - GOSUB expected

Error 439 - GOSUB expected

GOSUB expected - An ON statement is missing its accompanying GOSUB part.

Error 440 - GOTO expected

Error 440 - GOTO expected

GOTO expected - An ON statement is missing its accompanying GOTO part.

Error 441 - IN expected

Error 441 - IN expected

IN expected - The IN reserved word is missing in a REGEXPR, REGREPL, or REPLACE statement. Check the syntax of the relevant statement in the reference directory section.

Error 442 - THEN expected

Error 442 - THEN expected

THEN expected - An
is missing its accompanying THEN part.

Error 443 - TO expected

Error 443 - TO expected

TO expected - Missing TO in a FOR statement. This can also be reported for a missing TO in the CALL *FuncName* TO syntax.

Error 444 - PREFIX clause expected

Error 444 - PREFIX clause expected

WITH clause expected - A PREFIX clause is expected in this statement.

Error 445 - OF expected

Error 445 - OF expected

OF expected - Indexed

with dual indexes require an "OF Limit" clause on both indexes. For example:

```
x = @w[i& OF m&, j& OF n&]
```

Error 446 - FUNCTION expected

Error 446 - FUNCTION expected

FUNCTION expected - The compiler found an END FUNCTION or EXIT FUNCTION statement without a FUNCTION defined. When defining a FUNCTION, it must begin with a FUNCTION statement.

Error 447 - IF expected

Error 447 - IF expected

IF expected - The compiler found an END IF or an EXIT IF statement without a beginning IF statement defined.

Error 448 - DO loop expected

Error 448 - DO loop expected

DO loop expected - The compiler found a LOOP or EXIT LOOP statement without a beginning DO statement defined.

Error 449 - SELECT expected

Error 449 - SELECT expected

SELECT expected - When defining a SELECT CASE statement, you either forgot to include the reserved word SELECT or the compiler ran into an END SELECT or EXIT SELECT without a beginning SELECT CASE statement. This error can also occur if you try to use the reserved word CASE as a variable name in your program.

Error 450 - CASE expected

Error 450 - CASE expected

CASE expected - When defining a SELECT CASE statement, you forgot to include the reserved word CASE. This error can also occur if you try to use the reserved word SELECT as a variable name in your program.

Error 451 - FOR loop expected

Error 451 - FOR loop expected

FOR loop expected - A NEXT, EXIT FOR, or ITERATE FOR was encountered here without the associated FOR statement to begin the FOR/NEXT loop.

Error 452 - SUB expected

Error 452 - SUB expected

SUB expected - An END SUB was encountered here without the associated SUB statement to begin the procedure.

Error 453 - Equate (%xyz) expected

Error 453 - Equate (%xyz) expected

Equate (%xyz) expected - The %DEF() function requires a numeric or string equate name as the parameter. It returns true (non-zero) or false (zero) to advise whether this equate has been defined in the program.

Error 454 - END FUNCTION expected

Error 454 - END FUNCTION expected

END FUNCTION expected - A FUNCTION block was not terminated with an associated END FUNCTION statement. It's likely you tried to start a new procedure block, without first terminating the current FUNCTION.

Error 455 - END IF expected

Error 455 - END IF expected

END IF expected - An IF block was not terminated with a corresponding END IF statement.

Error 456 - LOOP/WEND expected

Error 456 - LOOP/WEND expected

LOOP/WEND expected - A DO or WHILE loop was not terminated with a corresponding LOOP or WEND statement.

Error 457 - END SELECT expected

Error 457 - END SELECT expected

END SELECT expected - A SELECT CASE statement was not properly terminated with an END SELECT statement.

Error 458 - END SUB expected

Error 458 - END SUB expected

END SUB expected - A SUB block was not terminated with an associated END SUB statement. It's likely you tried to start a new procedure block, without first terminating the current SUB.

Error 459 - NEXT expected

Error 459 - NEXT expected

NEXT expected - A FOR loop was not properly terminated with a NEXT statement.

Error 460 - Undefined equate

Error 460 - Undefined equate

Undefined equate - A named constant (numeric equate or string equate) was referenced in your program, but it has not yet been defined.

Error 461 - INSTANCE arrays must be declared

Error 461 - INSTANCE arrays must be declared

INSTANCE arrays must be declared before any CLASS code.

Error 462 - Undefined SUB/FUNCTION reference

Error 462 - Undefined Procedure reference

Undefined Procedure reference - You attempted to execute or reference a SUB or FUNCTION, but it has not been declared or defined anywhere in the program. Check for the possibility of spelling errors.

Error 463 - Undefined label/line reference

Error 463 - Undefined label/line reference

Undefined label/line reference - You used a label or line number, but it does not exist. Check for the possibility of spelling errors. Note that labels and line numbers are local to the

where they are defined.

Error 464 - Undefined class reference

Error 464 - Undefined class reference

Undefined class reference - You used a CLASS name which does not exist. You must define a CLASS before it can be used. Check for the possibility of spelling errors.

Error 465 - May be defined only once

Error 465 - May be defined only once

May be defined only once - A program element which should only appear once was duplicated in your program. For example, two #STACK metastatements could cause this error to be generated. A common source of this problem is multiple #INCLUDE files which define the same term.

Error 466 - This name is already in use

Error 466 - This name is already in use

This name is already in use - This name (identifier) is used for more than one purpose, causing a fatal conflict. For example, you might have used the name ABC as both a variable and a label. You must rename one or both uses of this particular name. PowerBASIC generates this error when it sees the second use of the name.

Error 467 - Duplicate line number

Error 467 - Duplicate line number

Duplicate line number - A line number was used more than once.

Error 468 - This equate may not be redefined

Error 468 - This equate may not be redefined

This equate may not be redefined - A numeric or string equate is defined a second time with a different value. Equate definitions may appear more than once, but the value must remain constant.

Error 469 - Quad integer variable expected

Error 469 - Quad integer variable expected

Quad integer variable expected - A Quad integer variable is required as a parameter in this statement.

Error 471 - Invalid line number

Error 471 - Invalid line number

Invalid line number - Line numbers must be in the range 1 through 65535.

Error 472 - Invalid label

Error 472 - Invalid label

Invalid label - A label in your code contains invalid characters, such as the period character or the label conflicts with another function, sub, variable, etc. name.

Error 473 - Invalid numeric format

Error 473 - Invalid numeric format

Invalid numeric format - Your program declared a

with more than 18 digits or a number with an E component without the exponent value. This error can also occur if the "&" concatenation operator is used without leading whitespace. For example: a$ = a$&b$ should be written a$ = a$ & b$

Error 474 - Invalid name

Error 474 - Invalid name

Invalid name - A function, sub, method, property, macro, or label has an invalid name. In the case of a Sub, Function, Method, or Property, the name must begin with a letter and can be followed by other letters, digits, and underscores, but may not include a type-specifier or period. In the case of a macro you may have a duplicate macro name defined.

Error 475 - Metastatements not allowed here

Error 475 - Metastatements not allowed here

Metastatements not allowed here - A metastatement must be the first statement on a line.

Error 476 - Block/scanned statements not allowed here

Error 476 - Block/scanned statements not allowed here

Block/scanned statements not allowed here - Block statements (like WHILE/WEND, DO/LOOP, and SELECT CASE) are not allowed in single line IF statements. In addition, you may not have a Sub, Function, Method, or Property definition nested within the body of another definition. A missing END SUB, END FUNCTION, END METHOD, or END PROPERTY can also cause this error.

Error 477 - Syntax error

Error 477 - Syntax error

Syntax error - Something is incorrect on the line; however, the compiler could not determine a proper error message or decode the line further. A common cause is mixing two statement keywords together, using a reserved keyword for a variable name, or attempting to use an undefined interface member (in an OBJECT statement) when using ID Binding, etc.

Error 478 - Resource file error

Error 478 - Resource file error

Resource file error - The resource file referenced has not been found or is not identifiable as a valid resource file. A common cause of this problem is attempting to use #RESOURCE with a non-PBR file, or if the PBR file was not able to be opened by the compiler (for example, because the file is locked by another process or application).

Error 479 - Array bounds error

Error 479 - Array bounds error

Array bounds error - You dimensioned an array within a User-Defined Type that contains invalid array boundaries. For example:

```
TYPE MyType
  ArrayWithinUDT(5 TO 1)
END TYPE
```

Error 480 - Parameter mismatches definition

Error 480 - Parameter mismatches definition

Parameter mismatches definition - You attempted to reference a

using a parameter which does not match (or cannot be converted to) the data type found in the original declaration/definition. This might also be caused by passing too few or too many parameters, misspellings, etc.

Error 481 - Mismatch with prior definition

Error 481 - Mismatch with prior definition

Mismatch with prior definition - This program element (TYPE, UNION, SUB, FUNCTION, etc.) does not match a declaration or definition found previously in the program. It could be a SUB or FUNCTION which mismatches a declaration, a duplicate TYPE or

which is not identical, or another similar condition.

Error 482 - Data type mismatch

Error 482 - Data type mismatch

Data type mismatch - Many PowerBASIC statements and functions require parameters which evaluate to a variable or expression of a particular data type. This error is generated if there is a mismatch with the expected data type. Consult the documentation for the specific statement or function to determine the exact parameter requirements.

Error 483 - Requires Object Procedure (Method/Property)

Error 483 - Requires Object Procedure (Method/Property)

Requires Object Procedure (Method/Property) - The statement or function found here is only allowed within a METHOD or PROPERTY. Elsewhere, it has no valid meaning and must be removed.

Error 484 - Requires procedure (Sub/Function)

Error 484 - Requires procedure (Function/Method...)

Requires procedure (Sub/Function/Method/Property) - The statement or function found here is only allowed within a procedure (SUB, FUNCTION, METHOD or PROPERTY). Elsewhere, it has no valid meaning and must be removed.

Error 485 - Dynamic/Field strings not allowed

Error 485 - Dynamic/Field strings not allowed

Dynamic/Field strings not allowed - A TYPE or UNION may not include a dynamic string or a field string as a member, because the total size of the structure must be known at compile-time. Fixed-length strings and Nul-Terminated Strings should be used instead.

Error 486 - BYVAL option not allowed

Error 486 - BYVAL option not allowed

BYVAL option not allowed - Use of the

option in this context is not allowed. This error is most frequently generated by an attempt to pass an array as a BYVAL parameter. Generally speaking, you should change this to instead.

Error 487 - Multiple NEXT not allowed

Error 487 - Multiple NEXT not allowed

Multiple NEXT not allowed - Prior versions of PowerBASIC allowed multiple NEXT statements implied by, or separated by commas. This is no longer supported.

Error 488 - Numeric processor overflow

Error 488 - Numeric processor overflow

Numeric processor overflow - Execution of this line of source code is complex, and requires more

registers than are currently available in the FPU. One solution might be to add the metastatement #REGISTER NONE to the current , if register variables are being allocated. Another solution would be to break up the source code into multiple simpler statements.

Error 489 - Invalid string length

Error 489 - Invalid string length

Invalid string length - You attempted to DIM a fixed-length string with a length of zero, or you attempted to create a string equate whose length exceeds 255 characters. Fixed-length strings must be at least 1 byte long, and individual string equates may not exceed 255 bytes in length

Error 490 - Static array too large

Error 490 - Static array too large

Static array too large - You attempted to dimension a static array larger than 16 MB in a User-Defined Type.

Error 491 - Invalid register variable

Error 491 - Invalid register variable

Invalid register variable - You specified a register variable which is not allowed in this context. Register variables must be LOCAL, and must be one of: Integer, Long, Word, DWord, or Extended float. It's also possible this variable was used with a function such as VARPTR(), which requires a memory variable for correct execution.

Error 492 - Invalid SORT function

Error 492 - Invalid SORT function

Invalid SORT function - ARRAY SORT of a custom array requires a custom user FUNCTION with a specific signature (2 parameters, calling conventions, etc.). The function you supplied did not meet these requirements.

Error 493 - Compiler file not found/accessible

Error 493 - Compiler file not found/accessible

Compiler file not found/accessible - A source file could not be found in the specified directory path, or the current directory, or in the search path specified in the compiler /I command-line option. Alternatively, the file may be locked by another process. Check the directory paths or make sure that the specified file exists, and that another process or application has not locked the file.

Error 494 - ASM not allowed here

Error 494 - ASM not allowed here

ASM not allowed here - You tried to use multiple statements on a line containing an ASM statement. An ASM statement must be the only statement on a line (plus an optional comment or REM statement).

Error 495 - Compiler file read error

Error 495 - Compiler file read error

Compiler file read error - During the compilation process, the compiler tried to open an #INCLUDE or

#RESOURCE file, but a disk error was encountered. Verify that the file is present, not locked by another process, and that the disk itself is free from errors.

Error 496 - Destination file write error

Error 496 - Destination file write error

Destination file write error - During compilation the compiler received a disk write error. This can occur if the destination EXE is, for example, still running in memory when you attempt to compile, the target file is write locked by another process or compile session, or the target file is write-protected (read-only).

Error 497 - Assembler syntax error

Error 497 - Assembler syntax error

Assembler syntax error - An ASM statement contains an invalid assembly-language construction.

Error 498 - Assembler variables must be declared

Error 498 - Assembler variables must be declared

Assembler variables must be declared - An attempt was made to reference an assembler variable before it was defined.

Error 499 - Statement must be first on line

Error 499 - Statement must be first on line

Statement must be first on line - Certain PowerBASIC statements, and all metastatements, must be the first statement on a line. This includes block structures like PREFIX and MACRO, as well as constructs like SELECT CASE elements. If this error is generated, split compound statements apart so that each statement is on a separate line.

Error 500 - Variable name must be unique

Error 500 - Variable name must be unique

Variable name must be unique - All Global, Threaded, and Instance variable names must be unique to guarantee access to a specific variable. If #UNIQUE VAR ON is specified, then all variable names must be unique.

Error 501 - Parameters too large (exceed 64 Kb)

Error 502 - COM interface name expected

Error 502 - COM interface name expected

COM interface name expected - This form of the LET (assignment) statement is used to create a COM object, one which is created externally using the COM services provided by Windows. The associated interface name is not valid.

Error 503 - Invalid MAIN Function(s)

Error 503 - Invalid MAIN Function(s)

Invalid MAIN Function(s) - Main/LibMain Function(s) do not match the target file type.

Error 504 - Executable requires PBMAIN/WINMAIN function

Error 504 - Executable requires PBMAIN/WINMAIN function

Executable requires PBMAIN/WINMAIN function - No WINMAIN or PBMAIN function was located in an executable program. Without one of these functions, it is not possible for Windows to execute the program.

Error 505 - Debugging requires EXE file, not DLL

Error 505 - Debugging requires EXE file, not DLL

Debugging requires EXE file, not DLL - An attempt was made to launch the debugger on a DLL rather than an EXE file (PB/Win only). Be sure to use an explicit #COMPILE EXE metastatement to ensure the compiler generates the correct type of compiled code.

Error 506 - Declaration must precede statements

Error 506 - Declaration must precede statements

Declaration must precede statements - You attempted to use a declaration, such as a #DIM ALL metastatement after executable code. Move the declaration to a position before any statements that generate executable code.

Error 507 - OLE variable expected

Error 507 - OLE variable expected

OLE variable expected - The OBJECT statement requires that all parameters, return values, and assignment values be in the form of COM-compatible variables. Literals and expressions are not allowed. COM-compatible variables include BYTE, WORD, DWORD, INTEGER, LONG, QUAD, SINGLE, DOUBLE, CURRENCY, STRING, WSTRING, and VARIANT.

Error 508 - INSTANCE not allowed here

Error 508 - INSTANCE not allowed here

INSTANCE not allowed here - INSTANCE statements may only be placed at the beginning of a CLASS/END CLASS block, preceding all INTERFACE blocks and METHODS.

Error 509 - Interface mismatches class

Error 509 - Interface mismatches class

Interface mismatches class - This form of the LET (assignment) statement is used to create an internal object, but the associated class and interface are not defined in the program.

Error 510 - Interface name expected

Error 510 - Interface name expected

Interface name expected - The compiler encountered a statement or other text where an name was expected.

Error 511 - Numeric operand expected

Error 511 - Numeric operand expected

Numeric operand expected - The compiler encountered a statement or other text where a operand was expected.

Error 512 - Brackets not supported (use OPTIONAL)

Error 512 - Brackets not supported (use OPTIONAL)

Brackets not supported (use OPTIONAL) - Brackets are no longer supported for optional parameters.

Error 513 - "]" expected

Error 513 - "]" expected

"]" expected - The statement's syntax requires a closing bracket ( ]).

Error 514 - Enclosing <...> angle brackets expected

Error 514 - Enclosing <...> angle brackets expected

Enclosing <...> angle brackets expected - An definition block member item requires a parameter enclosed with angle brackets to identify the member ID.

Error 515 - Fixup overflow

Error 515 - Fixup overflow

Fixup overflow - You have a jump short instruction that exceeds its maximum length.

Error 516 - DEFtype, Type ID or type-specifier required

Error 516 - DEFtype, Type ID or type-specifier required

DEFtype, Type ID or type-specifier (?%&!#$), or AS ... required - A variable with no type declaration was found and no DEFtype statement (such as DEFINT) was found. The compiler was unable to identify the type of variable indicated. The misspelling of variable names commonly causes this error. The DEFtype statement may not be supported in future editions of PowerBASIC. Use explicit declarations wherever possible to maintain future compatibility.

Error 517 - OPTIONAL requires CDECL or SDECL

Error 517 - OPTIONAL requires CDECL or SDECL

OPTIONAL requires CDECL or SDECL - The (or OPT) clause in a DECLARE, SUB, FUNCTION, METHOD, or PROPERTY statement requires the or calling convention. You may not use OPTIONAL or OPT parameters with calling convention.

Error 519 - Missing declaration

Error 519 - Missing declaration

Missing declaration - You specified that all variables must be declared before use, but this one was not declared. Use DIM, GLOBAL, INSTANCE, LOCAL, STATIC, or THREADED to declare the data type and dimensions, if an array. To declare Register Variables use the REGISTER statement.

Error 520 - TYPE expected

Error 520 - TYPE expected

TYPE expected - An END TYPE was encountered here without the associated TYPE statement to initiate the data block.

Error 521 - UNION expected

Error 521 - UNION expected

UNION expected - An END UNION was encountered here without the associated UNION statement to initiate the data block.

Error 522 - END TYPE expected

Error 522 - END TYPE expected

END TYPE expected - The compiler found a TYPE statement without a terminating END TYPE statement.

Error 523 - END UNION expected

Error 523 - END UNION expected

END UNION expected - The compiler found a UNION statement without a terminating END UNION statement.

Error 524 - Undefined type

Error 524 - Undefined type

Undefined type - You referenced a TYPE or UNION which was not defined. Check for the possibility of spelling errors.

Error 525 - Type ID or specifier (?%&!#$) not allowed

Error 525 - Type ID or specifier (?%&!#$) not allowed

Type ID or specifier (?%&!#$) not allowed - Members in a User-Defined Type (UDT) or UNION variable must not include type ID or type-specifier characters. Change the definition to use the AS type syntax instead.

Error 526 - Period not allowed

Error 526 - Period not allowed

Period not allowed - Periods are not allowed within any identifier names. They may only be used as a separator for member names. A good alternative is to use an underscore (_) character to decorate variable names.

Error 527 - End of statement expected

Error 527 - End of statement expected

End of statement expected - There were one or more extra characters at the end of this statement.

Error 528 - Type too large

Error 528 - Type too large

Type too large - This TYPE or UNION exceeded the 16 Megabyte structure size limit.

Error 529 - Pointer variable error

Error 529 - Pointer variable error

Pointer variable error - You used pointer variable syntax incorrectly, such as placing a leading "@" on a variable which is not declared as a pointer.

Error 530 - Invalid member name/definition

Error 530 - Invalid member name/definition

Invalid member name/definition - This usage of a member name or definition is not allowed in a TYPE, UNION, or

. The name could be invalid, or the data type could be disallowed. See the specific statement definition for more information.

Error 531 - Object variable expected

Error 531 - Object variable expected

Object variable expected - The syntax of this statement or function requires an object variable here. Substitution with another data type is not possible. See the specific statement definition for more information.

Error 532 - Variant variable expected

Error 532 - Variant variable expected

Variant variable expected - The syntax of this statement or function requires a VARIANT variable here. Substitution with another data type is not possible. See the specific statement definition for more information.

Error 533 - Dispatch object variable expected

Error 533 - IDispatch object variable expected

IDispatch object variable expected - The OBJECT statement requires an object variable which has either been declared as IDISPATCH (for late binding), or by a specific dispatch interface (for ID binding).

Error 534 - Bit field error

Error 534 - Bit field error

Bit field error - An error was made in defining a bit field of BIT/SBIT variables. For example, it could be that the first variable in the bit field did not define the total size (using IN BYTE|WORD|DWORD), or the total number of bits may have exceeded the maximum of 32.

Error 535 - Dynamic string variable expected

Error 535 - Dynamic string variable expected

Dynamic string variable expected - The syntax of this statement or function requires a dynamic string variable here. Substitution with another data type is not possible. See the specific statement definition for more information.

Error 536 - Too many imports

Error 536 - Too many imports

Too many imports - The program has exceeded the maximum number of allowed imports.

Error 537 - Pointer expected

Error 537 - Pointer expected

Pointer expected - This operation expects a pointer. For example:

```
... @PtrName[n]
```

Error 538 - Invalid FOR/NEXT limits

Error 538 - Invalid FOR/NEXT limits

Invalid FOR/NEXT limits - The specified start, stop and/or increment value(s) for a FOR/NEXT loop are not within the allowable range for the class of counter variable used. For example, you attempted to specify an increment value of -1 (a signed value) when the loop counter uses an unsigned variable. This error is also generated if the compiler is able to determine, at compile time, that the start and stop values chosen will prevent the FOR/NEXT from ever executing, e.g., FOR x = 10 TO 1.

Error 539 - Invalid thread function

Error 539 - Invalid thread function

Invalid thread function - A valid thread Function may only take one 32-bit LONG or DWORD parameter, which must be received by value (

). This error can occur if the thread Function does not match the following syntax:

```
FUNCTION ThreadFuncName (BYVAL param AS {LONG | DWORD}) AS {LONG | DWORD}
```

An error 539 can also occur if the target thread Function is declared to use a DWORD parameter but is passed a Long-integer, or vice-versa. You must pass the correct (matching)

for the thread Function parameter. For example:

```
THREAD CREATE MyThread(y&) TO hThread???
[statements]
FUNCTION MyThread(BYVAL x AS LONG) AS LONG
```

Or

```
THREAD CREATE MyThread(y???) TO hThread???
[statements]
FUNCTION MyThread(BYVAL x AS DWORD) AS LONG
```

See Also

THREAD CREATE statement

Error 540 - Invalid operation with a register variable

Error 540 - Invalid operation with a register variable

Invalid operation with a register variable - This assembler opcode or operands are invalid using a register variable.

Error 541 - Register size conflict

Error 541 - Register size conflict

Register size conflict - An inline assembler statement (ASM) used registers or a memory operand which conflicted in size. For example, an attempt might have been made to move a value such as:

```
ASM MOV   AX, EBX
ASM SUB   EBX, DL
```

Error 542 - May not be altered

Error 542 - May not be altered

May not be altered - An attempt was made to change the value of a read-only parameter. For example, COMM SET cannot be used with RING, RLSD, RXQUE or TXQUE.

Error 543 - Must be outside Sub/Function/Class...

Error 543 - Must be outside Sub/Function/Class...

Must be outside Sub/Function/Class... - This statement/function is only allowed outside of any Sub, Function, Method, or Property block. It should be moved to the correct location.

Error 544 - Field variable expected

Error 544 - Field variable expected

Field variable expected - The syntax of this statement or function requires a field variable here. Substitution with another data type is not possible. See the specific statement definition for more information.

Error 545 - AT expected

Error 545 - AT expected

AT expected - The syntax of this statement or function requires the word AT here. See the specific statement definition for more information.

Error 546 - Use only as a Callback

Error 546 - Use only as a Callback

Use only as a Callback - You tried to explicitly call a DDT Callback function. Callback functions may only be invoked by the DDT engine or Windows. To reference it indirectly, send an appropriate window message using CONTROL SEND or DIALOG SEND. To send custom messages, be sure to use message values higher than %WM_USER+500 to avoid conflicts with other notification messages.

Error 547 - Callback function required

Error 547 - Callback function required

Callback function required - A Callback Function was named but the target function was not defined as a CALLBACK, or the nominated function was not a Callback Function. (PB/Win only)

Error 548 - No parameters with Callback

Error 548 - No parameters with Callback

No parameters with Callback - A Callback Function definition cannot specify parameters. (PB/Win only)

Omit the parameters from the function definition. For example:

```
CALLBACK FUNCTION Dlg1Callback()
[statements]
END FUNCTION
```

Error 549 - BYVAL required with pointers

Error 549 - BYVAL required with pointers

BYVAL required with pointers - Pointers may only be passed

. Add an explicit BYVAL to the Sub/Function/Method/Property declaration and prototype. Previous versions of PowerBASIC used an implied BYVAL.

Error 550 - Too many data statements

Error 550 - Too many data statements

Too many data statements - Data is limited to 64 Kb per Sub, Function, Method, or Property, and 16384 individual data items. Either reduce the number of DATA statements, or split the data into separate procedures.

Error 551 - Not supported in this version

Error 551 - Not supported in this version

Not supported in this version - An attempt was made to use a feature that is not supported by this version of the compiler. This error may also occur if a reserved word is used as a variable, label, Sub, Function, Method, or Property name. For example, using `INP` or `OUT`.

Error 552 - TRY statement expected

Error 552 - TRY statement expected

TRY statement expected - PowerBASIC expected to find a TRY statement at or before the indicated position in the code. Check the syntax of the surrounding code for other syntax errors, such as the misplacement of a CATCH or END TRY statement, conditional compilation excluding required portions of the code, etc.

Error 553 - CATCH statement expected

Error 553 - CATCH statement expected

CATCH statement expected - A TRY/END TRY block did not include a CATCH statement. Recheck the syntax of the block.

Error 554 - END TRY statement expected

Error 554 - END TRY statement expected

END TRY statement expected - A TRY/END TRY block appears to be missing its END TRY clause. This can typically occur if an END SUB, END FUNCTION, END METHOD, END PROPERTY statement was encountered within the TRY/END TRY block.

Error 555 - ON ERROR/RESUME not allowed here

Error 555 - ON ERROR/RESUME not allowed here

ON ERROR/RESUME not allowed here - An attempt was made to include an ON ERROR or a RESUME statement inside a TRY/END TRY block. Remove the ON ERROR or RESUME statement or move it out of the TRY/END TRY block. Error handling is automatic within a TRY/END TRY block.

Error 556 - Function restricted to threads

Error 556 - Function restricted to threads

Function restricted to threads - Functions that are called with THREAD CREATE may not be called in the conventional manner. This restriction is necessary because thread Functions require additional initialization steps that are not included in standard function code.

One situation that can arise is where a Function may need to be invoked both directly and used as a thread Function. The easiest solution is to create a small wrapper function for the function, then use THREAD CREATE with the wrapper function, or call the original function directly. For example:

```
FUNCTION WorkerFunc(BYVAL x AS LONG) AS LONG
  ' code here
END FUNCTION

FUNCTION WorkerThread(BYVAL x AS LONG) AS LONG
  FUNCTION = WorkerFunc(x)
END FUNCTION

' more code here

' Execute the worker function directly, thus:
lResult& = WorkerFunc(var&)

' Execute the worker thread as a thread, using
' the wrapper function:
THREAD CREATE WorkerThread(var&) TO hThread???
```

Error 557 - Macro too long/complex

Error 557 - Macro too long/complex

Macro too long/complex - An attempt was made to create a MACRO that is too long or complex. An individual macro can contain replacement text of up to approximately 4000 characters, and can specify up to 240 parameters occupy up to approximately 2000 bytes expanded space per macro. Macro substitutions are limited to an expanded total of approximately 16000 characters per line of original source code.

Error 558 - MACRO expected

Error 558 - MACRO expected

MACRO expected - An END MACRO statement was found without a matching MACRO statement. Please recheck the syntax of the macro block.

Error 559 - END MACRO expected

Error 559 - END MACRO expected

END MACRO expected - A MACRO block appears to be missing a terminating END MACRO statement. Please recheck the syntax of the macro block.

Error 560 - FASTPROC expected

Error 560 - FASTPROC expected

FASTPROC expected - A FASTPROC statement must precede other related statements like EXIT FASTPROC and END FASTPROC.

Error 561 - END FASTPROC expected

Error 561 - END FASTPROC expected

END FASTPROC expected - A FASTPROC statement must be matched with an associated END FASTPROC.

Error 562 - INTERFACE expected

Error 562 - INTERFACE expected

INTERFACE expected - An END INTERFACE statement was found to be without a matching statement. Please recheck the syntax of the interface definition block.

Error 563 - END INTERFACE expected

Error 563 - END INTERFACE expected

END INTERFACE expected - An

statement was found without a matching END INTERFACE statement. Please recheck the syntax of the interface definition block.

Error 564 - MACROTEMP not allowed here

Error 564 - MACROTEMP not allowed here

MACROTEMP not allowed here - PowerBASIC encountered a MACROTEMP statement outside the scope of a MACRO block.

Error 565 - Macro mismatch with code position

Error 565 - Macro mismatch with code position

Macro mismatch with code position - The compiler encountered a multi-line MACRO statement in a non-statement position.

Error 566 - CLASS expected

Error 566 - CLASS expected

CLASS expected - An END CLASS statement was encountered here without the associated CLASS statement to initiate the block.

Error 567 - END CLASS expected

Error 567 - END CLASS expected

END CLASS expected - A CLASS block was not terminated with an associated END CLASS statement.

Error 568 - METHOD expected

Error 568 - METHOD expected

METHOD expected - An END METHOD statement was encountered here without the associated METHOD statement to initiate the block.

Error 569 - END METHOD expected

Error 569 - END METHOD expected

END METHOD expected - A METHOD block was not terminated with an associated END METHOD statement. It's likely you tried to start a new procedure block, without first terminating the current METHOD.

Error 570 - PROPERTY expected

Error 570 - PROPERTY expected

Property expected - An END PROPERTY statement was encountered here without the associated PROPERTY statement to initiate the block.

Error 571 - END PROPERTY expected

Error 571 - END PROPERTY expected

END METHOD expected - A PROPERTY block was not terminated with an associated END PROPERTY statement. It's likely you tried to start a new procedure block, without first terminating the current PROPERTY.

Error 572 - PROPERTY GET expected

Error 572 - PROPERTY GET expected

PROPERTY GET expected - A PROPERTY = *nnnn* statement (for assigning the return value) was found, but it was not located within a PROPERTY GET block. It is not allowed at any other location in your program.

Error 573 - Valid only in a CALLBACK FUNCTION

Keyword Template

Purpose

Syntax

Remarks

See also

Example

Error 573 - Valid only in a CALLBACK FUNCTION

Error 573 - Valid only in a CALLBACK FUNCTION - FUNCTION = x,y with two parameters is only valid in a CALLBACK FUNCTION.

Error 574 - Not allowed in an Event Class

Error 574 - Not allowed in an Event Class

Not allowed in an Event Class - The statement or function found here is not allowed within an EVENT CLASS. It has no valid meaning and must be removed. See the specific statement definition for more information.

Error 575 - EVENT SOURCE is not declared

Error 575 - EVENT SOURCE is not declared

EVENT SOURCE is not declared - You included code which generates events with the RAISEEVENT statement, but did not declare an event source with the EVENT SOURCE statement.

Error 576 - Too many Interfaces

Error 576 - Too many Interfaces

Too many Interfaces - PowerBASIC allows up to 32 interfaces per CLASS, but you have exceeded that limit. You should try to combine two or more of those interfaces.

Error 577 - EVENT INTERFACE expected

Error 577 - EVENT INTERFACE expected

EVENT INTERFACE expected - The EVENT INTERFACE you specified could not be found.

Error 578 - INHERIT of Base Class expected

Error 578 - INHERIT of Base Class expected

INHERIT of Base Class expected - Every INTERFACE must INHERIT from a base class, which may be nested any level. Ultimately, every interface inherits from IUnknown. The INHERIT statement must be the first statement in every INTERFACE block.

Error 579 - BYREF variable or BYVAL/BYREF variant expected

Error 579 - BYREF variable or BYVAL/BYREF variant expected

BYREF variable or BYVAL/BYREF variant expected - The ISMISSING() function can only detect a missing parameter for a BYREF variable, or a BYVAL/BYREF variant.

Error 580 - Duplicate GUID usage

Error 580 - Duplicate GUID usage

Duplicate GUID usage - You have used a single GUID to identify two or more elements of your program. Change at least one of the GUIDs to a new value.

Error 581 - Type Library creation error

Error 581 - Type Library creation error

Type Library creation error - A system error occurred while creating the COM Type Library. The common cause of this error is using a data type not supported by Type Libraries. Type Libraries only support the following data types: BYTE, WORD, DWORD, INTEGER, LONG, QUAD, SINGLE, DOUBLE, CURRENCY, OBJECT, STRING, and VARIANT. Either suppress the creation of a Type Library by using the #COM TLIB OFF metastatement or by changing the Methods and Properties to only use supported data types.

Error 582 - Duplicate Dispatch interface

Error 582 - Duplicate Dispatch interface

Too many DISPATCH interfaces - Only one Dispatch (DUAL) interface is allowed per CLASS.

Error 583 - Unpaired PROPERTY definition

Error 583 - Unpaired PROPERTY definition

Unpaired PROPERTY definition - If you create both a PROPERTY GET and a PROPERTY SET, they must be paired. The parameters and the property value must be identical in both forms, and the PROPERTY SET must immediately follow the PROPERTY GET.

Error 584 - Mismatched PROPERTY pair

Error 584 - Mismatched PROPERTY pair

Mismatched PROPERTY pair - If you create both a PROPERTY GET and a PROPERTY SET, they must be paired. The parameters and the property value must be identical in both forms, and the PROPERTY SET must immediately follow the PROPERTY GET.

Error 585 - PROPERTY requires BYVAL parameters

Error 585 - PROPERTY requires BYVAL parameters

PROPERTY requires BYVAL parameters - PROPERTY methods created in PowerBASIC must have BYVAL parameters.

Error 586 - User Defined Type or AS expected

Error 586 - User Defined Type or AS expected

User Defined Type or AS expected - The name of a User-Defined TYPE, or an "AS <type>" clause is required here.

Error 587 - Invalid Constructor/Destructor

Error 587 - Invalid Constructor/Destructor

Invalid Constructor/Destructor - Constructor and Destructor Methods must be CLASS METHODS. They must take no parameters and return no result.

Error 588 - Indirect operand must be bracketed: [12]

Error 588 - Indirect operand must be bracketed: [12]

Indirect operand must be bracketed: [12] - An inline assembler (ASM) opcode which includes indirect addressing must enclose that operand in square brackets.

Error 589 - Dual/IDispatch interface is required

Error 589 - Dual/IDispatch interface is required

Dual/IDispatch interface is required - This statement or construct may only be used in a DUAL interface.

Error 590 - PROPERTY SET requires at least one parameter

Error 590 - PROPERTY SET requires at least one parameter

PROPERTY SET requires at least one parameter - PROPERTY SET is used to assign a value to an INSTANCE variable. At least one parameter is mandatory to hold that value.

Error 591 - BYVAL with OUT is not allowed

Error 591 - BYVAL with OUT is not allowed

BYVAL with OUT is not allowed - OUT parameter may not be BYVAL, because those are destroyed before the OUT value could be retrieved.

Error 592 - Return value required

Error 592 - Return value required

Return value required - GET PROPERTY requires a return value to hold the retrieved value.

Error 593 - Dual or Automation interface is required

Error 593 - Dual or Automation interface is required

Dual or Automation interface is required - OBJRESULT is only valid in a DUAL or IAUTOMATION interface.

Error 594 - Macro ends with continuation '_'

Error 594 - Macro ends with continuation '_'

Macro ends with continuation '_' - MACRO body text may not end with an underscore continuation character.

Error 595 - Object return type required

Error 595 - Object return type required

Object return type required - Component methods in a Compound Object Reference must each return an object variable to be used by the next method.

Error 596 - Inherited interface expected

Error 596 - Inherited interface expected

Inherited interface expected - MYBASE may only be used on an interface which is derived from an inherited user-created interface.

Error 597 - Invalid name or sequence in the interface

Error 597 - Invalid name or sequence in the interface

Invalid name or sequence in the interface - To OVERRIDE an inherited METHOD, the replacement must have the same name and signature, and appear in the same sequence.

Error 598 - CLASS METHOD name expected

Error 598 - CLASS METHOD name expected

METHOD or PROPERTY name expected - A valid METHOD or PROPERTY name must appear in this context.

Error 599 - Requires CLASS but outside of Interfaces

Error 599 - Requires CLASS but outside of Interfaces

Requires CLASS but outside of Interfaces - This item must be enclosed within a CLASS, but outside of Interfaces.

Error 600 - Macro phase error, referenced before define

Error 600 - Macro phase error, referenced before define

Macro phase error, referenced before define - A macro was referenced before it was defined.

Error 601 - One INHERIT per interface

Error 601 - One INHERIT per interface

One INHERIT per interface - PowerBASIC offers single inheritance, so just one INHERIT is allowed per interface. However, the inherited interface may itself inherit from another interface, to virtually any level of nesting.

Error 602 - Hidden interface referenced by COM

Error 602 - Hidden interface referenced by COM

Hidden interface referenced by COM - The compiler was not able to create a Type Library. The most likely cause is the use of a Hidden Interface as a parameter or return value in a METHOD or PROPERTY published AS COM.

Error 603 - Incompatible with a Dual/IDispatch interface

Error 603 - Incompatible with a Dual/IDispatch interface

Incompatible with a Dual/IDispatch interface - This data type cannot be passed as a variant.

Error 604 - Incompatible with #COM TLIB generation

Error 604 - Incompatible with #COM TLIB generation

Incompatible with #COM TLIB generation - This data type cannot be described in a Type Library.

Error 605 - Macro parameter mismatch

Keyword Template

Purpose

Syntax

Remarks

See also

Example

Error 605 - Macro parameter mismatch

Macro parameter mismatch - A Macro parameter does not match the original definition.

Error 606 - PowerCollection / LinkListCollection required

Keyword Template

Purpose

Syntax

Remarks

See also

Example

Error 606 - PowerCollection / LinkListCollection requiredrequired

PowerCollection / LinkListCollection required - FOR EACH loops require an object of a specific class.

Error 607 - New syntax requires GETCOM/NEWCOM/ANYCOM

Error 607 - New syntax requires GETCOM/NEWCOM/ANYCOM

New syntax requires GETCOM/NEWCOM/ANYCOM - The LET statement syntax for COM OBJECT creation has been changed. Previous syntax is no longer recognized. Refer to LET.

Error 609 - Too many macro expansions

Error 609 - Too many macro expansions

Too many macro expansions - You have used more than 65,535 macros in this program.

Error 610 - Invalid within a FastProc

Error 610 - Invalid within a FastProc

Invalid within a FastProc - You have used a feature which is not supported within a FastProc.

Error 611 - FASTPROC params must be ByVal Long Integer

Error 611 - FASTPROC params must be ByVal Long Integer

FASTPROC params must be ByVal Long Integer - FASTPROC parameters must be ByVal Long Integer.

Error 612 - FASTPROC return may only be Long Integer

Error 612 - FASTPROC return may only be Long Integer

FASTPROC return may only be Long Integer - FASTPROC return value must be Long Integer or nothing.

Error 613 - Cannot compile - the program is now running

Error 613 - Cannot compile - the program is now running

Cannot compile - the program is now running - The program you are trying to compile is currently executing. You may have to use Task Manager to force the program to end.

Error 614 - Mismatched CHR Mode (Ansi/Wide)

Error 614 - Mismatched CHR Mode (Ansi/Wide)

Mismatched CHR Mode (Ansi/Wide) - The operand does not match the required Ansi or Wide mode.

Error 615 - PREFIX expected

Error 615 - PREFIX expected

WITH expected - A PREFIX statement must precede each END WITH statement.

Error 616 - END PREFIX expected

Error 616 - END PREFIX expected

END WITH expected - A PREFIX statement must be matched with an associated END WITH.

Error 617 - ASMDATA expected

Error 617 - ASMDATA expected

ASMDATA expected - An ASMDATA statement must precede each END ASMDATA statement.

Error 618 - END ASMDATA expected

Error 618 - END ASMDATA expected

END ASMDATA expected - An ASMDATA statement must be matched with an associated END ASMDATA.

Error 619 - ENUM expected

Error 619 - ENUM expected

ENUM expected - An ENUM statement must precede each END ENUM statement.

Error 620 - END ENUM expected

Error 620 - END ENUM expected

END ENUM expected - An ENUM statement must be matched with an associated END ENUM.

Error 621 - Interface cannot inherit from itself

Error 621 - Interface cannot inherit from itself

Interface cannot inherit from itself - An interface cannot inherit from itself.

Error 622 - AS STRING required for variant conversion

Error 622 - AS STRING required for variant conversion

AS STRING required for variant conversion - If you assign a user defined TYPE to a variant variable, it is now necessary to add the words AS STRING to confirm the type conversion.

Error 623 - THREADPARM Instance variable required

Error 623 - THREADPARAM Instance variable required

THREADPARM Instance variable required - THREAD Class must declare a THREADPARM Instance variable.

Error 624 - Invalid THREADPARM variable type

Error 624 - Invalid THREADPARAM variable type

Invalid THREADPARM variable type - THREADPARM must be a LONG, DWORD, or UDT PTR INSTANCE variable.

Error 625 - THREAD Method required

Error 625 - THREAD Method required

THREAD Method required - THREAD Class must include a THREAD Method.

Error 626 - Duplicate THREAD Method

Error 626 - Duplicate THREAD Method

Duplicate THREAD Method - THREAD Class must have exactly one THREAD Method.

Error 627 - INHERIT IPowerThread expected

Error 627 - INHERIT IPowerThread expected

INHERIT IPowerThread expected - THREAD METHOD is only allowed with a threaded interface.

Error 628 - Not valid in a Static-Lin-Lib (SLL)

Error 628 - Not valid in a Static-Link-Lib (SLL)

Not valid in a Static-Link-Lib (SLL) - This language element is invalid in a Static-Link-Library.

Error 629 - ALIAS disallows Private/Thread/Callback

Error 629 - ALIAS disallows Private/Thread/Callback

ALIAS disallows Private/Thread/Callback - ALIAS clause is not valid with Private, Thread, or Callback.

Error 630 - Link File Error

Error 630 - Link File Error

Link File Error - The SLL Link File is not valid for this compiler.

Error 631 - Nested Link Files

Error 631 - Nested Link Files

Nested Link Files - You cannot link an SLL file into an SLL file.

Error 632 - COMMON name is a duplicate

Error 632 - COMMON name is a duplicate

COMMON name is a duplicate - COMMON procedure name was previously defined.

Error 633 - COMMON signature is mismatched

Error 633 - COMMON signature is mismatched

COMMON signature is mismatched - COMMON procedure signature (params, return type...) is mismatched.

Error 634 - Undefined COMMON reference

Error 634 - Undefined COMMON reference

Undefined COMMON reference - COMMON item was referenced but not defined.

Error 635 - USING clause is required

Error 635 - USING clause is required

USING clause is required - USING <ProcName> is required to describe the function signature.

Error 636 - Invalid VersionInfo Resource

Error 636 - Invalid VersionInfo Resource

Invalid VersionInfo Resource - Invalid VersionInfo, may be out of sequence.

Error 637 - SLL mismatch with this compiler

Error 637 - SLL mismatch with this compiler

SLL mismatch with this compiler - This SLL requires CONSOLE (PB/CC only) or DDT support which is not available.

Error 638 - Please change AS STRING to AS WSTRING

Error 638 - Please change AS STRING to AS WSTRING

Please change AS STRING to AS WSTRING - Strings stored in a variant must be in wide Unicode format.

Error 639 - TYPE variable expected

Error 639 - TYPE variable expected

TYPE variable expected - A user-defined type variable is expected here.

Error 801 to 815 - Internal error

Error 801 to 815 - Internal error

Internal error - If one of these errors occurs, please report it to the PowerBASIC Technical Support group.

Error 640 - Invalid use of BYCOPY

Error 640 - Invalid use of BYCOPY

Invalid use of BYCOPY - The BYCOPY override may not be used with certain parameters (for example, entire arrays).

Run Time Errors

Error 0 - No error

Error 0 - No error

No error (%ERR_NOERROR)

Error 5 - Illegal function call

Error 5 - Illegal function call

Illegal function call - (%ERR_ILLEGALFUNCTIONCALL) - This is a catch-all error related to passing an inappropriate argument to some statement or function.

There are many things that can cause an Error 5, for example:

- A record number is too large (or negative) in a GET or PUT.
- Attempting to use the WIDTH# statement on a
  .
- The run-time execution of a LET, LET (with Objects), LET (with Types), LET (with Variants), or OBJECT statement failed (see OBJRESULT and OBJRESULT$ to obtain an extended error code).

Error 6 - Overflow

Error 6 - Overflow

Overflow (%ERR_OVERFLOW) - This error is not currently supported.

Error 7 - Out of memory

Error 7 - Out of memory

Out of memory - (%ERR_OUTOFMEMORY) - Many different situations can cause this message, including dimensioning too large an array, or running out of virtual memory due to insufficient free disk space for the Windows swap file.

Error 9 - Subscript / Pointer out of range

Error 9 - Subscript / Pointer out of range

Subscript / Pointer out of range - (%ERR_SUBSCRIPTPOINTEROUTOFRANGE) - You attempted to use a subscript smaller than the minimum or larger than the maximum value established when the array was dimensioned. Attempting to use a null or invalid pointer may also cause this error. Error 9 will only be generated if you have specified #DEBUG ERROR ON.

Error 11 - Division by zero

Error 11 - Division by zero

Division by zero (%ERR_DIVISIONBYZERO) - This error is not currently supported.

Error 24 - Device time-out

Error 24 - Device time-out

Device time-out - (%ERR_DEVICETIMEOUT) - The specified time-out value for a UDP or TCP communications operation has expired.

Error 51 - Internal error

Error 51 - Internal error

Internal error - (%ERR_INTERNALERROR) - A malfunction occurred within the PowerBASIC run-time system, or the operating system reported an error that PowerBASIC was not expecting (or was unable to decipher). For example, attempting to KILL (delete) an open file can cause this kind of problem.

If you are unable to identify the cause of the problem, contact the PowerBASIC Technical Support group with information about your program.

Error 52 - Bad file name or number

Error 52 - Bad file name or number

Bad file name or number - (%ERR_BADFILENAMEORNUMBER) - The file number you gave in a file statement does not match the file number given in an OPEN statement, or the file number may be out of the range of valid file numbers.

Error 53 - File not found

Error 53 - File not found

File not found - (%ERR_FILENOTFOUND) - The file name specified could not be found on the indicated drive.

Error 54 - Bad file mode

Error 54 - Bad file mode

Bad file mode - (%ERR_BADFILEMODE) - You attempted a PUT or a GET (or PUT$ or GET$) on a file opened in sequential mode.

Error 55 - File is already open

Error 55 - File is already open

File is already open - (%ERR_FILEISOPEN) - You attempted to OPEN a file that was already open, or you attempted to delete an open file.

Error 57 - Device I/O error

Error 57 - Device I/O error

Device I/O error - (%ERR_DEVICEIOERROR) - A hardware problem occurred when trying to carry out some device-orientated command.

For example, a COMM connection was lost during a session, or a TCP/UDP statement failed to be connected, etc. Alternatively, a TCP/UDP port may have been closed unexpectedly or the network refused the connection requested.

If an ERROR 57 occurs with a TCP OPEN statement under Windows 98 when using a dotted IP address string (i.e., "202.123.456.1"), then check to ensure that "Client for Microsoft Networks" is installed in the Network applet in Control Panel. Alternatively, manually add a DNS entry in the HOSTS file in the \WINDOWS folder.

For example, add the following line into the HOSTS file, and change the TCP OPEN statement to use the (dummy) domain name instead of the dotted IP address:

202.123.456.1 dummyname.com

Error 58 - File already exists

Error 58 - File already exists

File already exists - (%ERR_FILEALREADYEXISTS) - The new name argument specified in your NAME statement already exists.

Error 61 - Disk full

Error 61 - Disk full

Disk full - (%ERR_DISKFULL) - There is not enough free space on the indicated or default disk to carry out a file operation. Create more free disk space and retry your program.

Error 62 - Input past end

Error 62 - Input past end

Input past end - (%ERR_INPUTPASTEND) - You tried to read more data from a file than it had to read. Use the EOF (end of file) function to avoid this problem. Trying to read from a sequential file opened for output or append can also cause this kind of error.

Error 63 - Bad record number

Error 63 - Bad record number

Bad record number - (%ERR_BADRECORDNUMBER) - A number less than the BASE option specified in the OPEN statement or a number larger than 2^63-1 was specified as the record argument to a random file PUT or a GET statement.

Error 64 - Bad file name

Error 64 - Bad file name

Bad file name - (%ERR_BADFILENAME) - The file name specified in a KILL or NAME statement contains invalid characters.

Error 67 - Too many files

Error 67 - Too many files

Too many files - (%ERR_TOOMANYFILES) - This error can be caused either by trying to create too many files in a drive's root directory, or by an invalid file name that affects the performance of the Create File system call.

Error 68 - Device unavailable

Error 68 - Device unavailable

Device unavailable - (%ERR_DEVICEUNAVAILABLE) - You tried to

a device or to a device or graphic without that device present or installed.
For example, opening COM1 on a system without a serial adapter or modem, or attempting to use TCP/IP or UDP/IP on a machine without Winsock 2.0 (or better) installed. Also, trying to attach to a graphic or printer that is not available will cause this error.

Error 69 - COMM error

Error 69 - COMM error

COMM error - (%ERR_COMMERROR) - A communications error occurred. For example, a framing error may have occurred.

Error 70 - Permission denied

Error 70 - Permission denied

Permission denied - (%ERR_PERMISSIONDENIED) - You tried to write to a write-protected disk. This error can also be generated as a result of network permission errors, such as accessing a locked file, or a locked record. It can also occur when attempting to open a subdirectory as a file.

Error 71 - Disk not ready

Error 71 - Disk not ready

Disk not ready - (%ERR_DISKNOTREADY) - The door of a floppy disk drive is open, or there is no disk in the indicated drive.

Error 72 - Disk media error

Error 72 - Disk media error

Disk media error - (%ERR_DISKMEDIAERROR) - The controller board of a floppy or hard disk indicates a hard media error in one or more sectors.

Error 74 - Rename across disks

Error 74 - Rename across disks

Rename across disks - (%ERR_RENAMEACROSSDISKS) - You cannot rename a directory across disk drives or partitions.

Error 75 - Path/file access error

Error 75 - Path/file access error

Path/file access error - (%ERR_PATHFILEACCESSERROR) - During a command capable of specifying a path name (OPEN, NAME, or MKDIR, for example), a path was used inappropriately. For example, attempting to delete a directory that is in-use.

Error 76 - Path not found

Error 76 - Path not found

Path not found - (%ERR_PATHNOTFOUND) - The path you specified during a CHDIR, MKDIR, OPEN, etc, cannot be found.

Error 98 - XPrint Preview error

Error 98 - XPrint Preview error

XPrint Preview error - XPrint Preview failed because it was not executed immediately after the XPrint Attach statement.

Error 99 - Object error

Error 99 - Object error

Object error - (%ERR_OBJECTERROR) - A run-time error occurred involving an object.

Error 241 - Global memory corrupt

Error 241 - Global memory corrupt

Global memory corrupt - (%ERR_GLOBALMEMORYCORRUPT) - PowerBASIC detected a global memory corruption.

Typical causes include misuse of

, accessing an array beyond its boundary, or bad Inline Assembly code. The cause of the problem may actually be in a seemingly unrelated portion of the program, and/or in a DLL or module used by the program.

Error 241 was formerly deemed "Far heap corrupt" (%ERR_FARHEAPCORRUPT). While this equate remains supported for a short period, source code should be updated to maintain compatibility with future versions of PowerBASIC.

Error 242 - String space corrupt

Error 242 - String space corrupt

String space corrupt - (%ERR_STRINGSPACECORRUPT) - PowerBASIC detected a memory or space corruption. Typical causes include misuse of , accessing an array beyond its boundary, or bad Inline Assembly code. The cause of the problem may actually be located in a seemingly unrelated portion of the program, and/or in a DLL or module used by the program.

Dynamic Dialog Tools (DDT)

Dynamic Dialog Tools (DDT)

Dynamic Dialog Tools (DDT)

Welcome to PowerBASIC's powerful and improved Dynamic Dialog Tools™. DDT allows a BASIC programmer to easily create a Graphical User Interface (GUI) for an application using simple BASIC statements. With DDT, there's no need to stress over learning how to effectively use GUI design software that contains icons you don't understand and also hundreds of cryptic "property" settings. With DDT, your PowerBASIC application or DLL can create user interface dialogs "on the fly".

For programmers who are familiar with DDT, you will find that PowerBASIC has expanded the DDT implementation even further in this version of PowerBASIC, with advanced features such as User Data storage and accelerator tables.

This chapter describes PowerBASIC's Dynamic Dialog Tools and how to easily create full-featured Graphical User Interfaces in your code.

See Also

Creating a Dialog

Adding Controls to the Dialog

Creating a Dialog

Creating a Dialog

In this example, we will create a simple dialog that asks the user to enter his/her name, providing a text box for input, plus both "OK" and "Cancel" buttons. To create the dialog, first we use the DIALOG NEW statement:

```
LOCAL hParent AS DWORD
LOCAL hDlg AS DWORD
[statements]
DIALOG NEW hParent, Caption$,,, 160, 50, Style&, exStyle& TO hDlg
```

hParent refers to the parent window handle. If this value is 0 (or %HWND_DESKTOP), the dialog has no parent window, and may be referred to as a "top-level" window. However, if the dialog has a parent window and the dialog is a MODAL dialog, Windows will automatically disable the parent window while the DDT dialog is displayed.

Caption$ is the text displayed in the caption of the dialog. This may be the name of your program, or it can be used to convey other information to the user.

The next two parameters for the location on the screen are omitted (this causes the dialog to be centered on the screen), and the size is set to 160 dialog units wide by 50 dialog units tall. *Style&* specifies how the dialog is drawn on the screen (with a caption, without a caption, etc). *exStyle&* specifies an extended style attributes for drawing the dialog. For information on the range of possible dialog styles, please see the DIALOG NEW statement.

Once the dialog has been created, the handle for it is placed in the hDlg variable. hDlg may be a Long-integer or Double-word variable (i.e., *hDlg&* or *hDlg???*), but a **Double-word variable is recommended**. This handle is used by Windows (and your program) code to identify the dialog. Windows gives each dialog a unique handle value at run-time; no two windows, dialogs, or controls can have the same handle value. This means that the actual handle value will be different every time the dialog is created.

Note that the height and width values determine the client size of the dialog, if the dialog style explicitly includes the %WS_CAPTION style. Otherwise, they are interpreted as the outer dimensions of the complete dialog.

Note: The location and size of a dialog are specified in Dialog Units or, optionally, Pixels.

See Also

Dynamic Dialog Tools (DDT)

Adding Controls to the Dialog

Adding Controls to the Dialog

Adding Controls to the Dialog

Once the dialog has been created, we can add controls to it. For our example, we will add a text box to let the user type in their name, and also add two BUTTON controls ("OK" and "Cancel"):

```
CONTROL ADD TEXTBOX, hDlg, IdText&, "", 14, 21, 134, 12, Style&, exStyle&
CONTROL ADD BUTTON, hDlg, 1, "&OK", 44, 38, 40, 14, %BS_DEFAULT or %WS_TABSTOP CALL Ok
CONTROL ADD BUTTON, hDlg, 2, "&Cancel", 90, 38, 40, 14 CALL Cancel
```

hDlg refers to the handle of the dialog you're adding the control to, as returned by the DIALOG NEW statement.

The next parameter *IdText&*, *1*, and *2* in the example lines above) is the unique numeric identifier (ID) for the control. Whereas dialog handles are determined by Windows at run-time, controls use ID values that are specified by the programmer. By knowing the dialog handle and a control ID, we can identify and interact programmatically with any control on a DDT dialog using any of the control-related DDT statements.

In general, ID values should be kept within in the range 100 to 65535. It should also be noted that some values below 100 are reserved by Windows for special purposes. For example, the special ID value 1 (%IDOK) is usually assigned to a Button control that is to be activated when the ENTER key is pressed (this would typically be the "OK" button on a dialog). Similarly, the special ID value of 2 (%IDCANCEL) is usually assigned to a Button control that is to be activated when the ESCAPE key is pressed (typically this would be the "Cancel" button).

In general, two controls on a given dialog should not use the same ID value, as it prevents them from being identified uniquely. However, it is common to assign the special value -1& to plain Label (static) controls that will not have their content, style, or color changed at run-time.

It is always a good idea to plan the values of control identifiers carefully. For example, a set of related Option (radio) controls should use ID values that are ordered sequentially, as this makes it very easy to manipulate them as a group with the CONTROL SET OPTION statement, etc. Another common scheme is keep all the ID numbers for the controls in a specific range. For example, the first dialog in a program might use controls whose ID values are in the range 100 to 199, the second dialog might use the range 200 to 299, etc.

The identifier parameter is followed by the caption text for the control. The ampersand symbols "&" within the caption text fields is surprisingly helpful - the letter that follows the symbol specifies a command accelerator (hot-key). At run-time, the accelerator character is drawn underscored: OK and Cancel. In this case, the underscored character informs the user that pressing the ALT+O keys has the same effect as using the mouse to click the "OK" button. Similarly, the ALT+C combination will trigger the "Cancel" button.

Coordinates used in the

statement are specified in the same terms (dialog units or pixels) as the parent dialog. The final Style& (primary style) and exStyle& (extended style) parameters tell Windows how to draw the control, and how the control should behave. These parameters are optional, and if omitted, receive default styles according to the type of control.

> **Each type of control has its own unique set of style options. Most of the equates have been predefined in the DDT.INC and WIN32API.INC files supplied with PowerBASIC.**
> **It should be noted that explicit (custom) style values replace the default values for the**

control. That is, custom styles are not additional to the default style values - your code must specify all necessary style parameters. This also applies to the extended styles parameter - if your code specifies a custom primary style, the default extended style will no longer be in effect either. In this case, an explicit extended style may also need to be added to the CONTROL ADD statement if an explicit primary style is specified.

The CONTROL ADD statement for the "OK" button includes the keyword CALL. This tells Windows to call the "OK" function each time the "OK" button is pressed. The "OK" function is simply a Callback Function that contains the code you want to execute when the button is pressed (or when some other control-related event occurs).

In this example, we want to assign the text from the text box control to a global string, and then close the dialog box. However, we first must check that our code is executed only in response to a "click" event - we would not want our dialog to end if some other notification message was sent to the callback! We do this by testing the values of the message parameters held in the CB.HNDL, CB.MSG, and CB.CTLMSG system variables:

```
CALLBACK FUNCTION Ok() AS LONG
  IF CB.MSG = %WM_COMMAND AND CB.CTLMSG = %BN_CLICKED THEN
    CONTROL GET TEXT CB.HNDL, %IDTEXT TO gsUserName
    DIALOG END CB.HNDL, 1 ' Return 1
    FUNCTION = 1
  END IF
END FUNCTION
```

Similarly, we provide a Callback Function for the "Cancel" button, which will close the dialog box, ignoring any text entered into the text box:

```
CALLBACK FUNCTION Cancel() AS LONG
  IF CB.MSG = %WM_COMMAND AND CB.CTLMSG = %BN_CLICKED THEN
    DIALOG END CB.HNDL, 0 ' Return 0
    FUNCTION = 1
  END IF
END FUNCTION
```

Once the dialog has been created and the controls added, we are ready to display the dialog on the screen. In this example, we will create it as a Modal dialog. That means that when the DIALOG SHOW MODAL statement is executed, the execution of this portion of our program will block (halt) until the dialog is closed: (see Modal vs. Modeless below for more information on modal and modeless dialogs)

```
LOCAL lResult AS LONG
...
DIALOG SHOW MODAL hDlg TO lResult
```

During the time that the "main" part of our code is blocked by the modal dialog, DDT may call the code in the Callback Functions in response to user interaction, etc. If no events occur, our code is not executed at all, and therefore uses no CPU time. In this example, the dialog only closes when the user eventually clicks the OK or the Cancel button (or presses the ENTER or ESCAPE keys).

Once the dialog is closed, the *lResult* variable will contain the value set using the DIALOG END statement, and execution of the statements following the DIALOG SHOW statement will resume. In our example, we use a return value of one (*1*) to indicate that the user clicked the OK button, and a return value of *0* to indicate the user clicked the Cancel button.

The complete example code can be found in the HELLODDT.BAS file in the \PB\SAMPLES\DDT\HELLODDT folder:

```
#COMPILE EXE
#INCLUDE "DDT.INC"

%IDOK = 1
%IDCANCEL = 2
%IDTEXT = 100
%BS_DEFAULT = 1

' Global variable to receive the user name
```

```
GLOBAL gsUserName AS STRING

CALLBACK FUNCTION OkButton()
  IF CB.MSG = %WM_COMMAND AND CB.CTLMSG = %BN_CLICKED THEN
    CONTROL GET TEXT CB.HNDL, %IDTEXT TO gsUserName
    DIALOG END CB.HNDL, 1
    FUNCTION = 1
  END IF
END FUNCTION

CALLBACK FUNCTION CancelButton()
  IF CB.MSG = %WM_COMMAND AND CB.CTLMSG = %BN_CLICKED THEN
    DIALOG END CB.HNDL, 0
    FUNCTION = 1
  END IF
END FUNCTION

FUNCTION PBMAIN() AS LONG

LOCAL hDlg AS DWORD
LOCAL lResult AS LONG

' ** Create a new dialog template
DIALOG NEW 0, "What is your name?", ,, 160, 50, 0, 0 TO hDlg

' ** Add controls to it
CONTROL ADD TEXTBOX, hDlg, %IDTEXT, "", 14, 12, 134, 12
CONTROL ADD BUTTON, hDlg, %IDOK, "OK", 34, 32, 40, 14, %BS_DEFAULT OR %WS_TABSTOP CALL
OkButton
CONTROL ADD BUTTON, hDlg, %IDCANCEL, "Cancel", 84, 32, 40, 14 CALL CancelButton

' ** Display the dialog
DIALOG SHOW MODAL hDlg TO lResult

' ** Check the dialog return result
IF lResult THEN
  MSGBOX "Hello " & gsUserName, &H00002000& ' = %MB_TASKMODAL
END IF

END FUNCTION
```

See Also

[Dynamic Dialog Tools (DDT)]

[Creating a Dialog]

[Modal vs. Modeless]

[Controls]

[Control Styles]

[Callbacks]

[Dialog Styles]

[Menus]

Modal vs. Modeless

Modal vs. Modeless

To support the different ways that applications use dialog boxes, PowerBASIC provides two types of dialog box: modal and modeless.

A modal dialog box requires the user to supply information, or cancel the dialog box, before allowing the application to continue. Applications use modal dialog boxes in conjunction with commands that require additional information before they can proceed.

A modeless dialog box allows the user to supply information and return to the previous task without closing the dialog box. Modal dialog boxes are simpler to manage than modeless dialogs because they are displayed, perform their task, and are destroyed by calling a single DIALOG SHOW MODAL statement.

In the above example, we display the dialog as modal. The DIALOG SHOW MODAL statement displays the dialog and waits until your code calls DIALOG END (or if there is a Close box in the caption, the dialog will end when the Close box is clicked). When Windows displays a modal dialog box, it disables the parent window to keep the user focused on the dialog. When the dialog box is closed, the parent window is automatically re-enabled.

By comparison, a modeless dialog box does not cause your code to stop and wait while the dialog is displayed. An example of a modeless dialog box is the "Cancel" dialog displayed by many programs that print long documents on the printer. The application code sits in a loop sending data to the printer. The "Cancel" dialog allows the user to cancel printing at any time. The following is a simplistic example of this process:

```
DIALOG SHOW MODELESS hDlg TO lResult&
DO
  DIALOG DOEVENTS
  Done& = PrintNextLineFunction()
LOOP UNTIL lResult& = %IDCANCEL OR Done& = %TRUE
```

The DIALOG DOEVENTS statement is necessary so that Windows can process messages for your modeless dialog. Without it, events such as clicking on the "Cancel" button or redrawing the dialog would not be processed. This loop is known as a Message Pump.

A modeless dialog must always have a message pump running while the dialog is running. Without a message pump, a modeless dialog will not be able to receive messages to redraw itself, etc.

Because of this consideration, applications should be written in such a way as to ensure that the message pump is able to run. The following example is of a modeless dialog message pump that relies on the fact that when the dialog is destroyed, DIALOG GET SIZE will return 0.

```
DIALOG SHOW MODELESS hDlg TO lResult&
DO
  DIALOG DOEVENTS
  DIALOG GET SIZE hDlg TO x&, y&
LOOP UNTIL ISFALSE (x& * y&)
```

This works fine for applications that have a single modeless dialog showing at any given moment, but this is not always practical. For example, consider an application that uses a tabbed dialog. Typically, this is constructed around a single dialog containing a "Tab Control", plus an additional set of modeless dialogs, each of which would form a "page" of the tabbed dialog.

In this case, we need to reconstruct our message pump so that it terminates only when all of the modeless dialogs have been destroyed. If the main dialog is modal, the application design would become quite complex - the modeless dialogs and the message pump would need to be launched from within the main dialog's Callback Function. Such an approach is technically feasible, but unnecessary. By changing the main dialog from modal to modeless, the whole design can be simplified to use a single message pump.

```
DIALOG SHOW MODELESS hMainDlg TO lResult&
DIALOG SHOW MODELESS hPage1
DIALOG SHOW MODELESS hPage2
' more code here
DO
  DIALOG DOEVENTS TO Count&
```

```
LOOP UNTIL ISFALSE Count&
```

See Also

[Dynamic Dialog Tools (DDT)]

[Creating a Dialog]

[Adding Controls to the Dialog]

[Controls]

[Control Styles]

[Callbacks]

[Dialog Styles]

[Menus]

Controls

Controls

A

is a special Window that provides a method for interacting with the user. Buttons, Combo boxes, List boxes, and Text boxes are all examples of controls. Whenever the user interacts with a control (clicks a button or types into a text box), an event occurs causing Windows to send a message to your application. Your application processes these messages in special functions called Callback Functions.

When you add a control to a dialog, it is important that each control has a unique numeric identifier. This identifier helps your application to know which control is sending an event. For example, if your program has two buttons in it, the control ID allows you distinguish between them.

As each control is created, Windows assigns a unique window handle to identify the control. Because your program does not assign these handle values, your code cannot directly use them to identify individual controls. Further, each time a control is destroyed and recreated, a new unique handle value is assigned, further complicating the task. The control ID overcomes these problems, as the programmer determines the ID for each control.

Controls are added to your dialog with the CONTROL ADD statement. Make sure that each control you create has a unique numeric identifier, so that you (and Windows) can tell it apart from other controls on the dialog.

Given the ID of a control, DDT provides the CONTROL HANDLE statement to retrieve the window handle value of the control. If a given ID is duplicated in a dialog, CONTROL HANDLE is only able to identify the first control that matches the ID, and the remaining controls will essentially be ignored. Control ID's can often be duplicated for Label (static) text controls, provided these controls (and their contents, color, or styles) are not going to be modified at run-time. If such a Label control is to be modified, its control ID must be unique.

PowerBASIC provides a comprehensive set of statements and functions for dealing with controls. The following is a small sample of these statements and functions with a brief description of the purpose of each:

Function Description

#MESSAGES	Specify which messages should be sent to a Control Callback Function
CB.CTL	Return the ID of the control sending a message to your Callback Function. (Only valid inside a Callback Function).
CB.CTLMSG	Return the notification ID of the control sending a message to your Callback Function. (Only valid inside a Callback Function).
CB.HNDL	Returns the dialog handle sending a message to your Callback Function. (Only valid inside a Callback Function).

CB.LPARAM	Returns the lParam& value sent to your Callback Function. (Only valid inside a Callback Function).
CB.MSG	Returns the wMsg& value sent to your Callback Function. (Only valid inside a Callback Function).
CB.NMCODE	Returns the specific notification message describing the event which occurred. (Only valid inside a Callback Function).
CB.NMHDR	Returns the address (a pointer) to the NMHDR UDT for a notification message sent to your Callback Function. (Only valid inside a Callback Function).
CB.NMHDR$	Returns the contents of the NMHDR UDT as a dynamic string. (Only valid inside a Callback Function).
CB.NMHWND	Returns the handle of the control which sent this message to your Callback Function. (Only valid inside a Callback Function).
CB.NMID	Returns the ID number assigned to this control which sent this message to your Callback Function. (Only valid inside a Callback Function).
CB.WPARAM	Returns the wParam& value sent to your Callback Function. (Only valid inside a Callback Function).
	Create a control in a dialog.
CONTROL DISABLE	Disable a control so that it can no longer send messages to a callback. If the control is a button, it is grayed. If it is a text box, it becomes grayed out and you can no longer edit the text contained within it.
CONTROL ENABLE	Enable a control that was previously disabled. A control must be enabled in order for it to send notifications to a Callback Function.
CONTROL GET SIZE	Get the size of a control.
CONTROL GET LOC	Get the location of a control inside of its parent dialog.
CONTROL GET TEXT	Retrieve the text from a control, such as a Text box or Label, etc.
CONTROL HANDLE	Return a window handle for a given control.
CONTROL KILL	Remove a control from a dialog.
CONTROL SEND	Send a message to a control.
CONTROL SET FOCUS	Set the keyboard focus to a given control. If the control is a button, it receives keyboard focus. If the control is a text box, the caret is placed in the text box to allow the user to edit the text.
CONTROL SET FONT	Select a font to be used for a particular control.
CONTROL SET IMAGE	Change the image on an image button or image control. Also see CONTROL SET IMAGEX.
CONTROL SET SIZE	Change the size of a control.
CONTROL SET LOC	Change the location of a control within its parent dialog.
CONTROL SET TEXT	Place new text into a control. Any existing text in the control is replaced.
WINDOW GET ID	Returns the Control ID for a given control.
WINDOW GET PARENT	Returns the handle of a controls parent.

For a more comprehensive list of DDT statements and functions, See the Command Summary for DDT.

See Also

Dynamic Dialog Tools (DDT)

Creating a Dialog

Adding Controls to the Dialog

Modal vs. Modeless

Control Styles

Callbacks

Dialog Styles

Menus

Control Styles

Control Styles

When creating child controls for your dialogs, you are free to use almost any control style permitted by Windows. These styles mostly start with the %WS_ prefix (Window Style), and are included in the WIN32API.INC file included in your WINAPI directory.

If the style parameter in your CONTROL ADD statements is set to 0, DDT will set default styles automatically for you. The default styles will depend on the type of control you are adding to your dialog. For example, a button will be given the %WS_TABSTOP style.

Note that DDT always gives your controls certain styles, such as %WS_CHILD and %WS_VISIBLE, regardless of the styles you specify. When setting your style parameter, you can safely ignore these two styles and concentrate on the more important styles that are required. This has the advantage of reducing the clutter of your code. The exception is custom controls - in this case you must explicitly specify all required styles.

The "tab-order" of controls (also known as the "z-order") is determined by the order that DDT controls are created at run-time. That is, the first control added to a dialog is the first control in the z-order, the second control added is second, and so forth. When a dialog is initially displayed, keyboard focus is automatically given to the first control in the z-order that has the %WS_TABSTOP style. Each time the TAB key is subsequently pressed, the keyboard focus moves to the next control in the tab-order. To ensure all controls in a dialog can be selected using the TAB key, each control in the dialog should include the %WS_TABSTOP style. The z-order also determines the order that controls are drawn on a dialog, to help ensure that control that overlap one another can be drawn in a predictable manner.

Controls that are disabled (because either they have the %WS_DISABLED style or they have been dynamically disabled with CONTROL DISABLE) are skipped over.

Most DDT controls are created with the %WS_TABSTOP style by default. However, you should explicitly include the %WS_TABSTOP style in the control style parameter, if your DDT code creates controls with custom (non-default) styles. If you do not include this style, these control(s) may not be able to receive keyboard focus.

The following table lists the default DDT styles for many of the standard controls:

Control type	Default DDT Styles *	Hex Value
BUTTON	%WS_TABSTOP	50010000
CHECK3STATE	%WS_TABSTOP, {%BS_AUTO3STATE}	50010006
CHECKBOX	%WS_TABSTOP, {%BS_AUTOCHECKBOX}	50010003
COMBOBOX	%WS_TABSTOP, %CBS_SORT, %CBS_DROPDOWN, {%CBS_HASSTRINGS}	50010302
FRAME	%BS_LEFT, {%BS_TOP, %BS_GROUPBOX}	50000507
GRAPHIC	%WS_CHILD, %WS_VISIBLE, %SS_OWNERDRAW	5001000D
IMAGE	**either** {%SS_ICON} **or** {%SS_BITMAP}	50000003 5000000E
IMAGEX	**either** {%SS_ICON} **or** {%SS_BITMAP}	50000003 5000000E
IMGBUTTON	**either** %WS_TABSTOP, {%BS_ICON} **or** %WS_TABSTOP, {%BS_BITMAP}	50010040 50010080
IMGBUTTONX	**either** %WS_TABSTOP, {%BS_ICON} **or** %WS_TABSTOP, {%BS_BITMAP}	50010040 50010080
LABEL	%SS_LEFT	50000000
LINE	%SS_ETCHEDFRAME	50000012

LISTBOX	%WS_TABSTOP, %LBS_SORT, %LBS_NOTIFY, % WS_VSCROLL	50210003
LISTVIEW	%WS_TABSTOP, %LVS_REPORT, % LVS_SHOWSELALWAYS	50000009
OPTION	%WS_TABSTOP, {%BS_AUTORADIOBUTTON}	50010009
PROGRESSBAR	%WS_BORDER	50800000
SCROLLBAR	**either** {%SBS_HORZ} **or** {%SBS_VERT}	50000000 50000001
STATUSBAR	%CCS_BOTTOM	50000003
TAB	%WS_CHILD, %WS_TABSTOP	54010000
TEXTBOX	%WS_TABSTOP, %WS_BORDER, %ES_AUTOHSCROLL, % ES_LEFT	50810080
TOOLBAR	%WS_CHILD, %WS_VISIBLE, %WS_BORDER, %CCS_TOP, and %TBSTYLE_FLAT	50808801
TREEVIEW	%WS_TABSTOP, %TVS_HASBUTTONS, % TVS_LINESATROOT, %TVS_HASLINES, and % TVS_SHOWSELALWAYS	50010027
"custom control"	No default style (%WS_CHILD and %WS_VISIBLE not used)**	0

See Also

Dynamic Dialog Tools (DDT)

Creating a Dialog

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Callbacks

Callbacks

A callback is a Function called by Windows when an event occurs. In the previous modal dialog example, when the OK button is clicked by the user, Windows calls the *OkButton()* function. PowerBASIC's Dynamic Dialog Tools allows you to create a single callback to handle all events for the dialog, or you can create individual Callback Functions for each in your dialog. You can even use a combination of the two methods.

Control Callback

If you've used Visual Basic, you'll be familiar with the concept of a Control Callback even though it's not called by that name. A Control Callback is a function that is called when a %WM_COMMAND or % WM_NOTIFY event is generated for a particular control. In the earlier example, we arranged it so the *OkButton()* function was called when the OK button was clicked. Further, when the Cancel button was clicked, the *CancelButton()* function was called. A Control Callback function is enabled when you execute a statement using the CALL *CtlProc* option at the end.

```
CONTROL ADD BUTTON, hDlg, %IDOK, "OK", 34, 32, 40, 14, %BS_DEFAULT OR %WS_TABSTOP CALL
OkButton
```

```
CONTROL ADD BUTTON, hDlg, %IDCANCEL, "Cancel", 84, 32, 40, 14 CALL CancelButton
```

Some controls, like text boxes, list boxes, and combo boxes, can generate more than one type of event. In VB, each separate event on each control is handled by a new function. For example, if your VB form includes a list box, it may include a Callback Function such as *List1_Change()* that is called whenever the current selected item changes. In PowerBASIC, only a single Callback Function is needed for each control. When an event occurs, the Callback Function just chooses which events to handle, and which events to ignore. If your PowerBASIC callback wanted to process the Change event for a list box, your code would look like this:

```
CALLBACK FUNCTION List1() AS LONG
  IF CB.MSG = %WM_COMMAND THEN
    IF CB.CTLMSG = %LBN_SELCHANGE THEN
      [your code here]
      FUNCTION = 1
    END IF
  END IF

END FUNCTION
```

You can use a combination of the CB.MSG and CB.CTLMSG functions to decide exactly which event has occurred. Generally speaking, in a Control Callback, CB.MSG will contain either %WM_COMMAND or %WM_NOTIFY. The CB.CTLMSG will return the specific message is either of those two categories. In this example situation, the control notification %LBN_SELCHANGE is sent to the callback for the list box whenever the item in the list box changes (the user clicks on the new item or uses the keyboard to select a new item).

All of the control and dialog message equates are located in the DDT.INC file. This file is simply a subset of the much larger WIN32API.INC file and is provided only for convenience. Therefore, the use of these two files is mutually exclusive.

If your code processes a message, it should return TRUE (any non-zero value) by setting FUNCTION = *number* within the Control Callback. This advises that there is no need to process that message further. If you return the value FALSE (zero), the message is passed on to your Dialog Callback, if you have one. If the message is still unhandled by your Dialog Callback, the DDT dialog engine itself will handle the message on your behalf.

If your code processes a %WM_NOTIFY message, the return value is generally ignored. Because of the nature of %WM_NOTIFY messages, they are always directed to both Control callbacks and Dialog callbacks to use as needed.

Prior to version 9.0 of PowerBASIC for Windows, Control Callback Functions received only %WM_COMMAND messages. Beginning with PB 9.0, %WM_NOTIFY messages are sent as well. There are many situations where these added messages will prove to be very important. If your existing callback functions are written with complete error checking (ensuring that CB.MSG = %WM_COMMAND), this minor addition will cause no problems. It just presents additional information which can be acted upon, or just ignored. However, if callbacks were written without complete error checking, some ambiguity is possible. In this case, you should either update your Control Callback code, or suppress %WM_NOTIFY messages with a #MESSAGES COMMAND metastatement.

When a Control Callback receives a click notification for a control, the callback will receive a %WM_COMMAND message in the CB.MSG variable. A common mistake made by programmers is to fail to test both CB.MSG and CB.CTLMSG parameters before responding to the message. If the message is truly generated from a click event, CB.CTLMSG will contain %BN_CLICKED. This simple test ensures that your code responds correctly to notification messages.

```
CALLBACK FUNCTION OkButton() AS LONG
  IF CB.MSG = %WM_COMMAND AND CB.CTLMSG = %BN_CLICKED THEN
    '...Process the click event here
    FUNCTION = 1
  END IF
END FUNCTION
```

It pays to be sure you are responding to the correct message in your callback. Subtle bugs can

occur if you aren't very careful to notice and recognize unanticipated messages.

It should also be noted that there are ranges of notification messages that individual controls can send to the Control Callback or Dialog Callback. However, many of these messages are suppressed unless the controls have been initially assigned a "notify" style. For controls that are members of the Button class (CHECKBOX, OPTION, FRAME, etc.), this is the %BS_NOTIFY style. Please refer to the statements for additional information on notification styles for other control types.

Dialog callback

If you review the example code in most Windows programming books (particularly the Windows 32-bit SDK), you will see that most of the examples create a single callback for the entire dialog. Each time the user presses a button, a message is sent to this Callback Function. Within this Callback Function, there is often a large SELECT CASE or IF/ELSEIF/THEN structure, designed to pick out the incoming event messages and then process the selected messages.

C programmers are usually quite familiar with this concept, and often resort to using "Message Cracker" functions to separate their event handling code into a set of independent functions. On the other hand, PowerBASIC's DDT takes much of this drudgery away. By permitting separate callbacks for each CONTROL ADD statement, you become free to enclose your event handling code in separate functions, just like a C programmer may do, but without the confusing macros C programmers are often forced to use.

DDT gives the programmer the choice of either using a single callback to handle all dialog and control events, or writing a callback for each (or any) specific control. If you intentionally omit a callback for a particular control, the programmer has the choice of handling messages for that control within the dialog Callback Function, or ignoring them altogether.

In addition to handling control messages within the dialog callback, this Callback Function also provides a way to handle events that concern the actual dialog box itself. For example, handling a %WM_PAINT message, or notification that the dialog was minimized, etc.

A Dialog Callback function is enabled when you execute a

statement using the CALL *DlgProc* option.

```
DIALOG SHOW MODELESS hDlg CALL DlgProc TO lResult&
```

or:

```
DIALOG SHOW MODAL hDlg CALL DlgProc TO lResult&
```

These two lines of code specify that dialog related event messages should be directed to the Callback Function *DlgProc()*. If we rewrote the earlier DDT example to use a single Dialog Callback instead of individual Control Callback Functions, the function might look something like this:

```
CALLBACK FUNCTION DlgProc()
  SELECT CASE CB.MSG
    CASE %WM_COMMAND
      IF CB.CTLMSG = %BN_CLICKED THEN
        IF CB.CTL = %IDOK THEN
          DIALOG END CB.HNDL, 1
          FUNCTION = 1
        ELSEIF CB.CTL = %IDCANCEL THEN
          DIALOG END CB.HNDL, 0
          FUNCTION = 1
        END IF
      END IF
  END SELECT
END FUNCTION
```

To complete this stage of modifications, you would also remove the "CALL OkButton" and "CALL CancelButton" parameters from the CONTROL ADD lines. Once changed, this modified code produces the identical behavior of the original example with only a single Callback Function.

This simple example only scrapes the surface of what can be achieved in a Dialog Callback Function. For example, by intercepting a %WM_ERASEBKGND message, you could draw onto the dialog client area, producing colorful dialogs with ease.

Callback Return Values

Callback functions always return a long integer result. The primary purpose of this return value is to tell the PowerBASIC DDT engine and the Windows operating system whether your Callback Function has processed this particular message. If you return the value TRUE (any non-zero value), you are asserting that the message was processed and no further handling is needed. If you return the value FALSE (zero), the PowerBASIC DDT engine will manage the message for you, using the default message procedures in Windows. If you do not specify a return value in the function, PowerBASIC chooses the value FALSE (zero) for you.

The term "process a message" may have many meanings. If it's a simple notification of a change in focus or style, which has no impact on your program, you may decide to consider it processed, yet do nothing. In other cases, your reaction could be quite complex and involved. As the programmer, that's your decision to make. But, regardless of your reaction, you should consider a message "processed" (returning a true value) whenever no further handling of the message (by DDT or Windows) is needed.

In some cases, especially when dealing with Common Controls and custom controls, you may be required to return a second result value through a special Windows data area named DWL_MSGRESULT. When you complete a Callback Function, PowerBASIC automatically copies any non-zero return value to DWL_MSGRESULT, if you haven't done so already. Therefore, it's generally safe to ignore this requirement in your code.

In most cases, when you process a message, you'll return a generic value for TRUE, such as: FUNCTION = 1. However, some messages require that you return a special value for TRUE, such as a graphical brush handle. As long as the value is non-zero, you can return it in the normal manner (with FUNCTION=n), since any non-zero value automatically implies that the message was processed.

That said, there are a few unique messages which may require special handling. Luckily, they're rare, but some just "break all the rules" listed above. For example, you might find one which requires a zero result, even when you have processed the message. You may find another which requires the return value be different from DWL_MSGRESULT. For these very special cases, you can simply specify two return values:

```
FUNCTION = 1, BrushHandle&
```

In this form, the first numeric expression specifies the value to be returned from the Callback Function. The second numeric expression tells the value to be assigned to DWL_MSGRESULT. When you use this double parameter assignment, the results are absolute. PowerBASIC assumes you have processed the message, regardless of the values given. PowerBASIC makes no other assumptions of any kind about these values. A double parameter function assignment is only allowed in a Callback Function.

Previous versions of PowerBASIC did not offer a double parameter form of function return. This caused some difficulty with a few Windows messages which required a special return value of zero. If you return a value of zero (0) with the single parameter form, it implies the message was not processed at all by the Callback. This issue is totally circumvented by the double parameter form.

See Also

- Dynamic Dialog Tools (DDT)
- Creating a Dialog
- Adding Controls to the Dialog
- Modal vs. Modeless
- Controls
- Control Styles
- Dialog Styles
- Menus

Dialog Styles

Dialog Styles

Like control styles, DDT provides a default style for a dialog window, if the DIALOG NEW statement does not specify a specific style parameters.

The default style comprises the combination of %WS_POPUP, %WS_CAPTION, %DS_SETFONT, %DS_NOFAILCREATE, %DS_MODALFRAME, and %DS_3DLOOK. These equates are equivalent to a style of &H080C00D4. The extended style default is zero.

If you explicitly specify %WS_CAPTION in your DIALOG NEW statement, DDT will interpret the width and height values as client dimensions, rather then as overall dialog dimensions. This can be very useful for the times when you need to build a dialog with particular client dimensions.

You can create dialogs using combinations of the following styles:

Style Equate	Description
%WS_BORDER	Dialog has a thin-line border.
%WS_CAPTION	Dialog has a title bar (includes the %WS_BORDER style).
%WS_HSCROLL	Dialog contains a horizontal scroll bar.
%WS_MAXIMIZE	Dialog is initially maximized.
%WS_MAXIMIZEBOX	Dialog has a Maximize button, but must be used in conjunction with the %WS_SYSMENU style. You cannot combine this style with the %WS_EX_CONTEXTHELP extended style.
%WS_MINIMIZE	Dialog is initially minimized.
%WS_MINIMIZEBOX	Dialog has a Minimize button, but must be used in conjunction with the %WS_SYSMENU style. You cannot combine this style with the %WS_EX_CONTEXTHELP extended style.
%WS_SIZEBOX	Dialog has a resizable border. Equivalent to the %WS_THICKFRAME style.
%WS_SYSMENU	Dialog contains a system-menu on its title bar. Must be used in conjunction with the %WS_CAPTION style.
%WS_THICKFRAME	See %WS_SIZEBOX.
%WS_VSCROLL	Dialog contains a vertical scroll bar.
%DS_3DLOOK	Dialog uses a non-bold font and uses three-dimensional borders around child controls. Not required with applications marked for #OPTION VERSION4 or #OPTION VERSION5, as Windows provides this style automatically.
%DS_CENTER	Centers the dialog box in the region of the screen that is not obscured by the taskbar and tray (i.e., the work area).
%DS_CENTERMOUSE	Centers the mouse cursor in the dialog.
%DS_CONTEXTHELP	Places a "question mark" button in the title bar of the dialog. If this button is clicked, the cursor changes to a pointer with a question mark. If the next click is on a control in the dialog, the control's Callback Function will receive a %WM_HELP message. When a dialog containing this style is created, Windows automatically adds the %WS_EX_CONTEXTHELP extended style. %DS_CONTEXTHELP is mutually exclusive with the %WS_MAXIMIZEBOX and %WS_MINIMIZEBOX styles.
%DS_CONTROL	Dialog operates as a child of another dialog. For example, a modeless dialog is able to operate as a child window of a tab control (although the parent must be the tab control's owner, not the tab control itself). This style permits the TAB key to move from control to control in both the parent and the modeless dialog seamlessly, provided the parent includes the extended style %WS_EX_CONTROLPARENT.

%DS_FIXEDSYS	Dialog uses the %SYSTEM_FIXED_FONT instead of the %SYSTEM_FONT.
%DS_MODALFRAME	Used in combination with %WS_CAPTION and %WS_SYSMENU to produce a dialog with a title bar and system-menu.
%DS_NOFAILCREATE	Dialog is created even if an error occurs during creation. Such an error may occur if a child control cannot be created successfully.
%DS_SETFONT	During dialog creation, the child controls in the dialog will be sent a %WM_SETFONT message in order to receive the handle of the font specified by the dialog.

See Also

Dynamic Dialog Tools (DDT)

Creating a Dialog

Adding Controls to the Dialog

Modal vs. Modeless

Controls

Control Styles

Menus

Menus

Menus

Just like regular GUI windows and dialog boxes, DDT dialogs can use menus too. With just a handful of statements, you can create a menu and add or remove items, depending on the context of your application.

A menu bar is positioned just below the caption bar of a dialog box. From this menu bar, popup menus (or sub-menus as they are also known) can be displayed, each containing commands. Popup menus may contain even deeper levels of popup menus.

Menus are constructed in a hierarchical manner: the top-most level is positioned on the menu bar, and the lower levels of the menu are the popup portions. The items on the menu bar are always visible, but the popup menus are never visible until a menu bar item is either clicked by the mouse, or activated by a command accelerator (hot-key) which is indicated by an underscored character in the menu item text.

Please note that command accelerators differ slightly from keyboard accelerators. The latter are configured and described in the ACCEL ATTACH statement topic.

Typically, a popup menu contains a range of associated commands. For example, a FILE popup menu usually contains a range of commands to permit the opening, saving and closing of files, etc.

When the user activates a popup menu item, and a command is selected, a %WM_COMMAND message is sent to the dialog Callback Function to notify the program that a menu item has been selected.

See Also

Menu Walkthrough

More on the Menu

Menu State

Menu Example

Menu Walkthrough

Menu Walkthough

In order to create an example menu for our DDT dialog, we will need one Double-word variable to hold the handle of the menu, and one for each of the popup menu levels that our menu will contain. In the following code, we will work towards creating a menu with two items on the menu bar (therefore two popup menus). In all, we will need three 32-bit variables:

```
DIM hMenu AS DWORD
DIM hPopup1 AS DWORD
```

To begin creating our menu, we use the MENU NEW BAR statement:

```
MENU NEW BAR TO hMenu
```

The value returned in *hMenu* is termed the menu handle. We use this handle to attach each of our popup menus. In order to create these popup menus, we will also need to create a handle:

```
MENU NEW POPUP TO hPopup1
```

Now we will "glue" our new popup menu to the menu bar. We do this using the MENU ADD POPUP statement, which results in an entry on the menu bar labeled "*File*", complete with a command accelerator:

```
MENU ADD POPUP, hMenu, "&File", hPopup1, %MF_ENABLED
```

The ampersand character in "*&File*" means that pressing ALT+F on the keyboard, in addition to the conventional mouse click, can open the menu. The *hPopup1* parameter instructs the DDT engine to attach the menu to the menu bar (*hMenu*), and it is initially enabled.

Using the handle returned in *hPopup1*, we can begin adding items to the newly created popup menu. For each menu item that is a command (Open, Save, etc), we assign an ID value and specify the state of the item. When the user clicks on a menu item, the dialog Callback Function receives a %WM_COMMAND message.

In turn, we can then use the CB.CTL function to obtain this ID value, to determine which menu item the user has selected. The state parameter allows us to specify whether the menu item is initially enabled, grayed (disabled), checked, or unchecked, etc.

Now let's begin to add items to our new popup menu:

```
MENU ADD STRING, hPopup1, "&Open", 201, %MF_ENABLED
MENU ADD STRING, hPopup1, "&Exit", 202, %MF_ENABLED
MENU ADD STRING, hPopup1, "-", 0, 0
```

Here we created two items that form part of our first popup menu. These menu items have the ID values *201* and *202* respectively, and each is initially enabled. The third item is a special type of menu item, called a separator. A separator is a horizontal line within the menu, and can be used to visually separate groups of menu items from each other within the same popup menu.

We recommend using equates for the ID parameters, as they make your code more readable and maintainable. For this example we use hard-coded values simply for clarity.

Let's add an additional popup menu to this original popup menu, just to demonstrate how simple it can be to create menus with multiple "layers". First, we will need to create a new popup menu handle:

```
MENU NEW POPUP TO hPopup2
```

Using this new popup menu handle, we attach menu items in exactly the same order as we did as before:

```
MENU ADD STRING, hPopup2, "Option &1", 403, %MF_ENABLED
MENU ADD STRING, hPopup2, "Option &2", 404, %MF_ENABLED
```

Now comes the tricky part... we must attach this new menu to the previous menu, rather than the menu bar:

```
MENU ADD POPUP, hPopup1, "&More Options", hPopup2, %MF_ENABLED
```

This statement "glues" the second popup menu to the end of the first popup menu. If we changed the *hPopup1* parameter to *hMenu*, the popup menu would appear on the menu bar. Making multiple level menus is that simple!

With our menu created, we then attach the menu to our DDT dialog:

```
MENU ATTACH hMenu, hDlg
```

This code is almost self-explanatory - DDT is instructed to attach our menu structure to the dialog handle contained in *hDlg*. The only thing left now is to show the dialog, complete with a menu.

```
DIALOG SHOW MODAL hDlg, CALL DlgProc TO lResult
```

See Also

[Menus]
[Menu Walkthrough]
[More on the Menu]
[Menu State]
[Menu Example]

More on the Menu

More on the Menu

When adding new menu items to a menu, additional parameters may be included in the following statements:

```
MENU ADD POPUP, hMenu, txt$, hPopup, state&[, AT [BYCMD] position&]
MENU ADD STRING, hMenu, txt$, hPopup, state&[, AT [BYCMD] position&] [, CALL callback]
```

AT *position&* An optional position parameter that allows the programmer to specify an absolute position of the menu item within the popup menu, inserted immediately before the value of *position&*. Omitting this parameter causes the menu item to be appended to the menu at the "current position". Position values are indexed to 1. For example:

```
' Insert a new menu item at position 3 in the popup menu hPopup
position& = 3
MENU ADD STRING, hPopup, "&Print", %id_Print, _
ItemState&, AT position&
```

BYCMD The BYCMD keyword (also applicable to other forms of the MENU statement) changes the interpretation of *position&* to an identifier value, rather than an absolute position value. For example:

```
' Insert the "Print Setup" menu item before the "Print" menu item
Position& = %id_Print
MENU ADD STRING, hPopup, "Print Se&tup", _
  %id_PrintSetup, ItemState&, AT BYCMD Position&
```

callback ([MENU ADD STRING] only) The Callback parameter provides a mechanism to specify a [Callback] Function that is executed, to process %WM_COMMAND messages for the menu item.

See Also

[Menus]
[Menu Walkthrough]
[Menu State]
[Menu Example]

Menu State

Menu State

The

statements provide for an *ItemState&* parameter. For popup menus, this may be either %MFS_ENABLED or %MFS_DISABLED. For menu items, the state may be one of %MFS_ENABLED, %MFS_DISABLED, %MFS_CHECKED, %MFS_UNCHECKED, or %MFS_GRAYED.

A DDT menu requires the parent DDT dialog to contain at least one child control for the menu to operate correctly. This control may be a BUTTON or LABEL, etc, and the control may be located out of the visible client area of the dialog if necessary.

The Dessert Menu

In addition to creating menus dynamically, DDT provides a rich set of additional menu functions to allow you to manipulate your menus at run-time. The following is a brief summary of these functions:

MENU DELETE	Delete (remove) a menu item from a menu, or a popup menu from a menu bar.
MENU DRAW BAR	Redraw the menu bar for a given menu. This must be used if a menu is changed at run-time, regardless of whether the menu is visible or not.
MENU GET STATE	Obtain the current state of a menu item (%MF_ENABLED, etc). If the menu item is a separator, the returned value will be %MF_SEPARATOR.
MENU GET TEXT	Retrieve the text for a given menu item.
MENU SET STATE	Set the current state of a menu item.
MENU SET TEXT	Change the text of a specific menu item, and can be used to change the command accelerator of the item.

For a more comprehensive list of menu statements and functions, See the Command Summary for DDT.

See Also

Menus

Menu Walkthrough

More on the Menu

Menu Example

Menu Example

Menu Example

In the following code example, we create a dialog with a menu, outlining the concepts discussed in this chapter. Feel free to use this code as a base for your own DDT projects. This example is also available in your PowerBASIC installation, in the \PBWIN\SAMPLES\DDT\MENU folder.

```
'============================================================
'
' Simple example of an application that has a menu and
' requires absolutely no API calls!
'
'============================================================

#COMPILE EXE

%IDOK = 1
%IDCANCEL = 2
%IDTEXT = 100
```

```
%BN_CLICKED = 0
%BS_DEFAULT = 1
%MF_ENABLED = 0
%WM_COMMAND = &H111

%ID_OPEN = 401
%ID_EXIT = 402
%ID_OPTION1 = 403
%ID_OPTION2 = 404
%ID_HELP = 405
%ID_ABOUT = 406

'------------------------------------------------------------

' ** Global variable to receive the user name
GLOBAL gsUserName AS STRING

'------------------------------------------------------------

CALLBACK FUNCTION OkButton()
  IF CB.MSG = %WM_COMMAND AND CB.CTLMSG = %BN_CLICKED THEN
    CONTROL GET TEXT CB.HNDL, %IDTEXT TO gsUserName
    DIALOG END CB.HNDL, 1
    FUNCTION = 1
  END IF
END FUNCTION

'------------------------------------------------------------

CALLBACK FUNCTION CancelButton()
  IF CB.MSG = %WM_COMMAND AND CB.CTLMSG = %BN_CLICKED THEN
    DIALOG END CB.HNDL, 0
    FUNCTION = 1
    END IF
  END FUNCTION

'------------------------------------------------------------

CALLBACK FUNCTION DlgProc()
  IF CB.MSG = %WM_COMMAND THEN
    IF CB.CTL => %ID_OPEN AND CB.CTL <= %ID_ABOUT THEN
      MSGBOX "WM_COMMAND received from a menu item!", &H00002000& ' = %MB_TASKMODAL
      FUNCTION = 1
    END IF
  END IF
END FUNCTION

'------------------------------------------------------------

FUNCTION PBMAIN () AS LONG
  LOCAL hDlg AS DWORD
  LOCAL lResult AS LONG
  LOCAL hMenu AS DWORD
  LOCAL hPopup1 AS DWORD
  LOCAL hPopup2 AS DWORD

  ' ** First create a top-level menu:
  MENU NEW BAR TO hMenu

  ' ** Add a top-level menu item with a popup menu:
```

```
    MENU NEW POPUP TO hPopup1
    MENU ADD POPUP, hMenu, "&File", hPopup1, %MF_ENABLED
    MENU ADD STRING, hPopup1, "&Open", %ID_OPEN, %MF_ENABLED
    MENU ADD STRING, hPopup1, "&Exit", %ID_EXIT, %MF_ENABLED
    MENU ADD STRING, hPopup1, "-", 0, 0

    ' ** Now we can add another item to the menu that will bring up a sub-menu.
    ' First we obtain a new popup menu handle to distinguish it from the first
    ' popup menu:
    MENU NEW POPUP TO hPopup2

    ' ** Now add a new menu item to the first menu.
    ' This item will bring up the sub-menu when selected:
    MENU ADD POPUP, hPopup1, "&More Options", hPopup2, %MF_ENABLED

    ' ** Now we will define the sub menu:
    MENU ADD STRING, hPopup2, "Option &1", %ID_OPTION1, %MF_ENABLED
    MENU ADD STRING, hPopup2, "Option &2", %ID_OPTION2, %MF_ENABLED

    ' ** Finally, we'll add a second top-level menu and popup.
    ' For this popup, we can reuse the first popup variable:
    MENU NEW POPUP TO hPopup1
    MENU ADD POPUP, hMenu, "&Help", hPopup1, %MF_ENABLED
    MENU ADD STRING, hPopup1, "&Help", %ID_HELP, %MF_ENABLED
    MENU ADD STRING, hPopup1, "-", 0, 0
    MENU ADD STRING, hPopup1, "&About", %ID_ABOUT, %MF_ENABLED

    ' ** Create a new dialog template
    DIALOG NEW 0, "What is your name?", ,, 160, 60, 0, 0 TO hDlg

    ' ** Add controls to it
    CONTROL ADD TEXTBOX, hDlg, %IDTEXT, "", 14, 12, 134, 12, 0
    CONTROL ADD BUTTON, hDlg, %IDOK, "OK", 34, 32, 40, 14, %BS_DEFAULT CALL OkButton
    CONTROL ADD BUTTON, hDlg, %IDCANCEL, "Cancel", 84, 32, 40, 14, 0 CALL CancelButton

    MENU ATTACH hMenu, hDlg

    ' ** Display the dialog
    DIALOG SHOW MODAL hDlg, CALL DlgProc TO lResult

    ' ** Check the dialog return result
    IF lResult THEN
      MSGBOX "Hello " & gsUserName
    END IF
  END FUNCTION

  '------------------------------------------------------------
```

See Also

[Menus]

[Menu Walkthrough]

[More on the Menu]

[Menu State]

Files

Files

Files

PowerBASIC offers three distinct ways to store and retrieve information from disk: sequential, random, and binary file input and output. Each has its advantages and disadvantages; the one that works best for you will depend on your application.

See Also

Sequential Files

Random Access Files

Binary Files

Sequential Files

Sequential Files

Sequential file techniques provide a straightforward way to read and write files. PowerBASIC's sequential file commands manipulate *text* files: files of ANSI or WIDE characters with carriage-return/linefeed pairs separating records.

Quite possibly, the best reason for using sequential files is their degree of portability to other programs, programming languages, and computers. Because of this, you can often look at sequential files as the common denominator of data processing, since they can be read by word-processing programs and editors (such as PowerBASIC's), absorbed by other applications (such as database managers), and sent over the Internet to other computers.

The idea behind sequential files is simplicity itself: write to them as though they were the screen and read from them as though they were the keyboard.

Create a sequential file using the following steps:

1. Open the file in sequential output mode. To create a file in PowerBASIC, you must use the OPEN statement. Sequential files have two options to prepare a file for output:
   OUTPUT: If a file does not exist, a new file is created. If a file already exists, its contents are erased, and the file is then treated as a new file.
   APPEND: If a file does not exist, a new file is created. If a file already exists, PowerBASIC appends (adds) data at the end of that file.
2. Output data to a file. Use WRITE# or PRINT# to write data to a sequential file.
3. Close the file. The CLOSE statement closes a file after the program has completed all I/O operations.

To read a sequential file:

1. First, OPEN the file in sequential INPUT mode. This prepares the file for reading.
2. Read data in from the file. Use PowerBASIC's INPUT# or LINE INPUT# statements.
3. Close the file. The CLOSE statement closes a file after the program has completed all I/O operations.

The drawback to sequential files is, not surprisingly, that you only have sequential access to your data. You access one line at a time, starting with the first line. This means if you want to get to the last line in a sequential file of 23,000 lines, you will have to read the preceding 22,999 lines.

Sequential files, therefore, are best suited to applications that perform sequential processing (for example, counting words, checking spelling, printing mailing labels in file order) or in which all the data can be held in memory simultaneously. This allows you to read the entire file in one fell swoop at the start of a program and to write it all back at the end. In between, the information can be stored in an array (in memory) which *can* be accessed randomly.

Although the SEEK statement can be used to change the point in the file where the next read or write will occur, the calculations required to determine the position of the start of each record in a sequential file would add considerable overhead. Sequential files typically consist of records of varying sizes. Either you would have to maintain a separate index file indicating the starting byte position of each record, or you would have to seek randomly until you found the correct position. However, SEEK does have its uses with sequential files. For instance, after reading an entire file, you could use SEEK to reposition the file pointer to the start of the file, in order to process the data a second time. This is certainly quicker than closing and re-opening the file.

Sequential files lend themselves to database situations in which the length of individual records is variable. For example, suppose an alumni list had a comments field. Some people may have 100 bytes or more of comments. Others, perhaps most, will have none. Sequential files handle this problem without wasting disk space.

The OPEN statement provides an optional LEN parameter for use with sequential files. This instructs PowerBASIC to use internal buffering to speed up reading of sequential files, using a buffer of the size specified by the LEN parameter. A buffer of 8192 bytes is suggested for best general performance, especially when networks are involved. However, this value can be increased in size to gain additional performance - the best value will always be specific to a particular combination of hardware and software, and may vary considerably from PC to PC, network to network, etc.

The OPEN statement also provides an optional character mode parameter. This specifies the character mode for this file: ANSI or WIDE (Unicode). Since sequential files consist of text alone, the selected mode is enforced by PowerBASIC. All data read or written to the file is automatically forced to the selected mode, regardless of the type of variables or expressions used. With binary or random files, this specification has no effect, but it may be included in your code for self-documentation purposes.

ANSI characters in the U.S. range of CHR$(0) to CHR$(127) are known as ASCII, and are always represented by a single byte. International ANSI characters in the range of CHR$(128) to CHR$(255) may be followed by one or more additional bytes in order to accurately represent non-U.S. characters. The exact definition of these characters depends upon the character set in use. WIDE characters are always represented by two bytes per character. If the Chr option is not specified, the default mode is ANSI.

See Also

Files

Random Access Files

Binary Files

Random Access Files

Random Access Files

Random access files consist of records that can be accessed in any sequence. This means the data is stored exactly as it appears in memory, thus saving processing time (because no translation is necessary) both in when the file is written and in when it is read.

Random files are a better solution to database problems than sequential files, although there are a few disadvantages. For one thing, random files are not especially transportable. Unlike sequential files, you cannot peek inside them with an editor, or type them in a meaningful way to the screen. In fact, moving a PowerBASIC random file to another computer or language will probably require that you write a translator program to read the random file and output a text (sequential) file.

One example of the transportability problem strikes close to home. Interpretive BASIC uses Microsoft's non-standard format for

values, and PowerBASIC uses IEEE standard floating-point conventions, this means you cannot read the floating-point fields of random files created by Interpretive BASIC with a PowerBASIC program, or vice versa, without a bit of extra work.

The major benefit of random files is implied in their name: every record in the file is available at any time. For example, in a database of 23,000 alumni, a program can go straight to record number 11,663 or 22,709 without reading any of the other records. This capability makes it the only reasonable choice for large files, and probably the better choice for small ones, especially those with relatively consistent record lengths.

However, random access files can be wasteful of disk space because space is allocated for the longest possible field in every record. For example, a 100-byte comment field forces every record to use an extra 100 bytes of disk space, even if only one in a thousand actually uses it.

At the other extreme, if records are consistent in length, especially if they contain mostly numbers, random files can save space over the equivalent sequential form. In a random file, every number of the *same* type (Integer, Long-integer, Quad-integer, Byte, Word, Double-word, Single-precision, Double-precision, Extended-precision or Currency) occupies the same amount of disk space, regardless of the value itself. For example, the following five Single-precision values each require four bytes (the same space they occupy in memory):

```
0
1.660565E-27
15000.1
641
623000000
```

By contrast, numbers in a sequential file require as many bytes as they have ASCII characters when printed (plus one for the delimiting comma if WRITE# was used instead of PRINT#). For example:

```
WRITE #1, 0;0            ' takes 3 bytes
PRINT #1, 0;0            ' takes 5 bytes
PRINT #1, 1.660565E-27   ' takes 13 bytes
```

You can create, write, and read random access files using the following steps:

1. First, OPEN the file and specify the length of each record:

   ```
   OPEN filespec FOR RANDOM AS [#]filenum [LEN = recordsize]
   ```

   The LEN parameter indicates to PowerBASIC the total size of each record in bytes. If you do not specify a LEN parameter, PowerBASIC assumes 128. Unlike sequential files, you do not have to declare whether you are opening for input or output because you can simultaneously read and write a random file.

2. Define a structure for records in the file using the TYPE statement.

   ```
   TYPE StudentRecord
     LastName     AS STRING * 20 ' A 20-character string
     FirstName    AS STRING * 15 ' A 15-character string
     IDnum        AS LONG        ' Student ID, a Long-integer
     Contact      AS STRING * 30 ' Emergency contact person
     ContactPhone AS STRING * 14 ' Their phone number
     ContactRel   AS STRING * 8  ' Relationship to student.
     AverageGrade AS SINGLE      ' Single-precision % grade
   END TYPE

   DIM Student AS StudentRecord
   ```

3. Fill the UDTs members with the values you want, and write records to the file using the PUT statement.

   ```
   Student.LastName = "Anderson"
   Student.FirstName = "Bob"
   Student.IDnum = 494425610
   ```

```
Student.Contact = "Ma Anderson"
Student.ContactPhone = "(800) BOBSMOM"
Student.ContactRel = "Mother"
Student.AverageGrade = 98.9

PUT #fileNumber, recordNumber, Student
```

4. Read records from the file using the GET statement.

```
GET #fileNumber, recordNumber, Student
```

5. When finished, CLOSE the file.

See Also

Files

Sequential Files

Binary Files

Binary Files

Binary Files

PowerBASIC's binary file technique, an extension to Interpretive BASIC, allows you to treat any file as a numbered sequence of bytes without regard to anything, including the following: ASCII characters, number versus string considerations, record length, carriage returns. With the binary approach to a file problem, you read and write a file by specifying exactly which bytes to read or write. This is similar to the services provided by Windows API functions used for reading and writing files.

Flexibility always comes at a price. Binary files require that you do all the work to decide what goes where. Binary may be the best option when dealing with alien files that aren't in ASCII format; for example, a file created by a spreadsheet or database product. Of course, you will have to know the precise structure of the file before you can even attempt to break it down into numbers and strings agreeable to PowerBASIC.

Every file opened in binary mode has an associated position indicator that points to the place in the file that will be read or written to next. Use the SEEK statement to set the position indicator, and the SEEK function to read it.

Binary files are accessed in the following way:

1. First, OPEN the file in BINARY mode. You need not specify whether you are reading or writing; you can do either, or both.
2. To read the file, use SEEK to position the file pointer at the byte you want to read. Then use GET$ to read a specified number of characters into a string variable.
3. To write to the file, load a string variable with the information to be written. Then use SEEK to position the point in the file to which it should be written, and use PUT$ to write the data.
4. When finished, CLOSE the file.

See Also

Files

Sequential Files

Random Access Files

Graphics

This version of PowerBASIC offers an excellent graphics package for most any programming need. It's fast. It's complete. And it handles all those messy Windows details for you... automatically!

First, it's good to know that graphics in PowerBASIC are persistent. Create it once... and forget it. You'll never worry about redrawing when your window is minimized or temporarily covered. PowerBASIC handles everything. Automatically!

So, how about a quick overview? Just what can you do? First, how about some fancy text? Any font. Any size. Any color. Bold. Italic. Underline and Strikeout. Mix any combination of fonts on a single Window. Print just about anything, just about anywhere. Then add bitmaps. Stretch them or condense them. Copy them or change them. Circles, ovals, lines and boxes. Fat lines, skinny lines, ellipses, rounded rectangles. Filled forms or empty. Colors or not. You'll create a custom scaling system -- even with fractional floating point coordinates!

So, let's get started. You should know that almost every graphical function name starts with the word

. You'll find all of them together in the help file or the book.

Step one -- you'll need a canvas. A place to create these works of art. So, create a GRAPHIC WINDOW. Or two. Or ten. They'll be visible right away and give you quick feedback.

```
GRAPHIC WINDOW "PowerGraphics", 600, 200, 400, 300  TO hWin???
```

You'll get a new window, with the title "PowerGraphics". It's positioned on the upper right side of the screen at x=600, y=200. It's 400 pixels wide, and 300 pixels high.

A second option is a memory bitmap. These aren't visible at all. You create your image "behind-the-scenes", then copy or stretch it to a visible window whenever you're ready. Use GRAPHIC BITMAP NEW for a blank bitmap, or GRAPHIC BITMAP LOAD to get one from a resource or a disk file. You can have one window or five. One bitmap or twenty. As each is created, it returns a handle that you need to save. That's how you'll identify each of your canvases.

Step two Use GRAPHIC ATTACH to choose a "graphic target". This tells PowerBASIC which window or memory bitmap to use, for the actions which follow. Until you execute another GRAPHIC ATTACH to change it again. Move back and forth, as often as necessary. There is no limitation here.

Step three Draw-Draw-Draw. Arcs. Circles. Lines. Boxes. Text. Display them. Copy them. Save them to disk.

Step four Clean up when you're done. You must close every graphic window with GRAPHIC WINDOW END, and every memory bitmap with GRAPHIC BITMAP END.

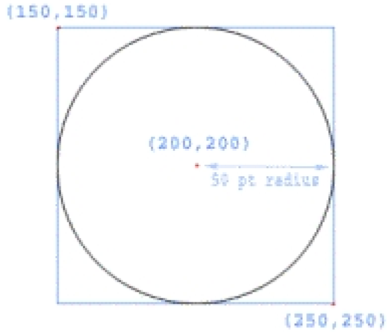
It's just that simple!

Some GRAPHIC functions use the concept of an implied "graphic position" to determine the default point on the graphic target where the next operation will take place. In PowerBASIC, we use the keyword POS to refer to this position (See GRAPHIC GET POS and GRAPHIC SET POS to alter or retrieve this position). POS is also commonly known as the LPR (Last Point Referenced) or even NPR (Next Point Referenced). For most purposes, you can consider these three terms to be synonymous.

When a Graphic Window or Graphic Bitmap is created, the default POS is set to (0,0), which is the upper left corner. Unless you specify otherwise, the first graphical operation starts at that point, and the completion point is then saved as the new POS. So, if you draw a line from (0,0) to (100,100), that last point (100,100) is saved as the new POS. The next line you draw would then, by default, start at (100,100), and then automatically save its completion point as the updated POS for next time.

The "Graphic Position" (POS) is used by GRAPHIC LINE, GRAPHIC PAINT, GRAPHIC PRINT, and GRAPHIC SET PIXEL. Other graphic functions neither use nor update POS.

Other GRAPHIC functions, namely those involved with the drawing of curves (GRAPHIC ARC, GRAPHIC ELLIPSE, and GRAPHIC PIE), utilize the concept of a "bounding rectangle" to determine their size and position on the graphic target. A bounding rectangle is defined as the smallest rectangle which can be drawn around the circle or ellipse. For example, let's say you wish to draw a circle centered at position (200,200), which has a radius of 50 pixels. The upper left corner (x1,y1) of the bounding rectangle would be at (150,150), while the lower right corner of the bounding rectangle would be at (250,250).



See Also

[Graphic Commands](#)

[GRAPHIC Code Group](#)

Printing

Printing

Printing

PowerBASIC supports two general classes of printers. We categorize them as Line Printers or Host Printers. Generally speaking, we recommend using Host Printers whenever possible, as they have far greater capabilities, including an extensive graphics package.

A line printer is one which will accept standard ASCII text and associated control codes, such as CR, LF, and FF. A line printer is identified by the port to which it is attached (LPT1, etc.) because data is sent directly to the port, not through a device driver. Print to Line Printers by using the LPRINT family of functions.

A host printer is one which works through the Windows printing system and a Windows printer driver. These printers are sometimes known as "Windows-only printers" or "GDI printers". They achieve device independence because the printer driver handles the task of converting ASCII text into the manufacturers proprietary binary format used by the printer. Print to Host Printers by using the XPRINT family of functions.

An interesting feature of this version is the new PRINTER$ function. This will let you retrieve both the printer name and the port name for every printer connected to the computer. Also, the new XPRINT ATTACH statement will optionally display a Printer Common Dialog to assist the user in selecting a printer, and the associated options.

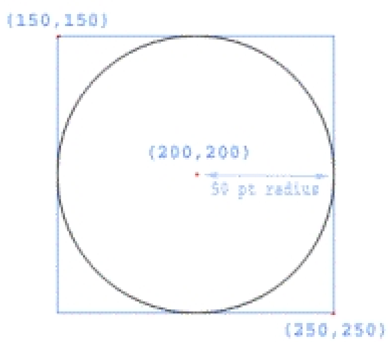
In contrast to single-tasking systems like DOS, you'll need to select a printer when you're ready to print. Use either LPRINT ATTACH or XPRINT ATTACH to do that. That assures two applications won't try to print to the same printer at the same time. Then print your report. Print your graphics. Print your charts. When you're done, don't forget to detach the printer with LPRINT CLOSE or XPRINT CLOSE. This frees up the printer for another application to use. Perhaps even more important, Host Printers normally won't even begin to print to the physical paper until the print job is closed!

Some XPRINT functions use the concept of an implied "XPrint Position", to determine the default point on the host printer page where the next operation will take place. In PowerBASIC, we use the keyword POS to refer to this position (See XPRINT GET POS and XPRINT SET POS to alter or retrieve this position). POS is also commonly known as the LPR (Last Point Referenced) or even NPR (Next Point Referenced). For most purposes, you can consider these three terms to be synonymous.

When a new host printer page is created (with XPRINT ATTACH of a host printer, or XPRINT FORMFEED which ends a printer page), the default POS is set to (0,0), which is the upper left corner. Unless you specify otherwise, the first XPRINT operation starts at that point, and the completion point is then saved as the new POS. So, if you draw a line from (0,0) to (100,100), that last point (100,100) is saved as the new POS. The next line you draw would then, by default, start at (100,100), and then automatically save its completion point as the updated POS for next time.

The "XPrint Position" (POS) is used by XPRINT, XPRINT LINE, and XPRINT SET PIXEL. Other XPRINT functions neither use nor update POS.

Other XPRINT functions, namely those involved with the drawing of curves (XPRINT ARC, XPRINT ELLIPSE, and XPRINT PIE), utilize the concept of a "bounding rectangle" to determine their size and position on the host printer page. A bounding rectangle is defined as the smallest rectangle which can be drawn around the circle or ellipse. For example, let's say you wish to draw a circle centered at position (200,200), which has a radius of 50 pixels. The upper left corner (x1,y1) of the bounding rectangle would be at (150,150), while the lower right corner of the bounding rectangle would be at (250,250).



See Also

- Print Preview
- Printing Commands
- XPRINT Code Group

Print Preview

Print Preview

Print Preview is a powerful concept which should be considered in most application programs which provide printed reports. Briefly, the idea involves displaying a replica of a printed document on the screen before it is committed to printing on paper. There are other related benefits available as well, such as the opportunity to save this replica report permanently to a disk file. PowerBASIC offers a simple and straightforward method to create printed reports which can be previewed on the screen.

The algorithm implemented by PowerBASIC can be summarized:

1. Select a printer to be used for the printed report using the XPRINT ATTACH statement.

   XPRINT ATTACH {DEFAULT | *PrinterName$*} [,*JobName$*]

```
XPRINT ATTACH CHOOSE [USING Flags&] [,JobName$]
```

2. Use the XPRINT PREVIEW statement to select a graphic target (a graphic bitmap, graphic control, or graphic window) for the preview display. You may create a new graphic target, or reuse one which already exists. The target is identified by the handle and ID given when it was created. You can optionally specify a callback function which is called upon every execution of an XPRINT FORMFEED or XPRINT PREVIEW CLOSE. This statement should immediately follow the XPRINT ATTACH.

```
XPRINT PREVIEW hWin, ID [, CALL xxx]
```

3. At this point, all subsequent output will be redirected to the graphic target. All data will be adjusted in size and position to the specification of the graphic target. It is best to use care to keep the proportions of the graphic page similar to the printer page to avoid distortion of the previewed report.
4. When XPRINT PREVIEW CLOSE is executed, it signals that the previewed report is completed. Redirection of XPRINT data is ended, and the XPRINT data stream is now sent to the original attached printer.
5. Repeat the XPRINT statements to create the desired report on the attached printer. Generally, these XPRINT statements are best placed in a subroutine which can be repeated with a single line of code.

A simplified PRINT PREVIEW:

```
GRAPHIC WINDOW NEW "Preview", 200, 100, 400, 550 TO h&
XPRINT ATTACH DEFAULT
XPRINT PREVIEW h&, 0
CALL PrintIt          ' print to the preview window
XPRINT PREVIEW CLOSE
CALL PrintIt          ' print to the host printer
XPRINT CLOSE
...
...
SUB PrintIt()
  XPRINT "This is a test of preview..."
  XPRINT ELLIPSE (300,300) - (500,400), %rgb_red
  XPRINT RENDER "xx.bmp", (300,500)-(500,700)
END SUB
```

XPRINT PREVIEW must be executed immediately after XPRINT ATTACH or an error 98 "XPrint Preview Error" will be generated at run time. No XPRINT statements (other than the XPRINT$ function) may be executed between XPRINT ATTACH and XPRINT PREVIEW.

If you include the CallBack option, the callback procedure must be a simple SUB with no parameters and no return value. It is called automatically by the XPRINT engine at the completion of each preview page (upon execution of XPRINT FORMFEED or XPRINT PREVIEW CLOSE. This Sub can perform all sorts of housekeeping help, such as copying the preview bitmap for separate storage, counting pages in the report, or most anything else needed by your program. Copying the bitmap is important in multi-page reports as XPRINT FORMFEED erases the graphic target for preview of the next page.

See Also

Printing

Printing Commands

XPRINT Code Group

Serial Communications

Serial Communications

Serial Communications

This section introduces telecommunications. For many programmers, writing a communications program is difficult. It is not that the programs themselves are especially long; it is that the procedures and terminology are unfamiliar. That means programs take longer to write and debug, making writing such programs frustrating. To compound the problem, performing serial communications using the Windows API can be a daunting task.

In this section, we define common communications terms and discuss some of the more regular ways of transmitting and receiving data, using the native COMM statements and related features of PowerBASIC. There are plenty of examples and some working PowerBASIC program code (included on your distribution disks) for you to try out. Feel free to use this code as a starting point for your own communications programs.

Before presenting any sample code or delving further into the mysteries of communications, let's define a few terms:

ACK	An acknowledgment signal sent by the receiver of a message.
Asynch	Asynchronous; not synchronous. The receiver and transmitter are free to send signals without matching clocks.
Baud Rate	Baud (from J. M. E. Baudot, a communications pioneer) refers to the total number of signal changes that could possibly be sent between transmitter and receiver per second. Signal changes do not necessarily mean bits, and not all bits are necessarily data, so baud rate isn't equivalent to a fixed number of characters (or even a fixed number of bits) per second.
Buffer	An area of memory used to hold transmitted or received signals before processing them.
CD	Carrier Detect. A signal used to tell that a carrier has been detected; the DCE (modem) has connected with another computer and is ready for use.
CRC	Cyclic Redundancy Check. A way of summing the data bits sent between transmitter and receiver so as to detect transmission errors.
CTS	Clear To Send. A handshaking signal that indicates the receiver is ready to receive data. Typically, a modem uses this signal for to control data flow from the computer. CTS (and sometimes DSR) are often used in response to an RTS signal.
DCE	Data Circuit-terminating Equipment. Typically, a DCE is a modem. A DCE is often inaccurately referred to as the "Data Communications Equipment".
DSR	Data Set Ready. A handshaking signal that serves to indicate that an RS-232C non-terminal device (usually a modem) is ready to receive data. Often used with CTS.
DTE	Data Terminal Equipment. Typically the computer.
DTR	Data Terminal Ready. A handshaking signal that indicates that an RS-232C serial terminal device (the computer) is ready to receive data.
Handshaking	A process whereby the receiver and transmitter match signals and correctly determine each other's status. See CTS, DSR, and RTS.
Modem	**Mo**dulator/**Dem**odulator. A device used to convert digital signals to sounds that can be carried over standard telephone lines, and to convert such sounds back to digital signals.
NAK	Negative Acknowledgment. A signal sent from receiver to transmitter, indicating that an error was detected in the last message.
Null Modem	A way of connecting receive and transmit lines, so that one computer can send or receive signals directly from another without having to go through a modem. This typically requires a "null-modem" or "cross-over" cable to ensure the signals are correctly interconnected between devices.

Parity	One bit (the high-order bit) per byte sent or received, used to detect some of the possible transmission errors. Parity may be even, odd, none, mark (always on), or space (always off).
Port	A term used to refer to any one of the possibly several communications devices available to the operating system. Usually COM1, COM2, etc.
Protocol	A way of controlling transmissions or receptions. A protocol consists of a set of rules describing the form of a valid transmission, the proper response when a transmission is received, and ways of detecting and correcting errors.
RS-232	A standard for wiring on serial communications ports, that describes which wires should carry which signals at what voltage. There are two basic standards: one for transmitting equipment (DTE) and one for receiving equipment (DCE).
RTS	Request To Send. A signal raised by the transmitter, to which the receiver should reply with CTS and/or DSR.
Serial	Refers to signals sent one bit after the other, as opposed to parallel. Parallel signals are sent more than one bit at a time.
Stop Bits	The number of bits added to each byte of data transmitted, to allow the receiver to get in step with the transmitter.
Synch	Synchronous. The receiver and transmitter match their clocks so that each will send and receive only at specific times.

See Also

Communications Basics

Communication Buffers

Parity and general error checking

Start and Stop bits

Opening a communications port

Reading and writing data

A simple communications program

Communications Basics

Communications Basics

To communicate from one computer to another, you need a communications program on each machine, and some way to connect them (telephone lines, for example). Sometimes, those programs are built into the operating system. Even when that's the case, there will be times when you want to do something faster, more reliably, or in a different manner than what has been provided.

To communicate, you will need a way for each program to inform the other that:

1. It is ready/not ready to transmit/receive data.
2. Data has been received and is correct.
3. Data has been received and is not correct.
4. Transmission is over.

If it is not important to check for, or correct errors, items 2 and 3 in the previous list can be ignored. Those capabilities are often skipped when the programs are to be used for simple communications - short text or brief typed messages. Even the other two parts can be dropped if the programs are closely monitored, or if errors will not matter very much.

However, it is important to realize that receiving and transmitting data is not always quite as simple as it might appear, especially when you are coding under Windows. For example, suppose your program is receiving data and saving material to a disk file. What should happen if more data is received while the program is writing data to disk? Alternatively, suppose the user presses a key that means "clear the screen and display a menu" while data is being received?

Situations like this are common. The standard way of handling them is to use a buffer.

See Also

Serial Communications

Communication Buffers

Parity and general error checking

Start and Stop bits

Opening a communications port

Reading and writing data

A simple communications program

Communication Buffers

Communication Buffers

Buffers can be useful in solving various types of communication or data transfer problems. For example, a printer typically includes a buffer of at least a few thousand characters. Since the computer can send material to the printer faster than it is capable of putting the material on paper, the buffer serves three purposes:

1. To even the workload for the printer
2. To allow the computer to finish sending material sooner
3. To handle occasions when the printer cannot accept more material

If the printer did not have a buffer, the computer would be forced to send data one character at a time. Until each character is received and printed, the computer should not send more. To prevent this, the printer sends a busy signal back to the computer. When it gets this signal, the computer stops until the printer sends a "ready" signal. This "ready/busy" signaling is called *handshaking*.

Visualize what is taking place. The printer sends a ready signal; the computer sends a character; the printer sends a busy signal, forcing the computer to wait while it prints the character; and then the whole process repeats. That is a lot of signaling for just one transmitted character!

Further, there is a possibility of error. If the computer is fast or the printer is slow (or both), it's possible for the computer to send the next character before the printer is able to signal that it's busy - something called *buffer overflow*. This can also happen if there is something wrong with the handshaking signals. When this happens, the printer fails to print one or more characters. Those characters have been sent by the computer, but cannot be received by the printer because there is no place to put them.

With a buffer, the printer sends a busy signal only when the buffer is full (or nearly so). That way, even if additional characters have already been sent, there will be room to store them before they are printed. Most of the time, the computer sends and the printer receives. As a result, far less signaling is necessary, and more actual data is transmitted. Therefore, a buffer makes communications between computers and printers more efficient. Since there is room to store characters transmitted, there is less chance that a character will be missed; so a buffer makes transmissions more error free, too.

In general, all communications are affected by buffering in the same way. For that reason, PowerBASIC allows you to set aside one communications buffer for received data and a separate buffer for transmitted data. In your programs, you have two responsibilities: to make sure that the buffer you use is large enough, and to empty the buffer as often as needed to prevent a buffer overflow.

How large a buffer will you need? It depends on the sort of program you are writing, and is often a matter of trial and error. At low baud rates (up to 300 baud), 256 bytes is probably adequate. Under some circumstances, 256 bytes may well be adequate at 1200 baud or higher; it all depends on how often your program checks the buffer and empties it. It's probably a good idea to use a buffer of 1024 bytes or more for 1200 baud, and it's not at all uncommon to use buffers of 4 Kilobytes or more. With the large amount of data memory available to your applications with PowerBASIC, you could specify a receive buffer of 1 MB (or even more) and have little impact on system memory.

See Also

[Serial Communications]

[Communications Basics]

[Parity and general error checking]

[Start and Stop bits]

[Opening a communications port]

[Reading and writing data]

[A simple communications program]

Parity and general error checking

Parity and general error checking

The ASCII character set contains 128 defined characters. It takes 7 bits to represent all 128 characters. Since there are 8 bits per byte, the eighth bit can be used to detect errors. One sort of checking adds up all the on (1) bits in each character transmitted. If the number of bits is even, the eighth bit is turned on when the character is transmitted; that forces the total number of on bits to be odd and is called odd parity. When the receiver gets the character, it performs the same procedure in reverse. If it gets the same answer as was encoded in the eighth bit, the character is accepted. If it does not, the character is in error. A related method (even parity), sums the bits and turns the parity bit on if the number of bits is odd, forcing the total number of on bits to be even.

Either method of checking the correctness of received characters is called a parity check. Unfortunately, the method can easily be thwarted if the errors are bad enough. If the transmission is relatively clean and there are few errors, a simple parity check of this sort can be reasonably effective. If any even number of data bits are reversed (on to off or vice versa), or if any odd number of bits are wrong and the parity bit is also incorrect, the parity check will fail to detect an error.

Most communications programs do not rely on parity checks, however. That is especially true if you must send a full 8 bits of data, as is the case when sending executable programs, spread sheets, some kinds of word processing files, and any kind of binary data. You should set parity to none or off whenever you need to send a full 8 bits of data.

See Also

[Serial Communications]

[Communications Basics]

[Communication Buffers]

[Start and Stop bits]

[Opening a communications port]

Reading and writing data

A simple communications program

Start and stop bits

Start and Stop bits

Stop bits are a way for a computer to "catch its breath" while sending or receiving data, while still letting the other end know that the connection is still there and is still valid; they're also used in error detection.

Stop bits are rather like parity bits. They are sent with the data, but they are not part of the data. Unlike parity bits, they are not turned on and off by the number of bits in the data; instead, they are always on. If one or more of the stop bits are missing, it constitutes a framing error.

Some computers also use start bits for a similar purpose; however, that is not as common a practice as it used to be.

The number of stop bits generally increases with higher baud rates. At 300 baud, usually 0 or 1 stop bits are used. At 1200 baud, 1 or 2 stop bits are most common.

If you connect with another computer and everything seems to be correct, but you cannot read the material you're receiving, one of three possible problems is likely. Either the baud rates are set wrong, the parity is wrong, or the number of stop (or start) bits is incorrect. If the baud rate is correct and the errors are framing errors, it is probably the number of stop bits.

See Also

Serial Communications

Communications Basics

Communication Buffers

Parity and general error checking

Opening a communications port

Reading and writing data

A simple communications program

Opening a communications port

Opening a communications port

Before we can actually open a communications port, we must first obtain a PowerBASIC *file number* so we may manage input and output to the communications port. The best method of obtaining a file number is to use the FREEFILE function:

```
DIM hComm AS LONG
hComm = FREEFILE
```

The general way of opening a communications port in a PowerBASIC program is with a COMM OPEN statement. The syntax is similar to a simple random-access file OPEN, where *n* is the communications port number

```
COMM OPEN "COMn" AS #hComm
```

Note the trailing colon typical in DOS communications is not permitted with COMM OPEN.

If you are familiar with serial communications with DOS compilers (where all of the communications parameters are configured within a single OPEN statement), you will realize that we must instead configure these parameters individually. For this purpose, PowerBASIC offers the COMM SET statement:

```
COMM SET #hComm, Comfunc = value
```

Although configuring a serial port for communications can mean using quite a few COMM SET statements, PowerBASIC offers a greater control of the serial port than was possible before, plus a completely new method of querying existing settings and status. Retrieving a setting is performed with the COMM function, which returns a Long-integer value:

```
x& = COMM(#hComm, Comfunc)
```

Comfunc **must** be one of the following keywords:

Comfunc	**Return values** (TRUE <> 0, FALSE = 0)
BAUD	Port Baud Rate (9600, 14400, 19200, etc). See notes below.
BREAK	TRUE/FALSE Break is asserted. Break is generally used to "get the attention" of the connected modem, terminal or system.
BYTE	Number of bits per byte (4, 5, 6, 7, or 8).
CD	TRUE/FALSE Carrier Detect state. Synonym for RLSD *(READ-ONLY)*. When CD is TRUE, the DCE (modem) has a suitable connection on the communications channel present. When CD is FALSE, there is no suitable connection.
CTS	TRUE/FALSE Clear-To-Send state is returned (READ-ONLY).
CTSFLOW	TRUE/FALSE Enable CTS output flow control (Input signal). When CTSFLOW is enabled, it causes the DTE (computer) to stop sending data whenever the CTS signal is set to logic low by the DCE (modem). Transmission continues when the DCE (modem) sets the CTS signal back to logic high. The CTS signal is usually used in response to an RTS signal.
DSR	TRUE/FALSE Data-Set-Ready state is returned (READ-ONLY).
DSRFLOW	TRUE/FALSE Enable DSR output flow control (Input signal). When DSRFLOW is enabled, it causes the DTE (computer) to stop sending data whenever the DSR signal is set to logic low by the DCE (modem). Transmission is enabled when the DSR signal returns to logic high. The DSR signal is often used in conjunction with CTS in response to a RTS signal.
DSRSENS	TRUE/FALSE Enable DSR sensitivity. When DSRSENS is enabled, data received by the DTE (computer) is placed into the receive buffer only if DSR is set to logic high. If DSR is set low, received data is discarded. Enabling DSRSENS allows DSR to enable or disable the DTE (the computer) to receive data from the DTE (the modem). DSRSENS is rarely used in practical communications situations.
DTRFLOW	TRUE/FALSE Enable DTR handshaking flow control (Output signal). When DTRFLOW is enabled, it signals that the DCE (modem) should prepare to connect to the communications channel. DTR is usually used for modem on-hook/off-hook control, but can also be used in conjunction with DSR for handshaking.
DTRLINE	TRUE/FALSE Enable DTR line. When enabled, DTRLINE leaves the DTR line active when the port is closed by the DTE (computer). This ensures that the DCE (modem) does not close the communications channel when the port is closed.
NULL	TRUE/FALSE Null ($NUL) bytes are discarded when read.
PARITY	TRUE/FALSE Enable parity checking. This mode must be enabled for the other Parity options to be selected.
PARITYCHAR	Character to use for parity error replacement. PARITY must be enabled.
PARITYREPL	TRUE/FALSE Enable character replacement on parity error. PARITY must be enabled.
PARITYTYPE	0 = None, 1 = Odd, 2 = Even, 3 = Mark, 4 = Space. PARITY must be enabled. Default = 0.
RING	TRUE/FALSE Ring indicator is on *(READ-ONLY)*. When RING returns TRUE, a ringing signal is being received on the communications channel (by the modem). RING approximates the state of the ringing signal; however, it may not report accurately in all Windows platforms.
RLSD	Receive-line-signal-detect *(READ-ONLY).* See CD/Carrier Detect above.
RTSFLOW	Ready To Send (Output signal). 0 = Disable, 1 = Enable, 2 = Handshake, 3 = Toggle. **Toggle** is used for half-duplex (2-wire) operations to "reverse" the line. While the DTE (computer) is busy sending data, it raises the RTS signal, and the DCE (modem) blocks its data receive channel. When RTS signal reverts to logic low, the DCE (modem) reverts to transmit mode and the DTE (computer) switches to receive mode.

	Handshake mode causes the DTE (computer) to check the receive buffer (RXQUE) after each character is placed into the buffer. When the buffer is 5/6th full, the RTS signal is dropped. When the receive buffer drops to below 1/6th full, RTS is raised again.
`RXBUFFER`	Size of the receive buffer in bytes.
`RXQUE`	Bytes currently in the receive buffer *(READ-ONLY)*.
`STOP`	0 = 1 stop bits, 1 = 1.5 stop bits, 2 = 2 stop bits.
`TXBUFFER`	Size of the transmit buffer in bytes. In some cases, Windows may not be able to report the transmit size.
`TXQUE`	Bytes currently in the transmit buffer *(READ-ONLY)*.
`XINPFLOW`	TRUE/FALSE Enable XON/XOFF input flow control. When the DTE (computer) receive buffer is full, an XOFF character is sent to the DCE (modem) to instruct it to halt transmission. When the DCE is ready to resume transmission, an XON character is sent to the DCE. Typically, XOFF is sent when the receive buffer has less than 1/16th remaining, and XON is sent when the receive buffer drops to less than 1/16th of its maximum size. Default = FALSE.
`XOUTFLOW`	TRUE/FALSE Enable XON/XOFF out flow control. When enabled, the DCE (modem) sends an XOFF to the DTE (computer) to halt data transmission to the DCE. When the DCE is ready to receive more data, an XON character is sent. XOUTFLOW typically uses the same 1/16th rules as XINPFLOW. Default = FALSE.

Common baud rates range from 110 to 256000. There are equates defined in the WIN32API.INC file, prefixed with %CBR_ to assist you with specifying a common baud rate, but you are not restricted to a limited set of rates.

To open a communication port and initialize it for use, you will need to set the following parameters. The values are for demonstration purposes, you may choose your own settings as necessary.

```
' Minimum recommended settings
COMM SET #hComm, BAUD     = 9600   ' 9600 baud
COMM SET #hComm, BYTE     = 8      ' 8 bits
COMM SET #hComm, PARITY   = %FALSE ' No parity
COMM SET #hComm, STOP     = 0      ' 1 stop bit
COMM SET #hComm, TXBUFFER = 2048   ' 2 Kb transmit buffer
COMM SET #hComm, RXBUFFER = 4096   ' 4 Kb receive buffer

' Optional settings for flow control
COMM SET #hComm, CTSFLOW  = 1      ' Enable CTS flow control
COMM SET #hComm, RTSFLOW  = 1      ' Enable RTS flow control
COMM SET #hComm, XINPFLOW = 0      ' Disable XON/OFF Input
                                   ' flow control
COMM SET #hComm, XOUTFLOW = 0      ' Disable XON/XOFF output
                                   ' flow
```

When we have finished using our communication channel, we can terminate it using the COMM CLOSE function:

```
COMM CLOSE #hComm
```

If any errors occur when attempting to open the communications port, or as a result of an invalid *Comfunc* value, PowerBASIC will set the ERR system variable.

See Also

- Serial Communications
- Communications Basics
- Communication Buffers
- Parity and general error checking
- Start and Stop bits

Reading and writing data

Reading and writing data

To complement the new COMM OPEN statement, PowerBASIC introduces four new statements to help you write serial communications programs:

```
COMM PRINT #hComm, expr [;]
COMM SEND #hComm, expr
COMM RECV #hComm, count, expr
COMM LINE [INPUT] #hComm, expr
```

COMM PRINT and COMM SEND are used to send data out of the communications port (via the transmit buffer). COMM PRINT sends the data specified by *expr* followed by a CR/LF byte pair {$CRLF or CHR$(13,10)}. By adding a trailing semicolon to the COMM PRINT statement, PowerBASIC suppresses these CR/LF bytes. COMM SEND is identical to COMM PRINT with a trailing semicolon.

COMM RECV and COMM LINE [INPUT] are used to receive data from a communications port (via the receive buffer). The COMM(#hComm, RXQUE) function can be used to identify the number of bytes that can be retrieved with COMM RECV. COMM LINE is used to return a CR/LF delimited "line" of data from the receive buffer.

If your communications application is primarily dealing with binary data transmission and reception, COMM SEND and COMM RECV will suit this purpose exactly. COMM PRINT and COMM INPUT are very useful for sending "AT" commands to a modem and receiving the modem response. For example:

```
COMM PRINT #hComm, "AT"
SLEEP 1000 ' Give modem time to respond
WHILE COMM(#hComm, RXQUE)
  COMM LINE #hComm, a$
  ' Display "AT" (the modem echo),
  ' followed by "OK" (the modem response)
  #IF %DEF(%PB_CC32)
    PRINT a$
  #ELSE
    MSGBOX a$
  #ENDIF
WEND
```

The COMM RESET statement allows you to switch off all flow control during a serial communications session.

```
COMM RESET #hComm, FLOW
```

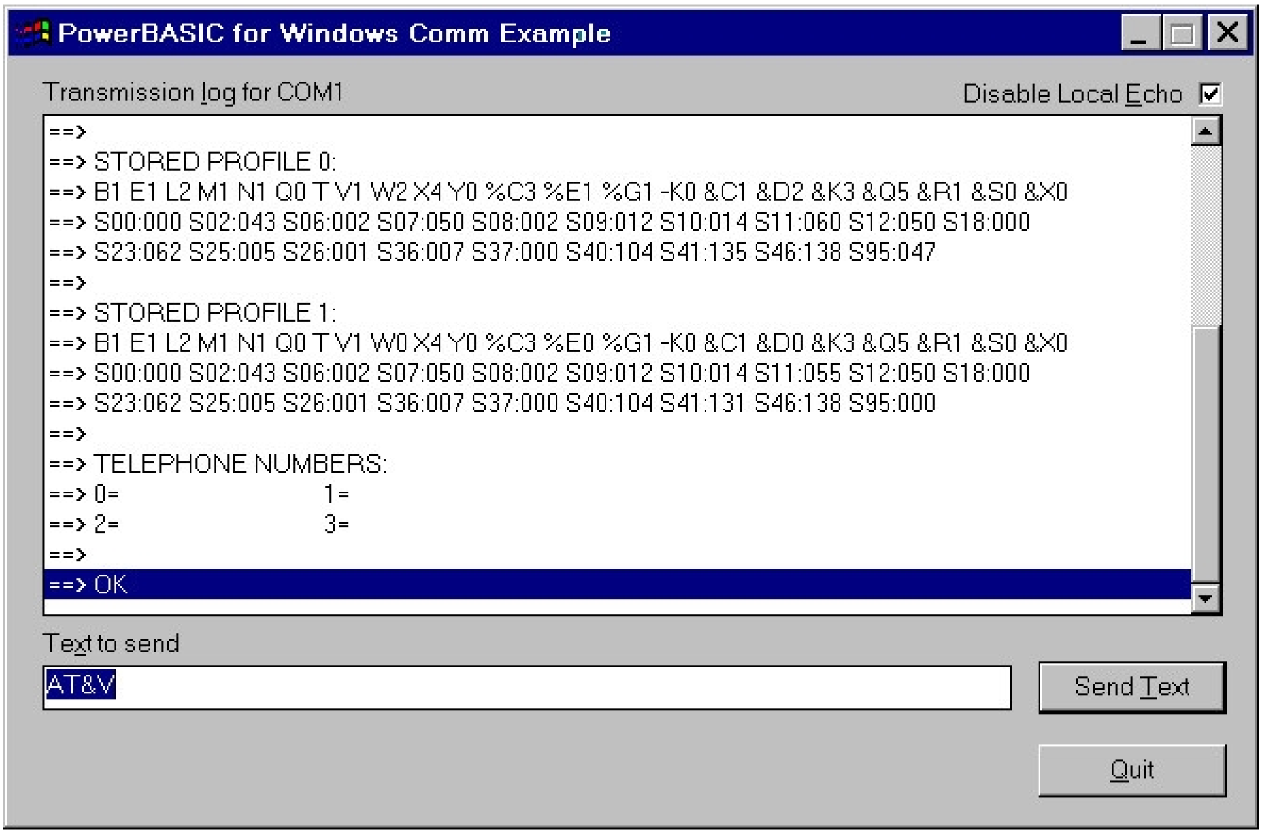
See Also

A simple communications program

A simple communications program

Let's assume you want a simple communications program to use for accessing a local computer bulletin board. You know the parameters for the board: it is 14400 baud, 8 data bits, one stop bit, and no parity.

You want to display data on your screen, be able to type data, and have it sent to the bulletin board. You intend to use a modem connected to COM1. The following short program serves as a starting point, and uses PowerBASIC's new DDT features to create the user interface:




```
'-----------------------------------------------------------
'
'  Serial Communications Example for PowerBASIC for Windows
'           Copyright (C) 2004-2009 PowerBASIC, Inc.
'
'  Be sure to set the $ComPort constant to the appropriate
'  COM port before compiling this example!
'
'-----------------------------------------------------------
#COMPILE EXE
#DIM ALL
#INCLUDE "WIN32API.INC"

$ComPort             = "COM1"
$AppTitle            = "PowerBASIC for Windows Comm Example"
%IDD_MAIN            = 100
%IDC_LISTBOX1        = 101
%IDC_EDIT1           = 102
%IDC_SEND            = 103
%IDC_QUIT            = 106
```

```
%IDC_ECHO           = 107

GLOBAL hComm        AS LONG
GLOBAL Updating     AS LONG
GLOBAL hThread      AS DWORD
GLOBAL ThreadClose  AS LONG

DECLARE FUNCTION StartComms              AS LONG
DECLARE FUNCTION SendLine(ASCIIZ)        AS LONG
DECLARE FUNCTION ReceiveData(BYVAL LONG) AS LONG
DECLARE FUNCTION EndComms                AS LONG
DECLARE FUNCTION AddLine(BYVAL LONG, BYVAL LONG, ASCIIZ) AS LONG

CALLBACK FUNCTION Dialog_Callback() AS LONG
  SELECT CASE CB.MSG
    CASE %WM_INITDIALOG
      ' Set focus to the edit control
      CONTROL SET FOCUS CB.HNDL, %IDC_EDIT1

      ' Set SELECTION range to highlight the initial entry
      CONTROL SEND CB.HNDL, %IDC_EDIT1, %EM_SETSEL, 0, -1

      ' Return 0 to stop dialog box engine setting focus
      FUNCTION = %FALSE
  END SELECT
END FUNCTION

CALLBACK FUNCTION Send_Callback() AS LONG
  DIM SendText AS ASCIIZ * 1024, ListCount AS LONG
  DIM lResult AS LONG, hListBox AS DWORD

  ' Obtain the text to send from the edit control
  CONTROL GET TEXT CB.HNDL, %IDC_EDIT1 TO SendText

  ' Set the update flag
  Updating = %TRUE

  ' Send the line to the comm port
  IF SendLine(SendText) THEN
    SendText = "Transmission Error!"
  ELSE
    ' Check the Echo mode state
    CONTROL GET CHECK CB.HNDL, %IDC_ECHO TO lResult
    IF ISTRUE lResult THEN SkipEcho
  END IF

  ' Add the echo to the listbox
  CALL AddLine(CB.HNDL, %IDC_LISTBOX1, "<== " + SendText)

SkipEcho:
  ' Set the SELECTION range for the edit control so the
  ' next keypress "clears" the existing text
  CONTROL SEND CB.HNDL, %IDC_EDIT1, %EM_SETSEL, 0, -1

  ' restore the keyboard focus to the edit control
  CONTROL SET FOCUS CB.HNDL, %IDC_EDIT1

  ' Release the update flag
  Updating = %FALSE
  FUNCTION = %TRUE
```

```
END FUNCTION

CALLBACK FUNCTION Quit_Callback() AS LONG
  ' Kill the dialog and let PBMAIN() continue
  DIALOG END CB.HNDL, 0

  FUNCTION = 1
END FUNCTION

FUNCTION AddLine(BYVAL hWnd AS DWORD, BYVAL nID AS LONG, SendText AS ASCIIZ) AS LONG
  DIM ListCount AS LONG

  ' Find the current listbox count
  LISTBOX GET COUNT hWnd, nID TO ListCount

  ' Update the listbox
  LISTBOX ADD hWnd, nID, SendText

  ' Scroll the new item into view
  LISTBOX SELECT hWnd, nID, ListCount + 1
END FUNCTION

FUNCTION PBMAIN
  ' Build our GUI interface.
  DIM hDlg AS DWORD, Txt(1 TO 1) AS STRING, lResult AS LONG

  ' Initialize the port ready for the session
  IF ISFALSE StartComms THEN
      MSGBOX "Failure to start communications!",, $AppTitle
      EXIT FUNCTION
  END IF

  Txt(1) = "Listbox holds the transmission I/O stream..."

  ' Create a modal dialog box
  DIALOG NEW 0, $AppTitle,,, 330, 203, %WS_POPUP OR %WS_VISIBLE OR %WS_CLIPCHILDREN OR
_
      %WS_CAPTION OR %WS_SYSMENU OR %WS_MINIMIZEBOX, 0 TO hDlg

  ' Add our application controls
  CONTROL ADD LABEL, hDlg, -1, "Transmission &log for " & $ComPort, 9, 5, 100, 10, 0

  CONTROL ADD LISTBOX, hDlg, %IDC_LISTBOX1, Txt(), 9, 15, 313, 133, %WS_BORDER OR _
      %LBS_WANTKEYBOARDINPUT OR %LBS_DISABLENOSCROLL OR %WS_VSCROLL OR %WS_GROUP OR _
    %WS_TABSTOP OR %LBS_NOINTEGRALHEIGHT
  CONTROL ADD LABEL, hDlg, -1, "Te&xt to send", 9, 151, 100, 10, 0
  CONTROL ADD TEXTBOX, hDlg, %IDC_EDIT1, "ATZ", 9, 161, 257, 12, %ES_AUTOHSCROLL OR _
      %ES_NOHIDESEL OR %WS_BORDER OR %WS_GROUP OR %WS_TABSTOP
  CONTROL ADD BUTTON, hDlg, %IDC_SEND, "Send &Text", 273, 160, 50, 14, %WS_GROUP OR _
      %WS_TABSTOP OR %BS_DEFPUSHBUTTON CALL Send_Callback
  CONTROL ADD BUTTON, hDlg, %IDC_QUIT, "&Quit", 273, 182, 50, 14, %WS_GROUP OR %
WS_TABSTOP _
      CALL Quit_Callback
  CONTROL ADD CHECKBOX, hDlg, %IDC_ECHO, "Disable Local "+ "&Echo", 252, 5, 70, 10, _
      %WS_GROUP OR %WS_TABSTOP OR %BS_AUTOCHECKBOX OR %BS_LEFTTEXT

  ' Erase our array to free memory no longer required
  REDIM Txt()

  ' Create a "listen" Thread to monitor input from the modem
```

```
  THREAD CREATE ReceiveData(hDlg) TO hThread

  ' Start the dialog box & run until DIALOG END executed.
  DIALOG SHOW MODAL hDlg, CALL Dialog_Callback TO lResult

  ' Close down our "listen" Thread
  ThreadClose = %TRUE

  DO
    THREAD CLOSE hThread TO lResult

    ' Release time-slice for improved multitasking
    SLEEP 0
  LOOP UNTIL ISTRUE lResult

  ' Flush & close the comm port
  CALL EndComms

  FUNCTION = %TRUE
END FUNCTION

FUNCTION StartComms AS LONG
  hComm = FREEFILE
  COMM OPEN $COMPORT AS #hComm
  IF ERRCLEAR THEN EXIT FUNCTION     ' Port problem?

  COMM SET #hComm, BAUD     = 14400  ' 14400 baud
  COMM SET #hComm, BYTE     = 8      ' 8 bits
  COMM SET #hComm, PARITY   = %FALSE ' No parity
  COMM SET #hComm, STOP     = 0      ' 1 stop bit
  COMM SET #hComm, TXBUFFER = 4096   ' 4 Kb transmit buffer
  COMM SET #hComm, RXBUFFER = 4096   ' 4 Kb receive buffer

  FUNCTION = %TRUE
END FUNCTION

FUNCTION SendLine(SendText AS ASCIIZ) AS LONG
  COMM PRINT #hComm, SendText
END FUNCTION

FUNCTION ReceiveData(BYVAL hWnd AS DWORD) AS LONG
  DIM InboundData AS STRING
  DIM Stuf AS STRING, ListCount AS LONG
  DIM Qty AS LONG, x AS LONG, a AS STRING

  WHILE ISFALSE ThreadClose
    ' Test the RX buffer
    Qty = COMM(#hComm, RXQUE)

    ' Abort this iteration if sending
    IF ISFALSE Qty OR Updating THEN
      SLEEP 100
      ITERATE LOOP
    END IF

    ' Read incoming characters
    COMM RECV #hComm, Qty, Stuf

    InBoundData = InBoundData & Stuf
```

```
      ' strip out LF characters
      REPLACE CHR$(10) WITH "" IN InBoundData

      ' process only complete lines of data terminated by CR
      WHILE INSTR(InboundData, CHR$(13))
        ' Display the data
        CALL AddLine(hWnd, %IDC_LISTBOX1, "==> " + EXTRACT$(InBoundData, CHR$(13)))

        ' reduce the buffer to remove the "displayed" line
        InBoundData = STRDELETE$(InBoundData, 1, LEN(EXTRACT$(InBoundData, CHR$(13))) +
1)
      WEND
    WEND

    FUNCTION = %TRUE
  END FUNCTION

  FUNCTION EndComms() AS LONG
    DIM dummy AS STRING

    ' Flush the RX buffer & close the port
    SLEEP 1000

    IF COMM(#hComm, RXQUE) THEN
      COMM RECV #hComm, COMM(#hComm, RXQUE), dummy
    END IF

    COMM CLOSE #hComm
  END FUNCTION
```

This short program allows you to connect with the bulletin board, but it will not dial the number of the bulletin board through the program itself. You can do that easily though, in one of two ways:

You can dial the bulletin board manually. When you're done dialing, connect the telephone line to the modem (or press a button on your modem, switching the line from the telephone back to the modem). The program should now be ready to receive whatever the bulletin board sends.

You can send the appropriate signals directly to the modem itself. Most modems recognize a common command set originated by the Hayes Company. To initialize the modem and dial, you would enter the following commands:

```
ATZ
ATDT18005551212
```

Note: some modems require capital letters for AT commands. Lowercase letters will not work.

After you have entered the ATZ command, the modem responds. You will see the message "OK" on your screen. After you have entered ATDT and the telephone number, the modem's lights flicker for a moment. If your modem is capable of making a sound, you should hear the sounds of the number being dialed, and the telephone ringing at the other end.

If the number is busy, you may hear a busy signal through your modem speaker, or you may not hear anything more. If the connection is made, you may see some garbage characters on your screen.

At this point, many users become concerned and think that something must be wrong. Why are there illegible characters on screen? Relax: this happens often. The computer you called does not yet know what baud rate and communications parameters you are using. In most cases, you should press ENTER a few times; the computer at the other end will use that character to determine what your parameters are and will adjust itself accordingly. Soon afterward, you should see a welcoming message. You may now type whatever you like.

If you see double lines of characters, click on the Disable Local Echo button. This simply prevents the code from adding your characters to the transmission log window.

If you wish to send a stream of AT commands to a modem in quick succession, you may be required to add a small delay between each AT command, in order to give the modem time to decode each command and respond appropriately. A delay of 100 to 200 milliseconds (mSec) is usually sufficient.

Using disk files

The sample program does not let you save material to a disk file, or send data from a disk file to the bulletin board. Nevertheless, those two options are very useful. How do you do it?

Let us suppose you wanted to send a disk file to the bulletin board. To do that, the routine that sends your keystrokes to the bulletin board must be altered. The usual way to do this is to assign a special keystroke a different meaning: instead of being sent, it is interpreted as a command to get the name of a disk file, read that disk file, and send it to the bulletin board.

Let's add a new button to our dialog window to provide access to this feature - we will label this button Send File. In addition, we must also add a Callback Function to handle the event from this button. Lets start by adding the following equate definition to the block near the beginning of the file:

```
%IDC_SENDFILE = 104
```

Now we will insert the new Callback Function to the code. We'll add this immediately after the Send Callback() function ends:

```
CALLBACK FUNCTION SendFile_Callback() AS LONG
  STATIC SendFileName AS STRING
  LOCAL hReadFile AS LONG, FileLen AS LONG, Chunk AS LONG
  LOCAL i AS LONG, Buff1 AS STRING

  Buff1 = INPUTBOX$("Name of disk file to transmit?",  $AppTitle, SendFileName)
  IF ISFALSE LEN(Buff1) OR ISFALSE LEN(DIR$(Buff1)) THEN EXIT FUNCTION

  SendFileName = Buff1
  CALL AddLine(CB.HNDL, %IDC_LISTBOX1, "Wait... Sending " & SendFileName)
  DIALOG DOEVENTS

  ' send the file
  hReadFile = FREEFILE
  OPEN SendFileName FOR BINARY AS #hReadFile ' Binary mode
  FileLen = LOF(hReadFile)                   ' File length
  Chunk   = MAX&(32, COMM(#hComm, TXBUFFER) \ 2) ' 1/2*Buf

  FOR ix = 1 TO FileLen \ Chunk
    GET$ #hReadFile, Chunk, Buff1            ' Read a chunk
    COMM SEND #hComm, Buff1                  ' and send it
    SLEEP 0
  NEXT i

  IF FileLen MOD Chunk <> 0 THEN             ' More to send?
    GET$ #hReadFile, FileLen MOD Chunk, Buff1
    COMM SEND #hComm, Buff1
  END IF

  CLOSE #hReadFile
  CALL AddLine(CB.HNDL, %IDC_LISTBOX1, "Transmission complete!")
END FUNCTION
```

Finally, we insert the code that adds a new control button on the dialog box. Add the following line to the group of

statements in the PBMAIN function.

```
CONTROL ADD BUTTON, hDlg, %IDC_SENDFILE, "&Send File", 9, 182, 50, 14, %WS_GROUP OR _
    %WS_TABSTOP CALL SendFile_Callback
```

The routine works, but there's no error checking in it. If the disk file does not exist, nothing is sent, but a zero-length file is created. If you enter an illegal file name, the program will set the ERR system variable to indicate that [a potentially fatal] error has occurred. You'll probably want to add some kind of error checking to the program for those reasons.

To receive a disk file, we will add yet another button to the dialog window titled Receive File. However, things are not quite as simple as the code we added to send a file: you must be able to use the program at the same time as the data is stored, as it comes in from the serial port. We also need a way to stop receiving a disk file.

First, we will add another equate to the beginning of the file, exactly as before:

```
%IDC_RECEIVEFILE = 105
```

Add the following line at the end of the GLOBAL variable declarations, just below the equates:

```
GLOBAL hWriteFile AS LONG
```

Next, add the Callback Function code, immediately after the SendFile_Callback() function that we just added.

```
CALLBACK FUNCTION ReceiveFile_Callback() AS LONG
  STATIC ReceiveFileName AS STRING
  LOCAL Buff2 AS STRING

  ' First check if file is already open
  IF hWriteFile THEN
    ' Close the file
    CLOSE #hWriteFile

    CALL AddLine(CB.HNDL, %IDC_LISTBOX1, "Finished writing file!")

    ' Update the button label
    CONTROL SET TEXT CB.HNDL, %IDC_RECEIVEFILE, "&Receive File"

    RESET hWriteFile

    EXIT FUNCTION
  END IF

  ' Create a new file
  Buff2 = INPUTBOX$("Output file name?", $AppTitle, ReceiveFileName)
  IF ISFALSE LEN(Buff2) THEN EXIT FUNCTION

  ReceiveFileName = Buff2
  hWriteFile = FREEFILE

  OPEN ReceiveFileName FOR APPEND AS #hWriteFile
  IF ERRCLEAR THEN
    ' Error opening the file
    RESET hWriteFile
  ELSE
    ' Update the dialog
    CALL AddLine(CB.HNDL, %IDC_LISTBOX1, "Receiving data stream to " &
ReceiveFileName)
    CONTROL SET TEXT CB.HNDL, %IDC_RECEIVEFILE, "Stop &Receive"
  END IF
END FUNCTION
```

Now add the CONTROL ADD statement into PBMAIN in the same manner as before.

```
  CONTROL ADD BUTTON, hDlg, %IDC_RECEIVEFILE, "&Receive File", 62, 182, 50, 14, %
WS_GROUP OR _
      %WS_TABSTOP CALL ReceiveFile_Callback
```

Finally, to ensure that the disk file is closed correctly, if the program is closed before the file is closed, insert the following lines just before the END FUNCTION within PBMAIN.

```
IF hWriteFile THEN CLOSE #hWriteFile
```

When we click on the new Receive File button, we enter the file name that will be used to save the data. At this point, the output file is opened. The received data will be appended to the end of any existing file of that name. However, we have not provided any way to actually save any of that information. To do that, add one more small line of code to the ReceiveData() function, immediately after the line:

```
InBoundData = InBoundData & Stuf
```

The added line reads:

```
' If Receive mode is on, write raw data to the file
IF hWriteFile THEN PRINT #hWriteFile, Stuf;
```

Finishing touches

If we examine this example file, we find that we have overlooked one problem: if the program is terminated while the output file is in use, the file is not closed.

While this is not a fatal condition, it is a poor approach to program design: we should always close the files we have opened. Remembering to perform this chore will stand you in good steed when it comes to using the Windows API functions. In many cases, failing to close a registry key or delete a GDI object can cause both deceptive and difficult bugs to locate; or memory leaks that reduce system memory even after your program has ended. The golden rule should always be before you leave, clean up after yourself.

So, faced with this problem, how do we know if the output file is open before we end the program? Simple... we set the global variable that holds the file number when the file was open. If this number is non-zero (logical TRUE), we can simply assume we need to close the file before finally exiting the program.

After the line that reads:

```
CALL EndComms
```

We add the following line to the file:

```
IF hWriteFile THEN CLOSE #hWriteFile
```

In this instance, we control three possible scenarios with only one line of code:

1. the output file feature was not used (hFile2 = 0)
2. the output file remained open when the program was about to end (hFile2 <> 0)
3. the output file had been used, but had been closed before program termination (hFile2 <> 0)

It is true that we could have just closed the file associated with hWriteFile regardless of the state of the file or the value of the file number. However, in most programming circles, that is considered to be a poor approach. It is always better to write code that is fail-safe in as many conditions as possible.

The final program can be found in the PB\SAMPLES\COMM folder of your PowerBASIC installation. It is not very large, but it handles a surprising number of ordinary communications tasks. It lacks some error checking, as has been noted. If you choose to modify this program, you might want to put some error checking in. You might also want to test for such problems as the List box control filling up to the limits of the operating system (i.e., 32767 entries in Windows 95/98/ME), and even add a few more buttons to send certain preformatted strings to modem, for example "ATZ" or "ATDT555-1234".

Compared to DOS applications, this communications application may seem overly complex. This is because we simply cannot afford to use 100% of the CPU just to monitor a serial port. If we did, your multitasking operating system would suddenly take a huge drop in performance. If you examine the code a little more deeply, you will see it takes advantage of a very handy feature of 32-bit Windows: multi-threading.

This communications program consists of two threads in total: (1) the main thread handles the user commands and sending data to the modem; (2) the second thread simply monitors the serial port for receive data. If we used only one single thread in this application, the code would need to share its time between both data reception and transmission, but by using two, we ensure that the CPU is not heavily loaded unnecessarily.

Using a second thread in this way effectively splits the application into two (almost) independent sections.

The only time these threads need to be aware of each other is when one is writing to the list box control. To handle this, we used a GLOBAL variable to signal when data was being displayed; temporarily "locking" the other thread until the task was complete.

For further experimentation, you could split the main thread down even further and create a separate thread just for writing data to the serial port. You could even try replacing the TEXTBOX control with a COMBOBOX so users can scroll back through the most recent "send" strings, providing a simple "history" feature.

See Also

- Communications Basics
- Communication Buffers
- Parity and general error checking
- Start and Stop bits
- Opening a communications port
- Reading and writing data

TCP and UDP Communications

TCP and UDP Communications

TCP and UDP Communications

Network Communications is one of the hottest programming topics today. Whether you need to send an email message to an SMTP server on your Intranet, or transfer a file from a remote Internet server halfway around the world, PowerBASIC can handle your network communications requirements.

Networks typically consist of many computers, all with a number of different hardware architectures and operating systems. Your local area network might have machines running Windows, Linux, DOS, OS/2, or Mac OS. Your network may use IPX, ATM, or some other transmission protocol for sending data packets from one computer to the next. The architects of the Internet needed a transmission protocol that could be used on any platform.

See Also

- The Internet Protocol (IP)
- User Datagram Protocol (UDP)
- Transmission Control Protocol (TCP)
- Winsock
- Request for Comments (RFC)
- TCP clients and servers
- Simple Mail Transfer Protocol (SMTP)
- An ECHO client and server using TCP

The Internet Protocol (IP)

The Internet Protocol (IP)

The Internet Protocol was designed for transmitting blocks of data called datagrams from a source location, to one or more destinations. It is specifically limited to provide the functions necessary to deliver a datagram from a source to a destination over an interconnected system of networks. There is no functionality for data reliability, flow-control, or sequencing. It works by using one local network to connect with another local network, until the datagram is delivered to its destination - although, a datagram does not have to leave the local network at all if the destination does not reside outside of the network.

The source and the destination are specified as numeric addresses, also known as IP addresses. An IP address consists of four bytes. The combined sequence of the four bytes is unique for each connection to the network (a single computer can have more than one connection to the network, and therefore can have more than one IP address).

Let's say that you want to send the message "Hello" from your computer to another computer on the network. Your computer cannot simply transmit the 5 bytes of your message over the network cable. It first has to create a datagram. In simple terms, the datagram would include the identity of your computer (the sender), the identity of the computer you are sending the message to, and some kind of checksum that allowed the receiving computer to verify that the datagram arrived intact. Your computer would deliver that datagram to a host or gateway on your network.

The gateway will then determine where the datagram needs to go next. If the destination computer is on the same local network, it may simply deliver it to the destination. If the destination is outside of the local network, the datagram is delivered to another host or gateway "downstream" from your network. After that, either that host or gateway would then send the datagram even further downstream toward the destination; or if the destination resides on the local network of the current host or gateway, it will deliver the datagram to the final destination itself.

During this journey, it is possible for the datagram to become corrupted, be misrouted (and lost), or simply expire because the journey was too long. The Internet Protocol does not provide any notification capabilities to inform the sender of a delivery problem. It is also possible for large datagrams to be chopped into multiple smaller datagrams if any host or gateway along the path cannot handle the size of the datagram. Each datagram is then broken into as many smaller datagrams as it needs to hold all of the data. Those datagrams then have to be reassembled at the destination.

See Also

User Datagram Protocol (UDP)

Transmission Control Protocol (TCP)

Winsock

Request for Comments (RFC)

TCP clients and servers

Simple Mail Transfer Protocol (SMTP)

An ECHO client and server using TCP

User Datagram Protocol (UDP)

User Datagram Protocol (UDP)

Obviously, writing code to deal with reassembling fragmented datagrams would make you think twice about how badly your application needs to communicate over a network. Fortunately, the Internet architects provided a protocol layer that sits on top of the Internet Protocol.

UDP uses the Internet Protocol to send datagrams from a source to a destination. When the datagram arrives at the destination, it hands the complete datagram packet to the client. If the datagram was fragmented along the way, it reassembles the fragments into a complete datagram beforehand.

Like the Internet Protocol it uses, UDP does not guarantee delivery of a datagram. Its purpose is simply to format a datagram with your data, send it via the Internet Protocol to a destination, and at the destination, deliver the complete datagram to a client.

One interesting aspect of the Internet Protocol is that datagrams can be delivered to a destination in a different sequence than the one in which they were sent. For example: your application sends two datagrams to another computer. The first datagram is routed along a longer path than the second datagram, and therefore arrives at the destination after the second datagram has arrived.

See Also

The Internet Protocol (IP)

Transmission Control Protocol (TCP)

Winsock

Request for Comments (RFC)

TCP clients and servers

Simple Mail Transfer Protocol (SMTP)

An ECHO client and server using TCP

Transmission Control Protocol (TCP)

Transmission Control Protocol (TCP)

TCP is a connection-based protocol layer that guarantees delivery of data to the destination. The reliability and flow control of TCP requires that status information be sent with each datagram indicating sequence numbers and checksums. So that TCP transmissions can recover from data that is damaged, lost, duplicated, or delivered out of order, each datagram is checked for its sequence number, and the data is verified against the checksum. An acknowledgment (ACK) is then required from the recipient for each successful datagram received. If an ACK is not received within a timeout period, the datagram is resent.

Unlike UDP, TCP does not reassemble fragmented datagrams into the original data packet. It simply extracts the data portion of the datagram and adds it to the incoming data stream. This can be problematic if a source has sent 20 bytes of data that is fragmented into two datagrams with 10 bytes each. TCP will give the first 10 bytes to the client without waiting for the next 10 bytes to arrive. UDP will give all 20 bytes of the data, or nothing.

See Also

The Internet Protocol (IP)

User Datagram Protocol (UDP)

Winsock

Request for Comments (RFC)

TCP clients and servers

Simple Mail Transfer Protocol (SMTP)

An ECHO client and server using TCP

Winsock

Winsock

In Windows, Microsoft has encapsulated the Internet Protocol **and** the TCP and UDP protocol layers into the Windows Sockets Layer, or "Winsock". Winsock allows an application to send datagrams using either TCP or UDP without having to do low-level programming to create IP datagram packets, deal with receipts and acknowledgments, or reassemble fragmented datagrams.

PowerBASIC further encapsulates the process by handling DNS resolution of IP addresses, and presents statements familiar to the programming model used by BASIC programmers. You are free to concentrate on the data being sent and ignore the details of sending it.

PowerBASIC requires version 2.0 or later of Winsock.

See Also

- The Internet Protocol (IP)
- User Datagram Protocol (UDP)
- Transmission Control Protocol (TCP)
- Request for Comments (RFC)
- TCP clients and servers
- Simple Mail Transfer Protocol (SMTP)
- An ECHO client and server using TCP

Request for Comments (RFC)

Request for Comments (RFC)

All of the technical specifications for the Internet are contained in white papers called "Request for Comments". For example, the RFC document describing the UDP protocol is RFC768.TXT and can be downloaded from http://www.rfc-editor.org.

See Also

- The Internet Protocol (IP)
- User Datagram Protocol (UDP)
- Transmission Control Protocol (TCP)
- Winsock
- TCP clients and servers
- Simple Mail Transfer Protocol (SMTP)
- An ECHO client and server using TCP

TCP clients and servers

TCP clients and servers

The Internet Protocol driver in Winsock actually sends and receives the datagrams itself, and the UDP and TCP layers take care of data integrity. However, to actually communicate with another computer over the Internet your code will have to handle the data itself. That is typically done using a high-level protocol such as SMTP, POP3, FTP, and others.

Think of IP as the telephone wire that carries a voice from a transmitter of one telephone to a receiver of another telephone. UDP and TCP are simply different types of telephones that make sure each sound is received exactly as it was sent. Therefore, SMTP, POP3, FTP, etc, should be considered the language that you use to speak. Both the caller and the person being called need to speak the same language if they wish to understand the conversation. Obviously, you cannot speak Latin to a person who only understands English or French.

See Also

- The Internet Protocol (IP)
- User Datagram Protocol (UDP)
- Transmission Control Protocol (TCP)
- Winsock
- Request for Comments (RFC)
- Simple Mail Transfer Protocol (SMTP)
- An ECHO client and server using TCP

Simple Mail Transfer Protocol (SMTP)

Simple Mail Transfer Protocol (SMTP)

One of the easiest high-level TCP protocols to use is SMTP for sending an email message. This application simply connects to an SMTP server via TCP, identifies itself, and identifies who the message is for, sends the text of the message, and finally says goodbye. As each line of text is sent to the server, it returns a status code and message to indicate progress. The following code demonstrates this:

```
' Be sure to change the following two string equates
' to the name of your SMTP mail server and your email
' address.
#COMPILE EXE

$mailhost = "mailserver.mydomain.com"
$mailfrom = "email@address.com"

FUNCTION PBMAIN() AS LONG
  ' Get the local computer's IP address and name
  HOST ADDR TO ip&
  HOST NAME ip& TO hostname$

  ' ** Connect to the mailhost
  hTCP& = FREEFILE
  TCP OPEN "smtp" AT $mailhost AS hTCP&
  IF ERR THEN
    MSGBOX "Error connecting to mailhost"
    EXIT FUNCTION
  ELSE
    TCP LINE hTCP&, buffer$
    IF LEFT$(buffer$, 3) <> "220" THEN
      MSGBOX "Mailhost Error: " & buffer$
      EXIT FUNCTION
    END IF
  END IF

  ' Get the local computer's IP address and name
  HOST NAME TO hostname$
```

```
' ** Greet the mailhost
TCP PRINT hTCP&, "HELO " + hostname$
TCP LINE hTCP&, buffer$
IF LEFT$(buffer$, 3) <> "250" THEN
  MSGBOX "HELO Error: " & buffer$
  TCP CLOSE hTCP&
  EXIT FUNCTION
END IF

' ** Tell the mailhost who we are
TCP PRINT hTCP&, "MAIL FROM:<" & $mailfrom & ">"
TCP LINE hTCP&, buffer$
IF LEFT$(buffer$, 3) <> "250" THEN
  MSGBOX "MAIL FROM Error: " & buffer$
  TCP CLOSE hTCP&
  EXIT FUNCTION
END IF

' ** Tell the mailhost who we want to send the message to
TCP PRINT hTCP&, "RCPT TO:<info@powerbasic.com>"
TCP LINE hTCP&, buffer$
IF LEFT$(buffer$, 3) <> "250" THEN
  MSGBOX "RCPT TO Error: " & buffer$
  TCP CLOSE hTCP&
  EXIT FUNCTION
END IF

' ** Now we can send the message
TCP PRINT hTCP&, "DATA"
TCP LINE hTCP&, buffer$
IF LEFT$(buffer$, 3) <> "354" THEN
  MSGBOX "DATA Error: " & buffer$
  TCP CLOSE hTCP&
  EXIT FUNCTION
END IF

TCP PRINT hTCP&, "From: " & $mailfrom
TCP PRINT hTCP&, "To: info@powerbasic.com"
TCP PRINT hTCP&, "Subject: Greetings!"
TCP PRINT hTCP&, ""
TCP PRINT hTCP&, "Just wanted to say hello."
TCP PRINT hTCP&, "This TCP stuff is great!

' ** End of the message
TCP PRINT hTCP&, "."
TCP LINE hTCP&, buffer$
IF LEFT$(buffer$, 3) <> "250" THEN
  MSGBOX "DATA Error: " & buffer$
  TCP CLOSE hTCP&
  EXIT FUNCTION
END IF

' ** Say goodbye
TCP PRINT hTCP&, "QUIT"
TCP LINE hTCP&, buffer$
IF LEFT$(buffer$, 3) <> "221" THEN
  MSGBOX "QUIT Error: " & buffer$
  TCP CLOSE hTCP&
  EXIT FUNCTION
END IF
```

```
  TCP CLOSE hTCP&
END FUNCTION
```

The SMTP protocol is fully described in RFC 821 http://www.rfc-editor.org

See Also

TCP and UDP Communications

TCP clients and servers

An ECHO client and server using TCP

An ECHO client and server using TCP

An ECHO client and server using TCP

The simplest TCP server application is an Echo Server (RFC 862). It simply listens to port 7, and when it receives a data packet, it returns the data packet back to the client.

Writing a TCP server in PowerBASIC is quite straightforward, but your application must contain a (GUI) window or dialog to receive notification requests from Winsock. It is therefore necessary to either: (1) create a dialog with DDT, or (2) use the Windows API to create a GUI window for the application to receive these notifications. The following function will register a window class, and create a hidden window that can be used by your server.

```
FUNCTION MakeWindow() AS DWORD
  LOCAL wce         AS WndClassEx
  LOCAL szClassName AS ASCIIZ * 80
  LOCAL hWnd        AS DWORD
  STATIC registered AS LONG

  IF ISFALSE registered THEN
    szClassName       = "PBTCPCOMM"
    wce.cbSize        = SIZEOF(wce)
    wce.style         = %NULL
    wce.lpfnWndProc   = CODEPTR(TcpProc)
    wce.cbClsExtra    = 0
    wce.cbWndExtra    = 0
    wce.hInstance     = GetModuleHandle(BYVAL %NULL)
    wce.hIcon         = %NULL
    wce.hCursor       = %NULL
    wce.hbrBackground = %NULL
    wce.lpszMenuName  = %NULL
    wce.lpszClassName = VARPTR(szClassName)
    wce.hIconSm       = %NULL
    RegisterClassEx wce
    registered = %TRUE
  END IF

  hWnd = CreateWindow("PBTCPCOMM", "", 0,0,0,0,0, %NULL, %NULL, _
             GetModuleHandle(BYVAL %NULL), BYVAL %NULL)
  ShowWindow hWnd, %SW_HIDE

  FUNCTION = hWnd
END FUNCTION
```

To create a TCP server, your program must first open a socket using the TCP OPEN SERVER statement. Then, when a client contacts your server, this socket will receive the notification. To specify which notifications your code will process, use the TCP NOTIFY statement:

```
%TCP_ACCEPT = %WM_USER + 4093 ' user-defined message value
...
hServer = FREEFILE
TCP OPEN SERVER PORT 7 AS hServer
TCP NOTIFY hServer, ACCEPT TO hWnd AS %TCP_ACCEPT
```

TCP NOTIFY tells Winsock that it should send the %TCP_ACCEPT message to the window specified by hWnd. Your callback will then include a message handler for the %TCP_ACCEPT message. The lParam& parameter to your callback will tell you what type of notification was sent:

```
%TCP_ECHO = %WM_USER + 4094 ' user-defined message value
...
CASE %TCP_ACCEPT
  SELECT CASE LO(WORD, lParam&)

    '* An ACCEPT notification was sent
    CASE %FD_ACCEPT
      hEcho = FREEFILE
      TCP ACCEPT hServer AS hEcho
      TCP NOTIFY hEcho, RECV CLOSE TO hWnd AS %TCP_ECHO

  .
  .  'other notification code goes here
  .
  END SELECT
```

Once your code receives the ACCEPT notification, it uses the TCP ACCEPT statement to "close" the socket. A new socket is created for the actual communication with the client. The original socket (hServer) is used strictly to process ACCEPT notifications only. TCP NOTIFY is then used with the new socket handle to process RECV and CLOSE notifications.

When the Echo Client sends its message to your server, a RECV notification will be sent to your window. Your code can then log the incoming message, and send it right back to the client. When the CLOSE notification is received, you can close the socket:

```
CASE %TCP_ECHO
  SELECT CASE LO(WORD, lParam&)

    CASE %FD_READ
      IF hEcho <> %INVALID_SOCKET THEN
        TCP RECV hEcho, 1024, buffer
        TCP SEND hEcho, buffer
        LogEvent $DQ + Buffer + $DQ
      END IF

    CASE %FD_CLOSE
      TCP CLOSE hEcho
      hEcho = %INVALID_SOCKET

  END SELECT
```

To connect with the Echo Server, our Client simply needs to open a socket at port 7, send a

, and display the string echoed back from the server.

```
FUNCTION PBMAIN() AS LONG
  LOCAL hSocket AS LONG

  hSocket = FREEFILE
  TCP OPEN PORT 7 AT "" AS hSocket
  IF ERR THEN
    MSGBOX "OPEN Error" + STR$(ERR)
    EXIT FUNCTION
  END IF
```

```
    IF LEN(COMMAND$) = 0 THEN
      TCP SEND hSocket, "This is a test"
    ELSE
      TCP SEND hSocket, COMMAND$
    END IF

    TCP RECV hSocket, 1024, buffer$
    IF ERR THEN
      MSGBOX "RECV Error" + STR$(ERR)
      EXIT FUNCTION
    END IF

    MSGBOX buffer$

    TCP CLOSE hSocket
  END FUNCTION
```

The complete Echo Server and Echo Client sample can be found in your PB\SAMPLES\INTERNET\TCP folder.

Finally, it should be noted that there is no direct correlation between the number of TCP SEND statements executed, compared to the number of %FD_READ messages received. This is because Winsock may concatenate multiple data packets and issue a lesser number of %FD_READ messages in response. Therefore, it is usually necessary to construct your code so that it continues to read data from the incoming data stream until either the returned string is empty, or an error is detected. For example:

```
  DIM InBuffer AS STRING
  ...
    CASE %FD_READ
      InBuffer = ""
      IF hEcho = %INVALID_SOCKET THEN EXIT SELECT

      DO
        TCP RECV hEcho, 1024, buffer
        IF LEN(buffer) = 0 OR ISTRUE ERR THEN EXIT LOOP
        InBuffer = InBuffer + buffer
        TCP SEND hEcho, buffer
        LogEvent $DQ + Buffer + $DQ
      LOOP
  ...
```

See Also

TCP and UDP Communications

Simple Mail Transfer Protocol (SMTP)

Objects and COM Programming

What is an object, anyway?

What is an object, anyway?

An object is a pre-defined set of data (variables), neatly packaged with a group of

(code) which manipulate the data and provide any other functionality you need.

For example, a string array containing names and addresses (data) might be packaged with a subroutine (code) that displays a popup dialog to edit the data, another subroutine (code) to print mailing labels, and so forth. That's a great candidate for an object.

In short, an object is a complete little programming package, code and data, all in one tightly contained place. It's safer and protected, easier to debug, maintain, and reuse. An object can be written to perform most any task you might imagine.

In object terminology, a CLASS is used to define an object. A CLASS is much like an enhanced user-defined type; it's a description of both the variables and the subroutines which make up the object. When you instruct the compiler to create an object, it uses the definitions found in the CLASS to do so. It allocates memory for the variables, establishes pointers to the subroutines, and makes this new object available to your program.

Each time you create a new OBJECT, it is called an INSTANCE of its definition (an instance of the CLASS). That's why these variables are called INSTANCE variables. When you create multiple objects (from the same CLASS definition), each instance gets its own individual copy of these INSTANCE variables, and each instance gets individual access to the subroutines.

In PowerBASIC, objects are optional. Objects are a great programming tool, but your existing code remains fully functional. Standard Subs and Functions will always be supported, so you can blend the techniques at a comfortable pace.

PowerBASIC objects are practical. They're lightning fast with very little overhead. We've tried very hard to give you the best ratio of straightforward design to performance and features. We think you'll find PowerBASIC objects very hard to resist.

Thousands of books have been written to describe objects and object oriented programming. In most cases, the buzz words and abstract definitions make it seem as though they're designed to confuse, not enlighten. We'll try to limit the use of strange descriptors, but some of it just can't be avoided. In these cases, we'll try to give you clear definitions as they're needed.

A key trait of PowerBASIC objects (and objects in general) is the concept of encapsulation. Data is "hidden" within the object, so INSTANCE variables cannot be accessed from the outside.

INSTANCE variable data may only be set, altered, or retrieved by the subroutines in the object. These variables are hidden from the rest of the program.

Over the years, objects have gained a reputation for slow, bloated programming. In many cases, this reputation was well deserved. But don't let that fool you. With PowerBASIC, you'll find you have a whole new "Object World"! All the power, yet all the performance, too. PowerBASIC objects give you every ounce of performance possible... the same breathtaking speed as procedural programming!

See Also

Where are objects located?

Why should I use objects?

What are the parts of an object?

Are there other important "Buzz-Words"?

Where are objects located?

Where are objects located?

Since an object is a complete programming package (sort of like the idea of a sub-program), it can be located in many different places. However, regardless of where the object is found, PowerBASIC will still handle all the messy details for you... automatically.

In many cases, objects will be located right within your main program. You can create a single, self-contained program, with one object or a thousand objects. Get all the power of objects, but keep the details private -- for your eyes only.

Objects can be located in a Dynamic Link Library (DLL). This is usually called a COM object, but is also known as an OCX or an ActiveX object. The actual file extension is largely irrelevant. The

offered by these objects are generally available to any program which knows the subroutine definitions, and wishes to access them. This type of object is known as an "in-process" object because it is loaded into the address space of the calling application, just like a standard DLL.

Objects can also be located in an executable program (EXE). In this case, the calling application is frequently called a "controller", as it can control how the executable operates by manipulating its objects. A good example of this functionality is Microsoft Word -- by simply calling object subroutines, you can load a DOC file, display it to the user, make changes, then save the new document. All under the control of your calling application. Once again, the object subroutines are generally available to any program which knows the subroutine definitions. This type of object is known as an "out-of-process" object because it does not share address space with the calling application.

Whenever an object is accessed outside of your program, PowerBASIC uses the COM (Component Object Model) services of Windows to make the "connection" for you. COM is an important tool which will open many opportunities for you. But more about COM later...

See Also

What is an object, anyway?

Why should I use objects?

What are the parts of an object?

Are there other important "Buzz-Words"?

Why should I use objects?

Why should I use objects?

- Objects help you maintain your code. Objects break up your project into small, easily viewed parts. Usually, the input and output is clearly defined. You have all of the code and all of the data right at your fingertips.
- Objects help you write bug-free code. When you keep an object small and well-defined, you greatly enhance the stability of your programs. Consider the comparison to procedural programming: With standard Subs and Functions, it's typical to create the data (variables) in the calling code, but manipulate the data in the target procedures when they are executed. This separation of code and data has caused some of the most insidious bugs known to programmers. When you need to extend the range of data to a larger data type, it's easy to change the code. A piece of cake, so to speak. But what about the data? Now you must search out every reference to every involved Sub and Function. Find every data creation, every data change, and every other reference to these variables. What are the chances of missing a critical one? Far too great to ignore.
- Objects help you re-use your code. Since the object contains all the

  , and all the data, how could it be easier? Put one object source in one include file... Or put it in one DLL... Just use it when you need it!
- Objects help with team programming. Objects are self-contained. All of the subroutines and all of the data, all in one concise place. It's easy to create a precise definition for each object, and there's little dependency between the implementation of various objects. Each team member builds an object, one at a time, so it all comes together neatly in the end.
- Objects are an increasingly popular standard. Do you need to access the Windows API? Many of the newer API functions (DirectX graphics, for example) use only an object interface, and nothing else. If you don't use objects, you simply can't access them. Do you want to control an important application, like an Internet browser, word processor, or spreadsheet? COM objects are the only way to do it. As time goes by, objects will only become more embedded in day-to-day programming.

Don't be left behind!

See Also

What is an object, anyway?

Where are objects located?

What are the parts of an object?

Are there other important "Buzz-Words"?

What are the parts of an object?

What are the parts of an object?

- METHOD: A subroutine, very similar to a user-defined Sub/Function. A method has the special attribute that it can access the variables stored in the object. A method can return a value like a Function, or return nothing, like a Sub.
- PROPERTY: This is a METHOD, but in a specific form, for a specific purpose. A PROPERTY has all the attributes of a standard METHOD. It has a special syntax, and is specifically used to read or write private data to/from the internal variables in an object. This helps to maintain the principle of "encapsulation". Properties are usually created in pairs, a GET PROPERTY to read a variable, and a SET PROPERTY to write to a variable. Paired properties use the same name for both, since PowerBASIC will choose the correct one based upon the usage in your source code. You should note this important fact: Since a PROPERTY is a form of METHOD, all of the documentation about METHODS also applies to PROPERTIES, unless we specifically state otherwise.

  : A definition of a set of methods and properties which are implemented on an object. You might think of it as a list of DECLARE statements where the sequence of the Declares must be preserved. Remember, the interface is just the definition, not the actual code. Every interface is associated with a GUID (a 128-bit number or string) which uniquely identifies this particular interface from all other interfaces, anywhere in the world. This identifier is called the Interface ID, or IID for short.

  An interesting note is that one particular interface definition may become a part of several different classes and objects. In fact, the internal code for an interface in CLASS A may be entirely different from the internal code for the same interface in CLASS B. Method names, parameters, and return values must be identical, but the internal code could vary significantly.

  An important point: interfaces are immutable. Once an interface has been defined and published, the Method and Property definitions (sequence, names, parameters, return values, etc.) may never be altered. If you find you must change or extend an interface, you would usually define a new interface instead.
- CLASS: A definition of a complete object, which may include one or more interfaces. This is the place where you declare INSTANCE variables, and write your code for the enclosed METHOD and PROPERTY procedures. While some object implementations allow only a single interface per class, PowerBASIC objects (and COM objects in general) support the idea of optional multiple interfaces. Still, remember that a CLASS is the complete definition of an object. It defines all of the code and all of the data which will be found in a particular object. For this reason, there is only one copy of a CLASS. Every class is associated with a GUID (a 128-bit number or string) which uniquely identifies this particular class from all others, anywhere in the world. This identifier is called the Class ID, or CLSID. A friendlier version of the CLSID is a shorter text name, which also identifies the Class. This text name is known as the Program ID (PROGID), though it's possible this PROGID may not be totally unique. As it's a simpler construct, it might be duplicated in another program.
- CLASS METHOD: This is a private method, which may only be called from within the same CLASS.

It is not a part of any interface, so it is never listed there. It is called a CLASS METHOD because it is a member of the class, not an interface. It is not visible to any code outside the class where it is defined. Code in a CLASS METHOD may call other CLASS METHODS in the same CLASS. Class Properties do not exist because there is no need for them. Within the object, variables can be accessed directly, so there is no need to use a PROPERTY procedure as an intermediary.

- CONSTRUCTOR: This is a special form of CLASS METHOD, which is executed automatically whenever an object is created. It is optional, but if present, it must be named CREATE.
- DESTRUCTOR: This is a special form of CLASS METHOD, which is executed automatically whenever an object is destroyed. It is optional, but if present, it must be named DESTROY.
- OBJECT: An instance of a class. When you create an object in your running program, using the LET (with objects) statement, or its implied form, PowerBASIC allocates a block of memory for the set of instance variables you defined, and establishes a virtual function table (a set of function code pointers) for each of the interfaces. You can create any number of OBJECTS based upon one CLASS definition.
  It might be useful to think of an OBJECT in terms of an electrical appliance, like a television set. The TV is the equivalent of an OBJECT, because it's an instance of the plans which define all the things which make it a television. Of course, those plans are the equivalent of a CLASS. You can make many instances of a television from one set of plans, just as you can make many OBJECTS from one CLASS. The individual buttons and controls on the television are the equivalent of METHODS, while all of the controls, taken as a whole, are equivalent to the INTERFACE.
  We don't need to know how a television works internally to use it and benefit from it. Likewise, we don't need to know how an object works internally to use it and benefit from it. We only need to know the intended job of the object, and how to communicate with it from the outside. The internal workings are well "hidden", which is called encapsulation. Since we can't "look inside" an Object, it's not possible to directly manipulate internal variables or memory. This provides an increased level of security for the internal code and data.
- INSTANCE DATA: Each CLASS defines some INSTANCE variables which are present in every object. When you create multiple objects (of the same class), each object gets its own unique copy of them. These variables are called INSTANCE variables because a new set of them is created for each instance of the object. For example, if you created a CUSTOMER object for each customer of your business, you might have INSTANCE variables for the Name, Address, Balance owed, etc. Each object would have its own set of INSTANCE variables to describe the attributes of that particular customer. INSTANCE variables are always private to the object. They can be accessed directly from any METHOD on the object, but they are invisible to any code outside of the object.
- VIRTUAL FUNCTION TABLE: Commonly called a VFT or VTBL, this is a set of function code pointers, one for each METHOD or PROPERTY in an interface. This is a tool used internally to direct program execution to the correct method or property you wish to execute. While it is a vital and integral part of every object, you need give it no concern other than to be aware of its existence. PowerBASIC manages these items for you, with no programmer intervention required.

See Also

What is an object, anyway?

Where are objects located?

Why should I use objects?

Are there other important "Buzz-Words"?

Are there other important "Buzz-Words"?

Are there other important "Buzz-Words"?

- GUID: This is a "Globally Unique Identifier", a very large number which is used to uniquely identify every interface, every class, and every COM application or library which exists anywhere in the world. GUID's identify the specific components, wherever and whenever they may be used. A GUID is a 16-byte (128-bit) value, which could be represented as an integral value or a string. This 128-bit item is large enough to represent all the possible values, anywhere in the world. The PowerBASIC GUID$() function (or a hot-key in the PowerBASIC IDE) can generate a random GUID which is statistically guaranteed to be unique from any other generated GUID. Each of these identifying GUID's may be assigned by the programmer, or they will be randomly assigned by the PowerBASIC compiler. When a GUID is written in text, it takes the form: {00CC0098-0000-0000-0000-0000000000FF}.

- DIRECT INTERFACE: This is the most efficient form of interface. When you call a particular METHOD or PROPERTY, the compiler simply performs an indirect jump to the correct entry point listed in the virtual function table (VFT or VTBL). This is just as fast as calling a standard Sub or Function, and is the default access method used by PowerBASIC.

- DISPATCH INTERFACE: This is a slow form of interface, originally introduced as a part of Microsoft Visual Basic. When you use DISPATCH, the compiler actually passes the name of the METHOD you wish to execute as a text string. The parameters can also be passed in the same way. The object must then look up the names, and decide which METHOD to execute, and which parameters to use, based upon the text

  provided. This is a very slow process. Many scripting languages still use DISPATCH as their sole method of operation, so continued support is necessary.

- DUAL INTERFACE: This is a combination of a Direct Interface and a Dispatch Interface. This most flexible form allows either option to be used, depending upon how the calling application is implemented.

- AUTOMATION: This is a special calling convention, defined by MS later in the evolution of COM and objects. An Automation object is simply one which adheres to the rules for Automation COM Objects. It may offer just a direct interface, just a Dispatch interface, or both of them (DUAL). It should be noted that some programmers use the word AUTOMATION to mean DISPATCH. Even though that's not correct, you should keep the possibility in mind whenever you encounter the term. Automation Methods must use parameters, return values, and assignment variables which are AUTOMATION compatible: BYTE, WORD, DWORD, INTEGER, LONG, QUAD, SINGLE, DOUBLE, CURRENCY, OBJECT, STRING, WSTRING, and VARIANT. A User Defined Type used as a return value or parameter will be converted to a BYVAL DWORD. All Automation Methods return a hidden result code which is called the hResult. This is not really a handle, as the name suggests, but a result code to report the success or failure of a call to a METHOD or PROPERTY.

- IUNKNOWN: This is the name of a special interface which is the basis for every object. It has three methods, which are always defined as the first three methods in every interface. These 3 methods are used by compilers (PowerBASIC or others) to look up other interfaces on the object, and to keep track of usage of this object. While IUNKNOWN is mandatory for every object, you won't ever need to reference it directly. PowerBASIC handles all those messy details automatically.

- OBJECT REFERENCE: This is a reference (a pointer) to an object, which is the only way objects are used. In PowerBASIC, an object variable initially contains NOTHING. When you create an object, or duplicate one, a reference to that object is placed in an object variable by the compiler. That is, a pointer to the object is automatically inserted in the object variable. It is now considered to contain an OBJECT REFERENCE until such time as the reference is deleted or set to NOTHING.

- COMPONENT: An object that encapsulates code and data, providing a set of publicly available services.

- MONIKER: An object that implements the IMoniker interface. A moniker acts as a name that uniquely identifies a COM object. In the same way that a path identifies a file in the file system, a moniker identifies a COM object in the directory namespace.

See Also

What does a Class look like?

What does a Class look like?

Here is the PowerBASIC source code for a very simple class. It has just one interface and one instance variable.

```
CLASS MyClass
  INSTANCE Counter AS LONG
  INTERFACE MyInterface
    INHERIT IUNKNOWN            ' inherit the base class
    METHOD BumpIt(Inc AS LONG) AS LONG
      Temp& = Counter + Inc
      INCR Counter
      METHOD = Temp&
    END METHOD
  END INTERFACE
  ' more interfaces could be implemented here
END CLASS
```

Just like other blocks of code in PowerBASIC, a class is enclosed in the CLASS statement and the END CLASS statement. Every class is given a text name (in this case "MyClass") so it can be referenced easily in the program.

The INSTANCE statement describes INSTANCE variables for this class. Each object you create from this class definition contains its own private set of any INSTANCE variables. So, if you had a SHIRT class, you might have an instance variable named COLOR, among others. Then, if you create two objects from the class, the COLOR instance variable in the first object might contain WHITE, while the second might be BLUE.

Next comes the INTERFACE and END INTERFACE statements. They define the one interface in this class, and they enclose the methods and properties in this interface. Every interface is given a text name (in this case "MyInterface") so it can be referenced easily in the program. You could add any number of additional interfaces to this class if it suited the needs of your program.

The first statement in every Interface Block is the INHERIT statement. As you learned earlier, every interface must contain the three methods of IUNKNOWN as its first three methods. In this case, INHERIT is a shortcut, so you don't have to type the complete definitions of those methods in every interface. There are more complex (and powerful) ways to use INHERIT as well, but more about that later.

Finally, we have the METHOD and END METHOD statements. They are just about identical to a FUNCTION block, but they may only appear in an interface. In this case, the METHOD is named "BumpIt". It takes one ByRef parameter, and returns a long integer result.

How do you reference this object?

```
FUNCTION PBMAIN()
  DIM Stuff AS MyInterface
  LET Stuff = CLASS "MyClass"
  x& = Stuff.BumpIt(77)
END FUNCTION
```

The first line of PBMain (DIM...) defines an object variable for an interface of the type "MyInterface". The LET statement creates an object of the CLASS "MyClass", and assigns an object reference to the object variable named "Stuff". The next line tells PowerBASIC that you want to execute the method "BumpIt", and assign the result to the variable "x&". It's just that simple!

See Also

[What is an object, anyway?]

[What is a Base Class?]

[What does an Interface look like?]

[Just what is COM?]

What is a Base Class?

What is a Base Class?

The term "Base Class" is truly a misnomer, since it's actually an interface. The truth is, this term probably originated from those who use a programming language which supports only one interface per class. (Note: PowerBASIC allows an unlimited number of interfaces.) On those limited platforms, the distinction between a class and an interface tends to blur. However, since the term "Base Class" enjoys fairly wide usage already, it's probably best if we just learn to live with it and love it.

Every PowerBASIC interface must ultimately derive from the IUnknown interface, since it provides information about an object that the compiler must have to manage these affairs accurately. Previously, we discussed the concept of adding INHERIT IUNKNOWN as the first line of every Interface Block. In that way, PowerBASIC just inserts the necessary source code for you, so that the new interface you are creating will derive all the functionality of IUNKNOWN, but still save you from all of that typing. What we didn't tell you at first was that there are really 3 System Base Classes in PowerBASIC. The other two can be used, because they, too, are derived from IUNKNOWN.

So, the real definition of a Base Class is "The interface from which a newly created interface is derived". To implement any of the system interfaces, you would just use INHERIT followed by the Base Class name as the first line of the interface block. They are:

INHERIT IUNKNOWN

If this option is chosen, your methods may only be accessed using a Direct Interface, the most efficient form of access. It uses the STDCALL calling conventions, and uses return value conventions normally associated with C++. This style of Base Class is also known as a CUSTOM INTERFACE, so you can use "INHERIT CUSTOM" in place of "INHERIT IUNKNOWN" if that's more comfortable for you.

INHERIT IAUTOMATION

If this option is chosen, your methods may only be accessed using a Direct Interface, the most efficient form of access. It uses the STDCALL calling conventions, and uses return value conventions involving a hidden parameter on the stack. Automation Methods must use parameters, return values, and assignment variables which are AUTOMATION compatible: BYTE, WORD, DWORD, INTEGER, LONG, QUAD, SINGLE, DOUBLE, CURRENCY, OBJECT, STRING, WSTRING, and VARIANT. A User Defined Type used as a return value or parameter will be converted to a BYVAL DWORD. All Automation Methods return a hidden result code which is called the hResult. This is not really a handle, as the name suggests, but a result code to report the success or failure of a call to a METHOD or PROPERTY. "AUTOMATION" is a synonym for "IAUTOMATION", so you can substitute "INHERIT AUTOMATION" in your code if that's more comfortable for you. Automation Interfaces have become more popular than Custom Interfaces in recent times, likely due to availability of the hResult hidden result code.

INHERIT IDISPATCH

If this option is chosen, PowerBASIC will automatically create a DUAL Interface for you. That means your methods can be accessed using a Direct Interface (using Automation conventions described above), or the slower DISPATCH Interface, if that's what is needed. This is certainly the most flexible Base Class, and the only one which should be used if your methods will be accessed by code from a programming language other than PowerBASIC. In a DUAL interface, both forms return the hResult hidden result to report the success or failure of the operation. You may use the term "INHERIT DUAL" in place of "INHERIT IDISPATCH", if that's more comfortable for you. While a class may have any number of direct interfaces, only one DUAL or IDISPATCH interface is allowed.

See Also

What is an object, anyway?

What does a Class look like?

What does an Interface look like?

Just what is COM?

What does an Interface look like?

What does an Interface look like?

An INTERFACE is a definition of a set of methods and properties which may be implemented on an object. Think of it as much like a TYPE declaration, except that it contains Method and Property declarations instead of member variables. One interface definition may be used in many different classes and objects.

An Interface may appear in two general forms: the declaration form and the implementation form.

In the declaration form, the Interface just provides the "signature" of the member methods, without any other source code:

```
INTERFACE MyInterface
  INHERIT IAutomation
  METHOD Method1(parm AS LONG)
  PROPERTY GET Prop1() AS WSTRING
  PROPERTY SET Prop1(BYVAL TEXT AS WSTRING)
END INTERFACE
```

This type of declaration interface can be used to provide a description of external interfaces, which you plan to access through COM services, or just as additional self-documentation of internal code.

In the implementation form, it is part of a CLASS definition, so it contains the complete source code to implement each of the member Methods and Properties.

```
CLASS AnyClass
  INTERFACE AnyInterface
    INHERIT IAutomation
    METHOD Method1(parm AS LONG)
      CALL abc(parm)
    END METHOD

    METHOD Method2(parm AS LONG)
      CALL abc(Parm*1)
    END METHOD
  END INTERFACE
END CLASS
```

In this case, you have the complete definition of an object, with code implemented so the methods can be called and executed.

The first entry in every INTERFACE block must be the base class upon which it is built. In PowerBASIC, you choose one of the System Base Classes (IUnknown, IAutomation, or IDispatch), or you might decide to inherit a User Base Class instead.

```
INTERFACE CustomIface
  INHERIT IUNKNOWN
  METHOD  MethodDef()...
END INTERFACE
```

The above code defines a custom interface whose methods are available for direct access only. It uses custom calling conventions and does not support an hResult (OBJRESULT) return value.

```
INTERFACE AutoIface
  INHERIT IAutomation
  METHOD  MethodDef()...
END INTERFACE
```

The above code defines an automation interface whose methods are available for direct access only. It uses automation calling conventions and always supports an hResult (OBJRESULT) return value. The above two forms will typically be used for internal objects, since they offer the best performance. Every PowerBASIC interface and every COM interface must ultimately inherit from IUnknown. As required base classes, the IUnknown and IAutomation declarations are built into the PowerBASIC Compiler.

```
INTERFACE DispatchIface
  INHERIT IDISPATCH
  METHOD  MethodDef()...
END INTERFACE
```

The above code defines a dual interface whose methods are available for both direct access and Dispatch access. This is the form you will typically use for COM objects, since it offers the best compatibility with varied client modules.

Every method and property in a dual interface needs a positive, long integer value to identify it. That integer value is known as a DispID (Dispatch ID), and it's used internally by COM services to call the correct function on a Dispatch interface. You can specify a particular DispID by enclosing it in angle brackets immediately following the Method/Property name in an Interface definition block.

```
INTERFACE DualIface
  INHERIT IDISPATCH
  METHOD  MethodOne <76> ()
  METHOD  MethodTwo <77> ()
END INTERFACE
```

If you don't specify a DispID, PowerBASIC will assign a random value for you. This is fine for internal objects, but may cause a failure for published COM objects, as the DispID could change each time you compile your program.

See Also

What is an object, anyway?

What does a Class look like?

What is a Base Class?

Just what is COM?

Just what is COM?

Just what is COM?

COM is an acronym. It represents the words "Component Object Model".

The short answer is that COM defines a way to communicate between modules of code. The slightly longer answer follows.

You should know that every object created or defined in PowerBASIC is fully compatible with the COM specification. Many popular compilers are not able to make that claim accurately. The COM specification defines a standardized method of communication between modules of code (frequently called components), regardless of the platform or the tool used to create them. COM components are reusable chunks of code and associated data, which may be accessed by other "COM-Aware" components and applications.

One of the most frustrating things about this technology has been the ever-changing list of buzz-words used to describe it. We've evolved through OLE, VBX, and OCX, to COM, ActiveX, and more. Though nuances of difference abound, the important thing to remember is that COM and ActiveX describe a means of accessing code and data located outside of the current module. COM+ refers to some extensions which are specific to Win2000, WinXP, and WinVista. Throughout this discussion, we'll use the terms COM Object and ActiveX Object to describe components: reusable chunks of code and associated data.

Prior versions of PowerBASIC introduced client COM services, which were accessible through the COM DISPATCH interface. While the DISPATCH interface is very flexible and easy-to-use, that very flexibility adds a level of overhead which is unacceptable for many applications. This version of PowerBASIC adds the capability to create and access COM objects through a DIRECT INTERFACE or a DISPATCH INTERFACE.

All objects in PowerBASIC, COM or not, follow all the guidelines and implementation rules established for COM Objects. This simplifies usage by the programmer, yet adds no measurable overhead at run-time. PowerBASIC encapsulates all the low-level details of the actual COM communication process. This provides a straightforward way to load and communicate with a COM component using BASIC syntax. You'll find that the PowerBASIC object implementation is very efficient, with virtually no degradation of execution speed as compared to standard Subs and Functions.

See Also

What is an object, anyway?

What is a COM component?

How do you publish an object?

How are GUID's used with objects?

What is a COM component?

What is a COM component?

A COM component is commonly referred to as a COM Object. We can visualize a COM component or Object as simply a "black box" that comprises a set of methods and associated data. Internally, these Objects contain reusable code (Methods), and provide ways for an application to call the object's Methods and read/write its associated data through its Interfaces. Notice that this is the same definition as an object internal to your program. The difference is that COM offers a way to perform this functionality on an object external to your program.

A COM Component is generally known as a COM SERVER, because it serves up information or actions requested by a COM CLIENT. A COM SERVER makes its Methods and Properties public, so that a COM CLIENT can call them as needed.

COM Components usually take the form of an EXE, or DLL/OCX file, but the actual file extension is largely irrelevant. However, DLL/OCX versions of a component are generally referred to as "in-process", since they are loaded into the address space of the calling application. EXE-versions are typically "out-of-process" because they will not share the address space of the calling application.

To summarize, a COM Object (COM Server) is a special form of code library (similar to a standard DLL) that conforms to the COM specification. It provides at least one public interface, and is identified by a globally unique PROGID and CLSID.

Every class is associated with a GUID (a 128-bit number or string) which uniquely identifies this particular class from all others, anywhere in the world. This identifier is called the Class ID, or CLSID. A friendlier version of the CLSID is a shorter text name, which also identifies the Class. This text name is known as the PROGID, though it's possible this PROGID may not be totally unique. As it's a simpler construct, it might be duplicated in another program. These identifiers are stored in the Windows Registry when the COM component is installed and registered. PowerBASIC programmers reference COM components by their PROGID string, and rarely by their CLSID. However, since these two items are stored in pairs, it is straightforward to retrieve the matching PROGID for a known CLSID, and vice versa.

As mentioned earlier, you don't need to know how a television works internally to use it and benefit from it. Likewise, you don't need to know how a COM Object works internally to use it and benefit from it. You only need to know the intended job of the object, and how to communicate with it from the outside. The internal workings are well "hidden", which is called encapsulation. Since we aren't able to "look inside" a COM Object, it's not possible to directly manipulate internal variables or memory. This provides a increased level of security for the internal code and data.

See Also

- What is an object, anyway?
- Just what is COM?
- How do you publish an object?
- How are GUID's used with objects?

How do you publish an object?

How do you publish an object?

Publishing an object means making it available for access and use by other applications through the facilities of the COM Services of Windows. With some compilers, this requires pages upon pages of code. With PowerBASIC, you'll find it's fairly straightforward. Just add a Class Id (CLSID) GUID and the words "AS COM" to the end of the CLASS statement. Then, add an Interface ID (IID) to the end of the INTERFACE statement. Believe it or not, that's just about it!

```
$MyClassGuid = GUID$("{00000099-0000-0000-0000-000000000008}")
$MyIfaceGuid = GUID$("{00000099-0000-0000-0000-000000000009}")

CLASS MyClass $MyClassGuid AS COM
  INTERFACE MyInterface $MyIfaceGuid
    INHERIT IAutomation
    METHOD Method1(parm AS LONG)
      CALL abc(parm)
    END METHOD
  END INTERFACE
END CLASS
```

PowerBASIC handles all the messy details of COM for you. The name of the CLASS (in this case MyClass) will be used as the ProgID for COM registration of the DLL. The GUID's you selected will be used for the CLSID and IID, so you're ready to go...

See Also

- What is an object, anyway?
- Just what is COM?
- What is a COM component?
- How are GUID's used with objects?

What is inheritance?

What is inheritance?

Inheritance is all about code reuse. You can reuse the definitions of an interface, or you can reuse complete sections of code.

INTERFACE INHERITANCE is defined by COM standards, and available for use by any COM object. This form of inheritance applies only to the definition of each item in an interface, rather than the underlying code.

Interface inheritance gives you the option to use one interface in multiple classes (objects). Because the interface definition remains identical in each instance, you can often use the identical (or similar) code to manipulate different objects. With this form of inheritance, the programmer must provide appropriate code for each of the Methods and Properties in every implementation of the interface.

IMPLEMENTATION INHERITANCE is the process whereby a CLASS derives all of the functionality of an interface implemented elsewhere. That is, the derived class now has all the methods and properties of this new, extended version of a Base Class! This form of inheritance is offered by PowerBASIC, even though it is not required by the COM Specification.

You can extend the functionality of an interface you created earlier by adding new methods and properties to the derived interface/class. The syntax for adding extra methods (not in the Base Class) is the same as adding methods to a standard class -- just add methods and properties, as always.

You can add to, or replace, the functionality of a particular method or property by coding a replacement which is preceded by the word OVERRIDE. The overriding method must have the same name and signature (parameters, return value, etc.) as the one it replaces. When you implement a new method in a derived class, you may call a method in the Base Class by using the pseudo-object MYBASE. This allows you to extend the original functionality, or replace it entirely.

Inheritance is implemented by use of the INHERIT statement within an INTERFACE / END INTERFACE block. The word INHERIT is followed by the class name and interface name of the code to be inherited. Both are necessary, because COM allows you to have multiple implementations of any particular interface.

```
CLASS MyClass
  INTERFACE MyFace
    INHERIT IDISPATCH
    METHOD aaa()
      ' code...
    END METHOD
    METHOD bbb()
      ' code...
    END METHOD
    METHOD ccc()
    ' code...
    END METHOD
    METHOD ddd()
      ' code...
    END METHOD
  END INTERFACE
END CLASS

CLASS TheClass
  INTERFACE TheFace
    INHERIT MyClass, MyFace
    OVERRIDE METHOD bbb()
      ' new code
    END METHOD
    OVERRIDE METHOD ddd()
      ' new code
    END METHOD
    METHOD xxx()
    END METHOD
  END INTERFACE
END CLASS
```

Note that the derived interface "TheFace" first inherits IDISPATCH, and then, all four methods from "MyFace" (aaa,bbb,ccc,ddd). However, because of the OVERRIDE statements, both bbb() and ddd() are replaced by newer versions of these methods. Note that a derived class may be inherited by yet another class, repetitively. The depth of this inheritance is limited only by available memory.

The pseudo-object MYBASE may be used within a derived class to access a method in the original base class. For example, if you placed:

```
MyBase.bbb()
```

in the above derived code, it would execute the method bbb() in the parent interface/class. You could then use the results to extend or modify actions in your newer code.

When you inherit an interface, the inherited constructor and destructor methods (CREATE and DESTROY) are disabled, in case you wish to change their functionality in the derived interface. If you wish to execute them as-is, you can simply add MYBASE.CREATE and/or MYBASE.DESTROY in the derived CREATE/DESTROY methods.

See Also

What is an object, anyway?

What does an Interface look like?

Just what is COM?

How do you create an object?

How do you create an object?

How do you create an object?

This operation is frequently known as "Creating an INSTANCE of an OBJECT." Yes, this is just one more buzz-word -- but you'll hear it frequently.

In order to create an object, you first need an OBJECT VARIABLE. This object variable can be located most anywhere in your program, and have any scope: LOCAL, GLOBAL, THREADED, etc. This object variable is declared by using the name of the interface you wish to access on the object. This is done so that PowerBASIC knows which Methods can be called via this variable. This variable is expected to be a "container" for an OBJECT REFERENCE (that is, a pointer to the actual object). Initially, this variable is automatically set to "NOTHING". If you wish to use the generic DISPATCH interface to access the object, you would use the name IDISPATCH instead.

```
LOCAL object1 AS MyInterface
LOCAL object2 AS IDISPATCH
```

There is actually one more special case, that of an IDBIND DISPATCH interface. Since object creation works the same on those interfaces, as well, we'll have more on that special topic in a later section. So, now that you have two empty object variables, what do you do with them? Use the assignment statement (LET) to create an object!

To create an object, you need to specify a CLASS and an INTERFACE. The interface is implied by the object variable you use, so it only remains that you specify the CLASS name. If the requested CLASS is internal to your program, use the word CLASS:

```
LET object1 = CLASS "MyClass"
```

The class name ("MyClass") must be specified as a quoted string literal, which is the name of a class implemented within the program. Since the class is internal (the name is known at compile-time), you may not use a string variable or expression. Upon execution, a new object is created, and a reference to that object is assigned to the object variable *object1*. The interface requested is determined by the original declaration of *object1*. If the interface name is DISPATCH, you can call the methods with the OBJECT statement -- otherwise, regular Method and Property references are used for direct interfaces.

```
LET objvar = NEWCOM PROGID$
LET objvar = GETCOM PROGID$
LET objvar = ANYCOM PROGID$
```

This form of the LET statement is used to obtain an object reference external to the program using the COM facilities of Windows. If the requested object is in a DLL (an in-process server), you will always use the NEWCOM option, as you're asking Windows to supply a new object. If the request is successful, an OBJECT REFERENCE (a pointer to the object) is assigned to the *objvar*.

If the requested object is in an EXE (out-of-process server), you may use any of the three options. If the director word NEWCOM is specified, a new instance of a COM application is created. With GETCOM, an interface will be opened on an existing, running application, which has been registered as the active automation object for its class. With ANYCOM, the compiler will first try to use an existing, running application if available, or a new instance if not.

Of course, as with any other LET (assignment) statement, you are free to simply omit the word LET entirely.

If an object creation or assignment fails for any reason, the object variable is set to NOTHING. If this statement fails, no errors are generated, nor is an OBJRESULT set. You should test for success of the operation with ISOBJECT(*objvar*) before trying to use the object or execute its methods.

But what about the rare case when there's no ProgID$ available? There's an answer for that, too.

```
LET objvar = NEWCOM CLSID ClassID$
LET objvar = GETCOM CLSID ClassID$
LET objvar = ANYCOM CLSID ClassID$
```

This new form also obtains a COM object reference, just as in the previous example. However, it is only used in the unusual case of a COM Object which has no ProgID. It works exactly as the original form above, except that it describes the requested object by its 16-byte GUID which is the ClassID of the object.

```
LET objvar = NEWCOM CLSID ClassID$ LIB DLLPath$
```

PowerBASIC offers the unique ability to create and reference COM objects without any reference to the registry at all. As long as you know the CLSID (Class ID) and the file path/name of the DLL to be accessed, you can do so with no registry access at all. You don't need a special type of COM server. This technique can be used with any server, whether created by PowerBASIC or another compiler. By using this method of object creation, there is simply no need for the server to be registered at all. That allows you to keep local copies of the COM servers you use, with no chance they will be altered or replaced by another application. You use the above form, where the clause "CLSID ClassID$" identifies the 16-byte Class ID, and the clause "LIB DllPath$" identifies the file path and file name of the COM Server. Once you've obtained the COM object reference in objvar, it is used exactly as you would with a traditional object.

See Also

What is an object, anyway?

Just what is COM?

How do you duplicate an object variable?

How do you call a Direct Method?

How do you duplicate an object variable?

How do you duplicate an object variable?

In the previous section, you learned to create an object, which assigns an OBJECT REFERENCE to the object variable:

```
LOCAL object1 AS MyInterface
LET object1 = CLASS "MyClass"
```

What if you need to duplicate it? Well, you first must decide whether you want to create a completely new object, or if you just want a second object variable which points the same object. This is a very important distinction. With two objects, they each have their own set of INSTANCE variables. The variables in each set remain independent of the other set until they are destroyed. You would create two objects by writing:

```
LOCAL object1, object2 AS MyInterface
LET object1 = CLASS "MyClass"
LET object2 = CLASS "MyClass"
```

If you have two object variables pointing to the same object, they would share the same set of INSTANCE variables. You would create two OBJECT REFERENCES to one OBJECT by writing:

```
LOCAL object1, object2 AS MyInterface
LET object1 = CLASS "MyClass"
```

```
LET object2 = object1
```

Of course, now we can take this one step further. You already know that an OBJECT may have two (or even more) interfaces defined in a CLASS. How would you actually use two interfaces on the same object? Just declare an object variable for each interface, much like:

```
LOCAL object1 AS MyInterface
LOCAL object2 AS HisInterface
LET object1 = CLASS "MYClass"
LET object2 = object1
```

The code is very much like the preceding example, except that the two object variables are declared as two different interfaces. When the last line is executed, PowerBASIC looks at the object variables to determine if they represent the same interface or not. If they do, it simply creates an extra variable, pointing to the same object. If they differ, PowerBASIC checks object to ensure the new interface is supported. If so, it creates a new OBJECT REFERENCE via the new interface, and assigns it to *object2*. It's just that simple!

The final issue in this topic is how to destroy an object variable. Generally speaking, you do nothing at all. When an object variable goes out of scope, PowerBASIC will handle all the messy details for you. For the most part, just forget about it. However, in the rare case that you need to destroy an object variable at a specific time and place, you can do so with the following statement:

```
object1 = NOTHING
```

Setting an object variable to NOTHING handles it all for you.

See Also

What is an object, anyway?

Just what is COM?

How do you create an object?

How do you call a Direct Method?

How do you call a Direct Method?

How do you call a Direct Method?

First, you should remember that INSTANCE variables may only be accessed from within the object. The only way to access them from the "outside", is by a parameter or return value of a METHOD or PROPERTY function. Of course, Methods and Properties may also utilize the other data scopes: Global, Local, Static, and Threaded.

In PowerBASIC, the basic unit of code in an object is the METHOD. A METHOD is a block of code, very similar to a user-defined function. Optionally, it can return a value, like a FUNCTION, or merely act as a subroutine, like a SUB. Methods are implemented when you write:

```
METHOD NAME [ALIAS "altname"] (var AS type...) [AS TYPE]
  [statements]
  METHOD = expression
END METHOD
```

Methods can only be called through an object variable, which is an integral part of the calling syntax. The object variable must be valid, that is, it must contain a valid object reference which was assigned to it with the LET statement. If you attempt to call a method on a null object, you'll likely experience a GPF and a total failure of your program. Methods may be called by writing:

```
DIM ObjVar AS MyInterface
LET ObjVar = CLASS "MyClass"

[CALL] objvar.Method1(param)
```

Note the word CALL is optional. This example shows how to call "Method1" when "Method1" does not return a value. If it did have a return value, use this form instead:

```
var = ObjVar.Method1(param)
```

A PROPERTY is a special type of METHOD, which is only designed to GET or SET INSTANCE data in an object. While the work of a PROPERTY could readily be accomplished with a standard METHOD, this distinction is convenient to emphasize the concept of encapsulation of INSTANCE data within an object. There are two forms of PROPERTY procedures, PROPERTY GET and PROPERTY SET. As implied by the names, the first form is used to retrieve a data value from the object, while the second form is used to assign a value. Properties are implemented:

```
PROPERTY GET NAME [ALIAS "altname"] (BYVAL var AS type...) [AS TYPE]
  [statements]
  PROPERTY = expression
END PROPERTY

PROPERTY SET NAME [ALIAS "altname"] (BYVAL var AS type...)
  [statements]
  variable = value
END PROPERTY
```

When you use PROPERTY SET, the last (or only) parameter is used to pass the value to be assigned. A PROPERTY may be considered "Read-Only" or "Write-Only" by simply omitting one of the definitions. However, if both GET and SET forms are defined for a particular Property, parameters and the property must be identical in both forms, and they must be paired. That is, the PROPERTY SET must immediately follow the PROPERTY GET. It's important to note that all PROPERTY parameters must be declared as BYVAL.

Properties can only be called through an object variable, which is an integral part of the calling syntax. The object variable must be valid, that is, it must contain a valid object reference which was assigned to it with the LET statement.

You can access a PROPERTY GET with:

```
DIM ObjVar AS MyInterface
LET ObjVar = CLASS "MyClass"

var = ObjVar.Prop1(param)
```

You can access a PROPERTY SET with:

```
DIM ObjVar AS MyInterface
LET ObjVar = CLASS "MyClass"

[CALL] ObjVar.Prop1(param) = expr
```

Note that the choice of Property procedure is syntax directed. In other words, depending upon the way you use the name, PowerBASIC will automatically decide whether the GET or SET PROPERTY should be called.

In every Method and Property, PowerBASIC automatically defines a pseudo-variable named ME, which is treated as a reference to the current object. Using ME, it's possible to call any other Method or Property which is a member of the class:

```
var = ME.Method1(param)
```

Methods and Properties may be declared (using AS type...) to return a string, any of the numeric types, a specific class of object variable (AS MyInterface), a Variant, or a user defined Type.

See Also

What is an object, anyway?

Just what is COM?

How do you create an object?

What is a Compound Object Reference?

What is a Compound Object Reference?

What is a Compound Object Reference?

There is an interesting "shortcut" available to you by using "Compound Object References". In some cases, you'll find that you can combine two, three, or more method calls into a single line of PowerBASIC source code.

The notion here is that you may need to execute a METHOD which returns an object variable, just so you can use that temporary object variable to call another method. In fact, you may even find you need to nest this type of operation several levels deep! While this is certainly workable, you may find yourself with a maze of temporary objects and object variables, all of which need to be destroyed at some point.

For example, assuming you have an object variable named MyDBase, which is an instance of the interface named DataBase. The interface DataBase offers a method named ErrorObject which returns an Errors object. Errors is a second interface, which has a method named Count. Count returns a long integer, to tell the number of errors which have occurred. In order to retrieve Count, you would normally have to write:

```
LOCAL MyErrors AS Errors
LET MyErrors = MyDBase.ErrorObject
ErrorCount& = MyErrors.Count
MyErrors = NOTHING
```

However, with Compound Object References, this can be combined into a single line of code:

```
ErrorCount& = MyDBase.ErrorObject.Count
```

In particular, note that the temporary object called MyErrors is gone completely, since PowerBASIC automatically handles the lifetime of temporary objects. You can even declare the methods and properties with parameters, if it's appropriate to allow:

```
ErrorCount& = MyDBase.ErrorObject(item&).Count
```

See Also

What is an object, anyway?

Just what is COM?

How do you create an object?

What is an hResult?

What is an hResult?

What is an hResult?

Methods may optionally have an explicit return value which you specifically declare. However, in addition to this, all Automation or Dispatch Methods and Properties have another "Hidden Return Value", which is cryptically named hResult. While the name would imply a handle for a result, it's really not a handle at all, but just a long integer value, used to indicate the success or failure of the Method. After calling a Method or Property, you can retrieve the hResult value with the PowerBASIC function OBJRESULT. The most significant bit of the value is known as the severity bit. That bit is 0 (value is positive) for success, or 1 (value is negative) for failure. The remaining bits are used to convey error codes and additional status information. If you call any object Method/Property (either Dispatch or Direct), and the severity bit in the returned hResult is set, PowerBASIC generates Run-Time error 99: Object error. When you create a Method or Property, PowerBASIC automatically returns an hResult of zero, which implies success. You can return a non-zero hResult value by executing a METHOD OBJRESULT = *expr* within a Method, or PROPERTY OBJRESULT = *expr* within a Property.

See Also

What is an object, anyway?

Just what is COM?

How do you create an object?

How do you register a COM Component?

How do you register a COM Component?

How do you register a COM Component?

All COM Components (COM Servers) must be listed in the system registry. A variety of information is kept there, but the most important is the definition of the PROGID and the CLSID. These are the terms used to uniquely identify the component, so that the operating system can locate them for a client program that wants to use their services. PowerBASIC COM DLL's provide self-registration and unregistration services by automatically exporting two Subs:

```
Declare Function DllRegisterServer   alias "DllRegisterServer"   as long
Declare Function DllUnregisterServer alias "DllUnregisterServer" as long
```

You could write a small executable program to call these registration functions, or use the Microsoft registration utility (REGSVR32.EXE) for that purpose. REGSVR32.EXE is included with Windows.

See Also

What is an object, anyway?

Just what is COM?

What is a COM component?

How do you publish an object?

What is a Class Method?

What is a Class Method?

What is a Class Method?

A CLASS METHOD is one which is private to the class in which it is located. That is, it may only be called from a METHOD or PROPERTY in the same class. It is invisible elsewhere. The CLASS METHOD must be located within a CLASS block, but outside of any INTERFACE blocks. This shows it is a direct member of the class, rather than a member of an interface.

```
CLASS MyClass
  INSTANCE MyVar AS LONG

  CLASS METHOD MyClassMethod(BYVAL param AS LONG) AS WSTRING
    METHOD = "My" + STR$(param + MyVar)
  END METHOD

  INTERFACE MyInterface
    INHERIT IUNKNOWN
    METHOD MyMethod()
      Result$$ = ME.MyClassMethod(66)
    END METHOD
  END INTERFACE
END CLASS
```

In the above example, MyClassMethod() is a CLASS METHOD, and is always accessed using the pseudo-object ME (in this case ME.MyClassMethod). Class methods are never accessible from outside a class, nor are they ever described or published in a type library. By definition, there is no reason to have a private PROPERTY, so PowerBASIC does not offer a CLASS PROPERTY structure.

See Also

[What is an object, anyway?]

[What does a Class look like?]

[Just what is COM?]

[What are Constructors and Destructors?]

What are Constructors and Destructors?

What are Constructors and Destructors?

There are two special class methods which you may optionally add to a class. They meet a very specific need: automatic initialization when an object is created, and cleanup when an object is destroyed. Technically, they are known as constructor and destructor methods, and can perform almost any functionality needed by your object: initialization of variables, reading/writing data to/from disk, etc. You do not call these methods directly from your code. If they are present in your class, PowerBASIC automatically calls them each time an object of that class is created or destroyed. If you choose to use them, these special class methods must be named CREATE and DESTROY. They may take no parameters, and may not return a result. They are defined at the class level, so they may never appear within an INTERFACE definition.

```
CLASS MyClass
  INSTANCE MyVar AS LONG

  CLASS METHOD CREATE()
    ' Do initialization
  END METHOD

  CLASS METHOD Destroy()
    ' Do cleanup
  END METHOD

  INTERFACE MyInterface
    INHERIT IUNKNOWN
    METHOD MyMethod()
      ' Do things
    END METHOD
  END INTERFACE
END CLASS
```

As displayed above, CREATE and DESTROY must be placed at the class level, before any INTERFACE definitions. You should note that it's not possible to name any standard method (one that's accessible through an interface) as CREATE or DESTROY. That's just to help you remember the rules for a constructor or destructor. However, you may use these names as needed to describe a method external to your program.

A very important caution: You must never create an object of the current class in a CREATE method. To do so will cause CREATE to be executed again and again until all available memory is consumed. This is a fatal error, from which recovery is impossible.

See Also

[What is an object, anyway?]

[Just what is COM?]

[What is a Class Method?]

What is DISPATCH?

What is DISPATCH?

What is DISPATCH?

The DISPATCH INTERFACE is a slower form of interface, originally introduced as a part of Microsoft Visual Basic. An implementation of COM DISPATCH support was introduced in a prior version of PowerBASIC. It has now been substantially improved to offer COM SERVER as well as client support, Dual Interfaces, relaxed typing, exception information, and much more.

When you use DISPATCH, the compiler actually passes the name of the METHOD you wish to execute as a text string. The parameters can also be passed in the same way. The object must then look up the names, and decide which METHOD to execute, and which parameters to use, based upon the text strings provided. As if that weren't enough, DISPATCH requires that all parameters and return values be passed as VARIANT variables, with all those conversions the responsibility of the programmer. That's right, you. This is a slow process. However, DISPATCH is flexible, convenient, and forgiving. Further, you'll find that many scripting languages and application use DISPATCH as their sole method of operation, so continued support is absolutely necessary.

See Also

What is an object, anyway?

Just what is COM?

Late Binding

ID Binding

Late Binding

Late Binding

The standard methodology of DISPATCH is called "Late Binding", because nothing is done in advance. No method definitions. No Interface signatures. You can pretty much just start writing code:

```
LOCAL DispVar AS IDISPATCH
LET DispVar = NEWCOM "DispProgID"
OBJECT CALL DispVar.Method1(x&, y$)
```

It's just that easy. The first line declares an object variable which assumes the DISPATCH interface, while the second line creates an object and assigns a reference to DispVar. The third line just executes a method on the new object.

The OBJECT statement is always used to execute methods on a DISPATCH interface. This differentiates it from direct access, so PowerBASIC can handle your request in the appropriate manner.

It's important to note that this version of PowerBASIC relaxes the strict type checking of Dispatch parameters. While DISPATCH interfaces require that all parameters and return values be passed as a VARIANT variable, this version of PowerBASIC relaxes that requirement for you. You may substitute any COM-compatible variable, and PowerBASIC will convert them automatically to and from Variant variables as an integral part of the OBJECT statement. How could it get easier?

So, how does this work internally?

Well, each method name is assigned a positive integer number as its Dispatch ID (or DispID), to differentiate it from the other methods. In a similar fashion, each parameter is numbered from 0 - n to identify each of them uniquely. When you execute a statement like:

```
OBJECT CALL DispVar.Method1(x&, y$)
```

PowerBASIC packages up the Method Name (*Method1*) and the names of any named parameters (none in this example - more about that later), and passes them to a special DISPATCH function. After a bit of time for lookup, the Dispatch ID (let's say the number 77) is returned. PowerBASIC then converts the two parameters to Variants and packages the whole thing up to call another special Dispatch function. This tells the server to execute Method number 77 using the two enclosed parameters. Finally, it returns with an hResult code to indicate success or failure. That's classic "Late Binding" Dispatch.

"Late Binding" is flexible and easy to use because everything is resolved at run-time. That flexibility comes at a price -- it's the slowest form of COM.

See Also

- What is an object, anyway?
- Just what is COM?
- What is DISPATCH?
- ID Binding

ID Binding

ID Binding

So, how can we speed things up?

Well, the worst bottleneck is the name lookup, and that's something we can deal with! We usually know all the METHOD definitions at compile-time. If we can tell the compiler the DispID's and the parameter info at compile-time, one whole step can be eliminated! That's called ID-BINDING of the Dispatch Interface. We create a simple IDBIND Interface, which is written like this:

```
INTERFACE IDBIND MyDispIfaceName
  MEMBER CALL Method1<77> (WideVal AS LONG, WideText AS WSTRING)
  MEMBER CALL Method2<78> ()
  MEMBER CALL MethodX<79> ()
END INTERFACE
```

PowerBASIC can use this IDBIND Interface to create faster Dispatch execution. Just create this structure, and place it in your source code prior to any references. Then, when you create an object variable, just use the IDBIND Interface Name instead of DISPATCH:

```
LOCAL DispVar AS MyDispIfaceName
LET DispVar = NEWCOM "DispProgID"
OBJECT CALL DispVar.Method1(abc&, xyz$$)
```

"ID Binding" is faster than "Late Binding", but you must supply interface definitions in your source code.

How do you get this information? Most likely from the PowerBASIC COM Browser! At your convenience, it will scan your system registry, and find any COM objects available. It will create all of the Interface definitions for you with just a click.

See Also

- What is an object, anyway?
- Just what is COM?
- What is DISPATCH?
- Late Binding
- Creating a DISPATCH Object

Creating a DISPATCH Object

Creating a DISPATCH Object

DISPATCH objects are easy to create. The technique is virtually identical to that for direct interfaces. You must first declare the object variable -- if you wish to use "Late Binding", you'll use the generic name IDISPATCH.

```
LOCAL DispVar AS IDISPATCH
LET DispVar = NEWCOM "DispProgID"
```

If you wish to use "ID Binding", you'll use the interface name from your Interface IDBIND structure.

```
LOCAL DispVar AS MyDispIfaceName
LET DispVar = NEWCOM "DispProgID"
```

If all went well, you now have an object! (And an object reference in your object variable). Of course, it's always a good idea to use the ISOBJECT(*DispVar*) function to be certain that the operation was a success. If it failed, an attempt to use the object variable could cause a fatal exception.

See Also

What is an object, anyway?

What is DISPATCH?

Late Binding

ID Binding

How do you call a DISPATCH METHOD?

How do you call a DISPATCH METHOD?

How do you call a DISPATCH METHOD?

To call a Method through the DISPATCH interface, you will use the OBJECT statement. This differentiates it from direct access, so PowerBASIC can handle your request in the appropriate manner.

There are five general forms of the OBJECT statement:

OBJECT GET	Retrieve the value of a PROPERTY. This is similar to retrieving the value of a variable.
OBJECT LET	Write a value to a PROPERTY. This is similar to assigning a value to a variable.
OBJECT SET	Write an object reference to a PROPERTY. This is similar to assigning to an object variable.
OBJECT CALL	Call a DISPATCH METHOD. This is equivalent to calling a standard Sub or Function.
OBJECT RAISEEVENT	Call an EVENT METHOD. (Event Methods are fully covered in a later section).

```
OBJECT GET DispVar.Prop1 TO ResultVar
OBJECT LET DispVar.Prop1 =  NewValue
OBJECT SET DispVar.Prop1 =  NewReference
OBJECT CALL DispVar.Meth1(param1, TEXT=MyStr$$)
OBJECT RAISEEVENT EventMeth1
```

All parameters, return values, and assignment values must be in the form of COM-compatible variables. Literals and expressions are not allowed. COM-compatible variables include BYTE, WORD, DWORD,

INTEGER, LONG, QUAD, SINGLE, DOUBLE, CURRENCY, OBJECT, STRING, WSTRING, and VARIANT. You should use caution passing

data since COM Objects assume that Unicode format is used. When string data is contained in a VARIANT variable, conversion to/from Unicode is automatic, and no intervention is needed from the programmer. However, if you pass data in a dynamic string variable, you must use the ACODE$() and UCODE$() functions to convert the data to an appropriate format.

The OBJECT statement can use both positional and named parameters, but you should keep in mind that not all COM Dispatch Servers support named parameters. Positional parameters are universally supported.

A positional parameter is a variable containing an appropriate value. It is identified by its position in the parameter list, just as in a traditional SUB or FUNCTION. A named parameter consists of a parameter identifier (a name), an equal (=) sign, and a variable containing an appropriate value. Positional parameters must precede any and all named parameters, but named parameters may be specified in any sequence.

Each time you call a Method or Property using the OBJECT statement, a status code is returned in a hidden parameter to indicate the success or failure of the operation. You can retrieve information about this status code with the OBJRESULT function, and also by using the IDISPINFO Dispatch Information Object. If the failure was severe, then a PowerBASIC error 99 (Object Error) is also generated and the ERR system variable is set. You can find more information about these items by referring to OBJRESULT, IDISPINFO, and ERR.

See Also

What is an object, anyway?

What is DISPATCH?

Late Binding

ID Binding

What are Connection Points?

What are Connection Points?

What are Connection Points?

Generally speaking, a client module calls a server module to perform specific operations as they are needed. However, in many situations, it's convenient and efficient for a server to notify its client of a condition or event immediately, without forcing the client to inquire about the status. At the appropriate time, the server calls back to a client method, passing information via the method parameters. This is the exact opposite of normal communication, because the server module is now calling the client module. In effect, the client is acting as a server for the purpose of handling these events. In the world of objects, a server which can call such "Event Methods" is said to offer a "Connection Point". A Connection Point can be used with COM objects or internal objects. Further, it may use either a direct interface or the DISPATCH interface. Event methods may take parameters, but may not return a result.

In COM terminology, a server which offers a Connection Point is known as an "Event Source". A client which can attach to a Connection Point and handle events is known as an "Event Sink" or "Event Handler". The terms source and sink are analogous to the electrical engineering terms source and sink.

Perhaps you have a server object which performs complex arithmetic, and may take quite some time to finish. You'd like to notify the client of your progress towards completion at regular intervals. In that way, the client can continue other work, or just notify the user of the status. If a server object offers a Connection Point, it must declare the event interface:

```
INTERFACE STATUS $StatusGuid AS EVENT
  INHERIT IUNKNOWN
  METHOD Progress(Percent AS LONG)
END INTERFACE
```

Finally, the server class must include a declaration of the event interfaces it supports via a Connection Point by adding one or more EVENT SOURCE statements within the class definition:

```
EVENT SOURCE STATUS
EVENT SOURCE DISPATCH
```

Each server class created by PowerBASIC may offer up to four event interfaces. A client module may subscribe to any or all of these event interfaces. When it's time for the server object to notify the client of an event, the RAISEEVENT statement is used. For the Dispatch interface, OBJECT RAISEEVENT is used instead. RAISEEVENT may only appear within a class which declares the Event Source interface. The concept of RAISEEVENT is very similar to the CALL statement, but it may only be used to execute event methods:

```
RaiseEvent Status.Progress(10) ' advise the code is 10% done
```

It should be noted that RaiseEvent does not reference an object variable at all, because it calls any and all Event Methods which are currently attached to the Connection Point. Instead, it references the interface name (in this case "Status"), followed by the name of the Event Method to be executed (in this case "Progress").

The client may choose to support the event by creating the appropriate event code (it must precisely match the declaration in the server), or the client could just ignore the event completely. If supported, the client must have an event method to handle the event, and create an event object to do so. In effect, the client actually becomes an object server for this one purpose. The client code might be something like:

```
CLASS EventClass AS EVENT
  INTERFACE STATUS AS EVENT
    INHERIT IUNKNOWN
    METHOD Progress(Percent AS LONG)
      CALL DisplayIt(Percent)
    END METHOD
  END INTERFACE
END CLASS
```

In addition, the client must initiate a connection to the server with EVENTS FROM, and disconnect when done with EVENTS END:

```
DIM oEvent AS STATUS
oEvent = CLASS "EventClass"
EVENTS FROM MyObject CALL oEvent

' execute some code here...

EVENTS END oEvent
```

A Connection Point may be attached to one Event Method, multiple Event Methods, or no Event Method at all. Whenever a RAISEEVENT statement is executed, all Event Methods attached to the source object are called, one after another. There is no guarantee of the sequence of the calls, and you must consider the possibility that RAISEEVENT with a ByRef parameter could change the value of a parameter variable before any particular Event Method is executed.

Here is a complete program which demonstrates the execution of a Connection Point in a single, self-contained application. It uses only internal objects. Since the objects are all internal, it is not necessary to assign a GUID to each class and interface.

```
#COMPILE EXE

CLASS EvClass AS EVENT
  INTERFACE Status AS EVENT
    INHERIT IUNKNOWN
    METHOD Done
      MSGBOX "Done!"
    END METHOD
  END INTERFACE
END CLASS

CLASS MyClass
```

```
    INTERFACE MyMath
      INHERIT IUNKNOWN
      METHOD DoMath
        MSGBOX "Calculating..."   ' Do some math calculations here
        RAISEEVENT Status.Done()
      END METHOD
    END INTERFACE

    EVENT SOURCE Status

  END CLASS

  FUNCTION PBMAIN()
    DIM oMath AS MyMath, oStatus AS Status
    LET oMath = CLASS "MyClass"
    LET oStatus = CLASS "EvClass"

    EVENTS FROM oMath CALL oStatus
    oMath.DoMath
    EVENTS END oStatus
  END FUNCTION
```

Here is a set of programs which demonstrate the execution of a Connection Point using a COM SERVER and a COM CLIENT. It uses an in-process COM server (DLL created with PB/Win), and a COM CLIENT as an executable program. First the COM SERVER:

```
  #COMPILE DLL "EvServer.dll"

  $EvIFaceGuid = GUID$("{00000098-0000-0000-0000-000000000002}")
  $MyClassGuid = GUID$("{00000098-0000-0000-0000-000000000003}")
  $MyIFaceGuid = GUID$("{00000098-0000-0000-0000-000000000004}")

  INTERFACE Status $EvIFaceGuid AS EVENT
    INHERIT IUNKNOWN
    METHOD Done
  END INTERFACE

  CLASS MyClass $MyClassGuid AS COM
    INTERFACE MyMath $MyIFaceGuid
      INHERIT IUNKNOWN
      METHOD DoMath
        MSGBOX "Calculating..."   ' Do some math calculations here
        RAISEEVENT Status.Done()
      END METHOD
    END INTERFACE

    EVENT SOURCE Status

  END CLASS
```

Next the COM CLIENT:

```
  #COMPILE EXE "EvClient.exe"

  $EvClassGuid = GUID$("{00000098-0000-0000-0000-000000000001}")
  $EvIFaceGuid = GUID$("{00000098-0000-0000-0000-000000000002}")
  $MyIFaceGuid = GUID$("{00000098-0000-0000-0000-000000000004}")

  CLASS EvClass $EvClassGuid AS EVENT
    INTERFACE STATUS $EvIFaceGuid AS EVENT
      INHERIT IUNKNOWN
      METHOD Done
        MSGBOX "Done!"
```

```
    END METHOD
  END INTERFACE
END CLASS

INTERFACE MyMath $MyIFaceGuid
  INHERIT IUNKNOWN
  METHOD DoMath
END INTERFACE

FUNCTION PBMAIN()
  DIM oMath AS MyMath
  DIM oStatus AS STATUS

  LET oMath = NEWCOM "MyClass"
  LET oStatus = CLASS "EvClass"

  EVENTS FROM oMath CALL oStatus
  oMath.DoMath
  EVENTS END oStatus
END FUNCTION
```

See Also

[What is an object, anyway?](#)

[Just what is COM?](#)

[Enumerating Collections](#)

[What are Type Libraries?](#)

Enumerating Collections

Enumerating Collections

A [collection](#) is simply a set or group of items, where each can be accessed through its own [Interface](#). For example, Microsoft Word™ can have multiple documents open at the same time, and it can provide an Interface reference for each open document.

Therefore, enumerating a collection is simply a matter of determining the number of items in the collection, looping through and retrieving the appropriate information for one or more Interface members of the collection.

We'll start off with the Visual Basic syntax and show how to perform the same kind of task with PowerBASIC.

Visual Basic syntax for enumerating a collection looks something like this:

```
Dim Item  As InterfaceItem
Dim Items As InterfaceItemsCollection
[statements]
For Each Item In Items
  'do something with the Item.member Method/Property, e.g.,
  var$ = Item.StringProp
Next
```

In PowerBASIC, we can perform the same enumeration. For example:

```
DIM oItem  AS InterfaceItem
DIM oItems AS InterfaceItemsCollection
[statements]
OBJECT GET oItems.Count TO c&
FOR Index& = 1 TO c&
```

```
    OBJECT GET oItems.Item(Index&) TO oItem
    'do something with the Item.member Method/Property, e.g.,
    OBJECT GET oItem.StringProp TO var$$
  NEXT
```

See Also

[COLLECTION Object Group](#)

[What is an object, anyway?](#)

[Just what is COM?](#)

[What are Type Libraries?](#)

What are Type Libraries?

What are Type Libraries?

A Type Library is a block of data which describes one or more COM Object Classes. The internal format of the data is not important, because it is seldom accessed by application programs. Typically, it is only accessed by COM Browsers such as PBROW.EXE (supplied with PowerBASIC), TypeLib Browser from Jose Roca, or OLEVIEW.EXE from Microsoft. In the unusual circumstance that you must access this data directly, the Windows API provides numerous functions for just that purpose.

A Type Library is usually supplied by the author of the COM server. It's frequently supplied as a standalone data file with a file name extension of TLB. The data can also be embedded as a resource in the associated DLL or EXE. In practice, you would generally use a COM Browser to extract enough information about a COM Object to allow you to use these classes in your program. Generally speaking, a Type Library usually supplies specific details about every METHOD and PROPERTY (function), and the parameters of each of them. This would include the names, data types, return values, and more. The Type Library may also offer information about related equates, User-Defined-Types, and more. To include a numeric equate in your type library, just append the words AS COM to the equate definition:

```
  %ABCD = 99 AS COM
```

Traditionally, it was common to use Interface Definition Language (IDL) to create the source code for the definitions you wish to describe in a Type Library. IDL was created specifically for this purpose and resembles C++ syntax. Once the source code was written, you would use Microsoft's MIDL Compiler to create the final Type Library. That's a fairly cumbersome process.

With PowerBASIC, it's a bit simpler than that. Whenever you create a COM server, simply add the #COM TLIB ON metastatement to your source and your Type Library will be created automatically. You can prevent a Type Library from being created by using the #COM TLIB OFF metastatement. A Type Library is created with the same primary name as your COM server, and a file extension of TLB. That is, if you create a COM server named XX.DLL, PowerBASIC will name the Type Library as XX.TLB. The Type Library offers a description of every published class on the server. You can then use any COM Browser to display the type information in a format that meets your needs. The PowerBASIC COM Browser converts it directly to PowerBASIC source code declarations which can then be dropped into your COM client program. If any of your Methods or Properties use data types not supported by Type Libraries, you will receive a Error 581 - Type Library creation error. If you wish to create a Type Library for you COM server, then only use data types that are compatible with Type Libraries, which are BYTE, WORD, DWORD, INTEGER, LONG, QUAD, SINGLE, DOUBLE, CURRENCY, OBJECT, STRING, WSTRING, and VARIANT.

As mentioned earlier, you can consolidate your distribution files by embedding your Type Library right into your DLL or EXE as a resource. A utility program named PBTYP.EXE is provided for just that purpose. PBTYP.EXE is executed with one or two command line parameters used to specify the files to be used in the embedding process. The syntax is:

PBTYP.EXE ***TargetFile*** **[*ResourceFile*]**

The PBTYP.EXE utility requires that you supply two or three files: the Target File (the DLL or EXE which receives the resource), the TypeLib File (the Type Library to be embedded), and optionally a resource file to be used. Since it's assumed that the Target File and the TypeLib file share the same primary name, only the Target file name is needed. If an extension is not supplied, the default of ".DLL" is used. When executed, PBTYP.EXE scans the original resource file (such as ABC.RC), and replaces any references to a Type Library with a reference to the new Type Library. It then compiles it to a resource object file (such as ABC.RES), and then creates a final PowerBASIC version (such as ABC.PBR). Finally, it removes any prior resource from the target file, and replaces it with the newly created resource. It should be noted that RC.EXE and PBRES.EXE must be present in your path for the process to complete.

See Also

What is an object, anyway?

Where are objects located?

Why should I use objects?

How do you publish an object?

How are GUID's used with objects?

How are GUID's used with objects?

A GUID is a "Globally Unique Identifier", a very large number which is used to uniquely identify every interface, every class, and every COM application or library which exists anywhere in the world. GUID's identify the specific components, wherever and whenever they may be used. A GUID is a 16-byte (128-bit) value, which could be represented as an integral value or a string. This item is large enough to represent all the possible values needed.

The PowerBASIC GUID$() function (or a hot-key in the PowerBASIC IDE) can generate a random GUID which is statistically guaranteed to be unique from any other generated GUID.

When a GUID is written in text, it takes the form:

```
{00CC0098-0000-0000-0000-0000000000FF}
```

When a GUID is used in a PowerBASIC program, it is typically assigned to a string equate, as that makes it easier to reference.

```
$MyLibGuid   = GUID$("{00000099-0000-0000-0000-000000000007}")
$MyClassGuid = GUID$("{00000099-0000-0000-0000-000000000008}")
$MyIfaceGuid = GUID$("{00000099-0000-0000-0000-000000000009}")
```

Every COM COMPONENT, every CLASS, and every INTERFACE is assigned a GUID to uniquely identify it, and set it apart from another similar item. As the programmer, you can assign each of these identifiers, or they will be randomly assigned by the PowerBASIC compiler.

When you create objects just for internal use within your programs, it's common to ignore the GUID's completely. PowerBASIC will assign them for you automatically, so you don't need to give it a thought. However, if you plan to publish an object for any external use through COM services, it's very important that you assign an explicit identifier to each item in your code. Otherwise, the compiler will assign new identifiers randomly, every time you compile the source. No other application could possibly keep track of the changes.

The APPID or LIBID identifies the entire application or library. You specify this item with the #COM GUID metastatement:

```
#COM GUID $MyLibGuid
```

The CLSID identifies each CLASS. You specify this item in the CLASS statement:

```
CLASS MyClass $MyClassGuid AS COM
  [statements]
END CLASS
```

The IID identifies each INTERFACE. You specify this item in the INTERFACE statement:

```
INTERFACE MyInterface $MyIfaceGuid
```

```
  [statements]
END INTERFACE
```

See Also

[What is an object, anyway?](#)

[Just what is COM?](#)

[What is inheritance?](#)

[How do you create an object?](#)

Built-in Interfaces

Built-in Interfaces

The compiler provides a set of built-in Interfaces, including:

```
ICLASSFACTORY
ICONNECTIONPOINTCONTAINER
ICONNECTIONPOINT
IDISPATCH
IUNKNOWN
```

See Also

[What are the parts of an object?](#)

[Are there other important "Buzz-Words"?](#)

[What does an Interface look like?](#)

[Built-in numeric equates](#)

[Built-in string equates](#)

[Built-in User Defined Types](#)

[Built-in RGB Color Equates](#)

The PowerBASIC COM Browser

The PowerBASIC COM Browser

What is the PowerBASIC COM Browser

The PowerBASIC COM Browser is an application that exposes the data stored in a type library and generates PowerBASIC Compatible source code for this data. A Type Library is a block of data which describes one or more COM Object Classes.

If you are unfamiliar with COM programming, you may wish to review the COM Programming section in the PowerBASIC For Windows Help file to gain an insight into COM programming concepts before reading this topic.

A Type Library is usually supplied by the author of the COM server. It's frequently supplied as a standalone data file with a file name extension of TLB. The data can also be embedded as a resource in the associated DLL, EXE, OCX, etc. The PowerBASIC COM Browser is used to extract information about a COM Object to allow you to use these classes in your program. Generally speaking, a Type Library usually supplies specific details about every Method and Property, and the parameters of each of them. This would include the names, data types, return values, and more. The Type Library may also offer information about related equates, User-Defined-Types, and more.

The PowerBASIC COM Browser can be launched from the Tools menu in the PowerBASIC IDE, launched as a stand-alone application by double-clicking PBROW.EXE in the \PB\BIN\ folder, or run from the command-line by typing PBROW.EXE (and then press ENTER).

When launched, the PowerBASIC COM Browser offers a straightforward user interface, with which you open specific type-library files or choose from a list of registered libraries.

Before we start, we should first clarify a few terms so avoid confusion:

COM Object	An instance of an initialized COM library or application. COM Objects usually come in EXE (out-of-process), and DLL, or OCX formats (in-process). These discussions pertain to COM libraries that act as COM Servers, regardless of whether they are in-process or out-of-process Servers.
Type-Library	A type-library is a file that contains a database or data dictionary describing the Interfaces and Interface members exposed by a COM Object.

See Also

The PowerBASIC COM Browser user interface

The PowerBASIC COM Browser Tutorial

What is an object, anyway?

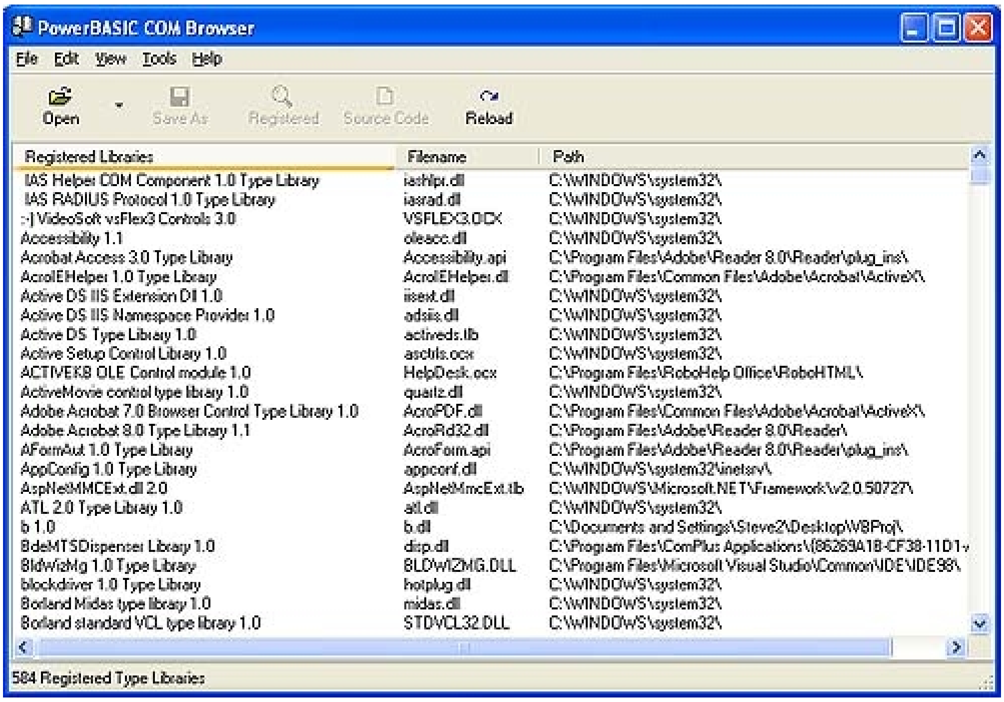
Just what is COM?

What are Type Libraries?

The PowerBASIC COM Browser user interface

The PowerBASIC COM Browser User Interface

The PowerBASIC COM Browser has two views, a list of all registered type libraries installed on the system and a source code view which displays the PowerBASIC declarations for this type library. The PowerBASIC COM Browser opens up with a list of all the registered type libraries installed on the users system.



See Also

[The PowerBASIC COM Browser]

[The PowerBASIC COM Browser Menu]

[What is an object, anyway?]

[Just what is COM?]

[What are Type Libraries?]

The PowerBASIC COM Browser Menu

The PowerBASIC COM Browser Menu

This topic briefly describes each menu option available from the PowerBASIC COM Browser's menu.

File menu

Open File	Open a type library file.
Save File As	Save the currently loaded source code to disk.
[recent files list]	A list of the most recently loaded type libraries.
Exit	Exits the PowerBASIC COM Browser.

Edit menu

Select All	Select all the text in the current source code window.
Copy	Copy the selected text in the source code window and place it in the Clipboard.

View menu

Registered Libraries	Show a list of all the Registered Libraries view.
Source Code	Show the Source Code window view.
Reload	If in Registered Library view, this options reloads the list of all Registered Libraries installed on the system. If in Source Code view, this option reloads the source code generated from the selected type library.

Tools menu

Options	Display the Options dialog, for configuring the PowerBASIC COM Browser.

Help menu

Help For PBRow	Displays the PowerBASIC COM Browser help file.
Help For Library	Displays the help file for the currently loaded type library if one exists.
About	Display version information for the PowerBASIC COM Browser.

See Also

The PowerBASIC COM Browser

The PowerBASIC COM Browser User Interface

What is an object, anyway?

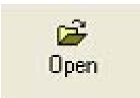
Just what is COM?

What are Type Libraries?

The PowerBASIC COM Browser Toolbar

The PowerBASIC COM Browser Toolbar

This topic briefly describes each menu option available from the PowerBASIC COM Browser's toolbar.



Open a type library file

Save the currently loaded source code to disk.

Show a list of all the Registered Libraries view.

Show the PowerBASIC compatible source code for the loaded type library.

If in Registered Library view, this options reloads the list of all Registered Libraries installed on the system. If in Source Code view, this option reloads the source code generated from the selected type library.

See Also

The PowerBASIC COM Browser User Interface

Menu Items

Shortcut Keys

Registered Type Library View

What is an object, anyway?

Just what is COM?

What are Type Libraries?

Shortcut Keys

Shortcut Keys

The following table summarizes the shortcut-keys available in the PowerBASIC COM Browser.

Keystroke	Description
F1	Display the help file for the type library if available, otherwise display the PowerBASIC COM Browser help file
CTRL+A	Select all the text in the Source Code View
CTRL+C	Copy the selected text in the Source Code window to the clipboard
CTRL+D	Display the Source Code View.
CTRL+L	Reload the Type library View or the Source Code View
CTRL+O	Open a Type Library file
CTRL+R	Display the Registered Type Library View.
CTRL+S	Save the current source code

See Also

The PowerBASIC COM Browser User Interface

Registered Type Library View

Source Code View

What is an object, anyway?

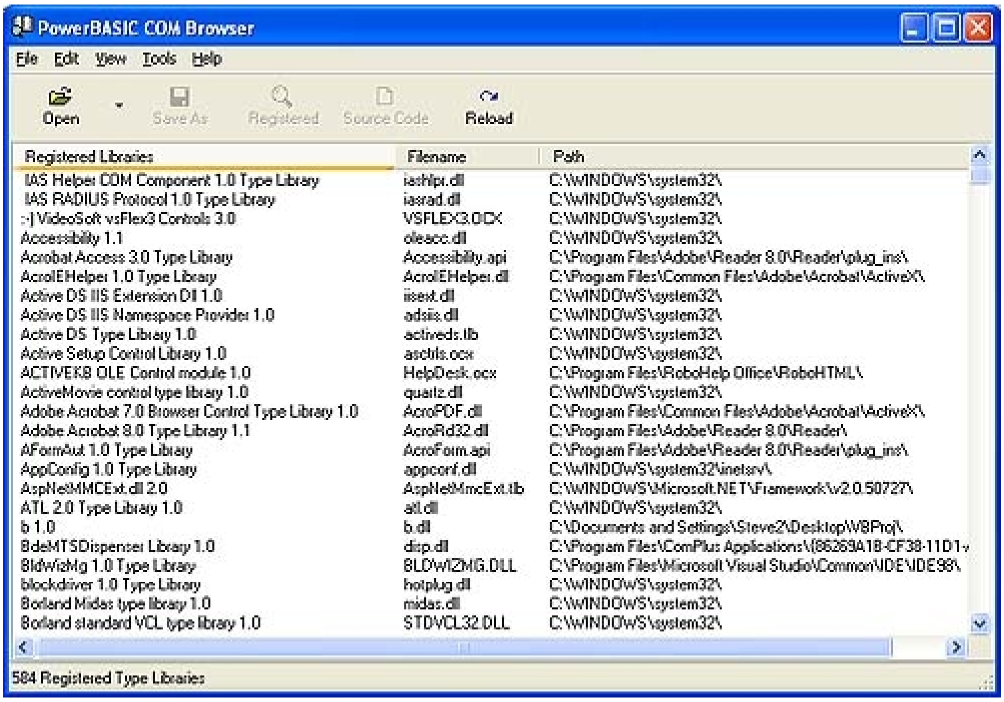
Just what is COM?

What are Type Libraries?

Registered Type Library View

Registered Type Library View

The Registered Library view displays a list of all the registered type libraries installed on the system. This Registered Library view is initially displayed when the PowerBASIC COM Browser is started. When in the Source Code view, you can switch to the Registered Library View by clicking the Registered Button or by selecting View | Registered Libraries from the menu.



The Registered Libraries column, displays the descriptive name for the registered library. The Filename column displays the filename of the registered type library. The Path column displays the path to the registered type library. Each column header can be clicked to sort the column in ascending order, if you click the same column header again the column will be sorted in descending order. The PowerBASIC COM Browser remembers the column and the sort order you last used and will display the list of registered type libraries using this information the next time you open the PowerBASIC COM Browser.

To generate PowerBASIC compatible declarations, double-click on the library name. The PowerBASIC COM Browser will display the declarations in the Source Code view.

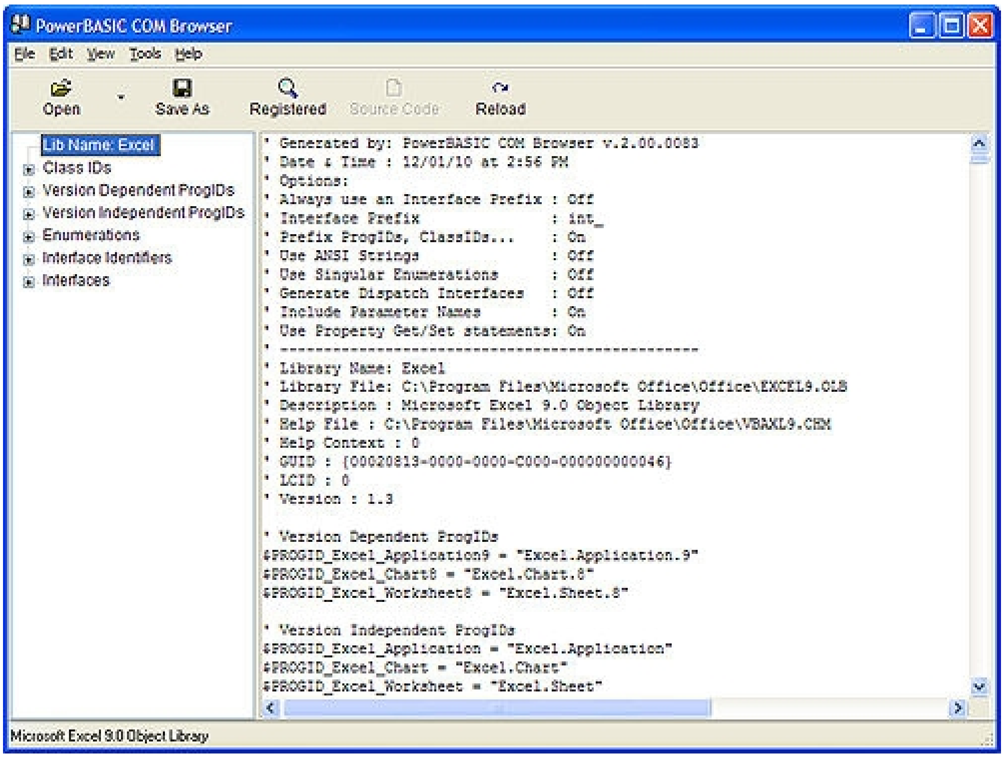
See Also

- [The PowerBASIC COM Browser User Interface]
- [Source Code View]
- [Getting Help]
- [What is an object, anyway?]
- [Just what is COM?]
- [What are Type Libraries?]

Source Code View

Source Code View

The Source Code view displays a list of all the data included in the selected type library and the PowerBASIC compatible declarations for this data.



Clicking on a type library data item on the left hand side will display only the PowerBASIC compatible code for the item on the right hand side, clicking on the top level library name will display all the PowerBASIC compatible code for the selected type library.

See Also

[The PowerBASIC COM Browser User Interface]

[Registered Type Library View]

[Getting Help]

[Saving the Source Code]

[What is an object, anyway?]

[Just what is COM?]

[What are Type Libraries?]

Getting Help

Getting Help

If the type library has a help file installed on the system, you can press the F1 key while in the Source Code view to display the help file. If you have selected an item from the list of items available and press the F1 key the help topic for the selected item is displays. If no help topic is available for the selected item the default topic for the type libraries help file is displayed. If there is no help file for the selected type library, then the PowerBASIC COM Browsers help file (this file) is displayed.

See Also

[The PowerBASIC COM Browser User Interface]

[Opening a type-library]

[What is an object, anyway?](#)

[Just what is COM?](#)

[What are Type Libraries?](#)

Opening a type-library

Opening a Type Library

The PowerBASIC COM Browser supports opening both registered an unregistered Type Libraries. A registered type library can be opened from the Registered Type Library view or by clicking the Open button and browsing to and selecting the type library file. A unregistered type library can only be opened by using the Open button and browsing to and selecting the type library file.

See Also

The PowerBASIC COM Browser User Interface

Saving the Source Code

What is an object, anyway?

Just what is COM?

What are Type Libraries?

Saving the Source Code

Saving the Source Code

To save the PowerBASIC compatible source code, simply click the Save As button or select File -> Save As from the menu and the source code displayed in the Source Code view will be saved to disk. You may wish to save the entire Source Code for the type library, in which case make sure you have selected the top level item on the right hand side, which is the type libraries name. If a type library item is selected on the left hand side of the Window, then only that portion of the displayed code will be saved to disk.

The selected text in the Source Code window can also be save to the Windows clipboard, by selecting Edit -> Copy.

See Also

The PowerBASIC COM Browser User Interface

Source Code View

Options Dialog

What is an object, anyway?

Just what is COM?

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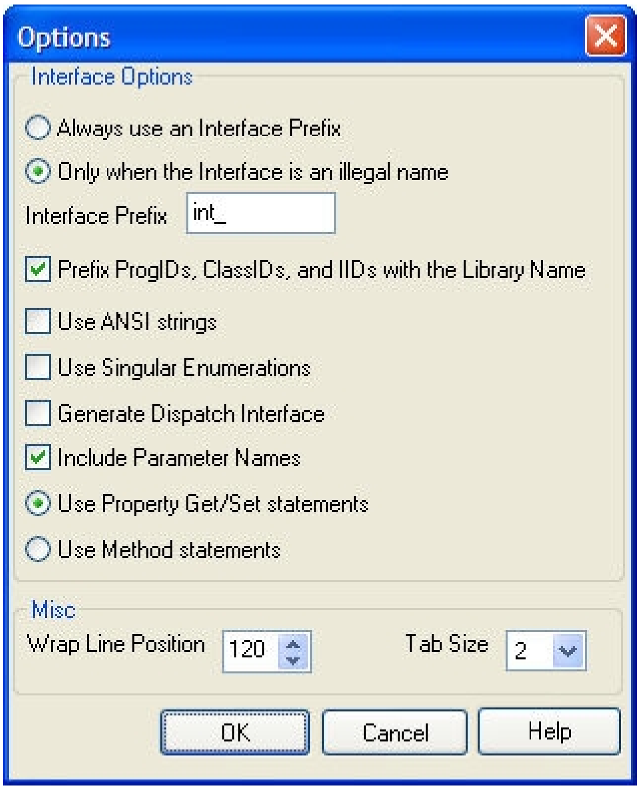
Options Dialog

Options

This topic describes the options available to customize the output of the source code generated by the

PowerBASIC COM Browser.



Always use an Interface Prefix

This option prefixes all Interface names with the text specified in the Interface Prefix textbox. This is useful when using multiple type libraries in a project and there are conflicts with duplicate Interface names.

Only When the Interface contains an illegal name

This option prefixes Interface names, only when they contain illegal characters or conflict with a reserved keyword.

Interface Prefix

This is the prefix used for Interface names.

Prefix ProgIDs,ClassIds, and IIds with Library Name

This option will prefix ClassIDs, ProgIDs, and IIDs with the library name. This option is used when you have multiple type libraries with conflicting names in one application.

Use ANSI strings

This option will generate string parameters and return values using ANSI strings instead of the preferred Unicode strings. This option should be used when the COM server was written using only ANSI strings, such as COM servers created with PowerBASIC 9 For Windows.

Use Singular Enumerations

Allows enumeration member names to be referenced by just the member name with a percent (%) prepended. Without this option enumeration members would be referenced with a percent (%) , the ENUM name, and a period prepended.

Generate Dispatch Interfaces only

This option generates Dispatch Interface's only for the purposes of IDBinding to a Dispatch COM Interface. Custom only Interfaces will be skipped when this option is used.

Include Parameter Names

This option generates Method and Property statements without any parameters names. This is useful when the type libraries Method and Property parameter names conflict with code used in your program.

Use Property Get/Set statements

This option will generate Property Get/Set statements in the generated source code. A Property is a special type of Method, which is only used to set or retrieve data in an object. The use of Property Get/Set statements is the preferred syntax as it improved readability of the source code.

Use Method statements

This option will convert Property Get/Set statements to Method statements in the generated source code. This option is useful when the type library Property Get or Set definition contains an error and the use of a Method statement can usually resolve the type library error. This option is not available when you have the Generate Dispatch Interfaces only.

Wrap Line Position

When generating source code, The PowerBASIC COM Browser wraps long lines of code (using standard PowerBASIC line continuation characters) when they reach the wrap column indicated in this field.

Tab Size

The number of spaces that Tab characters are expanded to in the generated source code.

See Also

The PowerBASIC COM Browser

The PowerBASIC COM Browser Tutorial

What is an object, anyway?

Just what is COM?

What is DISPATCH?

What are Type Libraries?

The PowerBASIC COM Browser Tutorial

The PowerBASIC COM Browser Tutorial

As described in the What is the PowerBASIC COM Browser topic, the PowerBASIC COM Browser is a browser utility application that exposes the Interfaces, Methods, and Properties in a type-library. It is also used to generate PowerBASIC compatible source code to be used in your application.

We will walk through an example of using the PowerBASIC COM Browser to locate a registered type library, generate the PowerBASIC compatible source code, and then use this source code in a PowerBASIC For Windows application.

1. Start the PowerBASIC COM Browser
2. Open the Options dialog by selecting Tools | Options and select the following options:
    - Always use an Interface Prefix : Off
    - Interface Prefix : Agent
    - Prefix ProgIDs, ClassIDs... : Off
    - Use ANSI Strings : Off
    - Use Singular Enumerations : Off

- Generate Dispatch Interfaces : Off
- Include Parameter Names : On
- Use Property Get/Set statements : On

3. Click the OK button to save and close the Options dialog.
4. Locate the Microsoft Agent Control 2.0 type library. This will be listed under the "Registered Library" heading with the text of "Microsoft Agent Control 2.0" or under the "Filename" heading of "agentctl.dll". If you do not have this type library installed it can be downloaded for free from http://www.microsoft.com/DOWNLOADS/en/default.aspx. After installing the Microsoft Agent Control 2.0 type library click the Reload button to update the list of registered type libraries.
5. Double-click on the Microsoft Agent Control 2.0 type library listed in the list of Registered type libraries, to generate the PowerBASIC compatible source code for this object.
6. Click the "Save As..." button and save it with the name of "agent.inc"
7. Close the PowerBASIC COM Browser
8. Start the PowerBASIC For Windows IDE
9. Click the Create New File button in the IDE
10. Paste the following code into the new file created in the IDE

```
#COMPILER PBWIN 10
#COMPILE EXE
#DIM ALL
%ID_START      = 1000
%ID_STOP       = 1001
%ID_EVENTLIST  = 1003
GLOBAL hDlg AS LONG
' MS Agent Control include file generated by PBrow.exe
#INCLUDE "agent.inc"
' Display an error message
MACRO DisplayError(TXT)
  IF ISTRUE(ISOBJECT(AgentEvents)) THEN
    ' Detach the events handler
    EVENTS END AgentEvents
  END IF
  ' Print the error and then exit the callback routine
  MSGBOX TXT, %MB_OK OR %MB_ICONERROR, "MS Agent Error"
  EXIT FUNCTION
END MACRO
CALLBACK FUNCTION DlgProc
  STATIC AgentCtrlEx  AS IAgentCtlEx
  STATIC AgentChars   AS IAgentCtlCharacters
  STATIC AgentCharsEx AS IAgentCtlCharacterEx
  STATIC AgentEvents  AS Agent_AgentEvents
  LOCAL  StartX       AS LONG
  LOCAL  StartY       AS LONG
  LOCAL  CharW        AS LONG
  LOCAL  CharH        AS LONG
  LOCAL  SpeakTxt     AS WSTRING
  SELECT CASE AS LONG CB.MSG
    CASE %WM_INITDIALOG
      ' Create the Agent Control Object
      AgentCtrlEx = NEWCOM $PROGID_Agent
      IF ISFALSE(ISOBJECT(AgentCtrlEx)) THEN
        DisplayError("The Microsoft Agent Control 2.0 is not installed. This
control can be " + _
```

```
                     "downloaded from
http://www.microsoft.com/DOWNLOADS/en/default.aspx")
      END IF
      ' Create the Events handler interface
      AgentEvents = CLASS "Class_Agent_AgentEvents"
      IF ISFALSE(ISOBJECT(AgentEvents)) THEN
        DisplayError("Error creating the event interface.")
      END IF
      ' Attach the Events handler interface to the Agent Control
      EVENTS FROM AgentCtrlEx CALL AgentEvents
      ' Create the Characters interface
      AgentChars = AgentCtrlEx.Characters
      IF ISFALSE(ISOBJECT(AgentChars)) OR OBJRESULT <> %S_OK THEN
        DisplayError("Error creating the Microsoft Agent Control 2.0
Characters interface.")
      END IF
      'Enable the Start button
      CONTROL ENABLE CBHNDL, %ID_START
    CASE %WM_COMMAND
      SELECT CASE AS LONG CB.CTL
        CASE %ID_START
          IF CB.CTLMSG = %BN_CLICKED OR CB.CTLMSG = 1 THEN
            ' Load the Merlin agent into the Characters interface
            AgentChars.Load("Merlin"$$, "Merlin.acs"$$)
            IF OBJRESULT <> %S_OK THEN
              DisplayError("The Microsoft Agent Control 2.0 Merlin Character
is not installed. This character " + _
                           "can be downloaded from
http://www.microsoft.com/DOWNLOADS/en/default.aspx")
            END IF
            ' Load the Merlin character into the CharactersEx Interface
            AgentCharsEx = AgentChars.Character("Merlin"$$)
            IF ISTRUE(ISOBJECT(AgentCharsEx)) THEN
              ' Show the Merlin agent on the screen
              AgentCharsEx.Show(0)
              ' Get the Width and Height of the Merlin agent
              CharW = AgentCharsEx.Width
              CharH = AgentCharsEx.Height
              ' Get the Width and Height of the Desktop
              DESKTOP GET CLIENT TO StartX, StartY
              ' Find the center of the desktop for Merlin agent
              StartX = (StartX - CharW)\2
              StartY = (StartY - CharH)\2
              ' Move the Merlin agent to the center of the desktop
              AgentCharsEx.MoveTo(StartX, StartY)
              ' Have the Merlin agent play the trumpet
              AgentCharsEx.Play("Announce"$$)
              ' Make the Merlin agent speak
              SpeakTxt = "With \map="+$DQ+"Powur bay
sick!"+$DQ+"="+$DQ+"PowerBASIC"+$DQ+ _
                         "\ \Pau=300\you can be a \map="+$DQ+ "wizurd
too!"+$DQ+"="+$DQ+"wizard too!"+$DQ
              AgentcharsEx.Speak(SpeakTxt)
              ' Disable the Start button and enable the Stop button
              CONTROL DISABLE CBHNDL, %ID_START
              CONTROL ENABLE  CBHNDL, %ID_STOP
            END IF
          END IF
        CASE %ID_STOP
```

```
          IF CB.CTLMSG = %BN_CLICKED OR CB.CTLMSG = 1 THEN
            ' Stop all actions by the Merlin agent and unload it
            AgentCharsEx.Stop
            AgentChars.Unload("Merlin"$$)
            ' Enable the Start button and disable the Stop button
            CONTROL ENABLE  CBHNDL, %ID_START
            CONTROL DISABLE CBHNDL, %ID_STOP
          END IF
      END SELECT
    CASE %WM_DESTROY
      IF ISTRUE(ISOBJECT(AgentEvents)) THEN
        ' Detach the event handler interface
        EVENTS END AgentEvents
      END IF
  END SELECT
END FUNCTION
FUNCTION PBMAIN () AS LONG
  DIALOG NEW 0, "COM Browser Tutorial", 201, 122, 198, 115, %WS_POPUP OR %
WS_BORDER OR %WS_DLGFRAME OR %WS_CAPTION OR _
    %WS_SYSMENU OR %WS_MINIMIZEBOX OR %WS_CLIPSIBLINGS OR %WS_VISIBLE OR %
DS_MODALFRAME OR %DS_3DLOOK OR _
    %DS_NOFAILCREATE OR %DS_SETFONT, %WS_EX_CONTROLPARENT OR %WS_EX_LEFT OR
%WS_EX_LTRREADING OR _
    %WS_EX_RIGHTSCROLLBAR, TO hDlg
  CONTROL ADD BUTTON,  hDlg, %ID_START, "Start Agent", 5, 5, 50, 15, %
WS_CHILD OR %WS_VISIBLE OR %WS_DISABLED OR _
    %WS_TABSTOP OR %BS_TEXT OR %BS_PUSHBUTTON OR %BS_CENTER OR %BS_VCENTER,
%WS_EX_LEFT OR %WS_EX_LTRREADING
  CONTROL ADD BUTTON,  hDlg, %ID_STOP, "Stop Agent", 5, 25, 50, 15, %
WS_CHILD OR %WS_VISIBLE OR %WS_DISABLED OR _
    %WS_TABSTOP OR %BS_TEXT OR %BS_PUSHBUTTON OR %BS_CENTER OR %BS_VCENTER,
%WS_EX_LEFT OR %WS_EX_LTRREADING
  CONTROL ADD LISTBOX, hDlg, %ID_EVENTLIST, , 70, 0, 125, 110,  %WS_CHILD OR
%WS_VISIBLE OR %WS_TABSTOP OR %WS_VSCROLL, _
    %WS_EX_CLIENTEDGE OR %WS_EX_LEFT OR %WS_EX_LTRREADING OR %
WS_EX_RIGHTSCROLLBAR
  DIALOG SHOW MODAL hDlg, CALL DlgProc
END FUNCTION
```

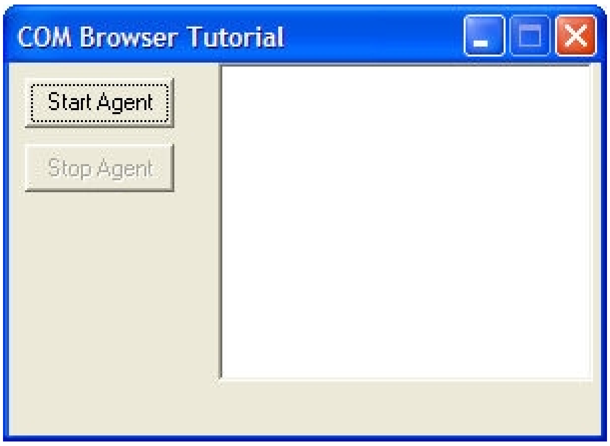
11. Click the Save All button and save this file as "agent.bas" in the same directory that you save "agent.inc" to in step #4
12. Open the "agent.inc" file in the IDE
13. Search (CTRL+F) in the IDE for the text of "IAgentCtl event interface" (without the quotes). The methods of this interface are called when an event occurs in the Microsoft Agent Control. We will add code to these methods that will display the event that occurred in the dialogs listbox. Make the Class_Agent_AgentEvents, look like the following:

```
CLASS Class_Agent_AgentEvents $CLSID_Event__AgentEvents AS EVENT
  INTERFACE Agent_AgentEvents $IID_Agent_AgentEvents
        INHERIT IDISPATCH
    METHOD ActivateInput <1> (BYREF CharacterID AS WSTRING)
       LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Input Activated"
    END METHOD
    METHOD DeactivateInput <3> (BYREF CharacterID AS WSTRING)
      LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Input Deactivated"
    END METHOD
    METHOD CLICK <2> (BYVAL CharacterID AS WSTRING, BYVAL BUTTON AS INTEGER,
BYVAL Param_Shift AS INTEGER, BYVAL x AS INTEGER, _
```

```
    BYVAL y AS INTEGER)
      LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Click at ("+FORMAT$(x)
+","+FORMAT$(y)+")"
    END METHOD
    METHOD DblClick <4> (BYVAL CharacterID AS WSTRING, BYVAL BUTTON AS
INTEGER, BYVAL Param_Shift AS INTEGER, BYVAL x AS INTEGER, _
    BYVAL y AS INTEGER)
      LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Double Click at ("+FORMAT$(x)
+","+FORMAT$(y)+")"
    END METHOD
    METHOD DragStart <5> (BYVAL CharacterID AS WSTRING, BYVAL BUTTON AS
INTEGER, BYVAL Param_Shift AS INTEGER, BYVAL x AS INTEGER, _
    BYVAL y AS INTEGER)
      LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Drag Start at ("+FORMAT$(x)
+","+FORMAT$(y)+")"
    END METHOD
    METHOD DragComplete <6> (BYVAL CharacterID AS WSTRING, BYVAL BUTTON AS
INTEGER, BYVAL Param_Shift AS INTEGER, BYVAL x AS INTEGER, _
    BYVAL y AS INTEGER)
      LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Drag Complete to ("+FORMAT$(x)
+","+FORMAT$(y)+")"
    END METHOD
    METHOD SHOW <15> (BYVAL CharacterID AS WSTRING, BYVAL Cause AS INTEGER)
      LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Character is showing"
    END METHOD
    METHOD HIDE <7> (BYVAL CharacterID AS WSTRING, BYVAL Cause AS INTEGER)
      LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Character is hidden"
    END METHOD
    METHOD RequestStart <9> (BYVAL Request AS IDISPATCH)
      LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Request Start"
    END METHOD
    METHOD RequestComplete <11> (BYVAL Request AS IDISPATCH)
      LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Request Complete"
    END METHOD
    METHOD Restart <21> ()
      ' Insert your code here
    END METHOD
    METHOD Shutdown <12> ()
      ' Insert your code here
    END METHOD
    METHOD Bookmark <16> (BYVAL BookmarkID AS LONG)
      ' Insert your code here
    END METHOD
    METHOD COMMAND <17> (BYVAL UserInput AS IDISPATCH)
      ' Insert your code here
    END METHOD
    METHOD IdleStart <19> (BYVAL CharacterID AS WSTRING)
      ' Insert your code here
    END METHOD
    METHOD IdleComplete <20> (BYVAL CharacterID AS WSTRING)
      ' Insert your code here
    END METHOD
    METHOD MOVE <22> (BYVAL CharacterID AS WSTRING, BYVAL x AS INTEGER,
BYVAL y AS INTEGER, BYVAL Cause AS INTEGER)
      LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Move to ("+FORMAT$(x)
+","+FORMAT$(y)+")"
    END METHOD
    METHOD SIZE <23> (BYVAL CharacterID AS WSTRING, BYVAL Param_Width AS
INTEGER, BYVAL Height AS INTEGER)
```

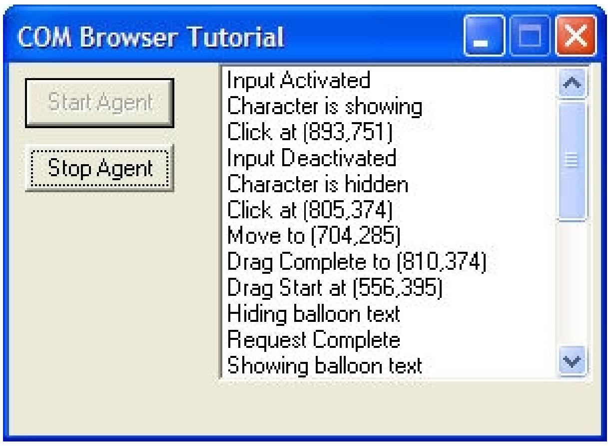
```
      ' Insert your code here
    END METHOD
    METHOD BalloonShow <24> (BYVAL CharacterID AS WSTRING)
      LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Showing balloon text"
    END METHOD
    METHOD BalloonHide <25> (BYVAL CharacterID AS WSTRING)
      LISTBOX INSERT hDlg, %ID_EVENTLIST, 1, "Hiding balloon text"
    END METHOD
    METHOD HelpComplete <26> (BYVAL CharacterID AS WSTRING, BYVAL Param_Name
AS WSTRING, BYVAL Cause AS INTEGER)
      ' Insert your code here
    END METHOD
    METHOD ListenStart <27> (BYVAL CharacterID AS WSTRING)
      ' Insert your code here
    END METHOD
    METHOD ListenComplete <28> (BYVAL CharacterID AS WSTRING, BYVAL Cause AS
INTEGER)
      ' Insert your code here
    END METHOD
    METHOD DefaultCharacterChange <30> (BYREF Param_GUID AS WSTRING)
      ' Insert your code here
    END METHOD
    METHOD AgentPropertyChange <31> ()
      ' Insert your code here
    END METHOD
    METHOD ActiveClientChange <32> (BYVAL CharacterID AS WSTRING, BYVAL
Active AS INTEGER)
      ' Insert your code here
    END METHOD
  END INTERFACE
END CLASS
```

14. In the IDE, click the compile and run button. The application will be displayed as



15. Click the "Start Agent" button and the Merlin character will display in the top left corner of the screen then move to the center of the desktop and play a trumpet then speak. If you wish to hear the text shown in the balloon when Merlin is speaking, you will need to download and install the free SAPI 4.0 and a Text to Speech Engine from http://www.microsoft.com/DOWNLOADS/en/default.aspx.

16. You can click, double-click, drag and drop, hide (right-click on Merlin and select Hide), or show (right-click on Merlin in the systems tray and select Show) and see these events listed in the listview control on the dialog box.



17. Click the Stop Agent button to stop and unload the Merlin character.

See Also

[What is the PowerBASIC COM Browser]

[The PowerBASIC COM Browser User Interface]

The Inline Assembler

The Inline Assembler

The Inline Assembler

Occasionally, you may run into a situation where the syntax and structure of the BASIC language is not the most suitable for a task at hand. PowerBASIC addresses the need for optimal speed and flexibility with its built-in assembler. Inline assembly is the process of embedding assembly-language statements (opcodes) within the overall structure of your BASIC code. Those statements are compiled along with your BASIC code without the need for an external assembler.

This chapter discusses the different ways that PowerBASIC lets you use assembly-language code in your BASIC programs. It also discusses some design philosophies and considerations, which you should keep in mind if you decide to write your own assembly-language procedures or functions.

The technique of interfacing with assembly-language is, by its very nature, somewhat complex. You should be reasonably familiar with assembly-language concepts before tackling the information in this chapter.

See Also

[Using assembly-language in your code]

Using assembly-language in your code

Using assembly-language in your code

PowerBASIC provides a number of ways in which you can use assembly-language. You can write the whole program using the Inline Assembler. You can write entire Subs, Functions, Methods, and Properties in assembly-language, or, you can write individual lines of code in assembler, surrounded by BASIC statements. This ability to intermix BASIC and assembly-language, line by line, makes PowerBASIC's Inline Assembler a very powerful tool when optimal performance is an essential issue.

To write good assembler code, you must be aware of certain items:

- The types of variables supported by PowerBASIC
- How those variables are stored in memory
- How to use variable names in your Inline Assembler routines

- Which registers to save (and restore)
- How to pass arguments (to and from Inline Assembler routines)
- The need to pop everything you push
- The differences between near and far calls
- The rules to follow when writing assembly-language routines

See Also

The Inline Assembler

Inline Assembler code syntax

Inline Assembler code syntax

Inline Assembler code syntax

The ASM statement or, for a "shortcut", the exclamation point (!), is used to insert assembler instructions (or opcodes) into your BASIC program. They must appear at the beginning of each line that contains an assembler instruction. The Inline Assembler supports standard instructions and registers, including 8086/8088, 80286, 80386, 80486, Pentium/MMX and 32-bit floating-point opcodes as defined in the Intel Reference Manuals, and can be downloaded from http://developer.intel.com/.

The machine code generated by ASM statements is placed directly in line with the code from your BASIC statements, so execution of your program will flow just as it appears in your source code. You should never, under any circumstances, attempt to exit a Sub/Function/Method/Property early by the use of a **RET** instruction, as that guarantees failure. If you need to terminate a routine at some point before the End Sub/Function/Method/Property statement, jump to a label at the end of the procedure instead.

See Also

The Inline Assembler

Using assembly-language in your code

Flat memory model

Flat memory model

Flat memory model

A program written in native 32 bit Windows format is created in what is called FLAT memory model that has a single segment, which contains both code and data. Such programs must be run on a 80386 or higher processor.

Differing from earlier 16-bit code that used combined segment and offset addressing with a 64 Kb segment limit, FLAT memory model works only in offsets and has a range of 4 Gigabytes. This makes assembly code easier to write and the compiled (assembled) code is generally a lot faster than the equivalent 16-bit code.

All segment registers are automatically set to the same value with the flat memory model. This means that segment / offset addressing must NOT be used in 32-bit programs that run in 32-bit Windows operating systems.

For programmers who have written code in DOS, a 32-bit Windows PE (executable) file is similar in some respects to a DOS COM file - they have a single segment that can contain both code and data and they both work directly in offsets. That is, neither uses segment / offset addressing.

Flat-model assembler code defaults to NEAR code addressing and NEAR data addressing within the range of 4 gigabytes.

The FS and GS segment registers are rarely (if ever) used in application programs but may be used in some instances by the operating system itself.

See Also

[The Inline Assembler]

[Protected mode programming]

[Mnemonics and Operands]

Protected mode programming

Protected mode programming

DLLs and EXEs generated by the PowerBASIC 32-bit compilers require Microsoft Windows 95 or later, or Windows NT 3.10 or later. This includes Windows 98, Windows ME, Windows NT 4.0, Windows 2000, Windows XP, Windows Vista, Windows 7, and so on. All of these operating systems run your program in protected mode, using a 32-bit flat memory model.

In real-mode operating systems such as DOS, it was possible to overwrite sections of the operating system code if a program was not correctly written. This would crash the operating system and the computer would require a reboot before it would run again.

Protected-mode memory is designed to prevent this from happening. It uses a protected mode memory manager to control the address range that all applications can read and write to, and the memory manager terminates any application that tries to read or write to a memory address range that is outside of the allocated application memory space. The memory region assigned to an application is known as the *process address space*.

This style of memory management was available in 16-bit Windows but because of the method that 16-bit Windows used to simulate multitasking, it was possible to overwrite sections of memory that were owned by other applications or the operating system before the errant program crashed.

Depending on what portions of the operating system were overwritten, another (completely unrelated) program that had no errors in it could try to use a damaged operating system function, resulting in both a program and operating system crash.

The common symptom of this behavior was the infamous "blue screen of death" which told you something was wrong, but often reported misleading causes of the problem. If an application destroyed critical sections of the operating system, the result was often a "black screen of death" - an instant black screen accompanied by a solidly locked or frozen machine. This obviously gave no feedback as to the cause of the problem.

As improvements in hardware design occurred, the use of hardware based multitasking in 32-bit Windows made protected-mode memory managers increasingly reliable and resulted in new operating systems with ever increasing stability - more able to cope with preventing operating system crashes when an application crashes.

From this we can see that one of the fundamental "rules" of writing code for a protected mode operating system is to ensure the application code can read and write only within the process address space.

However, because [Inline Assembler] allows you to read and write to almost any memory address, this clearly places the onus on the programmer to take suitable precautions with all referenced memory addresses.

For example, if you allocate a 10 Kb buffer and subsequently try to read 20 Kb, the protected mode memory manager will trigger a Page Read fault (GPF) the instant the address goes outside the process address space - typically this would occur when the memory address advances beyond the original 10 Kb buffer.

An application can also get into similar trouble if it incorrectly dereferences a register (i.e., if it incorrectly treats the register content as a pointer or address, rather than a value). If the address points outside of the allocated process address space, a GPF is virtually guaranteed.

Page read and write faults are exceptions (GPFs) that are passed from the operating system to the application that makes the error. If the exception is not handled by the application, the operating system closes the application. Current versions of PowerBASIC do not support native exception handling, but it is possible to configure an exception "trap" function using the Windows API.

Therefore, to create effective and stable assembler code, you should become familiar with protected mode programming concepts. As outlined above, you must never access memory not specifically assigned to your process, nor should you ever change the selector value in a segment register.

Likewise, all Calls, Jumps, and Returns should use "Near" addressing, as a full 32-bit offset is utilized. Should you violate any of the rules of protected mode programming, your code will likely fail catastrophically with a General Protection Fault (GPF).

See Also

The Inline Assembler

Flat memory model

Mnemonics and Operands

Mnemonics and Operands

An assembly code instruction (statement) consists of a mnemonic (pronounced "nih-MON-ick"), and between zero and three operands. For a logical or arithmetic mnemonic with two operands, the right operand is the *source* and the left operand is the *destination*. In general, 80x86 assembly code instructions takes the following form:

```
[ASM|!] mnemonic  destination, source
```

For example:

```
! MOV EAX, 1
ASM ADD EAX, EBX
```

In the examples above, the keywords MOV and ADD are the mnemonics, EAX is the destination operand, and 1 and EBX are the source operands.

In the first line, the value 1 is "moved" into the EAX operand (register). In BASIC code, this works similarly to the statement A = 1. The second example adds the value in EBX to the value in EAX and stores the result in EAX. In BASIC code, this works similarly to A = A + B.

See Also

The Inline Assembler

Using assembly-language in your code

Opcodes and Mnemonics

Registers

Opcodes and Mnemonics

Opcodes and Mnemonics

At the hardware level in an Intel or compatible processor, *instructions* are built directly into the CPU circuitry and these are represented by *opcodes*.

While assembly code can be written at the Byte level, it is a particularly complex method of writing code since it involves memorizing a very large number of opcodes. Additionally, such program code must use the Intel numeric (*little-endian*) data format. With little-endian, multi-byte numeric values are stored in reverse order to usual human representation.

For example, to copy the 32-bit value &H56A700FE into the EAX register (MOV EAX, &H56A700FE), you must first find the opcode for the MOV EAX mnemonic (&HA1) followed by the data in reverse order (&HFE, &H00, &HA7, and &H56).

In hex format, the whole instruction would look like this:

```
A1 FE 00 A7 56
```

Obviously this becomes a very tedious and error prone way to write assembly code. As a result, a system was developed (many years ago) where groups of similar opcodes were given verbose names that made them a lot more convenient to use than raw numeric opcodes. These names are referred to as *mnemonics*, and this is the system used in PowerBASIC's 32-bit Inline Assembler.

Each mnemonic represents a reserved name that represents a family of opcodes that perform similar tasks in the processor. The actual numeric opcodes are different depending on the size and type of operands being used. For example, with the MOV mnemonic:

```
! MOV EAX, VAR1   ' opcode = &HA1
! MOV VAR1, EAX   ' opcode = &HA3
```

The use of mnemonics provides a far more intuitive way of representing opcodes; however, there is no exact correlation between what you write using mnemonics and what you get as finished opcodes. This is because the opcode you actually get for a given mnemonic can depend on whether it is using near or far addressing, the operand data types (registers or pointers or constants), etc. However, PowerBASIC takes care of these details automatically and transparently for you, leaving you to get on with writing your actual program.

See Also

The Inline Assembler

Using assembly-language in your code

Mnemonics and Operands

Registers

Registers

Registers

Registers are a special working area within the processor. Registers are faster than memory operands, and are designed to work with the processor's opcodes.

Registers in an Intel or compatible processor are a very limited resource when writing assembler. In essence, there are eight general-purpose registers, EAX, EBX, ECX, EDX, ESI, EDI, ESP, and EBP. In most instances, ESP and EBP should remain unused as PowerBASIC uses them for entry and exit of procedures.

This means that you have six 32-bit registers to use in your assembly code, plus any other memory locations that are useful in the procedure. ESI and EDI can be used in the normal manner in most instances but neither can be accessed at a Byte level. You can read the low WORD of ESI as SI and the low WORD of EDI as DI.

Understanding the size of registers and the data that you can place in them is very important when using assembler. A 32-bit Intel or compatible processor has three native data sizes that can be used by the normal integral instructions, BYTE, WORD, and DWORD corresponding to 8-bit, 16-bit and 32-bit.

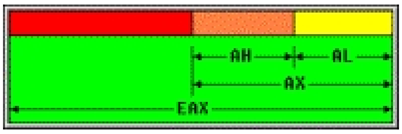
This can be shown in HEX notation.

```
BYTE         00
WORD         00 00
DWORD        00 00 00 00
```

In terms of registers, this corresponds to the three sizes that can be addressed with the normal integral registers. Intel and compatible processors are backwards compatible with older code that uses 8 and 16-bit registers, and it is done by accessing any of the general purpose registers in three different ways. Using the EAX register as an example:

```
AL or AH     =  8 bit
AX           = 16 bit
EAX          = 32 bit
```

This is the schematic of a general purpose 32-bit register:



This schematic is easier to understand at a bit level. Reading from the right side, you have 32 bits in the register, bits 0 to 31. Because of the bit positions for each piece of data that can be accessed in a 32-bit register, AL is called the Low (low-order) byte, AH is called the High (high-order) byte and AX is called the Low word.

To read the first BYTE in the register (bits 0 to 7) you use:

```
! MOV byteval, AL ; Copy the low-order byte into variable
```

Likewise, to read the second byte in the register (bits 8 to 15) you use:

```
! MOV byteval, AH ; Copy the high-order byte into bytevar
```

If you want to read the first WORD in the register (bits 0 to 15) you use:

```
! MOV wordval, AX ; Copy the low-order Word into a variable.
```

To get at bits 16 to 31, you must rotate the bits in the register so they can be accessed by the previous instructions. Rotating a 32-bit register in either direction by 16 bits move the low-order 16-bits into the high-order 16-bit positions, and the high-order 16 bits into the low-order 16-bit positions of the register.

```
! ROL EAX, 16     ; Rotate EAX left by 16-bits
```

…or:

```
! ROR EAX, 16     ; Rotate EAX right by 16-bits
```

You cannot put a different size piece of data into a register than its correct size and you cannot mix different register sizes:

```
! MOV EAX, CL     ; This fails as EAX is 32-bit, CL 8-bit
```

If you need to put the value in CL into a 32-bit register, you must first convert it using one of a number of different techniques:

```
! MOVZX EAX, CL   ; Zero extend unsigned Integer

! MOVSX EAX, CL   ; Sign extend signed Integer
```

In some instances you can use:

```
! XOR EAX, EAX    ; Clear EAX
! MOV AL,  CL     ; Copy CL into AL
```

In addition, there are also some "older" mnemonics that will do the conversions too:.

```
! MOV AL, CL      ; Copy CL into AL
! CBW             ; Convert Byte in AL to Word in AX
! CWDE            ; Convert Word in AX to DWORD in EAX
```

See Also

[The Inline Assembler](#)

[Data types in registers](#)

[MMX registers](#)

[Saving registers](#)

[Saving Registers at the Procedure level](#)

[Tricks in preserving registers](#)

[Saving the FPU registers](#)

[Using ESP and EBP](#)

Data types in Registers

Data types in registers

There are three basic types of operands that can be placed in a register: immediate, memory or another register.

An *immediate* operand is usually a numeric literal (number) but it can also be a string literal in the form "a" which is converted by PowerBASIC to its ASCII equivalent code.

```
! MOV AL, "a"       ; String literal
! MOV EDX, 0        ; Numeric immediate/literal
```

A *memory* operand is an address in memory of some form of data:

```
! MOV AL, [ESI]     ; Copy byte at address in ESI into AL
! MOV EDX, lpMemvar ; Copy variable address into EDX
```

A *register* operand is a register with a value in it:

```
! MOV ECX, EDX      ; Copy EDX into ECX
```

The actions that can be performed are determined by the available opcodes. For example, trying to move one memory operand directly into another does not work because there is no opcode in the 80x86 processor to do it.

```
! MOV mVar, lpMem   ; This fails as there is no opcode
```

However, if you have a "spare" register, you make an indirect copy through that register:

```
! MOV EAX, lpMem    ; Copy memory value into register
! MOV mVar, EAX     ; Copy register into memory variable
```

If you don't have a "spare" register, it can be done another way but it is slightly slower:

```
! PUSH lpMem        ; Push memory value onto the stack
! POP mVar          ; Pop it off as another memory value
```

See Also

[The Inline Assembler](#)

[Registers](#)

[MMX registers](#)

[Saving registers](#)

[Saving Registers at the Procedure level](#)

[Using ESP and EBP](#)

[Saving the FPU registers](#)

MMX registers

MMX registers

According to the Intel documentation, all MMX registers require parentheses around the register number. These were compulsory in early versions of PowerBASIC, but the parentheses are now optional.

```
! PXOR  mm(7), mm(7)  ' PB/DLL 5.0, PB/CC 1.0 format
! PXOR  mm7, mm7      ' PB/DLL/WIN 6.0+, PB/CC 2.0+ format
```

See Also

[The Inline Assembler]

[Registers]

[Data types in registers]

[Saving registers]

[Saving Registers at the Procedure level]

[Tricks in preserving registers]

The Stack

The stack

The stack is a range of memory addresses that can be used for temporary storage of data from either within a procedure or as the normal method of passing parameters to a procedure.

The stack is normally accessed in code by the [mnemonics] PUSH and POP. The stack is accessed on a last on, first off basis which means that the last value pushed onto the stack is the first one to be popped back off the stack.

The next position that can be written on the stack is called the top of the stack. When a piece of data is pushed onto the stack, the processor decrements the stack pointer ESP then writes the data to the top of the stack. When a piece of data is popped back off the stack, the processor reads the data from the top of the stack then increments the stack pointer. Therefore, the stack address decreases as more data is pushed onto it, and the address increases as data is popped back off the stack.

In the following images, each square represents 1 byte on the stack, and the different colors are intended to demonstrate the different data sizes being pushed and popped. The *top* of the stack is the left side of each image.

The following sequence demonstrates the stack layout as one 32-bit and two 16-bit values are pushed and popped from the stack.

Existing stack layout:

Pushes

Push a 32 bit value (PUSH EAX)

Push a 16 bit value (PUSH CX)

Push another 16 bit value (PUSH DX)

Pops

Pop a 16 bit value (POP DX)

Pop second 16 bit value (POP CX)

Pop the 32-bit value (POP EAX)

If you wrote the following code:

```
! MOV EDX, 100
! MOV ECX, 500

' push the 2 values onto the stack
! PUSH EDX  ; EDX has the value 100
! PUSH ECX  ; ECX has the value 500

' pop the 2 values off the stack
! POP EAX   ; EAX has the value 500
! POP ECX   ; ECX has the value 100
```

PowerBASIC conforms to the 32-bit Windows convention that specifies that certain registers must be preserved around blocks of assembly code, namely EBX, ESI, and EDI. While EAX, ECX, and EDX can be modified freely within a procedure, some conditions apply to their use too. See Saving registers for more detailed information.

See Also

- The Inline Assembler
- Balancing the stack
- Tricks of the stack
- Stack Overhead Reduction
- Saving registers
- Saving Registers at the Procedure level

Balancing the stack

Balancing the stack

An important consideration when using the stack is to be symmetrical in the byte count of what is pushed and what is popped.

If the stack is not balanced on exit from an assembly code block (i.e., you POP too few or too many registers), your routine will return to the wrong location in your code. This is because PowerBASIC must assume that the last item on the stack is the address to which it should return.

In other words, if the stack is not *balanced* on exit from an assembly code block, program execution is likely to resume at the wrong address and instantly crash the program. In most instances, if you PUSH a given data size onto the stack, you must POP the same data size.

See Also

- The Inline Assembler
- The stack
- Tricks of the stack

Tricks of the stack

Tricks of the stack

The stack is very flexible in what can be pushed and popped. There are a few tricks that are very useful when using the stack, you can push a 32-bit value and then pop two 16-bit values.

```
' Push a 32 bit value onto the stack
! PUSH EDX

' Now pop two 16 bit values off the stack
! POP AX
! POP CX
```

Even though the pushed data size is different to the popped data size, four bytes have been pushed onto the stack and four bytes have been popped back off the stack so the stack is balanced.

The stack can be used for many different things, you can push a register and pop it later when you need it so that you do not need to allocate a memory variable to put it in. You can use the stack to move a piece of data between memory operands and registers.

```
! PUSH ECX
! POP  memVar
```

…or:

```
! PUSH memVar
! POP  EDX
```

…or between two memory variables:

```
! PUSH memVar1
! POP  memVar2
```

…instead of using a register:

```
! MOV EDX, memvar1
! MOV memvar2, EDX
```

A collection of small tricks of this type free up the number of registers that you can use in your

, provided the stack is managed carefully.

Before the end of your routine, you should make sure that all the registers you have pushed onto the stack have also been popped from the stack. It is easy to make a mistake in this area, especially if the routine conditionally PUSHes and POPs any registers.

See Also

The Inline Assembler

The stack

Balancing the stack

Stack Overhead Reduction

Stack Overhead Reduction

Stack Overhead Reduction

There may be some instances where you wish to repeatedly call a very small SUB and this may produce a situation where the normally modest stack overhead may actually become a factor in the speed of the entire algorithm.

To help boost performance in such cases, PowerBASIC offers the often-overlooked GOSUB/RETURN statements, which can be used in place of a call to a SUB/END SUB block. Where stack overhead reduction is critical, you can create a Label in the code below the end of your normal code (but still within the current Sub/Function/Method/Property block).

You may then take the Inline Assembler code from the target SUB, and place it right after the Label. Finally, a RETURN statement is added so that execution resumes at the next instruction after the GOSUB. Such code would look something like this:

```
FUNCTION MyFunc() AS LONG
  ' Inline Assembler code
  GOSUB LABEL
  ' More Inline Assembler code
  EXIT FUNCTION ' or EXIT SUB

LABEL:
  ' Your Inline Assembler code
  RETURN
END FUNCTION  ' or END SUB
```

This technique is very efficient because the variables used in the Inline Assembler Sub/Function/Method/Property (that have been moved from a SUB, back into the calling code) are maintained within the same scope as the calling code, and can therefore be used without having to pass them on the stack. The result is that we have eliminated virtually all the stack overhead involved in repeatedly calling a SUB.

Finally, you can even use the standard Intel assembler notation !CALL and !RET within the Sub/Function/Method/Property, to jump to the Label and return from it to the next instruction. For example:

```
FUNCTION MyFunc() AS LONG
  ' Inline Assembler code
  ! CALL LABEL
  ' More Inline Assembler code
  EXIT FUNCTION ' or EXIT SUB

LABEL:
  ' Your Inline Assembler code
  ! RET
END FUNCTION  ' or END SUB
```

Finally, it is very important to note that you must **NEVER** exit a PowerBASIC procedure with the RET instruction. PowerBASIC procedures automatically perform their own stack cleanup (of local variables, etc) when an END SUB/FUNCTION/METHOD/PROPERTY or EXIT SUB/FUNCTION/METHOD/PROPERTY statement is executed, whereas an RET instruction would try to force a procedure exit without the internal stack cleanup being performed. A RET instruction cannot ever be used as a substitute for these BASIC statements.

In summary, your program will fail with a spectacular Stack Fault (GPF) if you attempt to terminate a PowerBASIC procedure with RET mnemonic.

See Also

The Inline Assembler

The stack

Balancing the stack

Tricks of the stack

Saving registers

Saving registers

Saving registers

When writing assembler code in 32-bit Windows, there is a convention that governs the use of registers so programmers can interact with the Windows API functions in a predictable and completely reliable way.

However, the registers available with an 80x86 processor are a very limited resource, and they are used by every application (process) running and also by the operating system itself. Therefore, a reliable method of using registers is very important to the process of writing reliable assembler code.

An 80x86 processor has eight general-purpose integral registers, EAX, EBX, ECX, EDX, ESI, EDI, ESP, and EBP. Of these, ESP and EBP are almost exclusively used to manage the entry and exit to a procedure, so there are effectively just six general-purpose registers available for application level programming.

Following on, the Windows convention splits the remaining registers so that 3 can be freely modified (EAX, ECX, and EDX) within the Sub/Function/Method/Property that uses them, while the other 3 must be preserved (EBX, ESI, and EDI) by the procedure. For the sake of this discussion, we'll refer to these two sets as *scratch* and *volatile* registers respectively.

In summary, PowerBASIC automatically preserves EBX, ESI, and EDI at the procedure level, but the programmer is responsible for preserving both the scratch and volatile registers within the procedure.

"Preserving the registers" does not necessarily mean that you must push all the registers on the stack, though that is the usual way of ensuring their safety. Simple routines might not modify any of the registers; in which case, you may not need to take any precautions. We use may because it's best to avoid making assumptions, especially with assembler programming. It is better to be safe than sorry. When in doubt, preserve (save and restore) all of the registers.

See Also

The Inline Assembler

Registers

Saving Registers at the procedure level

Saving the FPU registers

Tricks in preserving registers

Saving Registers at the Procedure level

Saving Registers at the Procedure level

To conform to the Windows programming conventions, PowerBASIC must provide a "safe" environment for the range of functions that are available. This is achieved by transparently preserving the three volatile registers at the start of each Sub/Function/Method/Property, and restoring these same registers before exit from the procedure. The following example shows approximately how PowerBASIC constructs the entry and exit of a procedure to preserve these registers:

```
SUB MySub(Params)
  ! PUSH EBX ' Automatically added by PowerBASIC
  ! PUSH ESI ' --"---
  ! PUSH EDI ' --"---

  ' the actual SUB code is placed here

  ! POP  EDI ' Automatically added by PowerBASIC
  ! POP  ESI ' --"---
  ! POP  EBX ' --"---
END SUB
```

When writing a procedure in PowerBASIC, we can safely predict that the EBX, ESI, and EDI registers will be *automatically* saved upon entry and restored upon exit from a procedure.

The virtue of code that observes these conventions is that it allows the programmer to safely assume that a call to any other procedure or API function is certain to follow the same register preservation rules for the EBX, ESI, and EDI registers. This helps ensure that writing Inline Assembler code in PowerBASIC will result in reliable and completely predictable code execution in terms of register use when calling PowerBASIC and API procedures.

The PowerBASIC compiler is also very efficient in the way it calls API system functions. For example, the following BASIC statement which calls the *SendMessage* API:

```
CALL SendMessage(hWnd&, %WM_COMMAND, 50, 100)
```

…is translated into assembly code in the compiled program, to resemble something like this:

```
PUSH 100
PUSH 50
PUSH %WM_COMMAND
PUSH hWnd&
CALL SendMessage
```

This direct low level translation is one of the main reasons why PowerBASIC programmers can easily mix API code and assembler code. However, when it comes to intermixing assembler and BASIC code within a procedure, the programmer must take additional care.

See Also

- The Inline Assembler
- Saving registers
- Using ESP and EBP
- Saving the FPU registers
- Tricks in preserving registers

Intermixing ASM and BASIC code

Intermixing ASM and BASIC code

There are special conditions with register preservation that apply when writing mixed assembler and BASIC code. PowerBASIC is a highly optimized compiler and among its optimizations are reductions in the stack overhead between BASIC code statements. Therefore, compiled PowerBASIC code is designed to expect that the EBX, ESI, and EDI registers will remain unchanged between lines of BASIC code.

This means that if your assembler algorithm uses any of the EBX, ESI, or EDI registers, you must preserve their original state from the last line of BASIC code that precedes the Inline Assembler code. This is, you must PUSH them before your ASM code, and POP them again right before the BASIC code commences.

This may appear to be more code than is necessary but it must be remembered that the internal structure of PowerBASIC does not duplicate the stack preservation that the application programmer must apply, so in terms of the stack overhead, the code is actually very efficient.

It should be noted that if your ASM code uses the EAX, ECX, or EDX registers, you should also preserve these as the internal execution of BASIC statements can also freely modify any of these three registers too.

The overall approach to preserving the registers around intermixed ASM and BASIC code is demonstrated in the following listing:

```
SUB TestProc(var1&, var2&)
  #REGISTER NONE     ' Ensure there is no conflict with
                     ' PowerBASIC Register variables

  ' Code that uses EAX ECX and EDX goes here
  [statements]
  ! PUSH EAX         ' Save the scratch registers
  ! PUSH ECX
  ! PUSH EDX
  [statements]
```

```
    ' Call an API function here
    [statements]
    ! POP EDX         ' Restore the scratch registers
    ! POP ECX
    ! POP EAX
    [statements]
    ' Other ASM code that uses EAX ECX and EDX goes here
    [statements]
    ! PUSH EBX        ' Save the volatile registers
    ! PUSH ESI
    ! PUSH EDI
    [statements]
    ' Other BASIC statements here, for example:
    var1 = var2 + 2^8 - COS(var2)
    [statements]
    ! POP  EDI        ' Restore from the stack
    ! POP  ESI
    ! POP  EBX
    [statements]
    ' More ASM code that relies on EBX, etc

  END SUB
```

Using this format ensures that you are writing "safe" code and that all of the utilized registers are preserved, because:

- The EBX, ESI, and EDI registers are preserved by the PowerBASIC compiler at the Sub/Function/Method/Property level.
- The EAX, ECX, and EDX registers are preserved by the application programmer around the API function call and the BASIC statements. This strategy ensures that EAX, ECX, and EDX registers are not overwritten (destroyed) by the function that is called.

With those points in mind, if there are no BASIC statements or API calls ***after*** the assembler code, preserving these registers is of no consequence. In this case, the automatic preservation code will take care of EBX, ESI, and EDI registers before the procedure terminates, and we can be sure that the calling code will also preserve the EAX, ECX, and EDX registers using the same conventions.

PROGRAMMING TIP: **As described above, the EBX, ESI, and EDI registers are automatically preserved at the start and exit of a procedure. Therefore, if you need to use registers for counters or to store other values in your Inline Assembler code, you may use any of the EBX, ESI, or EDI registers for this purpose as they are restored when the procedure terminates. This helps ensure efficiency and can result in even slightly faster code since we do not have to preserve extra registers each time the procedure is executed.**

See Also

The Inline Assembler

Registers

Data types in registers

MMX registers

Using ESP and EBP

Saving registers

Saving Registers at the Procedure level

Saving the FPU registers

Tricks in preserving registers

Using ESP and EBP

Using ESP and EBP

It is possible in PowerBASIC to write your own procedure within an existing Sub, Function, Method, or Property by manually coding the stack entry and exit. This is a complicated area of assembler coding where it is very easy to crash the entire operating system if the code is not written correctly. For example:

```
! CALL procname
' Other PowerBASIC code here
! JMP label       ; Jump over the procedure

procname:

! PUSH EBP        ; Preserve base pointer
! MOV EBP, ESP    ; Stack pointer into EBP

' Write your assembler code here

! MOV ESP, EBP    ; Restore stack pointer
! POP EBP         ; Restore base pointer
! RET

label:
' Other PowerBASIC code here
```

There are other methods of preserving both ESP and EBP depending on personal taste and calling conventions, but you must save and restore the states of both registers if you choose to use a procedure of this type. It is very important to note that ESP and EBP must always be preserved if they are to be altered, regardless of relative position of Inline Assembler code to BASIC statements.

See Also

- Registers
- MMX registers
- Saving registers
- Saving Registers at the Procedure level
- Data types in registers

Saving the FPU registers

Saving the FPU registers

Whereas the CPU has registers with fixed names (EAX, etc), the FPU (Floating-Point Unit or co-processor) has stack-like registers which are numbered according to their position in the stack: ST(0) {top}, ST(1), ST(2), …, ST(7) {bottom}. You deal with the FPU by loading a value onto the top of the FPU stack, or by storing the value held at the top of the stack. The latter operation may or may not involve removing the value from the stack.

Note the term loading is used to describe placing a value on the FPU stack, yet it operates more like a PUSH operation. In PowerBASIC, it is not a question of which FPU registers are available, but that four registers (or stack slots) are usually available for use by the programmer. If more are required, the stack should be saved and restored accordingly.

FSAVE/FRSTOR

To preserve the entire FPU stack, the mnemonics FSAVE and FRSTOR take care of preserving, and restoring, the FPU stack (respectively). These work in a similar way to the PUSHFD and POPFD CPU, but are notoriously slow to execute and FPU programmers often avoid their use unless necessary. However, they can be useful when starting to write FPU code since they guarantee the preservation and restoration of the FPU stack.

See Also

- The Inline Assembler
- Saving registers
- Saving Registers at the Procedure level
- Using ESP and EBP
- Tricks in preserving registers

Tricks in preserving registers

Tricks in preserving registers

When you are developing mixed assembler/API code, and you do not know what registers are used in the API functions, you can draw upon two pairs of assembler instructions that preserve *all* of the usual registers and the CPU flags as well: PUSHAD, POPAD, PUSHFD, and POPFD.

PUSHAD/POPAD

The first pair of mnemonics, PUSHAD and POPAD, save and restore the registers in a block. These mnemonics allow you to do things like display the value of a register in the middle of assembler code with a *MessageBox* API call.

```
' ...Assembler code
! PUSHAD
var& = 0
! MOV var&, EAX
MessageBox hWnd&,BYCOPY STR$(var&),"Test Value",%MB_OK
! POPAD
' ...More assembler code
```

It should be noted that the use of PUSHAD and POPAD in release code is less-than-optimal code design. That is, it does more work than is usually needed, but in the development stage, these two instructions can be very convenient.

PUSHFD/POPFD

If the code being tested has certain instructions, such as conditional jumps that depend on *flag* states within the processor, the other pair of block instructions to utilize is likely to be PUSHFD and POPFD. These preserve the state of the processor flags while code that may modify the flags is executed.

PROGRAMMING TIP: If the STD instruction is used to set the CPU direction flag, a CLD instruction must be executed before releasing control to a Windows API function or a BASIC statement.

See Also

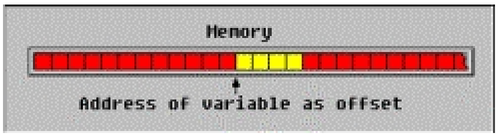
- ASM statement
- The stack

Addressing and pointers

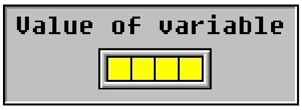
Addressing and pointers

An important distinction in assembler is the difference between the *address* of a variable and the *value* of a variable. The *address* of a variable is where it is located in memory; the *value* of a variable is what is stored at that address.

This is the ADDRESS of the variable in memory:



This is the VALUE at that address:



The method used in assembler to get the value at an address is a technique called *dereferencing*.

```
! MOV EAX, lpvar   ; Copy address into EAX
! MOV EAX, [EAX]   ; Dereference it
! MOV nuvar, EAX   ; Copy EAX into new variable
```

Using square brackets around EAX gives access to the information at the *address* in EAX. This is the case with any 32-bit register. A register enclosed in square brackets is effectively a memory operand. The size of the data accessed at the address is determined by the size of the register used to receive it. In the above example, it would be a 32-bit value since it uses a 32 bit register for the destination operand. Naturally, it can be done with 8 and 16-bit values as well using the correct size register.

Pointers

Pointers are a useful high-level language abstraction for passing addresses between procedures and performing other types of complex data manipulation.

In assembler, when you use an instruction like:

```
! LEA EAX, MyVar
```

…you have put the address of a variable into the EAX register. When you take the next step and put that address into a variable of its own, you will have a POINTER to the address:

```
! LEA EAX, MyVar
! MOV lpMyVar, EAX
```

The mechanics of this process are worth understanding as it can generate errors that are hard to track down when the technique is used incorrectly.

You can pass a pointer to another procedure either by its value:

```
! MOV EAX, lpMyVar     ; Copy the value into EAX
! PUSH EAX             ; Push it as a parameter
! CALL MyProcedure     ; Call the procedure
```

…or you can pass it by reference:

```
! LEA EAX, lpMyVar     ; Load the address into EAX
! PUSH EAX             ; Push it as a parameter
! CALL MyProcedure     ; Call the procedure
```

When you pass an address in this manner, you have added an extra level of indirection so at the procedure end, you have a reference to a reference to an address. To get the address in the procedure, you need to dereference the variable to get back the original address:

```
! MOV EAX, lpMyVar
```

```
! MOV EAX, [EAX]
```

The original address is now stored in EAX.

See Also

[The Inline Assembler]

[Effective addressing]

Effective Addressing

Effective addressing

The notation to calculate the effective address of data in memory can look complicated but it is in fact very clear and precise notation. In the range of allowable notation for Intel 80x86 assembler, an address in memory can be placed in a register and treated directly as a memory operand by enclosing it in square brackets.

```
! MOV EAX, lpArray ; Copy address into EAX
! MOV ECX, [EAX]   ; Copy 1st item in array into ECX
! ADD EAX, 4       ; Increment the array location by 4 bytes
! MOV ECX, [EAX]   ; Copy 2nd item in array into ECX
```

This works fine in simple situations where the register that has the address is manually incremented or decremented by the data size each time it is accessed, but there is a much more powerful and flexible technique available by using the standard Intel notation that is available.

The Intel 80x86 allows the following format to calculate the effective address of a value in memory:

```
[ Base Address + Index * Scale + Displacement ]
```

Base Address The register that has the starting address or *base address* of the array (or buffer) in memory.

Index The register used to determine the offset from the base address.

Scale The data size based multiplier for the index.

Displacement The additional offset adjustment from the base address.

For example:

```
[EBX + ECX * 4 + 8]

EBX is the Base Address
ECX is the Index
4   is the Scale based on the data size
8   is the Displacement in BYTES
```

Not all of the additional notation has to be used. For example, in a Byte array, you can just use the *base address* and the *index*:

```
! MOV AL, [EBX + ECX]
```

The advantage of this technique is that you set the base address once and vary the index. In the case above, ECX is the index. In terms of flexibility, you have the choice of varying the base address, the index, and the displacement so that you can access data in memory by a number of different methods that best suit your code.

The only difference when using data sizes larger than Byte is that you multiply the "index" by the "scale" of the data size:

```
! MOV EAX, [EBX + ECX * 4]
```

To make a practical example let us assume we have an array of 64 items that were each 32-bits in size, and we wanted to read the 16th member of that 32-bit array. In this case, we would copy the 16th member of the zero-based index into the register that we are using as the *index*. Next, copy the address of the array into the register that you are using as the *base address*, and finally read the value of the array member into another register.

```
! MOV ESI, lpArray         ; Base address register
! MOV ECX, 15              ; Zero-based index register
! MOV EAX, [ESI + ECX * 4] ; Copy the value into EAX
```

These three lines of code read the target value from the array into the EAX register.

If we wanted to compare the 16th and 17th members of the array and not have to use an additional register, we can add the required displacement so that we only have an extra line of code:

```
! MOV EAX, [ESI + ECX * 4]
! CMP EAX, [ESI + ECX * 4 + 4]
```

To compare the 17th and 18th members of the array, all we need to do is increment the index:

```
! INC ECX
```

Writing to the array is simply the reverse of reading it. With the same code as above:

```
! MOV ESI, lpArray          ; Base address register
! MOV ECX, 15               ; Zero-based index register
! MOV EAX, 1234
! MOV [ESI + ECX * 4], EAX
```

We can also write an *immediate* (literal) number to the array but it takes a slightly different notation:

```
! MOV DWORD PTR [ESI + ECX * 4], 1234
```

The extra notation "DWORD PTR" is because there is no way for the assembler to determine the data size from either the memory operand for the array or the immediate number. Specifying the size tells PowerBASIC what data size should be written to the address contained in the memory operand.

A very similar notation is used when an array is placed on the stack by creating a LOCAL variable. With a stack variable *MyArray*, PowerBASIC resolves this variable to an address on the stack, which will be something like this:

```
x& = VARPTR(Myarray(0)) ' first element
! mov edx, x&
! mov ecx, 3
! mov eax, [edx][ecx*4] ' assuming 32-bit integer

' eax = MyArray(3) ' 4th element of MyArray
```

See Also

The Inline Assembler

Addressing and pointers

Registers

Passing parameters

Passing parameters

Passing parameters

PowerBASIC 32-bit compilers pass all parameters to

by pushing them in sequence from right to left. This is always the case when a procedure uses the default calling conventions of (and its synonym STDCALL), or the C calling conventions of . However, if the optional calling conventions are specified, parameters are pushed from left to right, and the called code is responsible for cleaning up the stack frame before returning. PowerBASIC Subs ands Functions that use the BDECL convention automatically clean up the stack before returning execution to the calling code.

By default, PowerBASIC passes parameters by reference: a 32-bit

to the data. You can also pass most parameters by value, by declaring with the optional keyword.

When a parameter is passed by value, the actual value of the parameter is pushed on the stack.

> **Fixed-length strings, nul-terminated strings, and User-Defined Types/Unions may also be passed as BYVAL or OPTIONAL parameters, now. Try to avoid passing large items BYVAL, as it's terribly inefficient, and there is a maximum size limit of 64 Kb for a given parameter list. Arrays cannot be passed BYVAL.**

PowerBASIC automatically sets up a local "stack frame" at the beginning of each procedure in your program. As per standard conventions, the EBP register is used to address the parameters. The lowest parameter can be found at EBP+8, and subsequent parameters will be found in adjacent locations on the stack.

In assembler routines, it is easier and safer to access parameters by name rather than calculating their locations on the stack. However, it is important to remember the difference in accessing parameters passed by value and parameters passed by reference.

See Also

- The Inline Assembler
- Parameters passed by reference or by copy
- Parameters passed by value
- Passing arrays
- Passing dynamic strings
- Accessing PowerBASIC variables by name

Parameters passed by reference or by copy

Parameters passed by reference or by copy

When a parameter is passed by reference (the default method), PowerBASIC passes a 32-bit pointer on the stack. That pointer is the actual 32-bit offset, or memory location, of the variable to be utilized as a parameter. A 32-bit pointer occupies exactly four bytes of stack space. A parameter passed by reference is typically accessed in this way:

```
SUB MyProc(xyz&)    ' This will increment the
                    ' parameter variable by one
  ! PUSH EBX
  ! MOV  EBX, xyz&
  ! INC  DWORD PTR [EBX]
  ! POP  EBX
END SUB
```

Parameters passed by copy (such as expressions or constants) also take precisely 4 bytes on the stack. In this case, just as in parameters by reference, the item on the stack is not the value of the parameter. Rather, it is the address of a temporary location in memory where the value is stored. This may seem roundabout, but it has two distinct advantages. First, assembler routines can handle parameters

and in precisely the same way. Second, routines can modify the value of a parameter without altering the original variable in the main program.

Suppose the first and only parameter is a Long-integer. In that case, you can put the integral value into the ECX register by writing:

```
SUB MySub(xyz&)
  ! PUSH EBX
  ! MOV  EBX, xyz&   ; EBX is a pointer to xyz&
  ! MOV  ECX, [EBX]  ; ECX now contains xyz&
  ' ...more code would go in here
  ! POP  EBX
END SUB
```

In these cases, you must use the correct and complete address to access the value. But regardless of whether the parameter represents a variable, an expression, or a literal constant, or whether it was passed by reference or by copy, the routine will always work correctly.

See Also

- The Inline Assembler
- Passing parameters
- Parameters passed by value
- Passing arrays
- Passing dynamic strings

Parameters passed by value

Passing arrays

Passing arrays

Each array in your program has an associated array *descriptor*. This descriptor is saved in a proprietary format, which may change from version to version of PowerBASIC. Since most of the information in the descriptor in not relevant to assembler code, it is usually best to simply pass a pointer to the first element of the array instead. You can use the VARPTR function to retrieve that address. Subsequent elements of the array will immediately follow the first in memory, while multi-dimensional arrays are stored in column-major order.

In addition to the LBOUND and UBOUND functions, the ARRAYATTR function can be used to obtain array attributes and information on a given array.

See Also

- The Inline Assembler
- Passing parameters
- Parameters passed by reference or by copy
- Parameters passed by value
- Passing dynamic strings
- Accessing PowerBASIC variables by name

Passing dynamic strings

Passing dynamic strings

A dynamic string variable is defined as a 32-bit data item, which contains a pointer (or offset) to the string characters. When passed by value, the parameter is actually a 32-bit offset of the data. When passed by reference or by copy, the parameter is a pointer to another pointer that contains the offset of the actual string data. A dynamic string passed by reference is usually accessed in this way:

```
SUB MyProc(abc$)
! PUSH EBX
! MOV  EBX, abc$   ; EBX is a pointer to the string handle
! MOV  EBX, [EBX]  ; EBX is now a pointer to string data
! MOV  AL, [EBX]   ; AL contains the 1st char of the string
```

```
' more code could go here
! POP  EBX
END SUB
```

If you need to determine the current length of a dynamic string, there are two ways to do so. The end of string is always followed by a nul, CHR$(0), so it is possible to scan the string for the first occurrence. Of course, this will only work if there are no embedded nul bytes in the string data. An alternative method is to read the 32-bit Long-integer that immediately precedes the start of the string data, as the current length is always stored there.

PowerBASIC also calculates string literals in reverse order, in keeping with standard assembler operation. For example:

```
FUNCTION ab(x???) AS DWORD
  ! PUSH EBX
  ! MOV  EBX, x???
  ! MOV  DWORD PTR [EBX], "ABCD"
  ! POP  EBX
END FUNCTION
```

The above code stores the value &H41424344 in the DWORD variable *x*, passed from the calling code. However, since the Intel platform uses *little-endian* numeric data format, the actual bytes are written to memory in the reverse order. For example, if we were to call the code above, and examine the actual memory locations of the passed parameter after the function call, we can see the effect of the reverse memory storage:

```
DIM a AS STRING, x AS DWORD
CALL ab(x)
a = HEX$(x,8)          ' a = "41424344"
a = PEEK$(VARPTR(x),4) ' a = "DCBA"
```

See Also

The Inline Assembler

Passing parameters

Parameters passed by reference or by copy

Parameters passed by value

Passing dynamic strings

Accessing PowerBASIC variables by name

Accessing PowerBASIC variables by name

Accessing PowerBASIC variables by name

Most variables in a PowerBASIC module are visible to Inline Assembler code created with the ASM statement. You can reference LOCAL, STATIC, and GLOBAL variables by name by simply using the name as an operand of the assembler opcode. That isn't possible with INSTANCE, THREADED, array, and pointer variables, as their access requires multiple operations best handled by higher level PowerBASIC code. You can also reference procedure parameters by name, though you must differentiate between parameters passed by reference (

), and those passed by value ( ). Any variable referenced in an assembly-language statement must be defined prior to use.

```
SUB DoStuff (BYVAL c&)
  LOCAL a%, b$
  a% = 7              ' Local variable a%
  ! PUSH EBX
  ! MOV  AX, a%       ; Move value to AX
```

```
    ! ADD  a%, AX      ; Add value back to a%
    b$ = "LINDA"       ' Local variable b$
    ! MOV  EBX, b$     ; Address of b$
    ! MOV  [EBX], "l"  ; Put lowercase "l" in first position
    ! MOV  EAX, c&     ; Put c& into EAX
    ! INC  EAX         ; Increment its value
    ! MOV  c&, EAX     ; Put it back
    ! POP  EBX
  END SUB
```

See Also

[The Inline Assembler]

Commenting Assembly code

Commenting Assembly code

On assembly code lines, a semi-colon (;) is typically used for comments, although an apostrophe (') is still valid. For example:

```
  SUB KerPlunk
    ASM PUSH EBX           ; Save EBX
    ASM MOV  EAX, 5        ; Put 5 into EAX
      ! MOV  EBX, &HFF     ; Put FFh into EBX
      ! ADD  EAX, EBX      ' EAX = EAX + EBX
      ! POP  EBX           ' Restore EBX
  END SUB
```

See Also

[The Inline Assembler]

Resource Files

What is a Resource File?

What is a Resource File?

A resource file may contain a collection of icons, menus, dialog boxes, strings tables, user-defined binary data and other types of items.

Once compiled into a suitable format, a resource file can be embedded directly into an executable or DLL file, **producing a single EXE or DLL containing both code and resources**. At run-time, the application can use the resource items in the embedded file. The process of creating a resource is straightforward, and is similar to compiling a PowerBASIC program.

While resource files are still supported, usage of the #RESOURCE metastatement simplifies adding resources to your program or DLL. With the #RESOURCE metastatement you can add resource data inline, right in your basic source code. There is no need to create a resource file, compile it, and then link it into your source. All this done automatically when you use the #RESOURCE metastatement.

The following sections describe the (manual) techniques involved in compiling resource scripts into a usable format, and describe the Resource Script.

See Also

[Resource Editors](#)

[Resource Compiling](#)

[Resource Scripts](#)

[Converting a .RC to a .RES](#)

[#RESOURCE metastatement](#)

[RESOURCE$ function](#)

Resource Editors

Resource Editors

The most popular technique is to use a Resource Editor. A Resource Editor is a tool that lets you design and test dialog boxes visually, instead of defining individual dialog statements in a resource script by hand. Using a Resource Editor, you can add, modify, rearrange, and delete controls and resources in a resource script file.

Resource Editors such as Microsoft's "Visual Studio" and Borland's "Resource Workshop" also make it easy to place string tables, version info tables, bitmaps, icons, and other types of resources into a resource script.

See Also

What is a Resource File?

Resource Compiling

Resource Scripts

#RESOURCE metastatement

Resource File Compiling

Resource File Compiling

We begin with a plain text file and compile it into a binary format that can be utilized by PowerBASIC. The plain text file is termed a Resource Script and these are stored with a .RC file extension. A Resource Compiler is then used to create a binary (.RES) file.

The PowerBASIC IDE can be loaded with a Resource Script (.RC file) and compile the script into PowerBASIC resource file format. This is performed using the regular Compile Current File button or the RUN | Compile File menu item.

Once a .RES file has been created, it can be embedded into an application EXE or DLL simply by using a #RESOURCE metastatement. During compilation, PowerBASIC automatically embeds the resource file to create a single file that contains compiled code and resources.

```
#RESOURCE RES, "DIALOGS.RES"
```

Previous version of PowerBASIC also generated a .PBR (PowerBASIC resource file) when compiling an .RC file. The #RESOURCE metastatement still supports this format. You can enable .PBR generation for backward compatibility when compilng an .RC file by selecting the "Create a .PBR when compiling .RC files" option on the compiler options tab.

See Also

What is a Resource File?

[Resource Editors](#)

[Resource Scripts](#)

[#RESOURCE metastatement](#)

Resource Scripts

Resource Scripts

A resource script (.RC) file contains statements that define all of the items that will be included in the compiled binary resource file. Each statement describes a resource item, along with an identifier (*ID*) and any additional parameters (which vary according to the type of resource). A resource script can even reference a resource item that is stored in a separate file, such as a bitmap or icon.

A resource identifier can be numeric in the range 0 to 65535, or alphanumeric. When a PowerBASIC application needs to use a resource from the embedded resource file, it uses the resource's ID to identify it.

Hand-written scripts

There are several ways to create a resource script (.RC) file. The first technique is to write the file by hand, using a text editor like Notepad. This method is quite suitable for creating small resource scripts containing only a handful of statements.

Here is an example of a small handwritten resource script containing an icon and a version information block:

```
#include "resource.h"
ICON1 ICON "MYICON.ICO"
VS_VERSION_INFO VERSIONINFO
FILEVERSION 1, 5, 0, 0
PRODUCTVERSION 1, 5, 0, 0
FILEOS VOS_WINDOWS32
FILETYPE VFT_APP
BEGIN
  BLOCK "StringFileInfo"
  BEGIN
    BLOCK "040904E4"
    BEGIN
      VALUE "CompanyName",      "PowerBASIC, Inc.\000"
      VALUE "FileDescription",  "Program description\000"
      VALUE "FileVersion",      "01.50.0000\000"
      VALUE "InternalName",     "MYPROG\000"
      VALUE "OriginalFilename", "MYPROG.EXE\000"
      VALUE "LegalCopyright",   "Copyright (c) 2008 PowerBASIC, Inc.\000"
      VALUE "LegalTrademarks",  "PowerBASIC is a trademark of PowerBASIC,_
                                 Inc.\000"
      VALUE "ProductName",      "MYPROG\000"
      VALUE "ProductVersion",   "01.50.0000\000"
      VALUE "Comments",         "Example for Windows 95/98/NT/XP/Vista.\000"
    END
  END
END
```

This script defines two resource items, whose alphanumeric IDs are ICON1 and VS_VERSION_INFO respectively. In this case, the actual icon binary data is stored in a separate file (MYICON.ICO). During compilation, the resource compiler takes the necessary information from the ICO file and includes it in the binary resource file it creates.

Complete details of the resource script language syntax and features can be found at http://msdn.microsoft.com/en-us/library/aa381042.aspx

See Also

What is a Resource File?

Resource Editors

Resource Compiling

#RESOURCE metastatement

Converting a .RC to a .RES

Converting a .RC to a .RES

Using the IDE

Firstly, ensure that the PowerBASIC IDE's OPTIONS dialog is configured to correctly point to the RC.EXE and PBRES.EXE files. Once configured, the IDE can automatically compile a .RC into a .RES file. When the "Create a .PBR when compiling .RC files" option on the compiler options tab is selected the IDE will also produce a .PBR file from the .RES file. This is achieved in one simple step: simply load the .RC file into the IDE and select Compile.

Using the command-line Resource Compiler

To compile the .RC file, we need to run the Resource Compiler from a DOS box (command-line) to create the binary (.RES) resource file.

The resource compiler takes the filename of your modified (.RC) resource script file as a parameter, and produces a new 32-bit .RES file. For example:

```
C:\PB\BIN\RC.EXE MYAPP.RC
```

Note that you may need to change the path name to suit your individual settings. At this point, you should have a compiled binary resource file (i.e., MYAPP.RES), ready to be used with the #RESOURCE metastatement.

See Also

What is a Resource File?

Resource Editors

Resource Compiling

Resource Scripts

#RESOURCE metastatement

Working with Visual Basic

Visual Basic Data Types

Visual BASIC Data Types

Both Visual Basic and PowerBASIC support the following data types: Byte, Integer, Long-integer, Single-precision float, Double-precision float, Currency, User-Defined Type, Fixed-length string, Dynamic string, and Variant. Both products also support arrays of all data types.

PowerBASIC also supports the following data types, which Visual Basic does not: Word, Double-word, Quad-integer, Extended-currency, STRINGZ string, Unions, and Pointers.

- Currency
- Strings
- User-Defined Types
- Variants
- Arrays
- SafeArrays

See Also

Comparative Data Types To Visual Basic 6

VB Run-time errors when calling a PowerBASIC DLL

VB Run-time errors when calling a PowerBASIC DLL

There is one common and avoidable error that may be encountered when first attempting to use a PowerBASIC DLL with a Visual Basic application: Error 48 "Error in loading DLL" or "DLL not found".

In almost all circumstances involving this VB error, the problem is not that VB cannot find the DLL, rather, that VB is not able to locate the specified Sub/Function inside the DLL. When this occurs, the problem is very likely to be due to mismatching capitalization of the Sub/Function and the VB Declare statement, or the Sub/Function has not been

from the DLL.

To remedy these situations, either add an explicit

clause to the Exported PowerBASIC Subs and Functions to ensure that the exported name matches the VB Declare, or capitalize the VB Declare Sub/Function name. The latter solution works because PowerBASIC capitalizes all exported procedure (Sub, Function, Method, and Property) names that do not have an explicit ALIAS clause. For more information, please refer to the FUNCTION, SUB, METHOD, and PROPERTY topics.

In addition, VB Errors 53 and 453 may sometimes be resolved by the addition of an ALIAS clause.

In the design environment, it is common practice to provide an explicit path to the DLL in the LIB clause of the VB Declare statement. In the final "distribution" version, such explicit paths should be removed from the VB Declare statements. When the paths are omitted, Visual Basic use the following strategy to try to locate the DLL:

1. Directory containing the calling EXE
2. Current directory
3. Windows 32-bit system directory
4. Windows 16-bit system directory
5. Windows directory
6. Folders specified in the PATH environmental variable

Therefore, it is also possible that certain VB run-time errors (especially in the design environment) may be attributed to VB failing to locate the DLL, or that VB may be loading the wrong version/copy of the DLL. When debugging such issues, place the DLL in the appropriate VB project directory, and all rename or delete any other copies.

Problems calling DLLs, or General Protection Faults (GPFs) when the application runs/closes can often be attributable to errors in the Visual Basic declarations. Visual basic declarations should generally be placed in the declarations section of a Visual Basic module, rather than elsewhere in the project to avoid scoping issues. Declarations in a module should not use the Private Declare syntax.

General Protection Faults (GPFs) may also occur when incorrect parameters or passing methods are used with the DLL. Another source of GPF problems can occur if passed arrays are referenced beyond their boundaries from within the DLL code.

See Also

Visual Basic Data Types

Optimizing your code

Optimizing your code

Internally, the DOS and 32-bit Windows operating systems are very different. DOS applications run in 16-bit "Real Mode", which means that the largest single data object is 64 Kilobytes (the largest 16-bit value is 65535). And because of the way "memory segmentation" works, the total addressing space available in

"Real Mode" is a little over 1 Megabyte. Since the CPU is running in 16-bit mode (Real mode), numeric operations are fastest when variables are 16-bits (Integers and Words).

In contrast, 32-bit Windows runs in "Protected Mode", and the largest single data object is two Gigabytes (the largest 32-bit value is actually four Gigabytes, but the operating system reserves half of that for itself). Because the CPU is running in 32-bit mode (Protected mode), numeric operations are fastest when variables are 32-bits (Long-integers and Double-words).

Use 32-bit Variables

As you move your DOS code into PowerBASIC, you should replace all "Integer" and "Word" variable types with Long-integers and Double-words respectively - particularly in FOR/NEXT loops and integral-class math calculations. It actually takes the CPU longer to perform a calculation on a 2-byte Integer than it does with a 4-byte Long-integer, and it takes even longer with single byte variables.

Use Register Variables

Register variables are variables that are stored directly in specific CPU registers, rather than in application memory. Since data in a CPU register can be accessed much faster, and with less code, Register variables are valuable optimization tools.

Register variables are always local to the Sub, Function, Method, or Property where they appear. In the current version of PowerBASIC, there may be up to two integral-class Register variables (Word/Dword/Integer/Long), and up to four Extended-precision floats. It is possible that future versions of the compiler will change these limits, so you may declare an unlimited number of them. Any "extra" Register variables are automatically reclassified as locals.

The REGISTER statement allows you to choose which variables will be classified as Register variables. If you do not make the choice in a particular procedure, the compiler will attempt to choose for you. By default, the compiler will always assign the first two integral-class local variables available. Extended-precision float variables will be automatically assigned only in functions that contain no external function calls.

integral class Register variables are most efficient for variables that are updated or used often, such as For/Next loop counter variables, and variables that are used repeatedly as array indexes. Floating-point Register variables should generally be chosen with a bit more caution, since the compiler must generate code to save and restore them to conventional memory around each call to a procedure. In some rather rare cases, it is possible that floating-point Register variables could actually reduce execution speed. However, they are extremely valuable with intensive floating-point calculations and in functions that have few references to other procedures.

Due to the design of FPUs (floating point units), and the instruction sets available, the first float register variable declared in your program has far more optimization possibilities than the others do. Use care in choosing the variable which is used most within floating-point expressions (that is, on the right side of the '=' assignment operator), in order to gain the greatest advantage in execution speed. Also, remember it is typically valuable to assign floating-point numeric constants to Register variables when they are used in repetitive or intensive calculations.

You must use care with Inline Assembler floating-point opcodes in procedures that enable Register variables. Floating-point Register variables may occupy up to four of the FPU registers, so you must limit your use of the x87 registers to the remaining four. Further, floating-point Register variables may never be referenced by name from Inline Assembler code, as the compiler cannot always track the register locations with absolute certainty.

Register variables are preserved when a call to an external DLL or API function is made. Register variables are automatically thread-safe too.

Because Register variables are stored within the CPU, it is not possible to use VARPTR on a register variable. When passing a register variable to a procedure BYREF, the compiler temporarily converts the register variable into a memory variable, and reloads the register variable upon return from the procedure call. The overhead that this adds is insignificant.

See Also

Keyword Reference

Keyword Quick Finder

Keyword Quick Finder

% # A B C D E F G H I J K L M N O P R S T U V W X

%

%DEF operator

%PB_COMPILETIME numeric equate

#

#ALIGN metastatement

#BLOAT metastatement

#COM metastatement

#COMPILE metastatement

#COMPILER metastatement

#DEBUG CODE metastatement

#DEBUG DISPLAY metastatement

#DEBUG ERROR metastatement

#DEBUG PRINT metastatement

#DIM metastatement

#EXPORT metastatement

#IF/#ELSEIF/#ELSE/#ENDIF metastatements

#INCLUDE metastatement

#LINK metastatement

#MESSAGES metastatement

#OPTIMIZE metastatement

#OPTION metastatement

#PAGE metastatement

#PBFORMS metastatement

#REGISTER metastatement

#RESOURCE metastatement

#STACK metastatement

#TOOLS metastatement

#UNIQUE metastatement

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

R

S

T

U

V

W

X

Keyword Reference

Keyword Reference

This section contains an alphabetical listing of all of the PowerBASIC keywords. Each entry goes into specific detail about each command, and is cross-references to other relevant commands. The Programming Reference topics in this help file describe theory and example usage of a selection of essential commands.

The commands can be classified into four primary categories, according to their syntactic class: functions, statements, system variables, and metastatements:

Functions

These are predefined PowerBASIC functions, as opposed to user-defined functions. Functions generally return either a

or a value, and these can be used within a more complex expression. Most functions require the program pass one or more arguments to them; these arguments being numeric or string, or combinations thereof, depending on the function. For example:

```
T = COS(3.1!)
sResult = FORMAT$(T)
A$ = CHR$(123, "hello", 65, 66, 67, 65 TO 97)
```

Statements

Statements are building blocks that make up programs. They instruct the compiler to perform specific actions, such as opening a file, setting the date, sending data to a device, etc. Statements do not return a value, but often take one or more arguments. Each statement must appear on a line by itself; or be separated from other program elements with a delimiting colon (:) character. For example:

```
A& = A& + 10& : B$ = "PowerBASIC"
OPEN "A Long Filename.txt" FOR BINARY AS #1
Count& = 100
```

System variables

System variables allow a program to interact with the system (in this sense, "system" means the computer, the operating system, the internal run-time code, etc). System variables are predefined by PowerBASIC, and can be used to access and control certain information maintained by the system. For example:

```
A$ = DATE$
DATE$ = "03-03-2003"
ErrVal = ERRCLEAR
B$ = TIME$
TIME$ = "03:00"
```

Metastatements

Metastatements are instructions that control the action of the PowerBASIC compiler. Strictly speaking, metastatements are not part of the BASIC language because they do not operate at run-time (when the program is executing). Like compiler option-switches, metastatements can be used to determine how the compiler will operate during the compilation of program code (compile-time).

Metastatements are prefixed with a number (#) symbol to differentiate them from normal statements. Metastatements may take one or more arguments. For example:

```
#COMPILE EXE "The target filename.exe"
#OPTION VERSION4
#DIM ALL
#INCLUDE "WIN32API.INC"
```

Please note that PowerBASIC supports both the dollar ($) symbol and a the pound (#) symbol as a metastatement prefixes.

See Also

Format and typefaces

Command Summary

Format and typefaces

Format and typefaces

Every PowerBASIC command is listed alphabetically, as a separate topic. Each entry contains a brief explanation of what the command does, a description of its syntax, clarifying remarks and restrictions, plus examples of use. The examples are designed to be indicative of syntax and usage only.

The *syntax* section of each entry describes the available options and format each command may use, as follows:

Italic	Indicates areas within commands that you need to fill in with application-specific information, such as variable names, procedure names, numeric or string values, etc. For example: **y = VAL(*string_expression*)**
UPPERCASE	Indicates part of the command must be entered exactly as shown. For example: **OPTION EXPLICIT**
Brackets [ ]	Indicates the information they enclose is optional. For example: **SEEK [#] *filenum&*, *position&&*** If the brackets enclose multiple items, any number of them may be omitted. When one is omitted, all following items in that group must also be omitted. For example: **CONTROL ADD GRAPHIC, *hDlg*, *id&*, "", *x&*, *y&*, *nWide&*, *nHigh&*[, [*style&*] [, [*exstyle&*]]] [[,] CALL *CtrlCallback*]**
Brackets with vertical bar [|]	Indicates a choice of two or more options. You may choose one or none. **DIALOG NEW [PIXELS, | UNITS,] ...**
Braces with vertical bar { | }	Indicates a choice of two or more options, one of which MUST be used. For example: **#DIM {ALL | NONE}**
Ellipses ...	Indicates that part of the command can be repeated as many times as required. For example: **MACRO *macroname* [(*prm1*, *prm2*, ...)] = *replacementtext***

See Also

Keyword Reference

Command Summary

Command Summary

Command Summary

Command Summary

The following is a list of the commands built into the compiler and separated into 18 groups of related commands, which can assist with identifying the best command for the task at hand. Some commands may appear in more than one group.

Command List

- Array Operations
- Collection Objects
- COM Commands
- Communication Control
- Compiler Operations
- Debugging and Error Control
- File Commands
- Flow Control
- Graphic Commands
- Input Commands
- Memory Management
- Metastatements
- Numeric Operations
- Operating System
- Printing Commands
- String Operations
- Thread Control
- Time Commands
- Misc Operations

See Also

- Keyword Reference
- Format and typefaces

Array Operations

Array Operations

The following functions can be used to manipulate and manage arrays:

#DEBUG ERROR	Control generation of error checking code
#DIM	Specify if variables must be declared before use
ARRAY ASSIGN	Assign a number of values to successive elements of an array
ARRAY DELETE	Delete a single item from a given array
ARRAY INSERT	Insert a single item into a given array
ARRAY SCAN	Scan all or part of an array for a given value
ARRAY SORT	Sort all or part of a given array
ARRAYATTR	Return descriptive attributes of a given array
BIT CALC	Set or reset a bit in an implied bit-array
BIT	Return the value of a particular bit in an implied bit-array
BIT	Manipulate individual bits of an implied bit-array

DATA	Declare an array of constants to be read by READ$
DATACOUNT	Return the total count of the number of local data items
DIM	Declare and dimension arrays, scalar variables, and pointers
ERASE	Deallocate array memory
FILESCAN	Rapidly scan an open file, before loading into an array with GET
GET	Read a complete array from a binary file
IPowerArray.ARRAYBASE	Returns the address of the first element of the array.
IPowerArray.ARRAYDESC	Returns the address of the SAFEARRAY descriptor.
IPowerArray.ARRAYINFO <Get>	Retrieves the info string, if one is present.
IPowerArray.ARRAYINFO <Set>	Assigns the info string.
IPowerArray.CLONE	An exact duplicate of the SafeArray is created, and stored in the specified PowerArray object.
IPowerArray.COPYFROMVARIANT	An exact copy is made of the specified SafeArray and stored in this PowerArray object.
IPowerArray.COPYTOVARIANT	An exact copy is made of the SafeArray in this object and stored in the specified Variant.
IPowerArray.DIM	Dimensions (creates) a new array.
IPowerArray.ELEMENTPTR	Retrieves the address of the specified data element.
IPowerArray.ELEMENTSIZE	Retrieves the storage size (in bytes) of each data element of the array.
IPowerArray.ERASE	Destroys the contained array and empties the object.
IpowerArray.LBOUND	Retrieves the lower bound number for the dimension specified.
IPowerArray.LOCK	Increments the lock count of the SAFEARRAY.
IPowerArray.MOVEFROMVARIANT	Transfers ownership of the specified SafeArray to the PowerArray object.
IPowerArray.MOVETOVARIANT	Transfers ownership of the SafeArray contained in this PowerArray object to a variant parameter.
IPowerArray.REDIM	Allows the SafeArray to be erased and re-dimensioned to a new size.
IPowerArray.REDIMPRESERVE	Allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved.
IPowerArray.RESET	All elements in the SafeArray are set back to their initial, default value.
IPowerArray.SUBSCRIPTS	Retrieves the number of dimensions (subscripts) for this array.
IPowerArray.UBOUND	Retrieves the upper bound number for the dimension specified.
IPowerArray.UNLOCK	Decrements the lock count of the SAFEARRAY.
IPowerArray.VALUEGET	Retrieves the value of the specified array element.
IPowerArray.VALUESET	Assigns the specified value to the specified array element.
IPowerArray.VALUETYPE	Retrieves the %VT code which describes the data contained in this array.
JOIN$	Return a consisting of all of the strings in a string array
LBOUND	Return the lowest subscript of an array's specific dimension
LET	Assign a Variant to an array or an array to a Variant
LINE INPUT#	Read line(s) from a sequential file into a string variable or array
MAT	Matrix calculations on arrays
PARSE	Parse a string and extract all delimited fields into an array
PRINT#	Write a complete array to a sequential file
PUT	Write a complete array to a binary file
READ$	Retrieve string data from a local DATA list
REDIM	Declare dynamic arrays, allocate, reallocate, deallocate memory
RESET	Set an array subscript or an entire array to zero or null/empty
UBOUND	Return the highest subscript of an array's specific dimension

Collection Objects

Collection Objects

The following operations provides a convenient way to refer to a related group of items:

ILinkListCollection.ADD	An item is added to the end of the LinkListCollection.
ILinkListCollection.CLEAR	All items are removed from the LinkListCollection.
ILinkListCollection.COUNT	Returns the number of data items currently contained in the LinkListCollection.
ILinkListCollection.FIRST	Sets the index to the first item and returns the previous value.
ILinkListCollection.INDEX	Sets the index value and returns the previous value.
ILinkListCollection.INSERT	An item is added to the LinkListCollection at the specified position.
ILinkListCollection.ITEM	Returns the item at the position specified in the LinkListCollection.
ILinkListCollection.LAST	Sets the index value to the last item and returns the previous value.
ILinkListCollection.NEXT	Returns the next item in the LinkListCollection.
ILinkListCollection.PREVIOUS	Returns the previous item in the LinkListCollection.
ILinkListCollection.REMOVE	Removes the item at the specified position from the LinkListCollection.
ILinkListCollection.REPLACE	Replaces the item at the specified position with a new item in the LinkListCollection.
IPowerCollection.ADD	An item and key is added to the end of the PowerCollection.
IPowerCollection.CLEAR	Removes all items and keys from the PowerCollection.
IPowerCollection.CONTAINS	Scans the PowerCollection for the specified key.
IPowerCollection.COUNT	Returns the number of data items currently contained in the PowerCollection.
IPowerCollection.ENTRY	Returns the PowerCollection item specified by the Index number.
IPowerCollection.FIRST	Sets the index to the first item and returns the previous value.
IPowerCollection.INDEX	Sets the index value and returns the previous value.
IPowerCollection.ITEM	Returns the item associated with the specified key in the PowerCollection.
IPowerCollection.LAST	Sets the index to the last item and returns the previous value.
IPowerCollection.NEXT	Returns the next item in the PowerCollection.
IPowerCollection.PREVIOUS	Returns the previous item in the PowerCollection.
IPowerCollection.REMOVE	Removes the item associated with the specified key from the PowerCollection.
IPowerCollection.REPLACE	Replaces the item associated with the specified key with a new item.
IPowerCollection.SORT	The data items in the PowerCollection are sorted based upon the text in the associated keys.
IQueueCollection.CLEAR	All items are removed from the QueueCollection.
IQueueCollection.COUNT	Returns the number of data items currently contained in the QueueCollection.
IQueueCollection.DEQUEUE	The item at the "oldest" position in the QueueCollection is returned.
IQueueCollection.ENQUEUE	The specified item is added to the QueueCollection at the "newest" position.
IStackCollection.CLEAR	All items are removed from the StackCollection.
IStackCollection.COUNT	Returns the number of data items currently contained in the StackCollection.
IStackCollection.POP	The item at the "Stack-Top" (the item most recently added) is returned.
IStackCollection.PUSH	The specified item is added to the StackCollection at the "Stack-Top" position.

COM Commands

COM Operations

The following functions can be used to create and manage COM clients:

#COM DOC	Specifies a help string which usually provides a general description of the COM server.

#COM HELP	Specifies the name of the associated help file and the help context code.
#COM NAME	Specifies the name of the server and the version number.
#COM GUID	Specifies the GUID which identifies the entire application or library (APPID or LIBID).
ACODE$	Translate a Unicode into an ANSI string.
CLASS/END CLASS	Create the code and data for an object.
CLSID$	Return a 16-byte (128-bit) GUID string containing a CLSID.
ENUM/END ENUM	Creates a group of logically related numeric equates.
EVENT SOURCE	Declare an event interface within a Class definition.
EVENTS	Attach or detach an event handler to/from an event source.
FOR EACH/NEXT	Define a loop of program statements which can sequentially examine and act upon each member of a PowerCollection or LinkListCollection.
GUID$	Return a 16-byte (128-bit) Globally Unique Identifier GUID.
GUIDTXT$	Return a 38-byte human-readable GUID/UUID string.
IDISPINFO	Sets and returns additional information about certain Dispatch Status Codes for the OBJRESULT function.
INSTANCE	Declare INSTANCE variables which are unique to each object.
INTERFACE / END INTERFACE Block (Direct)	Declare a direct object interface and its member Methods/Properties.
INTERFACE/END INTERFACE block (IDBind)	Declare a dispatch interface and its member Methods/Properties for the purposes of IDBinding to a Dispatch COM interface.
ISINTERFACE	Determine whether an object supports a particular interface.
ISNOTHING	Determine the current status of a given object variable.
ISOBJECT	Determine the current status of a given object variable.
LET (with Objects)	Assign an object reference to an object variable.
LET (with Variants)	Assign a value to a variable or Variant.
ME	A pseudo object variable to reference the current object.
METHOD / END METHOD	Define a METHOD procedure within a class.
MYBASE	A pseudo object variable to reference the inherited parent object.
OBJACTIVE	Return True/False of the running state of a COM EXE object.
OBJECT GET	Retrieve or read the value of an Dispatch Interface member Property.
OBJECT LET	Assign or write a value to an Dispatch Interface member Property.
OBJECT SET	Assign or write a value to an Dispatch Interface member Property that contains a reference to an object.
OBJECT CALL	Call or execute a member Method of an Dispatch Interface.
OBJECT RAISEEVENT	Call or execute a member Method of an event Dispatch Interface.
OBJEQUAL	Check if object variables refer to the same object.
OBJPTR	Return an object pointer of a specified object variable.
OBJRESULT	Return the execution result of the most recent OBJECT statement.
OBJRESULT$	Returns a string which describes an OBJRESULT (hResult) code.
PROGID$	Return the alphanumeric PROGID string (text) of a given CLSID.
PROPERTY GET	Retrieve a data value from the object.
PROPERTY SET	Assign a data value to an object.
RAISEEVENT	Call Event Handler code.
RESET	Clear a Variant to empty (%VT_EMPTY).
UCODE$	Translate an ANSI string into a Unicode string.
VARIANT#	Return the numeric value contained in a Variant variable.
VARIANT$	Return the ANSI dynamic string value contained in a Variant variable.
VARIANT$$	Returns the Unicode string value contained in a Variant variable.
VARIANTVT	Determine the internal data type of the data stored in a Variant.

Communication Control

Communications Control

The following functions can be used for external communications:

COMM	Retrieve the value or status of a communications parameter
COMM CLOSE	Close an open serial port
COMM LINE	Receive a CR/LF terminated "line" of data from a serial port
COMM OPEN	Open a serial port
COMM PRINT	Send a "line" of binary data through a serial port
COMM RECV	Receive binary data from a serial port
COMM RESET	Disable flow control for a given serial port
COMM SEND	Send a of binary data through a serial port
COMM SET	Set communication options for a serial port
COMM TIMEOUT	Places a limit on the time to complete a COMM operation.
EOF	Return end-of-file status of a file, serial or TCP/UDP transmission
FREEFILE	Return the next available PowerBASIC file number
HOST ADDR	Translate a host name into a corresponding IP address
HOST NAME	Translate an IP address into a corresponding host name
OPEN	Prepare a file or device for reading or writing
TCP ACCEPT	Accept an incoming request for TCP communication
TCP CLOSE	Close a previously opened TCP/IP port
TCP LINE INPUT	Receive a line of text from a specified TCP/IP port
TCP NOTIFY	Designate which TCP/IP events generate notification messages
TCP OPEN	Enable an app to communicate with a TCP/IP server or client
TCP PRINT	Write a string to a nominated TCP/IP
TCP RECV	Receive data from a specified TCP/IP port
TCP SEND	Write a string to a nominated TCP/IP port
UDP CLOSE	Close a previously opened UDP socket
UDP NOTIFY	Designate which TCP/IP events generate notification messages
UDP OPEN	Create a socket to communicate with a UDP server or client
UDP RECV	Receive data from a previously opened UDP port
UDP SEND	Send a string of data through a previously opened UDP socket

Compiler Operations

Compiler Operations

The following functions manipulate the compiler's operation:

#ALIGN	Align the next instruction to a boundary.
%DEF	Determine if an equate has been previously defined
%PB_COMPILETIME	Contains the date and time of compilation.
#BLOAT	Artificially inflate the disk image size of a compiled program
#COMPILE	Determine which type of file will be created by the compiler
#DEBUG CODE	Compiler directive to suppress generation of debugging code
#DEBUG	Display a message when an untrapped run-time error occurs.

DISPLAY	
#DIM	Specify if variables must be declared before use
#EXPORT	Declare a Sub/Function to have the EXPORT attribute.
#IF	Define sections of source code to be compiled or ignored
#LINK	Link a pre-compiled Static Link Library (SLL) into your host program.
#MESSAGES	Specify which messages should be sent to a Control Callback Function
#OPTIMIZE	Choose the optimization which should be applied to your program.
#OPTION	Establish various compiler options.
#REGISTER	Control automatic allocation of Register variables
#STACK	Set the maximum potential stack size
#TOOLS	Enable/disable integrated development tools in compiled code
#UNIQUE	Specify whether unique variable names are required.
DECLARE	Explicitly declare a Sub or Function
DEFBYT	Declare the default variable type to be Byte
DEFCUR	Declare the default variable type to be Currency
DEFCUX	Declare the default variable type to be Extended Currency
DEFDBL	Declare the default variable type to be Double-precision
DEFDWD	Declare the default variable type to be Double-word
DEFEXT	Declare the default variable type to be Extended-precision
DEFINT	Declare the default variable type to be Integer
DEFLNG	Declare the default variable type to be Long-integer
DEFQUD	Declare the default variable type to be Quad-integer
DEFSNG	Declare the default variable type to be Single-precision
DEFSTR	Declare the default variable type to be String
DEFWRD	Declare the default variable type to be Word
DIM	Declare and dimension arrays, scalar variables, and pointers
DLLMAIN	Function called by Windows each time a DLL is loaded into, and unloaded from, memory
ERASE	Deallocate array memory
GLOBAL	Declare global (shared) variables between Subs, Functions, Classes, Methods, and Properties
INSTANCE	Declare Instance variables which are unique to each object
LIBMAIN	Function called by Windows each time a DLL is loaded into, and unloaded from, memory
LOCAL	Declare local variables in a Sub, Function, Method or Property
MACRO	Define a single or multi-line text substitution block
OPTION EXPLICIT	Force explicit declaration of all variables
PBLIBMAIN	Function called by Windows each time a DLL is loaded into, and unloaded from, memory
PBMAIN	Define the initial entry-point Function for an application
PREFIX/END PREFIX	Executes a series of statements, each of which utilizes pre-defined source code.
PROFILE	Capture an execution time profile of the Subs, Functions, Methods, and Properties
REDIM	Declare dynamic arrays, allocate, reallocate, deallocate memory
REGISTER	Define local Register variables within a Sub, Function, Method, or Property
STATIC	Declare static variables inside of a Sub, Function, Method, or Property
STRPTR	Return the address of the data held by a variable length string
VARPTR	Return the 32-bit address of a variable or handle
WINMAIN	Define the initial entry-point Function for an application

Debugging and Error Control

Debugging and Error Control

The following functions can be used to trap and manage error conditions:

#DEBUG CODE	Compiler directive to suppress generation of debugging code.
#DEBUG DISPLAY	Display a message when an untrapped run-time error occurs.
#DEBUG ERROR	Control generation of error checking code.
#DEBUG PRINT	Display information in the IDE's Debug Window.
#DIM	Specify if variables must be declared before use.
#STACK	Set the maximum potential stack size.
#TOOLS	Enable/disable integrated development tools in compiled code.
CALLSTK	Capture a representation of the stack frames in the call stack.
CALLSTK$	Retrieve the details of a specific stack frame.
CALLSTKCOUNT	Retrieve the number of stack frames in the call stack.
ERL	Return the line number of the most recent run-time error.
ERL$	Return the last label, line number, or procedure name executed prior to the most recent error.
ERR	Return the error code of the most recent run-time error.
ERRCLEAR	Return and clear the error code of the most recent run-time error.
ERROR	Cause a specific run-time error to be generated and set ERR.
ERROR$	Return a containing the descriptive name of an error.
FILENAME$	Return the file-system name of an open file.
FUNCNAME$	Return the name of the current Sub/Function/Method/Property.
ON ERROR	Specify an error handling routine; enable/disable trapping.
OPTION EXPLICIT	Force explicit declaration of all variables.
PROFILE	Capture an execution time profile of the Subs, Functions, Methods, and Properties.
RESUME	Continue execution after error handling with ON ERROR GOTO.
RESUME FLUSH	Execution continues on the line immediately following the RESUME FLUSH.
RESUME NEXT	Execution continues on the line immediately following the one which generated the error.
RESUME *<Label>*	Execution continues at the specified label location.
TRACE	Capture the precise flow of execution in a module.
TRY/END TRY	A structured method of trapping and responding to errors.

Dynamic Dialog Tools

Dynamic Dialog Tools Commands

The following functions can be used to create GUI application interfaces:

ACCEL ATTACH	Attach a table of keyboard accelerators to a DDT dialog.
CALLBACK FUNCTION	Define a Dialog/Control Callback Function block.
CB.CTL	Return the numeric ID of the control sending a callback message.
CB.CTLMSG	Return the numeric notification message parameter.
CB.HNDL	Return the window handle of the parent dialog receiving the message.
CB.LPARAM	Return the numeric value of the lParam& parameter of the message.
CB.MSG	Return the numeric value of the message sent by the caller.
CB.WPARAM	Return the numeric value of the wParam& parameter of the message.
CB.NMCODE	Return the numeric value of the notification message describing the event which occurred.

CB.NMHDR	Returns the address (a) to the NMHDR UDT for this notification message.
CB.NMHDR$	Returns the contents of the NMHDR UDT as a dynamic string.
CB.NMHWND	Returns the handle of the control which sent this message.
CB.NMID	Returns the ID number assigned to the control.
CLIPBOARD GET BITMAP	A bitmap is copied from the CLIPBOARD and stored in a newly created GRAPHIC BITMAP.
CLIPBOARD GET OEMTEXT	A text string is retrieved from the CLIPBOARD. If necessary, it is converted to OEM Text format.
CLIPBOARD GET TEXT	A text string is retrieved from the CLIPBOARD. If necessary, it is converted to ASCII Text format.
CLIPBOARD GET UNICODE	A text string is retrieved from the CLIPBOARD. If necessary, it is converted to Unicode Text format.
CLIPBOARD RESET	The contents of the CLIPBOARD are deleted.
CLIPBOARD SET BITMAP	Copies a GRAPHIC BITMAP to the CLIPBOARD.
CLIPBOARD SET OEMTEXT	Copies a OEM text string to the CLIPBOARD.
CLIPBOARD SET TEXT	Copies a ASCII text string to the CLIPBOARD.
CLIPBOARD SET UNICODE	Copies a Unicode text string to the CLIPBOARD.
COMBOBOX ADD	Add a value to a combo box control.
COMBOBOX DELETE	Remove a string from a combo box control.
COMBOBOX FIND	Strings in the COMBOBOX are searched to find the first string which begins with the specified characters.
COMBOBOX FIND EXACT	Strings in the COMBOBOX are searched to find the first string which exactly matches the specified characters.
COMBOBOX GET COUNT	The number of items in the list box of the COMBOBOX is retrieved.
COMBOBOX GET SELCOUNT	The number of selected items in the list box of the COMBOBOX is retrieved.
COMBOBOX GET SELECT	The index of the currently selected item in the list box of the COMBOBOX is retrieved.
COMBOBOX GET STATE	A data item is checked to see if it is currently selected.
COMBOBOX GET TEXT	Retrieve the default text from a combo box.
COMBOBOX GET USER	Retrieve the value in the user data area of the COMBOBOX.
COMBOBOX INSERT	Insert a new data item at a specified location.
COMBOBOX RESET	Remove all strings from a combo box.
COMBOBOX SELECT	Select a string in a combo box and make it the default selection.
COMBOBOX SET TEXT	Replace the string for a specific data item with a new string.
COMBOBOX SET USER	Set a value in the user data area of the COMBOBOX.
COMBOBOX UNSELECT	All items in a COMBOBOX control are set to an unselected state.
CONTROL ADD	Add a custom control to a DDT dialog.
CONTROL ADD BUTTON	Add a command button to a dialog.
CONTROL ADD CHECK3STATE	Add an auto 3-state checkbox to a dialog.
CONTROL ADD CHECKBOX	Add an checkbox to a dialog.
CONTROL ADD COMBOBOX	Add a combo box to a dialog.
CONTROL ADD FRAME	Add a frame control to a dialog.
CONTROL ADD GRAPHIC	Add a graphic control to a dialog.
CONTROL ADD HEADER	Add a header control to a dialog.
CONTROL ADD IMAGE	Add a non-resizing image control to a dialog.
CONTROL ADD IMAGEX	Add an image control to a dialog.
CONTROL ADD IMGBUTTON	Add a non-resizing image button to a dialog.
CONTROL ADD IMGBUTTONX	Add an image button to a dialog.
CONTROL ADD LABEL	Add a text label to a dialog.
CONTROL ADD LINE	Add a line control to a dialog.
CONTROL ADD LISTBOX	Add a list box control to a dialog.
CONTROL ADD LISTVIEW	Add a ListView control to a dialog.

CONTROL ADD OPTION	Add an option button to a dialog.
CONTROL ADD PROGRESSBAR	Add a ProgressBar control to a dialog.
CONTROL ADD SCROLLBAR	Add a scroll bar control to a dialog.
CONTROL ADD STATUSBAR	Add a StatusBar control to a dialog.
CONTROL ADD TAB	Add a Tab Control to a dialog.
CONTROL ADD TEXTBOX	Add a text box control to a dialog.
CONTROL ADD TOOLBAR	Add a ToolBar control to a dialog.
CONTROL ADD TREEVIEW	Add a TreeView control to a dialog.
CONTROL DISABLE	Disable a control so that it no longer accepts user interaction.
CONTROL ENABLE	Enable a control so that it can receive user interaction.
CONTROL GET CHECK	Get the Check State of a 3-state, checkbox, or option button.
CONTROL GET CLIENT	Get the client area dimensions of a control.
CONTROL GET LOC	Get the location of the specified control in a dialog.
CONTROL GET SIZE	Get the size of a control in the specified dialog.
CONTROL GET TEXT	Get the text from a control.
CONTROL GET USER	Retrieve a value from the user data area of a DDT control.
CONTROL HANDLE	Return a window handle for a given control ID.
CONTROL HIDE	Make a Control invisible.
CONTROL KILL	Remove a control from a dialog.
CONTROL NORMALIZE	Make a Control visible.
CONTROL POST	Place a message into the message queue of a control (non-blocking).
CONTROL REDRAW	Schedule a control to be redrawn.
CONTROL SEND	Send a message to a control and wait for it to be processed.
CONTROL SET CHECK	Set the Check State for a 3-state or checkbox control.
CONTROL SET CLIENT	Change the size of a control to a specific client area size.
CONTROL SET COLOR	Set the foreground and background color of a control.
CONTROL SET FOCUS	Set the keyboard focus to the specified control.
CONTROL SET FONT	Select a to be used for a particular Windows Control.
CONTROL SET IMAGE	Change the icon or bitmap displayed in an IMAGE control.
CONTROL SET IMAGEX	Change the icon or bitmap displayed in an IMAGEX control.
CONTROL SET IMGBUTTON	Change the icon or bitmap displayed in an IMGBUTTON control.
CONTROL SET IMGBUTTONX	Change the icon or bitmap displayed in an IMGBUTTONX control.
CONTROL SET LOC	Move the control to a new location in the dialog.
CONTROL SET OPTION	Set the Check State for an option (radio) control.
CONTROL SET SIZE	Change the size of a control.
CONTROL SET TEXT	Change the text in a control.
CONTROL SET USER	Set a value in the user data area of a DDT control.
CONTROL SHOW STATE	Change the visible state of a control.
DESKTOP GET CLIENT	Retrieve the size of the client area of the desktop, in pixels.
DESKTOP GET LOC	Retrieve the location of the top, left corner of the client area of the desktop, in pixels.
DESKTOP GET SIZE	Return the size of the specified dialog.
DIALOG DISABLE	Disable a dialog so that it no longer responds to user interaction.
DIALOG DOEVENTS	Process pending window or dialog messages for modeless dialogs.
DIALOG ENABLE	Enable a dialog so that it responds to user interaction.
DIALOG END	Close and destroy the specified dialog.
DIALOG DEFAULT FONT	Specify the default DDT font and point size.
DIALOG GET CLIENT	Return the client size of the specified dialog.
DIALOG GET LOC	Return the location of the specified dialog.
DIALOG GET SIZE	Return the size of the specified dialog.
DIALOG GET TEXT	Retrieve the text in a dialog or window caption.
DIALOG GET USER	Retrieve a value from the user data area of a DDT dialog.
DIALOG HIDE	Make a Dialog invisible.
DIALOG MAXIMIZE	Maximize a Dialog.

DIALOG MINIMIZE	Minimize a Dialog.
DIALOG NEW	Create a new dialog in memory, ready for display.
DIALOG NONSTABLE	Make a Dialog non-stable (closeable).
DIALOG NORMALIZE	Make a Dialog visible.
DIALOG PIXELS	Convert pixels (device units) into dialog units.
DIALOG POST	Place a message in the dialog message queue (non-blocking).
DIALOG REDRAW	Force a dialog and all child controls to be redrawn immediately.
DIALOG SEND	Send a message to a dialog and wait for it to be processed.
DIALOG SET CLIENT	Change the size of a dialog to a specific client area size.
DIALOG SET COLOR	Set the background color of a dialog to a specific RGB color.
DIALOG SET ICON	Change both the dialog icon in the caption, and the icon shown in the ALT+TAB task list.
DIALOG SET LOC	Change the position of a dialog.
DIALOG SET SIZE	Change the size of a dialog.
DIALOG SET TEXT	Set the text in a dialog or window caption.
DIALOG SET USER	Set a value in the user data area of a DDT dialog.
DIALOG SHOW MODAL	Display and activate a modal dialog.
DIALOG SHOW MODELESS	Display and activate a modeless dialog.
DIALOG SHOW STATE	Change the visible state of a dialog.
DIALOG STABILIZE	Make a Dialog stabilized (non-closeable).
DIALOG UNITS	Convert dialog units into pixels.
DISPLAY BROWSE	Display a folder selection dialog to return the user's choice.
DISPLAY COLOR	Display a color selection dialog to return the user's choice.
DISPLAY FONT	Display a selection dialog to return user choices.
DISPLAY OPENFILE	Display an OpenFile selection dialog to return user choices.
DISPLAY SAVEFILE	Display a SaveFile selection dialog to return user choices.
FONT END	Destroy a font when it is no longer needed.
FONT NEW	Create a new font for use with GRAPHIC PRINT, XPRINT, etc.
HEADER GET COUNT	Retrieves the count of the items in a Header control.
HEADER GET ITEM	Retrieves an HD_Item structure which describes an item in a Header control.
HEADER SEND	Sends a message to a Header control.
HEADER SET ITEM	Sets the attributes of the specified item in a Header Control.
IMAGELIST ADD BITMAP	An bitmap image is added to the IMAGELIST.
IMAGELIST ADD ICON	An icon image is added to the IMAGELIST.
IMAGELIST ADD MASKED	A bitmap is added to the icon IMAGELIST.
IMAGELIST GET COUNT	The number of images in the IMAGELIST is retrieved.
IMAGELIST KILL	The specified IMAGELIST is destroyed.
IMAGELIST NEW BITMAP	A new bitmap IMAGELIST structure is created.
IMAGELIST NEW ICON	A new icon IMAGELIST structure is created.
IMAGELIST SET OVERLAY	Specify an image to be used as an overlay.
INPUTBOX$	Displays a dialog box containing a prompt.
ISMISSING	Determine whether an was passed by the calling code.
ISWIN	Determine whether a Control/Dialog/Window currently exists.
LISTBOX ADD	Add a string value to a LISTBOX control.
LISTBOX DELETE	Remove a string from a LISTBOX control.
LISTBOX FIND	Strings in the LISTBOX are searched to find the first string which begins with the specified characters.
LISTBOX FIND EXACT	Strings in the LISTBOX are searched to find the first string which exactly matches the specified characters.
LISTBOX GET COUNT	The number of items in the LISTBOX is retrieved.
LISTBOX GET SELCOUNT	The number of selected items in the LISTBOX is retrieved.
LISTBOX GET SELECT	The LISTBOX is searched to find the first selected item.
LISTBOX GET STATE	A data item is checked to see if it is currently selected.
LISTBOX GET TEXT	Retrieve the default text from a LISTBOX control.
LISTBOX GET USER	Retrieve the value in the user data area of the LISTBOX.

[LISTBOX INSERT]()	Insert a new data item at a specified location.
[LISTBOX RESET]()	Remove all strings from a list box.
[LISTBOX SELECT]()	Select a string in a list box and make it the default selection.
[LISTBOX SET TEXT]()	Replace the string for a specific data item with a new string.
[LISTBOX SET USER]()	Set a value in the user data area of the LISTBOX.
[LISTBOX UNSELECT]()	A specified data item in the LISTBOX control is set to an unselected state.
[LISTVIEW DELETE COLUMN]()	Delete a column, including its associated header text (if any) from the [LISTVIEW]() control.
[LISTVIEW DELETE ITEM]()	The specified data item is deleted from the LISTVIEW control.
[LISTVIEW FIND]()	Strings in the LISTVIEW are searched to find the first string which begins with the specified characters.
[LISTVIEW FIND EXACT]()	Strings in the LISTVIEW are searched to find the first string which exactly matches the specified characters.
[LISTVIEW FIT CONTENT]()	The width of the specified column is adjusted to fit the width of the data items displayed in that column.
[LISTVIEW FIT HEADER]()	The width of the specified column is adjusted to fit the width of the data items displayed in that column, and the header text at the top of that column.
[LISTVIEW GET COLUMN]()	The width of the designated column is retrieved from the LISTVIEW.
[LISTVIEW GET COUNT]()	The number of data items in the LISTVIEW is retrieved.
[LISTVIEW GET HEADER]()	Column header text is retrieved from the LISTVIEW.
[LISTVIEW GET HEADERID]()	Retrieves the Listview handle and header control id.
[LISTVIEW GET MODE]()	The display mode of the specified LISTVIEW control is retrieved.
[LISTVIEW GET SELCOUNT]()	The number of selected items in the LISTVIEW is retrieved.
[LISTVIEW GET STATE]()	A data item is tested to see if it is currently selected.
[LISTVIEW GET STYLEXX]()	Retrieves the current setting of the LISTVIEW controls extended style.
[LISTVIEW GET TEXT]()	A string data item is retrieved from the LISTVIEW control.
[LISTVIEW GET USER]()	Retrieve the value in the user data area of the LISTVIEW.
[LISTVIEW INSERT COLUMN]()	A new vertical column is defined for Report Mode of the LISTVIEW.
[LISTVIEW INSERT ITEM]()	A new data item is added to this LISTVIEW control.
[LISTVIEW RESET]()	All data items are deleted from the specified LISTVIEW control.
[LISTVIEW SELECT]()	The specified string data item is chosen as selected text for the LISTVIEW.
[LISTVIEW SET COLUMN]()	Change the width of a LISTVIEW column.
[LISTVIEW SET HEADER]()	New column header text is displayed above the specified column on the LISTVIEW control.
[LISTVIEW SET IMAGE]()	The specified image is displayed next to the item specified.
[LISTVIEW SET IMAGE2]()	The specified image is displayed as a secondary "status" image next to the primary image.
[LISTVIEW SET IMAGELIST]()	Attach an [IMAGELIST]() to the LISTVIEW control.
[LISTVIEW SET MODE]()	Change the display mode of the specified LISTVIEW control.
[LISTVIEW SET OVERLAY]()	The specified overlay image is displayed on top of the image specified.
[LISTVIEW SET STYLE]()	Alter the current settings of the LISTVIEW controls extended style.
[LISTVIEW SET TEXT]()	The text, if any, for the specified data item is replaced with new text.
[LISTVIEW SET USER]()	Set a value in the user data area of the LISTVIEW.
[LISTVIEW SORT]()	All of the items in a LISTVIEW are sorted.
[LISTVIEW UNSELECT]()	The specified data item is set to an unselected state.
[LISTVIEW VISIBLE]()	The specified data item is scrolled, if necessary, to ensure that the data item is visible.
[PROGRESSBAR GET POS]()	The current position of the [PROGRESSBAR]() is retrieved.
[PROGRESSBAR GET RANGE]()	The current range of the PROGRESSBAR is retrieved.
[PROGRESSBAR SET POS]()	Set the current position of the PROGRESSBAR .
[PROGRESSBAR SET RANGE]()	Set the minimum and maximum ranges of the PROGRESSBAR .
[PROGRESSBAR SET STEP]()	Specify the default increment value to be used by PROGRESSBAR STEP.
[PROGRESSBAR STEP]()	Advance the current position of the PROGRESSBAR by the default increment value.

MENU ADD POPUP	Add a popup child menu to an existing menu.
MENU ADD STRING	Add a string or separator to an existing menu.
MENU ATTACH	Attach a menu to a given dialog.
MENU CONTEXT	Create a floating context menu.
MENU DELETE	Delete a menu item from an existing menu.
MENU DRAW BAR	Redraw the menu bar for a given dialog.
MENU GET STATE	Return the state of a specified menu item.
MENU GET TEXT	Return the text associated with a given menu item.
MENU NEW BAR	Create a new menu bar.
MENU NEW POPUP	Create a new popup menu.
MENU SET STATE	Set the state of a specified menu item.
MENU SET TEXT	Set the text of a given menu item.
MOUSEPTR	Change the mouse pointer (cursor) to a new shape.
SCROLLBAR GET PAGESIZE	Retrieve the current page size.
SCROLLBAR GET POS	Returns the current position of the SCROLLBAR.
SCROLLBAR GET RANGE	Returns the current range of the SCROLLBAR.
SCROLLBAR GET TRACKPOS	Retrieve the current position of the scroll box.
SCROLLBAR SET PAGESIZE	Set the current page size.
SCROLLBAR SET POS	Set the current position of the SCROLLBAR.
SCROLLBAR SET RANGE	Set the range of the SCROLLBAR.
STATUSBAR SET PARTS	Set the number of parts to be displayed in the STATUSBAR.
STATUSBAR SET TEXT	Assign the text to be displayed in the specified part of the STATUSBAR.
TAB DELETE	Delete a page from the TAB control.
TAB GET COUNT	Return the number of pages in a TAB control.
TAB GET DIALOG	Retrieve the handle of the dialog for a specific page in a TAB control.
TAB GET IMAGE	Retrieves the index of the image displayed on the specified TAB page.
TAB GET PAGE	Retrieves the page number of the specified TAB page dialog handle.
TAB GET SELECT	Returns the currently selected page in a TAB control.
TAB GET TEXT	The text displayed on the specified page tab is retrieved.
TAB INSERT PAGE	Add a new page to a TAB control.
TAB RESET	Delete all pages in a TAB control.
TAB SELECT	Select a specific page in a TAB control to be the active page.
TAB SET IMAGE	The specified image is displayed on the specified page tab.
TAB SET IMAGELIST	Assign an IMAGELIST to be used in a TAB control.
TAB SET TEXT	Displays the specified text on the tab of the page.
TOOLBAR ADD BUTTON	Add a button to a TOOLBAR control.
TOOLBAR ADD SEPARATOR	Add a separator to a TOOLBAR control.
TOOLBAR DELETE BUTTON	Delete a button from a TOOLBAR control.
TOOLBAR GET STATE	Get the state of a button on a TOOLBAR control.
TOOLBAR GET COUNT	Retrieve the number of buttons on a TOOLBAR control.
TOOLBAR SET IMAGELIST	Attach an IMAGELIST to a TOOLBAR control.
TOOLBAR SET STATE	Set the state of a button on a TOOLBAR control.
TREEVIEW DELETE	Delete a data item from a TREEVIEW control.
TREEVIEW GET BOLD	The bold attribute for a data item is retrieved.
TREEVIEW GET CHECK	The checkmark attribute for a data item is retrieved.
TREEVIEW GET CHILD	Return the handle of the first child item of a specified data item.
TREEVIEW GET COUNT	The number of data items in the TREEVIEW is retrieved.
TREEVIEW GET EXPANDED	The expanded attribute for the data item is retrieved.
TREEVIEW GET NEXT	Return the handle of the next sibling data item.
TREEVIEW GET PARENT	The handle of the parent for a specified data item is returned.
TREEVIEW GET PREVIOUS	Return the handle of the previous sibling data item.
TREEVIEW GET ROOT	The handle of the very first data item (topmost) in the TREEVIEW is retrieved.
TREEVIEW GET SELECT	The handle of the currently selected data item is retrieved.
TREEVIEW GET TEXT	The text of a specific data item is retrieved.

TREEVIEW GET USER	Retrieve the value in the user data area for a specific data item of the TREEVIEW.
TREEVIEW INSERT ITEM	Add a new data item to a TREEVIEW control.
TREEVIEW RESET	All data items are deleted from the specified TREEVIEW control.
TREEVIEW SELECT	Select a specific data item in the TREEVIEW control.
TREEVIEW SET BOLD	Set the bold attribute for specific data item.
TREEVIEW SET CHECK	Set the checkmark attribute for a specific data item.
TREEVIEW SET EXPANDED	Set the expanded attribute for a specific data item.
TREEVIEW SET IMAGELIST	Attach an IMAGELIST to a TREEVIEW control.
TREEVIEW SET TEXT	The text, if any, for the specified data item is replaced with new text.
TREEVIEW SET USER	Set the value in the user data area for a specific data item in the TREEVIEW control.
TREEVIEW UNSELECT	All items in the TREEVIEW control are set to an unselected state.
WINDOW GET HANDLE	Retrieves the handle of a Window.
WINDOW GET ID	The integral ID of the window is retrieved.
WINDOW GET PARENT	The handle of the parent is retrieved.
WINDOW GET STYLE	Retrieves the style of the Window.
WINDOW GET STYLEX	Retrieves the extended-style of the Window.
WINDOW GET USER	Retrieves the 32-bit user data value associated with the window.
WINDOW SET ID	Changes the integral ID of the window.
WINDOW SET STYLE	Changes the style of the Window.
WINDOW SET STYLEX	Changes the extended-style of the Window.
WINDOW SET USER	Changes the 32-bit user data value associated with the window.

File Commands

File Commands

The following functions can be used to manipulate files, standard I/O and disk services:

CHDIR	Change the current (default) directory on a given drive.
CHDRIVE	Change the current default drive.
CLOSE	Conclude I/O (input/output) to/from a file or device.
CURDIR$	Return the current directory for a given drive.
DIR$	Return a filename that matches the given mask.
DIR$ CLOSE	Force the release the operating system FindNext handle.
DISKFREE	Return the amount of available space of a disk, in bytes.
DISKSIZE	Return the total amount of space on a disk, in bytes.
EOF	Return end-of-file status of a file, serial or TCP/UDP transmission.
EXE	Return the path and/or name of the executing program.
FIELD	Bind a field string variable to a particular sub-section of a random file buffer or a dynamic string variable.
FIELD RESET	Reset the FIELD string to a nul (zero-length) dynamic string.
FIELD STRING	Change the FILED string to a dynamic string, but first assigns the current sub-section data to it.
FILEATTR	Return information about an open file.
FILECOPY	Copy a file.
FILENAME$	Return the file-system name of an open file.
FILESCAN	Rapidly scan a INPUT or BINARY file to obtain size info.
FLUSH	Flush file buffers to disk to ensure the disk information is current.
FREEFILE	Return the next available PowerBASIC file number.
GET	Read a record from a random-access file.
GET$	Reads an ANSI string from a file opened in binary mode.
GET$$	Reads WIDE string data from a file opened in binary mode.
GETATTR	Return the file-system attribute(s) of a disk file or directory.

INPUT#	Load variables with data from a sequential file.
ISFILE	Determine whether or not a file exists.
ISFOLDER	Determine whether or not a folder exists.
KILL	Delete a disk file.
LINE INPUT#	Read line(s) from a sequential file into a string variable or array.
LOC	Determine the current seek position in an open disk file.
LOCK	Lock part or all of an open file for exclusive access.
LOF	Return the length of an open disk file.
MKDIR	Create a subdirectory/folder (like the DOS MKDIR command).
NAME	Rename a file or a directory (like the DOS REN command).
OPEN	Prepare a file or device for reading or writing.
PATHNAME$	Parse a path/file name to extract component parts.
PATHSCAN$	Find a file on disk and return the path and/or file name parts.
PRINT#	Write data to a device or sequential file.
PROFILE	Create a file containing the time profile of Subs, Functions, Methods, and Properties.
PUT	Write a record to a random-access file or variable to a binary file.
PUT$	Writes an ANSI string to a file opened in binary mode.
PUT$$	Writes a WIDE Unicode string to a file opened in binary mode.
RMDIR	Delete a disk directory (like the DOS RMDIR command).
SEEK	File location where the next I/O operation will take place.
SEEK	Set the position in a file for the next input or output operation.
SETATTR	Set the file system attribute(s) of a disk file or directory.
SETEOF	Truncate/extend a file to its current file pointer position.
SHELL	Run an executable program asynchronously.
SHELL	Run an executable program synchronously.
UNLOCK	Remove exclusive-access locks placed on a file.
WRITE#	Output data to a sequential file in a delimited format.

Flow Control

Flow Control

The following functions can be used to manage program execution/flow:

%DEF	Determine if an equate has been previously defined.
#IF	Define sections of source code to be compiled or ignored.
#TOOLS	Enable/disable integrated development tools in compiled code.
CALL	Invoke a procedure (Sub, Function, Method, Property, or FastProc).
CALL DWORD	Invoke a procedure (Sub, Function, Method, Property, or FastProc) indirectly.
CALLSTK	Capture a representation of the stack frames in the call stack.
CALLSTK$	Retrieve the details of a specific stack frame.
CALLSTKCOUNT	Retrieve the number of stack frames in the call stack.
CHOOSE	Return one of several values, based upon the value of an index.
CODEPTR	Obtain a 32-bit address of a label or procedure..
DLLMAIN	User-defined function called when a DLL the DLL is loaded/unloaded.
DO/LOOP	Define a group of statements that are executed repetitively.
END	Terminate the program immediately.
EXIT	Transfer program execution out of a block structure.
FASTPROC/END FASTPROC	Define a FastProc code section.
FOR/NEXT	Define a loop of program statements controlled by a counter.
FOR EACH/NEXT	Define a loop of program statements which can sequentially examine and act upon each member of a PowerCollection or LinkListCollection.
FUNCNAME$	Return the name of the current Sub, Function, Method, or Property.
FUNCTION/END FUNCTION	Define a Function block.

GOSUB	Invoke a local subroutine.
GOSUB DWORD	Invoke a local subroutine indirectly.
GOTO	Transfer program execution to the statement identified by a label.
GOTO DWORD	Transfer execution indirectly to a local label or line number.
IF	Test a condition and execute one or more program statements.
IF/END IF	Create a IF/THEN/ELSE block with multiple lines and conditions.
IIF	Return one of two values based upon a True/False evaluation.
ISFALSE	Return the logical falsity of a given expression.
ISMISSING	Determine whether an optional parameter was passed by the calling code.
ISNOTHING	Determine the current status of a given object variable.
ISOBJECT	Determine the current status of a given object variable.
ISTRUE	Return the logical truth of a given expression.
ITERATE	Start an immediate iteration of a structure.
LIBMAIN	User-defined function called when a DLL the DLL is loaded/unloaded.
MACRO	Define a single or multi-line text substitution block.
METHOD/END METHOD	Define a METHOD procedure within a class.
ON ERROR	Specify an error handling routine; enable/disable trapping.
ON GOSUB	Call one of several subroutines based on a numeric expression.
ON GOTO	Send program flow to one of several labels based on a value.
PBLIBMAIN	User-defined function called when a DLL the DLL is loaded/unloaded.
PBMAIN	Define the initial entry-point Function for an application.
PREFIX/END PREFIX	Executes a series of statements, each of which utilizes pre-defined source code.
PROFILE	Capture an execution time profile of the Subs, Functions, Methods, and Properties.
PROPERTY/END PROPERTY	Define a PROPERTY procedure within a class.
RESUME	Continue execution after error handling with ON ERROR GOTO.
RESUME FLUSH	Execution continues on the line immediately following the RESUME FLUSH.
RESUME NEXT	Execution continues on the line immediately following the one which generated the error.
RESUME *<Label>*	Execution continues at the specified label location.
RETURN	Return from a (GOSUB) subroutine to its caller.
RETURN FLUSH	Removes the most recent return address from the system stack.
SELECT CASE	Control program flow based on the value of an expression.
SLEEP	Pause the current thread for a specified number of milliseconds.
SUB/END SUB	Define a Sub (procedure) block.
TRY/END TRY	A structured method of trapping and responding to errors.
WHILE/WEND	Define a block of statements that are executed repeatedly.
WINMAIN	Define the initial entry-point Function for an application.

Graphic Commands

Graphic Commands

The followings can be used to display graphics:

CONTROL ADD IMAGE	Add a (non-resizing) image control to a dialog.
CONTROL ADD IMAGEX	Add a stretched image control to a dialog.
CONTROL ADD IMGBUTTON	Add an image button to a dialog.
CONTROL ADD IMGBUTTONX	Add a stretched image button to a dialog.
CONTROL ADD GRAPHIC	Add a graphic control to a dialog.
BGR	Convert an RGB color value to BGR format.
GRAPHIC(CANVAS.X)	Retrieves the writable width of the attached graphic target.

GRAPHIC(CANVAS.Y)	Retrieves the writable height of the attached graphic target.
GRAPHIC(Cell.Size.X)	Retrieves the character cell width including external leading.
GRAPHIC(Cell.Size.Y)	Retrieves the character cell height including external leading.
GRAPHIC(Chr.Size.X)	Retrieves the character width on the graphic target.
GRAPHIC(Chr.Size.Y)	Retrieves the character height on the graphic target.
GRAPHIC(Client.X)	Retrieves the client width of the attached graphic target.
GRAPHIC(Client.Y)	Retrieves the client height of the attached graphic target.
GRAPHIC(Clip.X)	Retrieves the width of the clip area.
GRAPHIC(Clip.Y)	Retrieves the height of the clip area.
GRAPHIC(COL)	Retrieves the next column print position, based upon the row and column position of a text cell.
GRAPHIC(DC)	Retrieves the handle of the DC (device context) for the selected graphic target.
GRAPHIC(INSTAT)	determines whether a keyboard character is ready.
GRAPHIC(LINES)	Retrieves the number of text lines which will fit on the graphic target.
GRAPHIC(LOC.X)	Retrieves the horizontal location of the graphic target on the desktop.
GRAPHIC(LOC.Y)	Retrieves the vertical location of the graphic target on the desktop
GRAPHIC(MIX)	Retrieves the color mix mode for the selected graphic target.
GRAPHIC(OVERLAP)	Retrieves the status of Graphic Overlap Mode.
GRAPHIC(PIXEL...)	Retrieves the color of the pixel at the specified point.
GRAPHIC(POS.X)	Retrieves the horizontal POS (last point referenced) by a GRAPHIC statement.
GRAPHIC(POS.Y)	Retrieves the vertical POS (last point referenced) by a GRAPHIC statement.
GRAPHIC(PPI.X)	Retrieves the horizontal resolution of the display device, in points per inch.
GRAPHIC(PPI.Y)	Retrieves the vertical resolution of the display device, in points per inch.
GRAPHIC(ROW)	Retrieves the next row print position, based upon the row and column position of a text cell.
GRAPHIC(SCROLLTEXT)	Retrieves the status of Graphic ScrollText Mode.
GRAPHIC(SIZE.X)	Retrieves the overall width of the selected graphic target.
GRAPHIC(SIZE.Y)	Retrieves the overall height of the selected graphic target.
GRAPHIC(STRETCHMODE)	Retrieves the default bitmap stretching mode for the attached DC.
GRAPHIC(TEXT.SIZE.X...)	calculates the width of text to be printed.
GRAPHIC(TEXT.SIZE.Y...)	calculates the height of text to be printed.
GRAPHIC(View.X)	Retrieves the horizontal position of the virtual graphic viewport.
GRAPHIC(View.Y)	Retrieves the vertical position of the virtual graphic viewport.
GRAPHIC(WORDWRAP)	Retrieves the status of Graphic WordWrap Mode.
GRAPHIC(WRAP)	Retrieves the status of Graphic Wrap Mode.
GRAPHIC$(CAPTION)	Retrieves the caption from a Graphic Window.
GRAPHIC$(INKEY$)	reads a keyboard character if one is ready.
GRAPHIC$(WAITKEY$)	reads a keyboard character or extended key, waiting until one is ready.
GRAPHIC$(WAITKEY$...)	reads a limited set of keyboard characters or extended keys, with an optional timeout value.
GRAPHIC ARC	Draw an arc in the selected graphic window.
GRAPHIC ATTACH	Select the graphic target (window, control, or) on which future drawing operations will take place.
GRAPHIC BITMAP END	Close the selected graphic bitmap.
GRAPHIC BITMAP LOAD	Create a memory bitmap and load an image into it.
GRAPHIC BITMAP NEW	Create a new memory bitmap.
GRAPHIC BOX	Draw a box with square or rounded corners in the selected graphic window.
GRAPHIC CELL	Sets or Retrieves the next print position of a text cell.
GRAPHIC CELL SIZE	Retrieve the character cell size including external leading.
GRAPHIC CHR SIZE	Retrieve the character size for the current font in the selected graphic window.
GRAPHIC CLEAR	Clear the entire selected graphic window, optionally using a specified color and fill style.
GRAPHIC COLOR	Set the foreground color and optionally the background color for various graphic statements.
GRAPHIC COPY	Copy a bitmap to the selected graphic target.
GRAPHIC DETACH	Detaches a graphic target.

GRAPHIC ELLIPSE	Draw an ellipse or a circle in the selected graphic target.
GRAPHIC GET BITS	Retrieve a copy of a bitmap, storing it as a device-independent bitmap in a dynamic string variable.
GRAPHIC GET CANVAS	Retrieves the buffer size of the attached graphic target.
GRAPHIC GET CAPTION	Retrieves the caption from a Graphic Window.
GRAPHIC GET CLIENT	Retrieve the client size of the selected graphic target.
GRAPHIC GET CLIP	Retrieves the size of the clip area.
GRAPHIC GET DC	Retrieve the handle of the DC (device context) for the selected graphic target.
GRAPHIC GET LINES	Retrieve the number of lines that can be printed on the graphic target.
GRAPHIC GET LOC	Retrieve the location of the selected graphic target on the screen.
GRAPHIC GET MIX	Retrieve the color mix mode for the selected graphic target.
GRAPHIC GET OVERLAP	Retrieves the status of Graphic Overlap Mode.
GRAPHIC GET PIXEL	Retrieve the color of the pixel at the specified point in the selected graphic target.
GRAPHIC GET POS	Retrieve the POS (last point referenced) by a graphic statement.
GRAPHIC GET PPI	Retrieve the resolution of the display device, in points per inch.
GRAPHIC GET SCALE	Retrieve the current coordinate limits for the graphic target.
GRAPHIC GET SCROLLTEXT	Retrieves the status of Graphic ScrollText Mode.
GRAPHIC GET SIZE	Retrieves the overall size of the selected graphic target.
GRAPHIC GET STRETCHMODE	Retrieves the default bitmap stretching mode for the attached DC.
GRAPHIC GET VIEW	Retrieves the position of the virtual graphic viewport.
GRAPHIC GET WORDWRAP	Retrieves the status of Graphic WordWrap Mode.
GRAPHIC GET WRAP	Retrieves the status of Graphic Wrap Mode.
GRAPHIC IMAGELIST	Display an image from an IMAGELIST.
GRAPHIC INKEY$	Read a keyboard character if one is ready from the graphic target.
GRAPHIC INPUT	Read data from the keyboard from within a graphic window.
GRAPHIC INSTAT	Determine whether a keyboard character is ready.
GRAPHIC INPUT FLUSH	Remove all buffered keyboard data.
GRAPHIC LINE	Draw a line in the selected graphic target.
GRAPHIC LINE INPUT	Read an entire line from the keyboard from graphic window.
GRAPHIC PAINT	Fill an area with a solid color or a hatch pattern.
GRAPHIC PIE	Draw a pie section on the selected graphic target.
GRAPHIC POLYGON	Draw a polygon in the selected graphic target.
GRAPHIC POLYLINE	Draw a series of connected line segments.
GRAPHIC PRINT	Output text to the selected graphic target.
GRAPHIC REDRAW	Update buffered graphical statements, drawing them to the selected graphic target.
GRAPHIC RENDER	Render an image on the selected graphic target.
GRAPHIC SAVE	Save an image to a bitmap (.BMP) file.
GRAPHIC SCALE	Define a custom coordinate system for the graphic target.
GRAPHIC SET AUTOSIZE	Expands a graphic target into autosize mode.
GRAPHIC SET BITS	Replace a copy of a bitmap that was retrieved as a device-independent bitmap.
GRAPHIC SET CAPTION	Change the caption on a Graphic Window.
GRAPHIC SET CLIENT	Change the size of a graphic control or graphic window to a specific client area size.
GRAPHIC SET CLIP	Establishes margins around the outer edges of the graphic target.
GRAPHIC SET FIXED	Restores a graphic target to standard fixed mode.
GRAPHIC SET FOCUS	Bring the selected graphic window to the foreground and direct focus to it.
GRAPHIC SET FONT	Select a font for the GRAPHIC PRINT, GRAPHIC INPUT, and GRAPHIC LINE INPUT statements.
GRAPHIC SET LOC	Change the location of the selected graphic window on the screen.
GRAPHIC SET MIX	Set the color mix mode for the selected graphic target.
GRAPHIC SET OVERLAP	Enables or disables Graphic Overlap Mode.
GRAPHIC SET PIXEL	Draw a single pixel to the selected graphic window.

GRAPHIC SET POS	Set the last point referenced (POS) for the selected graphic target.
GRAPHIC SET SCROLLTEXT	Enables or disables Graphic ScrollText Mode.
GRAPHIC SET SIZE	Change the overall size of a graphic control or graphic window.
GRAPHIC SET STRETCHMODE	Sets the default bitmap stretching mode for the current DC.
GRAPHIC SET VIEW	Changes the position of the viewport on a virtual graphic target.
GRAPHIC SET VIRTUAL	Expands a graphic target into virtual mode.
GRAPHIC SET WORDWRAP	Enables or disables Graphic WordWrap Mode.
GRAPHIC SET WRAP	Enables or disables Graphic Wrap Mode.
GRAPHIC SPLIT	Splits a string into two parts for display on a graphic target.
GRAPHIC STRETCH	Copy and resize a bitmap to the selected graphic target.
GRAPHIC STYLE	Set the line style to be used by various graphical statements in the selected graphic target.
GRAPHIC TEXT SIZE	Calculate the size of text to be printed.
GRAPHIC WAITKEY$	Read a keyboard character from the graphic window, waiting until one is ready.
GRAPHIC WIDTH	Set the line width to be used by various graphical statements in the selected graphic target.
GRAPHIC WINDOW	Create a new graphic window.
GRAPHIC WINDOW CLICK	Check whether a GRAPHIC WINDOW has been clicked with the mouse.
GRAPHIC WINDOW END	Close and destroy the selected graphic window.
GRAPHIC WINDOW HIDE	Make a graphic window invisible.
GRAPHIC WINDOW MINIMIZE	Minimize a graphic window.
GRAPHIC WINDOW NONSTABLE	Make a graphic window non-stable (closeable).
GRAPHIC WINDOW NORMALIZE	Make a graphic window visible.
GRAPHIC WINDOW STABILIZE	Make a graphic window stable (non-closeable).
GRAPHIC WINDOW TEXT	Create a new graphic window oriented more towards the display of text.
IMAGELIST ADD BITMAP	An bitmap image is added to the IMAGELIST.
IMAGELIST ADD ICON	An icon image is added to the IMAGELIST.
IMAGELIST ADD MASKED	A bitmap is added to the icon IMAGELIST.
IMAGELIST GET COUNT	The number of images in the IMAGELIST is retrieved.
IMAGELIST KILL	The specified IMAGELIST is destroyed.
IMAGELIST NEW BITMAP	A new bitmap IMAGELIST structure is created.
IMAGELIST NEW ICON	A new icon IMAGELIST structure is created.
IMAGELIST SET OVERLAY	Specify an image to be used as an overlay.
RGB	Return an RGB color value for use with the Windows API palette and GDIs.

Input Commands

Input Commands

The following functions can be used to gather input data:

COMM	Retrieve the value or status of a communications parameter
COMM LINE	Receive a CR/LF terminated "line" of data from a serial port
COMM RECV	Receive binary data from a serial port
COMMAND$	Return the command-line used to start the program
ENVIRON	Modify the current program's environment table.
ENVIRON$	Retrieve from the operating system's environment table
EOF	Return end-of-file status of a file, serial or TCP/UDP transmission

FIELD	Bind a field string to a file buffer or dynamic string variable
FILESCAN	Rapidly scan a INPUT or BINARY file to obtain string size info
FREEFILE	Return the next available PowerBASIC file number
GET	Read a record from a random-access file
GET$	Read a string from a file opened in binary mode
GRAPHIC INKEY$	Read a keyboard character if one is ready from the graphic window
GRAPHIC INPUT	Read data from the keyboard from within a graphic window
GRAPHIC INPUT FLUSH	Remove all buffered keyboard data.
GRAPHIC INSTAT	Determine whether a keyboard character is ready.
GRAPHIC LINE INPUT	Read an entire line from the keyboard from graphic window
GRAPHIC WAITKEY$	Read a keyboard character from the graphic window, waiting until one is ready.
GRAPHIC WINDOW CLICK	Check whether a graphic window has been clicked with the mouse
INPUT#	Load variables with data from a sequential file
INPUTBOX$	INPUTBOX$ displays a dialog box containing a prompt
LINE INPUT#	Read line(s) from a sequential file into a string variable or array
LOC	Determine the current seek position in an open disk file
LOF	Return the length of an open disk file
MSGBOX	Display a message box and get the users Ok/Cancel selection
MSGBOX	Display an informational message box and discard the users selection
PEEK	Return the byte at a specific memory location
PEEK$	Return a sequence of bytes starting at a specific memory location

Memory Management

Metastatements

Metastatements

The following functions control compiler and debugger behavior:

#ALIGN	Align the next instruction to a boundary.
%DEF	Determine if an equate has been previously defined.
#COM DOC	Specifies a help string which usually provides a general description of the COM server.
#COM HELP	Specifies the name of the associated help file and the help context code.
#COM NAME	Specifies the name of the server and the version number.
#COM GUID	Specifies the GUID which identifies the entire application or library (APPID or LIBID).
#BLOAT	Artificially inflate the disk image size of a compiled program.
#COMPILE	Determine which type of file will be created by the compiler.
#COMPILER	Define the compiler for this program.
#DEBUG CODE	Compiler directive to suppress generation of debugging code.
#DEBUG DISPLAY	Display a message when an untrapped run-time error occurs.
#DEBUG ERROR	Control generation of error checking code.
#DEBUG PRINT	Display information in the IDE's Debug Window.

#DIM	Specify if variables must be declared before use.
#EXPORT	Declare a Sub/Function to have the EXPORT attribute.
#IF	Define sections of source code to be compiled or ignored.
#INCLUDE	Instruct the compiler to read an additional source file from disk.
#LINK	Link a pre-compiled Static Link Library (SLL) into your host program.
#MESSAGES	Specify which messages should be sent to a Control Callback Function.
#OPTIMIZE	Choose the optimization which should be applied to your program.
#OPTION	Establish various compiler options.
#PAGE	Sets a page boundary for the PowerBASIC IDE.
#PBFORMS	PowerBASIC Forms visual designer directives.
#REGISTER	Control automatic allocation of Register variables.
#RESOURCE	Embed a PowerBASIC Resource file into the executable file.
#STACK	Set the maximum potential stack size.
#TOOLS	Enable/disable integrated development tools in compiled code.
#UNIQUE	Specify whether unique variable names are required.
#UTILITY	Compiler directive to allow external utility programs to read text inserted on the #UTILITY line.

Numeric Operations

Numeric Operations

The following functions manipulate and manage data:

ABS	Return the absolute value of a numeric expression
AND	AND works as both a logical and a bitwise arithmetic operator
ARRAY ASSIGN	Assign a number of values to successive elements of an array
ARRAY DELETE	Delete a single item from a given array
ARRAY INSERT	Insert a single item into a given array
ARRAY SCAN	Scan all or part of an array for a given value
ARRAY SORT	Sort all or part of a given array
ASC	Return the ASCII code of the specified character in a
ASC	Place an ASCII byte at the specified position in a string
ATN	Return the arctangent of its argument
BIN$	Return a string with the binary (base 2) representation of a value
BIT CALC	Set or reset a bit in an variable
BIT	Return the value of a particular bit in an integral-class variable
BIT	Manipulate individual bits of an integral-class variable
BITS	Return the least significant portion of an integral-class value
BITS	Return the least significant 8, 16, or 32 bits of an argument
BITSE	Compare integral-class values for equivalent bits regardless of sign
CBYT	Convert a value to a Byte data type
CCUR	Convert a value to a Currency data type
CCUX	Convert a value to a Extended Currency data type

CDBL	Convert a value to a Double-precision data type
CDWD	Convert a value to a Double-word data type
CEIL	Return an that is greater than or equal to an argument
CEXT	Convert a value to a Extended-precision data type
CHOOSE	Return one of several values, based upon the value of an index
CINT	Convert a value to a integral data type
CLNG	Convert a value to a Long-integer data type
COS	Return the cosine of an argument
CQUD	Convert a value to a Quad-integer data type
CSNG	Convert a value to a Single-precision data type
CVBYT	Convert binary encoded string data to a byte value
CVCUR	Convert binary encoded string data to a Currency value
CVCUX	Convert binary encoded string data to Extended Currency
CVD	Convert binary encoded string data to a Double-precision value
CVDWD	Convert binary encoded string data to a Double-word value
CVE	Convert binary encoded string data to Extended-precision
CVI	Convert binary encoded string data to an integral value
CVL	Convert binary encoded string data to a Long-integer value
CVQ	Convert binary encoded string data to a Quad-integer value
CVS	Convert binary encoded string data to a Single-precision value
CVWRD	Convert binary encoded string data to a Word value
CWRD	Convert a value to a Word data type
DEC$	Convert an integral value to a decimal string.
DECR	Decrement a variable, , or pointer target
DEFBYT	Declare the default variable type to be Byte
DEFCUR	Declare the default variable type to be Currency
DEFCUX	Declare the default variable type to be Extended Currency
DEFDBL	Declare the default variable type to be Double-precision
DEFDWD	Declare the default variable type to be Double-word
DEFEXT	Declare the default variable type to be Extended-precision
DEFINT	Declare the default variable type to be integral value
DEFLNG	Declare the default variable type to be Long-integer
DEFQUD	Declare the default variable type to be Quad-integer
DEFSNG	Declare the default variable type to be Single-precision
DEFSTR	Declare the default variable type to be String
DEFWRD	Declare the default variable type to be Word
ENUM/END ENUM	Creates a group of logically related numeric equates.
EQV	Perform a logical or a bitwise Equivalence operation
EXP	Return a base number raised to a power, with a base of *e*
EXP2	Return a base number raised to a power, with a base of 2
EXP10	Return a base number raised to a power, with a base of 10
FIX	Truncate a number to an integral value
FORMAT$	Format numeric data according to a string mask expression
FRAC	Return the fractional part of a floating-point number
HEX$	Hexadecimal (base 16) string representation of an argument
HI	Extract the most significant (high-order) portion of an argument
IIF	Return one of two values based upon a True/False evaluation
IMP	Perform a logical or a bitwise Implication operation
INCR	Increment a variable, pointer, or pointer target
INT	Convert a numeric expression to an integral-class value
ISFALSE	Return the logical falsity of a given expression
ISNOTHING	Determine the current status of a given object variable
ISOBJECT	Determine the current status of a given object variable

ISTRUE	Return the logical truth of a given expression
LBOUND	Return the lowest subscript of an array's specific dimension
LEN	Return the logical length of a variable, UDT, or Union
LET	Assign a value to a variable
LET (with Variants)	Assign a value or an object reference to a variant variable
LO	Extract the least significant (low-order) portion of an argument
LOG	Return the natural (base *e*) logarithm of an argument
LOG2	Return the base 2 logarithm of an argument
LOG10	Return the base 10 logarithm of an argument
MAT	Matrix calculations on numeric arrays
MAX	Return the argument with the largest (maximum) value
MIN	Return the argument with the smallest (minimum) value
MOD	Return the remainder of the division between two numbers
NOT	The NOT operator works as a bitwise arithmetic operator
OCT$	Return a string that is a octal (base 8) representation of a value
OR	Perform a logical or a bitwise OR arithmetic operation
PEEK	Return the byte at a specific memory location
POKE	Store a byte at a specific memory location
RANDOMIZE	Seed the random number generator
RESET	Set a variable, array subscript, or an entire array to zero
RGB	Return a composite RGB color value
RND	Return a random number
ROTATE	Rotate the bits in an integral-class variable
ROUND	Round a numeric value to a specified number of decimal places
SGN	Return the sign of a numeric expression
SHIFT	Shift the bits in an integral-class variable
SIN	Return the sine of an argument
SQR	Return the square root of an argument
SWAP	Exchange the values of two variables, pointers, or pointer targets
SWITCH	Return one item of a series based upon a True/False evaluation
TAN	Return the tangent of an argument
UBOUND	Return the highest subscript of an array's specific dimension
USING$	Format string/numeric expressions using a mask string
VAL function	Returns the numeric equivalent of a string argument
VAL statement	Converts a text string to a numeric value with additional information.
VARIANT#	Return the numeric value contained in a Variant variable
XOR	Perform a logical or a bitwise Exclusive-OR operation

Operating System

Operating System

The following functions manipulate file and operating system features:

CHDIR	Change the current (default) directory on a given drive.
CHDRIVE	Change the current default drive.
CLIPBOARD GET BITMAP	A bitmap is copied from the CLIPBOARD and stored in a newly created GRAPHIC BITMAP.
CLIPBOARD GET OEMTEXT	A text string is retrieved from the CLIPBOARD. If necessary, it is converted to OEM Text format.
CLIPBOARD GET TEXT	A text string is retrieved from the CLIPBOARD. If necessary, it is converted to ASCII Text format.
CLIPBOARD GET UNICODE	A text string is retrieved from the CLIPBOARD. If necessary, it is converted to Unicode Text format.
CLIPBOARD RESET	The contents of the CLIPBOARD are deleted.
CLIPBOARD SET BITMAP	Copies a GRAPHIC BITMAP to the CLIPBOARD.

CLIPBOARD SET OEMTEXT	Copies a OEM text string to the CLIPBOARD.
CLIPBOARD SET TEXT	Copies a ASCII text string to the CLIPBOARD.
CLIPBOARD SET UNICODE	Copies a Unicode text string to the CLIPBOARD.
COMMAND$	Return the command-line used to start the program.
CURDIR$	Return the current directory for a given drive.
DATE$	Set and retrieve the system date.
DESKTOP GET CLIENT	Retrieve the size of the client area of the desktop, in pixels.
DESKTOP GET LOC	Retrieve the location of the top, left corner of the client area of the desktop, in pixels.
DESKTOP GET SIZE	Retrieve the size of the entire desktop, in pixels.
DIR$	Return a filename that matches the given mask.
DIR$ CLOSE	Force the release the operating system FindNext handle.
DISKFREE	Return the amount of available space of a disk, in bytes.
DISKSIZE	Return the total amount of space on a disk, in bytes.
DISPLAY BROWSE	Display a folder selection dialog to return the user's choice.
DISPLAY COLOR	Display a color selection dialog to return the user's choice.
DISPLAY FONT	Display a selection dialog to return user choices.
DISPLAY OPENFILE	Display an OpenFile selection dialog to return user choices.
DISPLAY SAVEFILE	Display a SaveFile selection dialog to return user choices.
ENVIRON	Modify the current program's environment table.
ENVIRON$	Retrieve from the operating system's environment table.
EXE.Inst	Returns the instance handle of the programming which is currently executing.
EXE.Extn$	Returns the extension of the program which is currently executing.
EXE.Full$	Returns the complete drive, path, and file name of the program which is currently executing.
EXE.Name$	Returns just the file name of the program which is currently executing.
EXE.Namex$	Returns the file name and the extension of the program which is currently executing.
EXE.Path$	Returns the complete drive and path of the program which is currently executing.
FILEATTR	Return information about an open file.
FILECOPY	Copy a file.
FILENAME$	Return the file-system name of an open file.
FLUSH	Flush file buffers to disk to ensure the disk information is current.
GETATTR	Return the file-system attribute(s) of a disk file or directory.
HOST ADDR	Translate a host name into a corresponding IP address.
HOST NAME	Translate an IP address into a corresponding host name.
ISFILE	Determine whether or not a file exists.
KILL	Delete a disk file.
METRICS	Retrieves information or dimensions of system elements.
MKDIR	Create a subdirectory/folder (like the DOS MKDIR command).
NAME	Rename a file or a directory (like the DOS REN command).
OPEN	Prepare a file or device for reading or writing.
PATHNAME$	Parse a path/file name to extract component parts.
PATHSCAN$	Find a file on disk and return the path and/or file name parts.
RGB	Return a composite RGB color value.
RMDIR	Delete a disk directory (like the DOS RMDIR command).
SETATTR	Set the file system attribute(s) of a disk file or directory.
SETEOF	Truncate/extend a file to its current file pointer position.
SHELL	Launch an executable program asynchronously.
SHELL	Launch an executable program synchronously.
SLEEP	Pause the current thread for a specified number of milliseconds.

Printing Commands

The followings are used to send data to a printer:

LPRINT	Output text and data to a printer device.
LPRINT ATTACH	Connect directly to a line printer device.
LPRINT CLOSE	Disconnect the current printer device.
LPRINT FLUSH	Flush any remaining print data to the printer device.
LPRINT FORMFEED	Send a formfeed (page eject) character to the printer.
LPRINT$	Return the current printer device used for LPRINT operations.
PRINTER$	Retrieve printer names and printer port names.
PRINTERCOUNT	Retrieves the number of available (installed) printers.
XPRINT(CANVAS.X)	Retrieves the writable width of the host printer page.
XPRINT(CANVAS.Y)	Retrieves the writable height of the host printer page.
XPRINT(Cell.Size.X)	Retrieves the character cell width including external leading.
XPRINT(Cell.Size.Y)	Retrieves the character cell height including external leading.
XPRINT(Chr.Size.X)	Retrieves the character width on the host printer page.
XPRINT(Chr.Size.Y)	Retrieves the character height on the host printer page.
XPRINT(Client.X)	Retrieves the width of the client area (printable area) on the host printer page.
XPRINT(Client.Y)	Retrieves the height of the client area (printable area) on the host printer page.
XPRINT(Clip.X)	Retrieves the width of the clip area on the selected printer.
XPRINT(Clip.Y)	Retrieves the height of the clip area on the selected printer.
XPRINT(COL)	Retrieves the next column print position, based upon the row and column position of a text cell.
XPRINT(COLLATE)	Retrieves the XPRINT collate status.
XPRINT(COLORMODE)	Retrieves the XPRINT colormode status.
XPRINT(COPIES)	Retrieves the XPRINT copy count.
XPRINT(DC)	Retrieves the handle of the device context (DC) for the host printer page.
XPRINT(DUPLEX)	Retrieves the XPRINT duplex status.
XPRINT(LINES)	Retrieves the number of lines that can be printed.
XPRINT(MIX)	Retrieves the color mix mode for a host printer page.
XPRINT(ORIENTATION)	Retrieves the paper orientation for a host printer page.
XPRINT(OVERLAP)	Retrieves the status of XPrint Overlap Mode.
XPRINT(PAPER)	Retrieves the current paper size/type.
XPRINT(PIXEL...)	Retrieves the color of a pixel on a host printer page.
XPRINT(POS.X)	Retrieves the last horizontal point referenced (POS) by an XPRINT statement.
XPRINT(POS.Y)	Retrieves the last vertical point referenced (POS) by an XPRINT statement.
XPRINT(PPI.X)	Retrieves the horizontal resolution of the host printer page.
XPRINT(PPI.Y)	Retrieves the vertical resolution of the host printer page.
XPRINT(QUALITY)	Retrieves the print quality setting for the host printer.
XPRINT(ROW)	Retrieves the next row print position, based upon the row and column position of a text cell.
XPRINT(SELECTION)	Retrieves the status of the SELECTION flag.
XPRINT(SIZE.X)	Retrieves the width of the host printer page.
XPRINT(SIZE.Y)	Retrieves the height of the host printer page.
XPRINT(STRETCHMODE)	Retrieves the default bitmap stretching mode for the attached DC.
XPRINT(TEXT.SIZE.X...)	Calculates the width of text to be printed on a host printer.
XPRINT(TEXT.SIZE.Y...)	Calculates the height of text to be printed on a host printer.
XPRINT(TRAY)	Retrieves the active printer tray.
XPRINT(WORDWRAP)	Retrieves the status of XPRINT WordWrap Mode.

XPRINT(WRAP)	Retrieves the status of XPRINT Wrap Mode.
XPRINT$	Returns the name of the attached host printer.
XPRINT$(ATTACH)	Returns the name of the attached host printer.
XPRINT$(PAPERS)	Retrieves a list of supported paper types.
XPRINT$(TRAYS)	Retrieves a list of supported paper trays.
XPRINT	Output text to a host-printer device.
XPRINT ARC	Draw an arc on a host printer page.
XPRINT ATTACH	Connect a host-based (GDI) printer for use with XPRINT.
XPRINT BOX	Draw a box with square or rounded corners on a host printer page.
XPRINT CANCEL	Cancel a print job on the host printer.
XPRINT CELL	Sets or Retrieves the next print position for a text cell.
XPRINT CELL SIZE	Retrieve the character cell size including external leading.
XPRINT CHR SIZE	Retrieve the character size for the current font on a host printer page.
XPRINT CLOSE	Detach a host printer so printing may begin.
XPRINT COLOR	Set the foreground color (and, optionally, the background color) for various XPRINT statements.
XPRINT COPY	Copy a bitmap to a host printer page.
XPRINT ELLIPSE	Draw an ellipse or a circle on a host printer page.
XPRINT FORMFEED	Start a new page for the host printer.
XPRINT GET ATTACH	Retrieve the name of the attached host printer.
XPRINT GET CANVAS	Retrieves the buffer size of the attached host printer.
XPRINT GET CLIENT	Retrieve the size of the client area (printable area) on the host printer page.
XPRINT GET CLIP	Retrieves the size of the clip area on the selected printer.
XPRINT GET COLLATE	Retrieve the XPRINT collate status.
XPRINT GET COLORMODE	Retrieve the XPRINT colormode status.
XPRINT GET COPIES	Retrieve the XPRINT copy count.
XPRINT GET DC	Retrieve the handle of the device context (DC) for the host printer page.
XPRINT GET DUPLEX	Retrieve the XPRINT duplex status.
XPRINT GET LINES	Retrieve the number of lines that can be printed.
XPRINT GET MARGIN	Retrieve the margin sizes for the host printer.
XPRINT GET MIX	Retrieve the color mix mode for a host printer page.
XPRINT GET ORIENTATION	Retrieve the paper orientation for a host printer page.
XPRINT GET OVERLAP	Retrieves the status of XPrint Overlap Mode.
XPRINT GET PAGES	Retrieves the XPRINT page number limits for this print job.
XPRINT GET PAPER	Retrieve the current paper size/type.
XPRINT GET PAPERS	Retrieve a list of supported paper types.
XPRINT GET PIXEL	Retrieve the color of a pixel on a host printer page.
XPRINT GET POS	Retrieve the last point referenced (POS) by an XPRINT statement.
XPRINT GET PPI	Retrieve the resolution of the host printer page.
XPRINT GET QUALITY	Retrieve the print quality setting for the host printer.
XPRINT GET SCALE	Retrieve the current coordinate limits for the host printer page.
XPRINT GET SELECTION	Retrieves the status of the SELECTION flag.
XPRINT GET SIZE	Retrieve the total size of the host printer page.
XPRINT GET STRETCHMODE	Retrieves the default bitmap stretching mode for the attached DC.
XPRINT GET TRAY	Retrieve the active printer tray.
XPRINT GET TRAYS	Retrieve a list of supported paper trays.
XPRINT GET WORDWRAP	Retrieves the status of XPRINT WordWrap Mode.
XPRINT GET WRAP	Retrieves the status of XPRINT Wrap Mode.
XPRINT IMAGELIST	Print an image from an IMAGELIST.
XPRINT LINE	Draw a line on a host printer page.
XPRINT PIE	Draw a pie section on a host printer page.
XPRINT POLYGON	Draw a polygon on a host printer page.
XPRINT POLYLINE	Draw a series of connected lines on a host printer page.
XPRINT PREVIEW	Display a replica of a printed document on the screen.
XPRINT PREVIEW CLOSE	Reverts XPRINT output back to the host printer.

XPRINT PRINT	Output text to be printed on the selected printer.
XPRINT RENDER	Render an image on a host printer page.
XPRINT SCALE	Define a custom world coordinate system for a host printer page.
XPRINT SCALE PIXELS	Resets the coordinate system to the original default pixel coordinates.
XPRINT SET CLIP	Establishes margins around the outer edges of the print page.
XPRINT SET COLLATE	Change the XPRINT collate status.
XPRINT SET COLORMODE	Change the XPRINT colormode status.
XPRINT SET COPIES	Change the XPRINT copy count.
XPRINT SET DUPLEX	Change the XPRINT duplex status.
XPRINT SET FONT	Select a font for the XPRINT statement.
XPRINT SET MIX	Set the color mix mode for a host printer page.
XPRINT SET ORIENTATION	Set the paper orientation for a host printer page.
XPRINT SET OVERLAP	Enables or disables XPRINT Overlap Mode.
XPRINT SET PAGES	Sets the XPRINT page number limits for this print job.
XPRINT SET PAPER	Set a new paper size/type.
XPRINT SET PIXEL	Set the color of a pixel on a host printer page.
XPRINT SET POS	Retrieve the last point referenced (POS) by an XPRINT statement.
XPRINT SET QUALITY	Set the print quality for a host printer.
XPRINT SET STRETCHMODE	Sets the default bitmap stretching mode for the current DC.
XPRINT SET TRAY	Set a new active printer tray.
XPRINT SET WORDWRAP	Enables or disables XPRINT WordWrap Mode.
XPRINT SET WRAP	Enables or disables XPrint Wrap Mode.
XPRINT SPLIT	Splits a string into two parts for printing with XPRINT.
XPRINT STRETCH	Copy and resize a bitmap to a host printer page.
XPRINT STRETCH PAGE	Copy and resize a bitmap to the clip or client area of the host printer page.
XPRINT STYLE	Set the line style to be used by various XPRINT statements.
XPRINT TEXT WIDTH	Calculate the size of text to be printed on a host printer.
XPRINT WIDTH	Set the graphic line width to be used by various XPRINT statements.

String Operations

String Operations

The following functions manipulate and manage data:

ACODE$	Translate a Unicode string into an ANSI string.
ARRAY ASSIGN	Assign a number of values to successive elements of an array.
ARRAY DELETE	Delete a single item from a given array.
ARRAY INSERT	Insert a single item into a given array.
ARRAY SCAN	Scan all or part of an array for a given value.
ARRAY SORT	Sort all or part of a given array.
BIN$	Return a string with the binary (base 2) representation of a value.
BITS$	Copies string contents without modification.
BUILD$	Concatenate multiple strings with high efficiency.
CHOOSE$	Return one of several values, based upon the value of an index.
CHR$	Convert one or more character codes into ASCII character(s).
CHR$$	Convert one or more character codes into Unicode character(s).
CHRBYTES	Determine the size of a single character in a string variable.
ChrToOem$	Translates a string of ANSI/WIDE characters to OEM byte characters.
ChrToUtf8$	Translates a string of ANSI/WIDE characters to UTF-8 byte characters.
CLIP$	Deletes characters from a string.
CLSID$	Return a 16-byte (128-bit) GUID string containing a CLSID.
COMM LINE	Receive a CR/LF terminated "line" of data from a serial port.
COMM PRINT	Send a "line" of binary data through a serial port.

COMM RECV	Receive binary data from a serial port.
COMM SEND	Send a string of binary data through a serial port.
COMMAND$	Return the command-line used to start the program.
CSET	Center a string within the space of another string or UDT.
CSET$	Return a string containing a centered (padded) string.
CURDIR$	Return the current directory for a given drive.
DATA	Declare an array of constants to be read by READ$.
DATACOUNT	Return the total count of the number of local data items.
DATE$	Set and retrieve the system date.
DEC$	Convert an integral value to a decimal string.
DIM	Declare and dimension arrays, scalar variables, and pointers.
DIR$	Return a filename that matches the given mask.
DIR$ CLOSE	Force the release the operating system FindNext handle.
ENVIRON	Modify the current program's environment table..
ENVIRON$	Retrieve strings from the operating system's environment table.
ERASE	Deallocate array memory.
ERL$	Return the last label, line number, or procedure name executed prior to the most recent
ERROR$	Return a string containing the descriptive name of an error.
EXTRACT$	Return up to the first occurrence of a specified character.
EXE	Return the path and/or name of the executing program.
FIELD	Bind a field string variable to a particular sub-section of a random file buffer or a dynamic variable.
FIELD RESET	Reset the FIELD string to a nul (zero-length) dynamic string.
FIELD STRING	Change the FIELD string to a dynamic string, but first assigns the current sub-section c
FILENAME$	Return the file-system name of an open file.
FORMAT$	Return a string containing formatted numeric data.
FUNCNAME$	Return the name of the current Sub/Function/Method/Property.
GET	Read a record from a random-access file.
GET$	Read a string from a file opened in binary mode.
GET$$	Reads WIDE string data from a file opened in binary mode.
GRAPHIC SPLIT	Splits a string into two parts for display on a graphic target.
GUID$	Return a 16-byte (128-bit) Globally Unique Identifier GUID.
GUIDTXT$	Return a 38-byte human-readable GUID/UUID string.
HEX$	Hexadecimal (base 16) string representation of an argument.
IIF$	Return one of two values based upon a True/False evaluation.
INPUT#	Load variables with data from a sequential file.
INPUTBOX$	INPUTBOX$ displays a dialog box containing a prompt.
INSTR	Search a string for the first occurrence of a character or string.
ISNOTNULL	Determine if a string is not nul (contains 1 or more characters).
ISNULL	Determine if a string is nul (zero-length).
IStringBuilderA.Add	Appends an ANSI string to the object.
IStringBuilderA.Capacity <Get>	Retrieves the size of the internal buffer.
IStringBuilderA.Capacity <Set>	Sets the size of the internal buffer.
IStringBuilderA.Char <Get>	Returns the numeric character code of the character at the specified position.
IStringBuilderA.Char <Set>	Changes the numeric character code of the character at the specified position.
IStringBuilderA.Clear	All data in the object is erased.
IStringBuilderA.Delete	Deletes a specified number of characters starting at a specified position.
IStringBuilderA.Insert	Inserts a string at a specified position.
IStringBuilderA.Len	Returns the number of characters stored in the object.
IStringBuilderA.String	The ANSI string stored in the object is returned to the caller.
IStringBuilderW.Add	Appends an WIDE string to the object.
IStringBuilderW.Capacity <Get>	Retrieves the size of the internal buffer.
IStringBuilderW.Capacity <Set>	Sets the size of the internal buffer.
IStringBuilderW.Char <Get>	Returns the numeric character code of the character at the specified position.
IStringBuilderW.Char <Set>	Changes the numeric character code of the character at the specified position.
IStringBuilderW.Clear	All data in the object is erased.

IStringBuilderW.Delete	Deletes a specified number of characters starting at a specified position.
IStringBuilderW.Insert	Inserts a string at a specified position.
IStringBuilderW.Len	Returns the number of characters stored in the object.
IStringBuilderW.String	The WIDE string stored in the object is returned to the caller.
JOIN$	Return a string consisting of all of the strings in a string array.
LCASE$	Return a lowercase version of a string argument.
LEFT$	Return the left-most *n* characters of a string.
LEN	Return the logical length of a variable, UDT, or Union.
LET	Assign a value to a variable.
LET (with Types)	Assign data to a user-defined type variable.
LET (with Variants)	Assign a value or an object reference to a variant variable.
LINE INPUT#	Read line(s) from a sequential file into a string variable or array.
LPRINT	Output text and data to a printer device.
LPRINT$	Return the current printer device used for LPRINT operations.
LSET	Left-align a string within the space of another string or UDT.
LSET$	Return a string containing a left-justified (padded) string.
LTRIM$	Return a string with leading characters or strings removed.
MAX$	Return the argument with the largest (maximum) value.
MCASE$	Return a mixed case version of a string argument.
MID$	Return a portion of a string.
MID$	Replace characters in a string with characters from another string.
MIN$	Return the argument with the smallest (minimum) value.
MKBYT$	Convert a Byte value into a binary encoded string.
MKCUR$	Convert a Currency value into a binary encoded string.
MKCUX$	Convert an Extended Currency value into a binary encoded string.
MKD$	Convert a Double-precision value into a binary encoded string.
MKDWD$	Convert a Double-word value into a binary encoded string.
MKE$	Convert an Extended-precision value into a binary encoded string.
MKI$	Convert a integral value into a binary encoded string.
MKL$	Convert a Long-integer value into a binary encoded string.
MKQ$	Convert a Quad-integer value into a binary encoded string.
MKS$	Convert a Single-precision value into a binary encoded string.
MKWRD$	Convert a Word value into a binary encoded string.
MKDIR	Create a subdirectory/folder (like the DOS MKDIR command).
NUL$	Return a string containing a specified number of $NUL characters.
OBJRESULT$	Returns a string which describes an OBJRESULT (hResult) code.
OCT$	Return a string that is a octal (base 8) representation of a value.
OemToChr$	Translates a byte string of OEM characters into ANSI/WIDE characters.
PARSE	Parse a string and extract all delimited fields into an array.
PARSE$	Return a delimited field from a string expression.
PARSECOUNT	Return the count of delimited fields in a string expression.
PATHNAME$	Parse a path/file name to extract component parts.
PATHSCAN$	Find a file on disk and return the path and/or file name parts..
PEEK$	Returns consecutive 1-byte characters starting at a specific memory location.
PEEK$$	Returns consecutive 2-byte wide characters starting at a specific memory location.
POKE$	Store a sequence of bytes starting at a specific memory location.
POKE$$	Store a sequence as 2-byte wide characters starting at a specific memory location.
PRINT#	Write a complete array to a sequential file.
PROGID$	Return the alphanumeric PROGID string (text) of a given CLSID.
PUT	Write a record to a random-access file or variable to a binary file.
PUT$	Writes an ANSI string to a file opened in binary mode.
PUT$$	Writes a WIDE Unicode string to a file opened in binary mode.
READ$	Retrieve string data from a local DATA list.
REGEXPR	Scan a string for a matching "wildcard" or regular expression.
REGREPL	Scan a "wildcard" match in a string with a new string.
REMAIN$	Returns the portion of a string which follows the first occurrence of a character or group

REMOVE$	Return a copy of a string with characters or strings removed.
REPEAT$	Return a string consisting of multiple copies of a specified string.
REPLACE	Replace all occurrences of one string with another string.
RESET	Clear a string, string array subscript, or an entire array.
RESOURCE$	Returns predefined resource data.
RETAIN$	Return a string with all non-specified characters removed.
RIGHT$	Return the rightmost *n* characters of a string.
RSET	Right justify a string into the space of a string variable or UDT.
RSET$	Return a string containing a right-justified (padded) string.
RTRIM$	Return a copy of a string with trailing characters/strings removed.
SHRINK$	Shrinks a string to use a consistent single character delimiter.
SIZEOF	Return the total or physical length of any PowerBASIC variable.
SPACE$	Return a string consisting of a specified number of spaces.
SPLIT	Splits a string into two parts.
STR$	Return the string representation of a number in printable form.
STRDELETE$	Delete a specified number of characters from a string expression.
STRING$	Returns an ANSI string consisting of multiple copies of a specified character.
STRING$$	Returns a WIDE string consisting of multiple copies of a specified character.
STRINSERT$	Insert a string at a specified position within another string.
STRPTR	Return the address of the data held by a variable length string.
STRREVERSE$	Reverse the contents of a string expression.
SWAP	Exchange the values of two strings, pointers, or pointer targets.
SWITCH$	Return one item of a series based upon a True/False evaluation.
TAB$	Return a string with TAB characters expanded with spaces.
TALLY	Count the number of occurrences of specified characters/strings.
TIME$	Read and/or set the system time.
TRIM$	Return a string with leading and trailing characters removed.
TYPE SET	Assign the value of a UDT or string expression to a UDT.
UCASE$	Return an all-uppercase (capitalized) version of a string.
UCODE$	Translate an ANSI string into a Unicode string.
UCODEPAGE	Set the default codepage used for ANSI / UNICODE conversions.
UNWRAP$	Removes paired characters from the beginning and end of a string.
USING$	Format string/numeric expressions using a mask string.
Utf8ToChr$	Translates a byte string of OEM characters into ANSI/WIDE characters.
VAL function	Returns the equivalent of a string argument.
VAL statement	Converts a text string to a numeric value with additional information.
VARIANT$	Returns the ANSI dynamic string contained in a Variant variable.
VARIANT$$	Returns the Unicode dynamic string contained in a Variant variable.
VARPTR	Return the 32-bit address of a string handle.
VERIFY	Determine if each character of a string is in another string.
WRAP$	Adds paired characters to the beginning and end of a string.

Text Commands

Text Commands

The following commands can be used with a Text Window:

TXT.CELL	Sets or retrieves the cursor position.
TXT.CLS	Clears the Text Window and moves to caret to the upper left corner.
TXT.COLOR	Sets the foreground color
TXT.END	The Text Window currently attached to your program is destroyed and detached from the process.
TXT.INKEY$	Reads a keyboard character if one is ready.
TXT.INSTAT	Determines whether a keyboard character is ready.

TXT.LINE.INPUT	Reads an entire line from the keyboard.
TXT.PRINT	Write text data to the TEXT WINDOW at the current caret location.
TXT.WAITKEY$	Reads a keyboard character, waiting until one is ready.
TXT.WINDOW	A new Text Window is created and attached to your program.

Thread Control

Thread Control

The following functions are used to create and manage threads:

IPowerThread.Close	Releases the thread handle of this thread.
IPowerThread.Equals	Compares the specified object to determine if it references the same object as this object.
IPowerThread.Handle	Retrieves the handle of the thread for use with Windows API functions.
IPowerThread.Id	Retrieves the ID of the thread for use with Windows API functions.
IPowerThread.IsAlive	Checks the thread to see if it is currently "*alive*".
IPowerThread.Join	Waits for the specified thread object to complete before execution of this thread continues.
IPowerThread.Launch	Begins execution of the thread object.
IPowerThread.Priority <Get>	Retrieves the priority value for this thread.
IPowerThread.Priority <Set>	Sets the Priority Value for this thread.
IPowerThread.Result	If the thread has ended, the result value is retrieved and returned to the caller.
IPowerThread.Resume	Resumes execution of a suspended thread.
IPowerThread.StackSize <Get>	Retrieves the size of the stack for this thread.
IPowerThread.StackSize <Set>	Sets the size of the stack for this thread to the value specified.
IPowerThread.Suspend	Suspends execution of the thread.
IPowerThread.TimeCreate	Retrieves the date and time-of-day of the thread creation.
IPowerThread.TimeExit	Retrieves the date and time-of-day of the thread exit
IPowerThread.TimeKernel	Retrieves the amount of time this thread has spent in kernel mode.
IPowerThread.TimeUser	Retrieves the amount of time this thread has spent in user mode.
PROCESS GET PRIORITY	Retrieve the Priority Value for the current process.
PROCESS SET PRIORITY	Sets the Priority Value for the current process.
THREADED	Declare Thread Local Storage (TLS) variables.
THREAD CLOSE	Close a Windows thread.
THREAD CREATE	Create a Windows thread.
THREAD GET PRIORITY	Retrieve the Priority Value for a thread.
THREAD FUNCTION	Declares a thread function.
THREAD SET PRIORITY	Sets the Priority Value for a thread.
THREAD RESUME	Resume execution of a suspended Windows thread.
THREAD STATUS	Retrieve the Status of a Windows thread.
THREAD SUSPEND	Suspend execution of a Windows thread.
THREADCOUNT	Return the number of active threads that exist in a module.
THREADID	Return a Long-integer thread identifier of the current thread.

Time Commands

Time Commands

The following functions manipulate and manage time and the system date:

DATE$	Set and retrieve the system date.
DAYNAME$	Converts a Day-of-Week number to the associated name.

IPowerTime.AddDays	Adds or subtracts a specified number of days to value of this object.
IPowerTime.AddHours	Adds or subtracts a specified number of hours to value of this object.
IPowerTime.AddMinutes	Adds or subtracts a specified number of minutes to value of this object.
IPowerTime.AddMonths	Adds or subtracts a specified number of months to value of this object.
IPowerTime.AddMSeconds	Adds or subtracts a specified number of milliseconds to value of this object.
IPowerTime.AddSeconds	Adds or subtracts a specified number of seconds to value of this object.
IPowerTime.AddTicks	Adds or subtracts a specified number of ticks to value of this object.
IPowerTime.AddYears	Adds or subtracts a specified number of years to value of this object.
IPowerTime.DateDiff	Compares the date component of an external PowerTime object with this objects date component.
IPowerTime.DateString	Returns the Date component of the object expressed as a .
IPowerTime.DateStringLong	Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name.
IPowerTime.Day	Returns the Day component of the object.
IPowerTime.DayOfWeek	Returns the Day-of-Week component of the object.
IPowerTime.DayOfWeekString	Returns the Day-of-Week of the object, expressed as a string (Sunday, Monday...).
IPowerTime.DaysInMonth	Returns the number of days which comprise the month of the date of the PowerTime object.
IPowerTime.FileTime <Get>	Returns a Quad-Integer value of the PowerTime object as a FileTime.
IPowerTime.FileTime <Set>	The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.
IPowerTime.Hour	Returns the Hour component of the object.
IPowerTime.IsLeapYear	Returns true/false (-1/0) to tell if the object year is a leap year.
IPowerTime.Minute	Returns the Minute component of the object.
IPowerTime.Month	Returns the Month component of the object.
IPowerTime.MonthString	Returns the Month component of the object, expressed as a string (January, February...).
IPowerTime.MSecond	Returns the millisecond component of the PowerTime object.
IPowerTime.NewDate	Assigns a new value to the date component of the PowerTime object.
IPowerTime.NewTime	Assigns a new value to the time component of the PowerTime object.
IPowerTime.Now	The current local date and time on this computer is assigned to this object.
IPowerTime.NowUTC	The current Coordinated Universal date and time (UTC) is assigned to this object.
IPowerTime.Second	Returns the Second component of the object.
IPowerTime.Tick	Returns the Tick component of the object.
IPowerTime.TimeDiff	Compares the time component of an external PowerTime object with this objects time component.
IPowerTime.TimeString	Returns the Time component of the PowerTime object expressed as a string.
IPowerTime.TimeString24	Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.
IPowerTime.TimeStringFull	Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.tt in 24-hour notation.
IPowerTime.Today	The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.
IPowerTime.ToLocalTime	The object is converted to local time.
IPowerTime.ToUTC	The object is converted to Coordinated Universal Time (UTC).
IPowerTime.Year	Returns the Year component of the PowerTime object as a numeric value.
MONTHNAME$	Converts a Month number to the associated name.
SLEEP	Pause the current thread for a specified number of milliseconds.
TIME$	Read and/or set the system time.
TIMER	Return the number of seconds that have elapsed since midnight.

TIX	Measures elapsed CPU cycles.

Misc Operations

Misc. Operations

Miscellaneous functions:

ASM	Identify an assembly-language statement.
ASM ALIGN	Rounds up the instruction location to a power of two address
ASMDATA/END ASMDATA	Define a block where primitive read-only data is stored.
BEEP	Play the default Windows sound through the computer speaker(s).
IMPORT	Load or free a library (DLL) to access an imported procedure.
PLAY WAVE	Play a sound under program control.
PLAY WAVE END	Stops any waveform sound which is currently playing.
REM	Indicates the remainder of a line of source code is a remark or comment.

%DEF operator

%DEF operator IMPROVED

Purpose Determine if an

has been previously defined.

Syntax `%DEF({%numeric_equate | $string_equate})`

Remarks The %DEF operator tests whether or not an equate has been defined. If the equate has been defined, %DEF returns TRUE (non-zero); or FALSE (zero) if it has not be defined.

PowerBASIC automatically defines the equates in the following table according to the PowerBASIC compiler being used. Please note the references to other PowerBASIC compilers are included for those writing programs that may be compilable by more than one PowerBASIC compiler.

Equate	Definition
%PB_CC32	Pre-defined as TRUE (non-zero) in PB/CC for Windows, but is not defined in other compilers.
%PB_DLL16	Pre-defined as TRUE (non-zero) in PB/DLL 16-bit, but is not defined in other compilers.
%PB_DLL32	Synonym of %PB_WIN32
%PB_WIN32	Pre-defined as TRUE (non-zero) in PB/Win 32-bit, but is not defined in other compilers.
%PB_REVISION	Pre-defined as the hex revision (10.00 = &H1000).
%PB_REVLETTER	Pre-defined as the ASCII code of the revision letter (a = &H61), or &H20 if there is no revision letter.
%PB_EXE	Pre-defined as TRUE (non-zero) if compiling to EXE or as FALSE (zero) if compiling to DLL (PB/Win only) or SLL format. The equate %PB_EXE is always defined in PowerBASIC, so %DEF(%PB_EXE) will always be evaluated as TRUE. The difference being the value assigned to the equate by the compiler. See the examples below.

These can be used in conjunction with #IF as a compiler directive to selectively include or exclude code from the compiled file.

See also #IF, Numeric Equates, Built-in numeric equates, String Equates, Built-in string equates

Example

```
' 1. Conditional compilation for PB/CC or PB/Win
#IF %DEF(%PB_CC32)
```

```
  'Assume PB/CC
  #COMPILE EXE "\PBCC\APPS\MYPROG.EXE"
#ELSE
  'Assume PB/Win
  #COMPILE DLL "MYAPP.DLL"
#ENDIF

' 2. Conditional compilation for EXE or DLL
#IF %PB_EXE
  ' we are compiling to an EXE (PB/CC or PB/Win)
  FUNCTION PBMAIN
    [statements]
  END FUNCTION
#ELSE
  ' we are compiling to a DLL (PB/Win)
  FUNCTION PBLIBMAIN
    [statements]
  END FUNCTION
#ENDIF
```

%PB_COMPILETIME numeric equate

Keyword Template

Purpose

Syntax

Remarks

See also

Example

%PB_COMPILETIME numeric equate New!

Purpose Helps to determine the date/time of compilation.

Remarks Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

Example

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

#ALIGN metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#ALIGN metastatement

Purpose Align the next instruction to a boundary.

Syntax `#ALIGN boundary`

Remarks The #ALIGN metastatement is primarily used by advanced assembler programmers to gain ultimate efficiency from critical code sections.

#ALIGN is used to round up the instruction location to a power of two address. The boundary parameter shown must be a power of two, in the range of 2 through 256.

PowerBASIC inserts NOP instructions into the code section to bring the instruction location up to the desired address. If the instruction location is already at a multiple of boundary, #ALIGN has no effect.

See also #OPTIMIZE, ASM, ASM ALIGN, TIX

#BLOAT metastatement

#BLOAT metastatement

Purpose Artificially inflate the disk image size of a compiled program.

Syntax `#BLOAT size_expression`

Remarks #BLOAT allows the creation of artificially bloated program files on disk, in order to match or exceed that generated by competing "*BloatWare*" compilers. #BLOAT does not affect the memory image size (running size) of a compiled program.

size_expression The *size_expression* parameter is a simple Long-integer expression that specifies the total desired size of the compiled programs disk image, but is ignored if it is smaller than the actual program size. #BLOAT uses sections of the actual compiled code to fill and obfuscate the portion added to the file.

While #BLOAT adds no true merit to the technical efficiency of the compiled code, there are a number of reasons for its use, including:

1. To allow "*BloatWare*" programmers to feel more comfortable when using PowerBASIC.
2. To impress project leaders/managers with the volume of executable code created.
3. To allay the fears of uninformed customers who may mistakenly infer that "such tiny programs couldn't possibly do everything that..."
4. To make certain versions of a program more readily identifiable simply by examining the size of the file on disk.
5. To improve convolution of the contents of the executable disk image, because the bloat region appears to contain executable code.

See also #COMPILE EXE, #OPTIMIZE

Example

```
#BLOAT 1024 * 1024 * 4   ' Create a 4 MB EXE file
```

#COM metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#COM metastatement IMPROVED

Purpose Declare information to be included in a COM Type Library.

Syntax

```
#COM CLASS ClassName  [, ClassName...]
#COM DOC "This is specific information to be used in the Help String"
#COM HELP "MyProg.chm"[, &H1E00]
#COM NAME "LibName", 3.32
#COM GUID GUID$("{20000000-2000-2000-2000000000000002}")
#COM TLIB {ON|+ | OFF|-}
```

Remarks The #COM metastatement establishes information about the COM library or application which can be extracted by COM client programs.

#COM CLASS allows you to add the COM attribute to a class defined elsewhere. The COM attribute can even be added to a class in an SLL which was compiled separately. A class which is declared AS COM makes it available to external programs through the COM services of Windows. When you define a class as COM, it is automatically considered to be COMMON as well.

#COM DOC specifies a help string which usually provides a general description of the COM server.

#COM HELP specifies the name of the associated help file and the help context code. The name must appear as a string literal, while the context code is an unsigned DWORD value greater than zero. The context code may be specified in decimal or radix format.

#COM NAME specifies the name of the server and the version number. The name must consist of only letters, numbers, and underscore characters, and may contain no punctuation nor spaces. If no name is specified, PowerBASIC substitutes the module name. If no version is specified, PowerBASIC uses version number 0.0.

#COM GUID specifies the GUID which identifies the entire application or library (APPID or LIBID). If no GUID is specified, PowerBASIC substitutes a random GUID for this purpose.

#COM TLIB ON specifies that the compiler should create a type library for the compiled EXE or DLL.

#COM TLIB OFF (default) specifies that the compiler should not create a type library for the compiled EXE or DLL.

Type Libraries only support the following data types: BYTE, WORD, DWORD, INTEGER, LONG, QUAD, SINGLE, DOUBLE, CURRENCY, OBJECT, STRING, and VARIANT. If any Methods or Properties use data types not supported by Type Libraries, you will receive a Error 581 - Type Library creation error, when using the #COM TLIB ON metastatement.

See also CLASS, INTERFACE (Direct), INTERFACE (IDBind), Just what is COM?

#COMPILE metastatement

#COMPILE metastatement IMPROVED

Purpose Determine what type of file will be created by the compiler.

Syntax

```
#COMPILE {EXE | DLL | SLL} ["filename{.exe|.dll|.sll}"]
```

Remarks This metastatement is used to specify whether a module is to be compiled as an EXE, DLL, or SLL file. The #COMPILE metastatement can only be used once per program, and must be placed before any executable code.

You may, optionally, specify the target name and path of the file. If the optional equal sign (=) is included, the name given is considered to be an exact name, and nothing is appended or changed. Otherwise, the file type is forced to be EXE, DLL, or SLL by the compiler.

If the filename clause is omitted, the compiled file is given the name of the main source code file with an appropriate extension.

If a path is included, the compiled file is placed in the named directory; otherwise, it is placed in the current directory.

If the named directory does not exist, the filename is invalid or locked, if the EXE is still running, or if the file cannot be successfully stored in that location for some other reason, a compile-time Error 496 ("Destination file write error") occurs.

A related item is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

Restrictions If #COMPILE is not specified, the default is #COMPILE EXE.

Examples

```
#COMPILE EXE ' Same name as source, i.e., ABC.EXE
#COMPILE DLL ' Same name as source, i.e., ABC.DLL
#COMPILE SLL "ABC" ' Compiles to ABC.SLL
#COMPILE EXE "ABC.BAS" ' Compiles to ABC.BAS.EXE
```

See also %PB_COMPILETIME, #COMPILER, DLLMAIN, LIBMAIN, PBLIBMAIN, PBMAIN, WINMAIN

#COMPILER metastatement

#DEBUG CODE metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#DEBUG CODE metastatement

Purpose Compiler directive to suppress generation of debugging code.

Syntax `#DEBUG CODE {ON|+ | OFF|-}`

Remarks When a program is compiled for debugging in the PowerBASIC IDE, the compiler must generate some additional code to facilitate setting of breakpoints and some other debug operations. In most cases, this does not affect the execution of your program. However, in the case of code repetition in a tight

, or for certain assembler code or data which must not be altered, it may be very important that some debugging code be suppressed so that code will execute correctly, and at full speed.

#DEBUG CODE OFF suppresses generation of debug code, from that line, until a subsequent #DEBUG CODE ON (or the end of the Sub/Function/Method/Property) is reached. Of course, when debug code is suppressed, it is not possible to set breakpoints on those lines.

#DEBUG CODE metastatements are ignored if not compiling for debug.

See also Error Trapping, Errors, Debugging, #DEBUG DISPLAY, #DEBUG ERROR, #DEBUG PRINT

#DEBUG DISPLAY metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#DEBUG DISPLAY metastatement

Purpose Display a message when an untrapped run-time error occurs.

Syntax `#DEBUG DISPLAY {ON|+ | OFF|-}`

Remarks #DEBUG DISPLAY ON enables error display mode within a compiled PowerBASIC program. In this mode, whenever an untrapped error occurs (without the benefit of ON ERROR GOTO, TRY/CATCH, etc.), program execution is suspended, and a descriptive message is displayed. This message includes the error number, a brief description of the error, and a position descriptor word to help you find the location of the error. The position descriptor word is the first 8 characters of the name of the last (most recent) label, line number, or procedure that was executed. This mode should only be used during program development and debugging. It should never be used in a production program.

When the descriptive message is displayed, it is accompanied by two buttons marked "OK" and "Cancel". If "OK" is selected, program execution continues despite the error condition. If "Cancel" is selected, program execution is stopped. However, if any child processes were started, it is possible they will continue running until ended normally.

#DEBUG DISPLAY OFF suppresses display mode, and is the default condition.

Restrictions #DEBUG DISPLAY ON|OFF can only be executed once and must precede all executable code. If #DEBUG DISPLAY is omitted, the default condition is #DEBUG DISPLAY OFF.

See also Error Trapping, Errors, Debugging, #DEBUG CODE, #DEBUG ERROR, #DEBUG PRINT

#DEBUG ERROR metastatement

#DEBUG ERROR metastatement

Purpose Control generation of error checking code.

Syntax `#DEBUG ERROR {ON|+ | OFF|-}`

Remarks #DEBUG ERROR option specifies whether the compiler should generate code that checks for array boundary and null-pointer errors wherever they may occur. The default setting is OFF.

When #DEBUG ERROR mode is ON, any attempt to access an array outside of its boundaries, or attempting to use a null-pointer will generate a run-time Error 9 ("Subscript/Pointer out of range"), and the statement itself is not executed.

When OFF, all statements are executed "as-is" and no errors are generated. However, accessing an array outside its boundaries or using a null-pointer can cause a General Protection Fault (GPF) or Exception error.

It is best to enable #DEBUG ERROR error checking when developing a program. Once all of the more obvious bugs have been eradicated, you will want to return to the default setting (OFF), as this will make your code smaller and faster. Depending on the type of application being developed, the final (production) version of a program may not need to contain any error-checking code.

Restrictions #DEBUG ERROR is always enabled when code is running within the Debugger, regardless of any explicit #DEBUG ERROR metastatement.

Disk I/O errors are always caught, regardless of the state of #DEBUG ERROR.

#DEBUG ERROR ON does not trap array boundary errors of arrays within User-Defined Types and Unions. Pointers are only tested for null (zero) values. Non-zero pointer target addresses are not tested for readability or writeability.

See also Error Trapping, Errors, Debugging, #DEBUG CODE, #DEBUG DISPLAY, #DEBUG PRINT

#DEBUG PRINT metastatement

#DEBUG PRINT metastatement

Purpose Display information in the IDE's Debugger Output Window

Syntax **#DEBUG PRINT *string_expression***

Remarks The PRINT option allows the programmer to display arbitrary information in the IDE's Debug Output Window during a debugging session. The output window is provided by debugger to display status information about the state of the debugging session; however, #DEBUG PRINT provides a convenient way of creating a "process log" of a Sub/Function/Method/Property/Variable as the program runs. Combined with FUNCNAME$, #DEBUG PRINT can be a useful tool for debugging application code. See the Example below.

This is possible because the Debugger Output Window has a scrollable range somewhat like a console window, whereas the Watch Window shows only the instantaneous value of a variable.

#DEBUG PRINT statements are ignored when code is compiled into a standalone (EXE/DLL) file; they are only included when using the Debugger. Control codes in the string are translated into hex format in the output window. For example, embedded CHR$(0) or $NUL bytes are displayed as "<00>".

Restrictions You may use Unicode strings with #DEBUG PRINT, but the results will always be converted to ANSI by Windows. This is a Windows design limitation, not a limitation of PowerBASIC.

See also Debugging, #DEBUG ERROR, FUNCNAME$

Example

```
FUNCTION PBMAIN() AS LONG
  Arg1% = 10000
  Arg2% = 20000
  CALL MySub(Arg1%, Arg2%)
  CALL MySub(Arg2%, Arg1%)
  #DEBUG PRINT "Done!"
END FUNCTION

SUB MySub(Arg1%, Arg2%)
```

```
  #DEBUG PRINT "We're in " & FUNCNAME$
  #DEBUG PRINT "Arg2% is" & STR$(Arg2%)
END SUB
```

Result

```
We're in MYSUB
Arg2% is 20000
We're in MYSUB
Arg2% is 10000
Done!
```

#DIM metastatement

#DIM metastatement

Purpose Specify if variables must be declared before use.

Syntax `#DIM {ALL | NONE}`

Remarks #DIM NONE (the default), requires you to dimension arrays, but not other kinds of variables, before their use.

Using #DIM ALL requires you to declare all variables before they are used in a program. This option makes PowerBASIC behave a lot like languages like C++ and Pascal which require that all variables be declared before they can be used. Although this will require more work, as even simple variables must be declared with DIM, INSTANCE, LOCAL, GLOBAL, STATIC, or THREADED statements, it will protect you from subtle errors like misspelling a variable name. For example, if you are using a variable *NumRecords* in your program and write a line like:

```
INCR NumRecrods
```

PowerBASIC will detect that you're trying to use a previously undeclared variable (since *NumRecrods* is misspelled) and give you a compile-time error 519 ("Missing declaration"). If you hadn't specified #DIM ALL, you wouldn't have gotten an error, but your program would now have a bug that could be difficult to diagnose.

#DIM ALL means the same thing as OPTION EXPLICIT, and the two can be used interchangeably.

Restrictions When #DIM ALL is used, type-specifier symbols with variable names are not allowed in a DIM var statement. e.g. Dim a$(10) will result in compile error 519. Instead variables or arrays defined with the DIM statement must use the AS vartype format. Additionally, DEFtype statements, such as DEFINT, DEFLNG, etc. will be ignored, resulting in an error 519 where any variable they would otherwise define is used.

See also DEFtype, DIM, GLOBAL, INSTANCE, LOCAL, REDIM, STATIC, OPTION EXPLICIT

Example

```
#DIM ALL
[statements]
DIM ListName(1 TO 400) AS STRING
[statements]
FOR ix = 1 TO 10  ' PowerBASIC flags this line
                  ' since "ix" wasn't dimensioned
  ListName(ix) = "Test"
NEXT
```

#EXPORT metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#EXPORT metastatement New!

Purpose Declare a Sub/Function to have the EXPORT attribute.

Syntax **#EXPORT *SubFuncName* [, *SubFuncName*...]**

Remarks #EXPORT allows you to add the EXPORT attribute to a Sub/Function defined elsewhere. The EXPORT attribute can even be added to a Sub/Function in an SLL which was compiled separately.

The EXPORT descriptor identifies a Sub/Function which may be accessed between Dynamic Link Libraries (DLLs), and/or the main executable which links them. If a procedure is not marked EXPORT, it is hidden from these other modules. Generally speaking, it's best not to mark a Sub/Function in an SLL as EXPORT. While it is syntactically acceptable, it may limit your future options when linking the SLL into host modules. PowerBASIC recommends that you mark them as COMMON in the SLL, and add the EXPORT attribute in the host module.

It's easy to create an SLL which can be linked into an executable program or a dedicated DLL for the same purpose. To add the EXPORT attribute to a linked Sub/Function, just add the word EXPORT to the DECLARE statement in the host module or add an #EXPORT metastatement.

Using this technique, your SLL can be linked directly into an application executable without publishing the Subs/Functions as EXPORT. However, you can also link the same SLL into a DLL host module which adds the EXPORT attribute with #EXPORT.

For example, let's say you want to make a library which publishes the SUB named XXX. You want to provide it in two forms, a linkable SLL and an industry standard DLL. So, first just create the SLL:

```
#COMPILE SLL = "XXXLib.SLL"

SUB xxx() COMMON
  MSGBOX "Hello"
END SUB
```

Just compile it, and you're ready to link it into your application. But now you want to create a DLL, too, since it might be used with other applications. It's just this easy:

```
#COMPILE DLL = "XXXLib.DLL"

#EXPORT xxx
#LINK "XXXLib.SLL"
```

That's all there is to it. You now have an SLL and an equivalent DLL to do the job of the XXX procedure.

See also #LINK, DECLARE

#IF metastatement

#IF/#ELSEIF/#ELSE/#ENDIF metastatements

Purpose Define sections of source code to be compiled or ignored, depending on a certain condition. This is often referred to as conditional compilation.

Syntax **#IF [NOT] {*%equate* | %DEF({*%numeric_equate* | *$string_equate*}) | *expression*}**
[*statements*]

```
[#ELSEIF [NOT] {%equate | %DEF({%numeric_equate | $string_equate}) |
expression}
  [statements]]
[#ELSE
  [statements]]
#ENDIF
```

Remarks

%equate is a named constant or constant value. The %DEF operator allows you to test whether an equate has been defined. %DEF returns TRUE or FALSE. Typical usage: #IF %DEF(%PB_DLL16) *or* #ELSEIF NOT %DEF(%PB_WIN32). *expression* may be a simple numeric expression using the arithmetic operators +, -, *, /, and \, and the relational operators >, <, >=, <=, <>, and =, and may also include the CVQ function.

PowerBASIC automatically defines the equates in the following table according to the PowerBASIC compiler being used. Please note the references to other PowerBASIC compilers are included for those writing programs that may be compilable by more than one PowerBASIC compiler.

Equate	**Definition**
%PB_CC32	Pre-defined as TRUE (non-zero) in PB/CC for Windows, but is not defined in other compilers.
%PB_DLL16	Pre-defined as TRUE (non-zero) in PB/DLL 16-bit, FALSE (zero) in other compilers.
%PB_DLL32	Synonym of %PB_WIN32
%PB_WIN32	Pre-defined as TRUE (non-zero) in PB/Win 32-bit, but is not defined in other compilers.
%PB_REVISION	Pre-defined as the hex revision (10.00 = &H1000).
%PB_REVLETTER	Pre-defined as the ASCII code of the revision letter (a = &H61), or &H20 if there is no revision letter.
%PB_EXE	Pre-defined as TRUE (non-zero) if compiling to EXE or as FALSE (zero) if compiling to DLL format (PB/Win only). The equate % PB_EXE is always defined in PowerBASIC, so %DEF(%PB_EXE) will always be evaluated as TRUE. The difference being the value assigned to the equate by the compiler.

Examples of valid expressions can include:

```
#IF %DEBUG = -1&
#IF %DEBUG AND (NOT %RELEASE)
#IF NOT %DEBUG
#IF %VERSION <> CVQ("DemoMode")
```

Note that the AND, OR and NOT operators work as bitwise operators, rather than logical operators, in #IF metastatements.

If the value of *%equate* or if *%DEF*(*%equate*|*$equate*) is TRUE (non-zero) or if the result of *expression* is TRUE, the statements between #IF and #ELSE or #ELSEIF are compiled, and the statements between #ELSE or #ELSEIF and #ENDIF are ignored.

If the value of *%equate* or *%DEF*(*%equate*|*$equate*) is FALSE (zero) or the result of *expression* is FALSE, the statements between #IF and #ELSE or #ELSEIF are ignored, and those between #ELSE or #ELSEIF and #ENDIF are compiled.

The #ELSE or #ELSEIF clause and associated statements are optional, but #ENDIF is required.

Conditional compilation statements can be nested up to 16 levels deep. A primary use of conditional compilation is to include test code in your programs that will be compiled during program development (but not in the final product), and to facilitate building special editions of an application from a single source code file.

It is possible to perform bitwise operations on

to produce a TRUE/FALSE result. For example:

```
#IF (%PB_REVISION AND &H0FF00) - &H0700
  SoftwareVersion$ = "not 7.x"
#ELSE
```

```
    SoftwareVersion$ = "7.x"
  #ENDIF
```

See also %DEF operator, IF statement, IF block

Example

```
Example ' 1. Conditional compilation by equate value
%DEBUG = -1       'set to 0 for no debugging
#IF %DEBUG
  CALL SubRoutine(Arg1, Arg2, Arg3, Answer)
  CALL DisplayDebugData(Answer)
#ELSE
  CALL SubRoutine(Arg1, Arg2, Arg3, Answer)
#ENDIF

' 2. Conditional compilation for EXE or DLL
#IF %PB_EXE
  ' we are compiling to an EXE (PB/CC or PB/Win)
  FUNCTION PBMAIN
    [statements]
  END FUNCTION
#ELSE
  ' we are compiling to a DLL (PB/Win)
  FUNCTION PBLIBMAIN
    [statements]
  END FUNCTION
#ENDIF
```

#INCLUDE metastatement

#INCLUDE metastatement IMPROVED

Purpose Instruct the compiler to read a text file from disk and treat it as an integral part of the source code.

Syntax

```
#INCLUDE "FileSpec"
#INCLUDE ONCE "FileSpec"
#INCLUDE THIS ONCE
```

Remarks Use #INCLUDE to compile the text of another file along with the current file. The first form causes *FileSpec* to be included in every case it is encountered. The second form causes *FileSpec* to be included only once, the first time it is encountered. This is particularly useful when including common declaration files like WIN32API.INC to avoid redundant code, and the resulting errors. To be effective, the ONCE option must appear on every #INCLUDE of a particular file. Effectively, #INCLUDE ONCE means: "Include this file only if it has not already been included."

The third form (#INCLUDE THIS ONCE) is placed in the file to be included, and produces an end result similar to form two. It tells the compiler to "Include me only one time, no matter how many times it is requested". Depending upon the content and context, this may be a simpler and more readable method to achieve the desired result.

FileSpec is a string constant that follows normal LFN file-naming conventions, and which names a PowerBASIC source code file. If *FileSpec* does not include an extension, the compiler looks for that file name with the default extension of .BAS.

If *FileSpec* does not include a path, the compiler scans the search path for each #INCLUDE file before checking the current (default) directory. For the IDE, the search path can be set in the Compiler Preferences tab in the Options dialog. The search path can also be specified when compiling from the command-line by using the /I Include option. The search path can contain one path or multiple paths to scan. If multiple paths are used, they are separated by a semicolon (;).

When the compiler encounters an #INCLUDE metastatement, it reads *FileSpec* from disk and continues compilation with the source code in *FileSpec*. When the end of *FileSpec* is reached, compilation continues with the statement immediately following the #INCLUDE in the original source file. The result is the same as if the contents of the included file were physically present within the original text. This allows large source files to be broken into smaller sections that are more manageable.

#INCLUDE metastatements can be nested as many as twelve levels deep. That is, an included file can have #INCLUDE metastatements of its own, including files that also have #INCLUDE metastatements, and so on, for a total of twelve levels of files (including the primary file). Note that macros count as #include files for nesting purposes.

See also WIN32API.INC Updates

Example

```
' MYHELLO.BAS
#INCLUDE ONCE "WIN32API.INC"  'include Windows API calls
FUNCTION PBMAIN
  MessageBox 0, "Hello World!", "PowerBASIC", %MB_OK
END FUNCTION
```

#LINK metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#LINK metastatement New!

Purpose LINK a pre-compiled Static Link Library (SLL) or a Power Library (PBLIB) into your host program.

Syntax

```
#LINK "filespec.SLL"
#LINK "filespec.PBLIB"
```

Remarks The #LINK metastatement is used to link pre-compiled Unit files (SLL or PBLIB) into your primary host program. The host program must compile to an EXE or DLL module. You cannot link a unit file into another unit file.

If a specified SLL unit file (or a component SLL in a PBLIB) is not needed by other compiled code, it is ignored entirely. This allows the host program to be compiled to the smallest possible size.

The *filespec* may include an optional path name, and must include the extension ".SLL" or ".PBLIB". The #LINK metastatement may be placed at any location in your source file, as long as it is outside of any block structure, such as Sub, Function, Method, Class, etc.

#LINK shares the file search path with #INCLUDE. If *filespec* does not include a path, the compiler scans the search path for each #LINK file before checking the current (default) directory. For the IDE, the search path can be set in the Compiler Preferences tab in the Options dialog. The search path can also be specified when compiling from the command-line by using the /I Include option. The search path can contain one path or multiple paths to scan. If multiple paths are used, they are separated by a semicolon (;).

See Also #COMPILE, #EXPORT

#MESSAGES metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#MESSAGES metastatement

Purpose Specify which messages should be sent to a Control Callback Function.

Syntax

```
#MESSAGES COMMAND
#MESSAGES NOTIFY
```

Remarks #MESSAGES COMMAND specifies that only %WM_COMMAND messages be sent to Control Callback Functions, just as in earlier versions of PowerBASIC

#MESSAGES NOTIFY specifies that %WM_NOTIFY messages (as well as % WM_COMMAND messages) be sent to Control Callback Functions. This is the default condition, and need not be explicitly stated.

There are two general types of CallBack Functions. The first is the DIALOG CALLBACK, which is specified with the CALL DLGPROC clause of the

statement. It receives all messages which are directed to the dialog, including certain messages regarding its child controls. Specifically, this would include both % WM_COMMAND and %WM_NOTIFY messages. The second is the CONTROL CALLBACK, which is specified with the CALL CTLPROC clause of the statement. If specified, it receives all %WM_COMMAND and %WM_NOTIFY messages sent to the parent dialog.

Prior to version 9.0 of PowerBASIC for Windows, Control Callback Functions received only %WM_COMMAND messages. Beginning with PB 9.0, %WM_NOTIFY messages are sent as well. There are many situations where these added messages will prove to be very important to you. If your existing callback functions are written with complete error checking (ensuring that CB.MSG = %WM_COMMAND), this minor addition will cause no problems. It just presents additional information which can be acted upon, or just ignored. However, if callbacks were written without complete error checking, some ambiguity is possible. In this case, you should either update your Control Callback code, or suppress %WM_NOTIFY messages with a #MESSAGES Command metastatement.

See also Callbacks, DIALOG SHOW MODAL, DIALOG SHOW MODELESS, FUNCTION/END FUNCTION

#OPTIMIZE metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#OPTIMIZE metastatement IMPROVED

Purpose Choose the optimization which should be applied to your program.

Syntax
```
#OPTIMIZE CODE [ON | OFF]
#OPTIMIZE {SIZE | SPEED}
```

Remarks The #OPTIMIZE metastatement is used to tell the compiler your preferences in regards to the optimization of generated code. You can specify optimization for either execution speed or smaller code size.

The first form of the directive (CODE) tells the compiler whether unreferenced code should be removed from the compiled program to minimize the executable file size. This option defaults to ON as there are few reasons to disable it (other than curiosity as to the effectiveness). Regardless of the compiled module type (SLL, DLL, or EXE), PowerBASIC removes every unneeded:

1. Sub
2. Function
3. FastProc
4. Method
5. Property
6. String Literal
7. Numeric Literal
8. Static Link Library

Extraction is always performed on a procedure basis, not an entire class. If you have a CLASS with 50 Methods, but only one is ever called, the other 49 are removed entirely. This level of granularity is particularly important with your personal code library of general purpose functions. You can include them all, and PowerBASIC will use just the minimum necessary. If you generate a log file (using the /L command line option), a list of the extracted procedures, classes, and SLL modules is provided.

The second form of the directive (SIZE/SPEED) tells the compiler whether you want additional optimization for execution speed or smaller total code size. If not used, the default is to choose faster code speed.

If you choose the SPEED option, one of the primary actions of the compiler is to align heavily used code sections on an address boundary which is most beneficial to the CPU/FPU.

In some cases, the speed of

mechanisms (FOR/NEXT, DO/UNTIL...) can be improved by as much as 100%, and occasionally even more.

Restrictions #OPTIMIZE SIZE | SPEED can only be executed once and must precede all executable code. If #OPTIMIZE is omitted, the default condition is #OPTIMIZE SPEED.

See also #ALIGN, ASM ALIGN

#OPTION metastatement

#OPTION metastatement IMPROVED

Purpose Establish various compiler options.

Syntax `#OPTION {LARGEMEM32 | VERSION3 | VERSION4 | VERSION5 | WIN95 | ANSIAPI}`

Remarks **#OPTION LARGEMEM32**

For 32-bit Windows applications, this option sets the "Large Memory Model" flag. This allows your application to use more than the original limit of 2 Gigabytes of memory. Depending upon the version of Windows in use, and the installed memory, the exact increase may vary from computer to computer. In most cases, you will likely be limited to a total of approximately 3 Gigabytes.

#OPTION VERSION3, VERSION4, VERSION5

When the #OPTION metastatement is used with any one of the VERSION directives, it controls the "minimum Windows version" tag that is written into your compiled code. If the version you select is equal or lower to the version of Windows that is running, the application will be executed. In turn, Windows will tailor the messages it sends to your program according to this version number, so your program will not need to handle messages from a later Windows version. The version tag may also affect the appearance and behavior of Windows common dialogs.

Conversely, if the version tag you select is higher than the version of Windows that is running, Windows will display an error message instead of running your application. For example, running a VERSION5 application on a VERSION4 platform would fail. It is your responsibility to make sure that your program only uses the Windows features that are present in the specified version of Windows. For example, don't call an API that's present only in Windows XP, if you want your program to run under Windows 98.

#OPTION VERSION3

Use #OPTION VERSION3 to make the compiled output file require a minimum of Windows 95 or NT 3.1. That includes Windows 95, 98, ME, Windows NT 3.1-4.0, Windows 2000, XP, Windows 2003, Windows Vista, Windows 7, and later.

#OPTION VERSION4

Use #OPTION VERSION4 (default) to make the compiled output file require a minimum of Windows 95 or NT4. That includes Windows 95, 98, ME, Windows NT 4.0, Windows 2000, XP, Windows 2003, Windows Vista, Windows 7, and later.

#OPTION VERSION5

Use #OPTION VERSION5 to make the compiled output file require a minimum of Windows 2000. That includes Windows 2000, XP, Windows 2003, Windows Vista, Windows 7, and later.

#OPTION WIN95

Windows95, Windows98, and Windows ME do not offer Unicode support for Windows API functions. Normally, that would make it possible to execute your compiled programs on these operating systems, as this version of PowerBASIC offers complete support for Wide Unicode text. However, if you specify #OPTION WIN95 in your source code, PowerBASIC will include a complete Unicode emulation package in your executable or DLL to allow them to run properly on these operating systems, This option will cause your code to be a bit larger, so it should only be used where necessary.

#OPTION ANSIAPI

This version of PowerBASIC offers complete support for Wide Unicode text, so it follows that the internal runtime library would call Unicode versions of functions in the Windows API. In some fairly rare cases, this could cause an incompatibility with code you have written, if your code calls ANSI functions in the Windows API. If you specify #OPTION ANSIAPI in your source code, PowerBASIC will call only ANSI versions of these functions. This option will cause your code to be a bit larger, so it should only be used when needed.

Example

```
#OPTION VERSION5
```

#PAGE metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#PAGE metastatement New!

Purpose Sets a page boundary for the PowerBASIC IDE.

Syntax `#PAGE`

Remarks Program listings which are nicely formatted are easier to read and understand, particularly after some elapsed time.

The #PAGE metastatement is used to set a page boundary when the source code is printed from the PowerBASIC IDE. Each time a #PAGE is found, the PowerBASIC IDE starts printing on a new page.

#PAGE has no effect on your compiled code.

#PBFORMS metastatement

#PBFORMS metastatement

Purpose Compiler directive to mark named blocks of generated **PowerBASIC Forms**™ code.

Syntax #PBFORMS *named_block_marker*

Remarks #PBFORMS metastatements are generated by the **PowerBASIC Forms™** visual design tool, and placed automatically into the generated source code. #PBFORMS metastatements identify named blocks of code that have special meaning to both the compiler and the **PowerBASIC Forms™** visual design tool.

#PBFORMS metastatements should not be removed or utilized - they should only be created and positioned by **PowerBASIC Forms™**. For more information, please refer to the documentation supplied with **PowerBASIC Forms™**.

> **PowerBASIC Forms™ is a visual design environment that enables rapid visual design of GUI application dialogs. PowerBASIC Forms generates compilable Dynamic Dialog Tools (DDT) source code, directly from the dialogs created in the designer. PowerBASIC Forms product information can be found at http://www.powerbasic.com/products/pbforms.**

An example **PowerBASIC Forms™** template and completed project can be found in the PB\SAMPLES\DDT\INTERFACE EXPLORER folder installed with PowerBASIC for Windows.

Example

```
#PBFORMS CREATED
#PBFORMS BEGIN INCLUDES
```

#REGISTER metastatement

#REGISTER metastatement

Purpose Control automatic allocation of Register variables.

Syntax

```
#REGISTER {ALL | DEFAULT | NONE}
```

Remarks Register variables may be Extended-precision floating-point variables, or 16/32-bit integral-class variables (Word, Dword, Integer, or Long). The #REGISTER metastatement determines the method of automatic allocation of Register variables.

The #REGISTER metastatement works at two levels - a "global" setting, and a "local" setting for each Sub/Function/Method/Property. To set the global default #REGISTER options, it must precede all executable code. To override the global register option for an individual routine, it must be placed between the FUNCTION/END FUNCTION, SUB/END SUB, METHOD/END METHOD, or PROPERTY/END PROPERTY pairs before any executable code.

ALL #REGISTER ALL requests automatic allocations of all possible Register variables, both integral-class and Extended-precision float variables.

DEFAULT #REGISTER DEFAULT (default) requests automatic allocations of integral-class variables in all cases, and Extended-precision floating-point variables located in a routine which contains no reference to another procedure.

NONE #REGISTER NONE disables automatic assignment of Register variables. You can still use the REGISTER statement to explicitly define Register variables in your code on an individual basis. This provides a way to hand-optimize your code to help obtain the utmost performance.

Restrictions PowerBASIC transparently prevents the automatic register conversion of the variable used in the TO clause of the DIALOG SHOW MODAL and DIALOG SHOW STATE statements. If the target variable is explicitly declared as a register variable, PowerBASIC raises a compile-time Error 491 ("Invalid register variable"). This is necessary as the result values stored in such variables may be assigned from the context of other procedures, and this may only occur with a memory variable.

See also REGISTER, Optimizing your code

Example

```
#REGISTER DEFAULT                ' global register setting
FUNCTION PBMAIN() AS LONG
  #REGISTER NONE                 ' No automatic register
                                 ' vars in this function
  REGISTER x&                    ' Explicitly declare x&
  …
END FUNCTION
```

#RESOURCE metastatement

#RESOURCE metastatement IMPROVED

Purpose Embed a PowerBASIC Resource data into a compiled EXE or DLL.

Syntax

```
#RESOURCE BITMAP,   ResID, "filespec.BMP"
#RESOURCE ICON,     ResID, "filespec.ICO"
#RESOURCE MANIFEST,     1, "filespec.XML"
#RESOURCE RCDATA,   ResID, "filespec.DAT"
#RESOURCE STRING,   ResID, "YourWideText"$$ [,LangID]
#RESOURCE TYPELIB,      1, "filespec.TLB"
#RESOURCE WAVE,     ResID, "filespec.WAV"
#RESOURCE VERSIONINFO <<block>>

#RESOURCE RES, "filespec.RES"
#RESOURCE PBR, "filespec.PBR"
```

Remarks

This metastatement is used to include PowerBASIC Resource data into your program or DLL. Resource data may consist of

, , , COM Type Libraries, Version Information, and more. You can even embed custom binary data for your personal, specialized needs.

The parameter *ResID* is a unique identifier which you create to reference this item. It can be a number or an alphanumeric label. If a number, it must be an integral value from 0 to 65535. If a label, it must begin with a letter, and consist of letters and numbers. Alphanumeric labels are not case sensitive. The filespec parameter must always be expressed as a string literal which tells the location of the resource data.

With most programming languages, creation and embedding of resource data is a cumbersome process. First you create a resource script (an .RC file) with a text editor. Then you save the .RC file. Now, compile the .RC file with a resource compiler to get a .RES file. Next, you convert it to a linkable file using Microsoft's CVTRES.EXE or another converter program like PBRES.EXE. Finally, you link it into your .EXE or .DLL with a compiler or linker program. What if you find you need to make a tiny change? Do it all over again, from the beginning. Even older versions of PowerBASIC suffered from this problem.

Isn't there a better way? Yes, PowerBASIC now handles the entire process in a single line of code. Need an embedded bitmap?

```
#RESOURCE BITMAP, 123, "MyPicture.BMP"
```

PowerBASIC finds your bitmap in the file MyPicture.BMP and embeds it in your executable. When you need to use it, you can reference it by the ID you chose for it (123). The ID can be an integral numeric value or a text name of your choice. So, to display the bitmap on a graphic window, it's as simple as:

```
GRAPHIC RENDER "#123", (100,100)-(160,140)
```

The second group of syntax examples show how you can embed resources which have been pre-compiled used a resource compiler. Standard resource compilers output a binary resource with a .RES extension. PowerBASIC will embed this resource just as it is given in the file. This form will always be supported to offer support resource forms which are typically not needed for most PowerBASIC programs, or which usually require the use of a resource editor.

The final example, using a .PBR file, will only be supported for a limited period of time. This is the form created by the PowerBASIC PBRES utility in older versions of the compiler. It is recommended that you change to the .RES version soon, as it is more efficient, and needs less effort from the programmer. It should be noted that prior versions of PowerBASIC allowed the descriptor "PBR" to be omitted. While this option will be supported for a limited period of time, we recommend that you always insert "PBR" for clarity.

String Resources

The String resource contains string data which is always created and stored as Wide Unicode characters. It is retrieved at run-time with the RESOURCE$ function. Due to the manner in which Windows stores string resources in a string table, the *ResID* must be numeric.

The string data must be from 1 to 127 characters in length, and may not contain any embedded nuls (CHR$(0)). The string data may be specified as a quoted wide string literal ("MyText"$$), or as a wide string literal expression. A string literal expression can be constructed from combinations of wide string equates or wide quoted string literals, the CHR$ function, SPACE$ function, and the STRING$ function when used with numeric parameters.

VersionInfo Resources

The VersionInfo resource contains information about the file, such as its version number, its intended operating system, its original file name, and much more. This resource is intended to be used with the Version Information API functions, so that Windows Explorer, and other programs, can display the relevant information about your EXE. The VersionInfo resource cannot be embedded in a Static Link Library (SLL).

The VersionInfo resource is unique in that it requires several #RESOURCE metastatements which are interpreted as a complete block. They must be placed consecutively in the correct sequence in order be processed correctly.

1. The block begins with the VERSIONINFO metastatement which marks the beginning of the version block.

   ```
   #RESOURCE VERSIONINFO
   ```

2. Next, you may choose to add one or more of the numeric version metastatements which embed numeric values.

   ```
   #RESOURCE FILEFLAGS FlagValue&
   #RESOURCE FILEVERSION HiNum1&, LoNum1&, HiNum2&, LoNum2&
   #RESOURCE PRODUCTVERSION HiNum1&, LoNum1&, HiNum2&, LoNum2&
   ```

3. Next, the mandatory STRINGINFO metastatement is added, to identify the Language ID and CharSet to be used. Each of these parameters must be passed as a 4-digit HEX value in a string literal. The parameter must not contain the "&H" prefix used with numeric hex numbers.

   ```
   #RESOURCE STRINGINFO "LangID", "CharSet"
   ```

4. Finally, you will add one or more of the string version metastatements, to provide extensive information about the file. The first string literal parameter chooses one of the following predefined names. The second string literal parameter adds your personal choice of information about the file.

   ```
   #RESOURCE VERSION$ "Comments",         "Additional info"
   #RESOURCE VERSION$ "CompanyName",      "PowerBASIC Inc."
   #RESOURCE VERSION$ "FileDescription",  "Presented to users"
   #RESOURCE VERSION$ "FileVersion",      "Readable VerNum 1.02"
   #RESOURCE VERSION$ "InternalName",     "Private"
   #RESOURCE VERSION$ "LegalCopyright",   "Copyright 2011 PB Inc"
   #RESOURCE VERSION$ "LegalTrademarks",  "xx is a..."
   #RESOURCE VERSION$ "OriginalFilename", "Original name w/o path"
   #RESOURCE VERSION$ "PrivateBuild",     "Private info"
   #RESOURCE VERSION$ "ProductName",      "Product distributed with"
   #RESOURCE VERSION$ "ProductVersion",   "Version distributed with"
   #RESOURCE VERSION$ "SpecialBuild",     "Special info"
   ```

FILEFLAGS

FlagValue&	**Description**
%VS_FF_DEBUG	File contains debugging information or is compiled with debugging features enabled.
%VS_FF_PATCHED	File has been modified and is not identical to the original shipping file of the same version number.
%VS_FF_PRERELEASE	File is a development version, not a commercially released product.
%VS_FF_PRIVATEBUILD	File was not built using standard release procedures. If this value is given, you must include a *PrivateBuild* string item.
%VS_FF_SPECIALBUILD	File was built by the original company using standard release procedures, but is a variation of the standard file of the same version number. If this value is given, you must include a *SpecialBuild* string item.

STRINGINFO

LangID	**Language**	*LangID*	**Language**
&H0401	Arabic	**&H0415**	Polish
&H0402	Bulgarian	**&H0416**	Portuguese (Brazil)
&H0403	Catalan	**&H0417**	Rhaeto-Romanic
&H0404	Traditional Chinese	**&H0418**	Romanian
&H0405	Czech	**&H0419**	Russian
&H0406	Danish	**&H041A**	Croato-Serbian (Latin)
&H0407	German	**&H041B**	Slovak
&H0408	Greek	**&H041C**	Albanian
&H0409	U.S. English	**&H041D**	Swedish
&H040A	Castilian Spanish	**&H041E**	Thai
&H040B	Finnish	**&H041F**	Turkish
&H040C	French	**&H0420**	Urdu
&H040D	Hebrew	**&H0421**	Bahasa
&H040E	Hungarian	**&H0804**	Simplified Chinese
&H040F	Icelandic	**&H0807**	Swiss German
&H0410	Italian	**&H0809**	U.K. English
&H0411	Japanese	**&H080A**	Spanish (Mexico)
&H0412	Korean	**&H080C**	Belgian French
&H0413	Dutch	**&H0816**	Portuguese (Portugal)
&H0414	Norwegian - Bokmal	**&H081A**	Serbo-Croatian (Cyrillic)
&H0810	Swiss Italian	**&H0C0C**	Canadian French
&H0813	Belgian Dutch	**&H100C**	Swiss French
&H0814	Norwegian - Nynorsk		

STRINGINFO

CharSet	**Character Set**
&H0000	7-bit ASCII
&H03A4	Japan (Shift - JIS X-0208)
&H03B5	Korea (Shift - KSC 5601)
&H03B6	Taiwan (Big5)
&H04B0	Unicode
&H04E2	Latin-2 (Eastern European)
&H04E3	Cyrillic
&H04E4	Multilingual
&H04E5	Greek
&H04E6	Turkish
&H04E7	Hebrew
&H04E8	Arabic

RES/PBR Resources

The second group of syntax examples show how you can embed resources which have been pre-compiled used a resource compiler. Standard resource compilers output a binary resource with a .RES extension. PowerBASIC will embed this resource just as it is given in the file. This form will always be supported to support resource forms which are typically not needed for most PowerBASIC programs, or which usually require the use of a resource editor.

The final example, using a .PBR file, will only be supported for a limited period of time. This is the form created by the PowerBASIC PBRES utility in older versions of the compiler. It is recommended that you change to the .RES version soon, as it is more efficient, and needs less effort from the programmer. It should be noted that prior versions of PowerBASIC allowed the descriptor "PBR" to be omitted. While this option will be supported for a limited period of time, we recommend that you always insert "PBR" for clarity.

Restrictions Windows 95, 98, and ME offer limited support for resources. When compiling on one of these versions of Windows, only #RESOURCE RES and #RESOURCE PBR may be used. Other forms of the #RESOURCE metastatement are not functional.

RES and PBR resources cannot be mixed with any other resources. Once you add a PBR or RES resource, you cannot add any other #RESOURCE metastatements in your program.

See also RESOURCE$, Resource Files

Example

```
#RESOURCE ICON, MySpecialIcon, "Icon.ICO"
```

#STACK metastatement

#STACK metastatement

Purpose Set the maximum potential stack size.

Syntax **#STACK *num_expr***

Remarks The literal numeric expression is expressed in bytes, and is rounded up to the next 64 Kb boundary. The minimum allowable stack size is 128 Kb, and a typical stack size of at least 1 Megabyte (the default) is usually recommended.

Upon program startup, an initial block of 128 Kb of physical memory is allocated to the stack. As the stack grows, additional memory is automatically added, as necessary, up to the specified maximum. Since physical memory is only committed as required, it is usually prudent to overestimate potential stack needs.

Restrictions #STACK is meaningful with EXE (executable) files only.

#TOOLS metastatement

#TOOLS metastatement

Purpose Enable or disable integrated development tool code in compiled code.

Syntax **#TOOLS [ON|+ | OFF|-]**

Remarks The #TOOLS metastatement allows integrated development tools like TRACE, PROFILE, and CALLSTK to be readily disabled, ensuring that extra code and data is not compiled into the final (distribution) version of an application. #TOOLS defaults to ON, and may appear only once in the source code, before any statement that generates executable code.

See also CALLSTK, CALLSTK$, CALLSTKCOUNT, FUNCNAME$, PROFILE, TRACE

#UNIQUE metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#UNIQUE metastatement New!

Purpose Specify whether unique variable names are required.

Syntax `#UNIQUE VAR [ON|OFF]`

Remarks The #UNIQUE metastatement is used to tell the compiler whether it should require unique variable names.

If this option is enabled, only LOCAL, STATIC, and parameter variable names may be reused in other

. Other variable names (GLOBAL, THREADED, and INSTANCE) must be unique from all other variable names.

If #UNIQUE VAR is omitted, the default condition is #UNIQUE VAR OFF.

See also #DIM, DEFtype, DIM, GLOBAL, LOCAL, REDIM, STATIC, OPTION EXPLICIT

#UTILITY metastatement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

#UTILITY metastatement

Purpose Compiler directive to allow external utility programs to read text inserted on the #UTILITY line.

Syntax `#UTILITY "any text for an external program"`

Remarks The entire line is ignored by the PowerBASIC compiler.

ABS function

ABS function

Purpose Return the absolute value of a expression.

Syntax `y = ABS(numeric_expression)`

Remarks The absolute value of a number is its non-negative value. For example, the absolute value of -3 is 3, and the absolute value of +3 is also 3. The absolute value of 0 is 0.

See also SGN

ACCEL ATTACH statement

ACCEL ATTACH statement

Purpose Attach a table of keyboard accelerators to a DDT dialog.

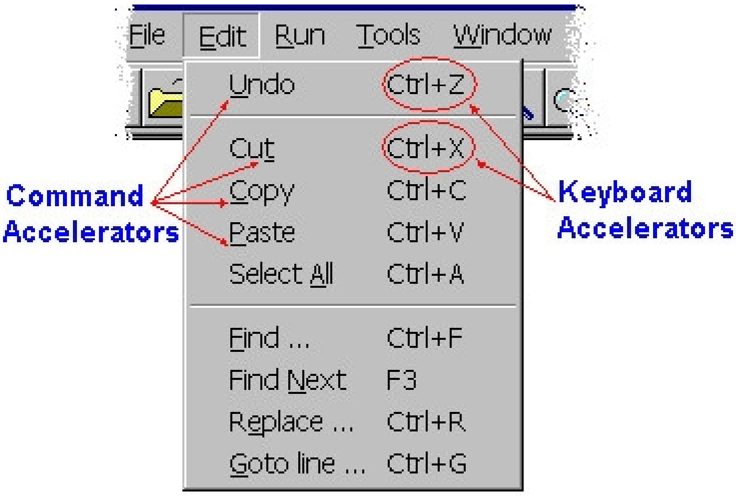
Syntax **`ACCEL ATTACH hDlg, AccelTbl() TO hAccelHandle`**

Remarks ACCEL ATTACH permits you to attach one table of accelerator key definitions to each DDT dialog in your application.

The keyboard accelerator itself is a specific keystroke combination, which results in a %WM_COMMAND or %WM_SYSCOMMAND message being placed into the application's message queue.

Keyboard accelerators are very similar to command accelerators, and often permit the same action selections as menus offer. Since keyboard accelerators can be used directly, they negate the need to navigate a menu in order to perform a specific action.

Typically, application menu items inform users of available keyboard accelerators so expert users can work more efficiently without using the actual menus, but can still use the menu if required. The following image shows a menu showing command accelerator and keyboard accelerators for menu items (the command accelerators are underscored):



On Windows XP and Windows 2000 you may need to press the ALT key before Command Accelerators are made visible. You can set if Command Accelerators are visible when using the ALT key or all the time in the Windows Display Settings.

For a command accelerator to operate, the specific menu item must be visible and enabled. Conversely, keyboard accelerators can be used without the menu being open. In the example above, the CTRL+X keystroke combination will perform the CUT action, but the accelerator letter t will only perform the Cut action if the EDIT menu is opened first.

AccelTbl() To utilize ACCEL ATTACH, you must first build the array *AccelTbl()* of *ACCELAPI* User-Defined Types (UDTs). This *ACCELAPI* structure is a 6-byte structure with the following definition:

```
TYPE ACCELAPI WORD
  FVIRT AS BYTE ' Flags: One or more of %FVIRTKEY, %FSHIFT, %FALT and %
FCONTROL
  KEY AS WORD ' Accelerator key: ASCII code, or virtual key code {%
FVIRTKEY}
  CMD AS WORD ' Accelerator ID code gets passed in CB.CTL {LO(WORD,
WPARAM)}
```

```
  END TYPE
```

You must build the array of *ACCELAPI* types yourself, then attach it to a dialog by executing an ACCEL ATTACH statement. There must be no empty elements in the array, so it must be sized accurately.

.FVIRT — The .FVIRT flags can be combined together with the OR operator to combine the actions of the individual flags, as follows:

%FALT	The ALT key must be pressed along with the accelerator key.
%FCONTROL	The CTRL key must be pressed along with the accelerator key.
%FSHIFT	The SHIFT key must be pressed along with the accelerator key.
%FVIRTKEY	The .KEY member specifies a virtual-key code. If this flag is not specified, the key member is assumed to specify an ASCII character code. %FVIRTKEY permits case-insensitive accelerator keystroke definitions - the Capslock state is ignored. For example, ALT+A and ALT+a (as determined by the Capslock key) produce the same accelerator event. If %FVIRTKEY is not used, the accelerator ALT+A would not trigger if Capslock were inactive.

.KEY — If the %FVIRTKEY flag is specified in the .FVIRT member, the .KEY field contains the virtual key code for the accelerator key. Virtual key equates are defined in the WIN32API.INC file, starting with the prefix %VK_.

If %FVIRTKEY is not specified, the accelerator key code in the .KEY member is the ASCII code of the accelerator key. In this case, alphanumeric keystrokes become case-sensitive and the state of the Capslock key state becomes important. For example, if an accelerator were defined for ALT+A, it would be activated only if the Capslock key was on. Conversely, if an accelerator were defined for ALT+a then it would only be activated Capslock was off.

.CMD — The .CMD member should contain the user-defined numeric ID code of the accelerator. When an accelerator keystroke occurs, a WM_COMMAND message is sent to the dialog Callback Function, with the accelerator identifier returned by the CB.CTL function.

It is usual practice to use the ID of a control that is to be activated by an accelerator. Accelerator notification codes sent to the Callback Function have CB.CTLMSG set to 1 (as opposed to button click events messages where CB.CTLMSG = %BN_CLICKED).

hDlg — The handle of the dialog to attach the accelerator table to.

hAccelHandle — Double-word or Long-integer variable where the handle of the attached accelerator table will be stored, or zero if the attach operation was unsuccessful.

Restrictions — If a previous table was attached to the target dialog, the table is automatically destroyed when the new table is attached in its place. The accelerator table is also destroyed automatically when the dialog is closed.

You can destroy the current accelerator table by executing ACCEL ATTACH with an array which is not dimensioned, but there is little or no reason to ever perform this action.

Accelerator tables can only run correctly when they are created in the same module that creates the dialog to which each table is attached.

See also — DIALOG NEW, MENU ADD STRING, MENU ATTACH

Example

```
DIM ac(0 TO 8) AS ACCELAPI
LOCAL hAccelHandle AS DWORD

FOR x& = 0 TO 8
  ac(x&).fvirt = %FCONTROL OR %FSHIFT OR %FVIRTKEY
  ac(x&).key = %VK_1 + x& ' CTRL+SHIFT+1 to 9
  ac(x&).cmd = %BTN1 + x& ' %BTN1 to %BTN9
NEXT x&

ACCEL ATTACH hDlg, ac() TO hAccelHandle
```

ACODE$ function

ACODE$ function

Purpose Translates Unicode bytes into ANSI bytes.

Syntax `a$ = ACODE$(UnicodeStrExpression [,CodePage&])`

Remarks This version of PowerBASIC handles all conversions between ANSI strings and UNICODE strings automatically. For example:

```
MyAnsiString$ = MyWideString$$
```

In this case, the wide characters are transparently converted to byte characters when they are stored in *MyAnsiString$*. You should not insert an ACODE$ function here. The simple fact that the variables are of differing types (ANSI/WIDE) causes the compiler to make all conversions for you, whenever they are needed.

Of course, this automatic conversion was not available in previous versions of the compiler. In the past, there were no WIDE UNICODE variables offered, so it was necessary to force wide characters into standard byte strings when UNICODE was needed. The ACODE$ and UCODE$ functions are used for this purpose alone: to support legacy programs which calculated strings in this fashion.

New PowerBASIC programs and updates to your older PowerBASIC programs should use the new WIDE UNICODE variables which are now available.

ACODE$ presumes that the *UnicodeStrExpression* contains WIDE UNICODE characters stored in an ANSI byte string. It converts them into ANSI byte characters and returns them as an ANSI string. To convert an ANSI byte string into a UNICODE byte string, use the UCODE$ function.

If the optional parameter *CodePage&* is present, it represents the code page to be used for the conversion process. If not given, the default code page for the locale of the executing computer is used.

Unicode strings require two bytes to represent a Unicode character, whereas ANSI strings (the native PowerBASIC string format) use one byte to represent a character. Therefore, ACODE$ returns a string that has half of the byte count of the Unicode string, yet represents the same number of characters.

See also UCODE$, UCODEPAGE

AND operator

AND operator

Purpose The AND operator works as both a logical and a bitwise arithmetic operator.

Syntax `p AND q`

Using AND as a logical operator

AND returns TRUE (non-zero) if (and only if) both its operands are TRUE. The AND truth table looks like this:

Truth Table

x	y	x AND y
T	T	T
T	F	F
F	T	F
F	F	F

Using AND as a bitwise arithmetic operator

AND masks clear selected bits of an integral-class value without affecting the other bits. For example, to clear the most-significant (leftmost) 2 bits in the integer value &H9700, AND it with &H3FFF. That is, the mask contains all 1s, except for the bit positions you want to force to 0:

```
        1001 0111 0000 0000 = &H09700
AND     0011 1111 1111 1111 = &H03FFF (the mask)
        0001 0111 0000 0000 = &H01700 (result)
MSB     ↑                 ↑   LSB (bit 0)
```

See also Arithmetic Operators, EQV, IMP, ISFALSE, ISTRUE, NOT, OR, XOR

ARRAY ASSIGN statement

ARRAY ASSIGN statement

Purpose Allow the assignment of a number of values to successive elements of an array.

Syntax **ARRAY ASSIGN *array()* = *param1* [,*param2*] [,…]**

Remarks ARRAY ASSIGN allows the assignment of a number of values to successive elements of an array. The assignment always starts with the first array element, and continues sequentially as the elements appear in memory. The values to be assigned must match the array type, and may be literals, variables, or expressions. ARRAY ASSIGN cannot be used on an array of Interfaces.

See also ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, PowerArray, REDIM, UBOUND

Example **ARRAY ASSIGN x&() = 1,2,3,4,5,6,7,8,9,10**

ARRAY DELETE statement

ARRAY DELETE statement

Purpose Delete a single item from a given array.

Syntax **ARRAY DELETE *array*([*index*]) [FOR *count*] [, *expression*]**

Remarks ARRAY DELETE deletes the data stored at the nominated element in *array*, an n-dimensional array. You can specify the *index* of the element which is to have its data deleted, how many elements (*count*) are to be automatically shifted down by one position, and what data value to give the last element after the rest of the elements have been shifted (*expression*).

All of these parameters are optional. If *index* is not specified, the data stored in the element at the beginning of the array is deleted. If *expression* is not present, the last element that the data is shifted out of will contain zero if *array* is a numeric array, or an empty

if *array* is a string array. If a shift *count* is given, when shifting the rest of the array to eliminate the element, only *count* elements will be shifted.

By default, ARRAY DELETE throws away the data at the element *index* of *array*, shifting the data in the appropriate portion of the array to cover the old element:

```
DIM A(1 TO 4) AS LONG
ARRAY DELETE A(2), 17&
```

makes *A(2)=A(3)*, *A(3)=A(4)*, and *A(4)=17*. The original value of *A(1)* remains in place. Use *count* to "protect" a portion of the array from the shift:

```
DIM A(1 TO 4) AS LONG
ARRAY DELETE A(2) FOR 2, 17&
```

makes *A(2)=A(3)* and *A(3)=17* because you told it to shift only 2 elements. The original values of *A(4)* and *A(1)* remain in place.

DELETE with multi-dimensional arrays

count can also be used with a multi-dimensional array (stored in linear column-major order; see ARRAY SORT), to prevent shifting element data from one dimension into another dimension, thus preserving the organization of the array. For example:

```
DIM A(0 TO 1,0 TO 1) AS INTEGER
A(0,0)=0
A(1,0)=100
A(0,1)=200
A(1,1)=300
ARRAY DELETE A(0,0) FOR 2, 17%
```

makes *A(0,0)=100* and *A(1,0)=17*. The original values of *A(0,1)* and *A(1,1)* remain in place since you told it to shift only 2 elements. Without *count*:

```
ARRAY DELETE A(0,0), 17%
```

makes *A(0,0)=100*, *A(1,0)=200*, *A(0,1)=300*, and *A(1,1)=17*. The original value of *A(0,0)* is lost.

Restrictions ARRAY DELETE cannot be used on arrays within UDT structures. However, ARRAY DELETE can be used with arrays of UDT structures - simply treat them as if they were an array of fixed-length strings.

To use ARRAY DELETE on an embedded UDT array, use DIM..AT to dimension a regular array (of the same type) directly "over the top" of the UDT array, and use ARRAY DELETE on that array. For example:

```
TYPE SalesType
  OrderNum AS LONG
  PartNumber(1 TO 20) AS STRING * 20
END TYPE
[statements]
DIM Sales AS SalesType
[statements]
DIM Temp(1 TO 20) AS STRING * 20 AT VARPTR(Sales.Partnumber(1))
ARRAY DELETE Temp(5), "string"
ERASE Temp()
```

See also ARRAY ASSIGN, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, PowerArray, REDIM, UBOUND

Example Makes *A(2)=3* and *A(3)=2.5*. *A(0)* and *A(1)* remain in place:

```
DIM A(0 TO 3) AS CUX
A(0)=0
A(1)=1
A(2)=2
A(3)=3
ARRAY DELETE A(2), 2.5@@
```

Makes *A(0)=2*, *A(1)=3*, and *A(2)=0*. The original value of *A(0)* is lost:

```
DIM A(0 TO 2) AS EXT
A(0)=1
A(1)=2
A(2)=3
ARRAY DELETE A()
```

ARRAY INSERT statement

ARRAY INSERT statement

Purpose Insert a single item into a given array.

Syntax **ARRAY INSERT *array*([*index*]) [FOR *count*] [, *expression*]**

Remarks ARRAY INSERT inserts a single data item into *array*, an n-dimensional array. You can specify the *index* at which the new element data is to be inserted, how many elements (*count)* are to be shifted up by one position to make room for the new element data, and what data value to give the new element (*expression*).

All of these parameters are optional. If *index* is not specified, the element data is inserted at the beginning of the array If e*xpression* is not present, the new element will contain zero if *array* is a numeric array, or an empty

if *array* is a string array.

If a shift *count* is given, when shifting the rest of the array to make way for the new element data, only *count* elements will be shifted.

By default, ARRAY INSERT throws away the data in last element of *array*, then shifts the appropriate portion of the array to make way for the new element data:

```
DIM A(1 TO 4) AS LONG
ARRAY INSERT A(2), 17
```

makes *A(4)=A(3)*, *A(3)=A(2)*, and *A(2)=17*. The original value of *A(4)* is lost, while the original value of *A(1)* remains in place. Use *count* to "protect" a portion of the array from the shift:

```
DIM A(1 TO 4) AS LONG
ARRAY INSERT A(2) FOR 2, 17
```

makes *A(3)=A(2)* and *A(2)=17* because you told it to shift only 2 elements. The original values of *A(4)* and *A(1)* remain in place.

INSERT with multi-dimensional arrays

count can also be used with a multi-dimensional array (stored in linear column-major order; see ARRAY SORT), to prevent shifting data from one dimension into another dimension, and thus preserving the organization of the array. For example:

```
DIM A(0 TO 1,0 TO 1) AS SINGLE
A(0,0)=0
A(1,0)=100
A(0,1)=200
A(1,1)=300
ARRAY INSERT A(0,0) FOR 2, 17
```

makes *A(0,0)=17* and *A(1,0)=0*. The original values of *A(0,1)* and *A(1,1)* remain in place since you told it to shift only 2 elements. Without *count*:

```
ARRAY INSERT A(0,0), 17
```

makes *A(0,0)=17*, *A(1,0)=0*, *A(0,1)=100*, and *A(1,1)=200*. The original value of *A(1,1)* is lost.

Restrictions ARRAY INSERT cannot be used on arrays within UDT structures or on an array of Interfaces. However, ARRAY INSERT can be used with arrays of UDT structures - simply treat them as if they were an array of fixed-length strings.

To use ARRAY INSERT on an embedded UDT array, use DIM..AT to dimension a regular array (of the same type) directly "over the top" of the UDT array, and use ARRAY INSERT on that array. For example:

```
TYPE SalesType
  OrderNum AS LONG
  PartNumber(1 TO 20) AS STRING * 20
END TYPE
[statements]
DIM Sales AS SalesType
[statements]
DIM Temp(1 TO 20) AS STRING * 20 AT VARPTR(Sales.Partnumber(1))
ARRAY INSERT Temp(5), "string"
```

```
ERASE Temp()
```

See also ARRAY ASSIGN, ARRAY DELETE, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, PowerArray, REDIM, UBOUND

Example Makes *A(3)=2.5* and *A(4)=3*. *A(0)*, *A(1)*, and *A(2)* remain in place:

```
DIM A(0 TO 4) AS DOUBLE
A(0)=0
A(1)=1
A(2)=2
A(3)=3
ARRAY INSERT A(3), 2.5#
```

Makes *A(0)=0*, *A(1)=1*, and *A(2)=2*. The original value of *A(2)* is lost:

```
DIM A(0 TO 2) AS QUAD
A(0)=1
A(1)=2
A(2)=3
ARRAY INSERT A()
```

ARRAY SCAN statement

ARRAY SCAN statement

Purpose Scan all or part of an array for a given value.

Syntax ***Numeric array:***

```
ARRAY SCAN array([index]) [FOR count], expression, TO lvar&
```

String arrays:

```
ARRAY SCAN array ([index]) [FOR count] [, FROM startChar TO endChar] [,
COLLATE {UCASE |
    cstring}], expression, TO lvar&
```

Remarks ARRAY SCAN scans all or part of array, an n-dimension array, for the first element that satisfies *expression*. *expression* consists of a relational operator (=, >, <, <>, >=, =>, <=, =<) followed by an expression of the same data type as *array*. The relative index of the first match is stored in *lvar&*, which must be a Long-integer variable:

```
ARRAY SCAN A&(), > 5, TO I&
```

This line of code identifies the relative index of the first element of array *A&()* that is greater than 5, and stores the relative index in *I&*. The match index ranges from 1 to the last element of the scan + 1.

Since it is a relative index:

```
DIM A(1 TO 10) AS SINGLE
ARRAY SCAN A(), > 17.42!, TO I&
```

…will store 2 in *I&* if *A(2)* > 17.42, but:

```
DIM A(5 TO 20) AS SINGLE
ARRAY SCAN A(), > 17.42!, TO lvar&
```

…will store 2, not 6, in *lvar&* if *A(6)* > 17.42.

If none of the scanned elements satisfy *expression*, zero will be stored in *lvar&*.

Together, *index* and *count* specify the portion of array to be scanned. *index* specifies the element at which the scan is to begin, while *count* specifies the number of consecutive elements to be scanned. If *index* is not specified, the scan begins at the first element of *array*. If *count* is not specified, the array is scanned from element *index* to the last element of *array*. If neither is specified, the entire array is scanned:

```
DIM A&(1 TO 100)
ARRAY SCAN A&(5), =1, TO I&          'scans 5..100
ARRAY SCAN A&() FOR 10, =1, TO I&    'scans 1..10
```

```
ARRAY SCAN A&(10) FOR 20, =1, TO I&  'scans 10..29
ARRAY SCAN A&(), =1, TO I&           'scans 1..100
```

Scanning a string array

When scanning a string array, COLLATE UCASE treats all lowercase letters as uppercase during the scan (for example, element "Bob" would satisfy the condition = "BOB"):

```
ARRAY SCAN A$(), COLLATE UCASE, = "BOB", TO I&
' scans A$() for "BOB"; all letters treated as
' uppercase
```

COLLATE string is used to specify a non-standard scanning order. *cstring* must contain exactly 256 characters, in the order in which they should be compared, from lowest to highest. For example, the normal ascending ASCII scan order (where "A" is considered less than "B", etc.) would be described by a

containing ASCII codes 0 through 255 in order:

```
C$ = CHR$(0 TO 255)
ARRAY SCAN A$(), COLLATE C$, > "BOB", TO I&
```

The normal descending ASCII scan order would be described by a string containing the reverse of the above:

```
C$ = STRREVERSE$(CHR$(0 TO 255))
ARRAY SCAN A$(), COLLATE C$, > "BOB", TO I&
```

The COLLATE string option is provided as a flexible means with which to specify a descending scan, or to specify the scanning order for strings containing international characters or other special symbols.

See ARRAY SORT for more information on building collating strings.

When scanning a string array, all characters of each element of the array are normally considered when performing comparisons. To limit the comparison to a specific subset of characters, use FROM to specify the *startChar* position, and TO to specify the *endChar* position that ARRAY SCAN will consider within each array element. For example, you could scan based on the zip code contained in the last 5 characters of a 40-character address string:

```
ARRAY SCAN A$(), = "90210", TO I&
' considers all characters when scanning for "90210"

ARRAY SCAN A$(), FROM 36 TO 40, = "90210", TO I&
' considers positions 36..40 only when scanning
```

Scanning a multi-dimensional array

When scanning a multi-dimensional array, the array is treated as a single-dimension array containing all of the elements of the multi-dimensional array, in linear column-major order. That is, all elements where all dimensions (except the first), are held at their minimum bounds, will come first in memory. These are immediately followed by the elements where the second dimension is set to its next consecutive index value, etc.

For example, the elements of a two-dimensional array (DIM A(0 TO n, 0 TO x)) would be stored in consecutive memory locations as follows:

```
A(0,0), A(1,0), …, A(n,0) ' The first n+1 elements,
A(0,1), A(1,1), …, A(n,1) ' The next n+1 elements,
[statements]              ' Subsequent elements,
A(0,x), A(1,x), …, A(n,x) ' The last n+1 statements.
```

…or more clearly:

```
A(0,0), A(1,0)…, A(n,0), A(0,1), A(1,1)…, A(n,1), A(0,x),
A(1,x) …, A(n,x)
```

In this case, ARRAY SCAN A(0,0) FOR n+1, >5, TO I& would scan only elements (0,0)...(n,0), while ARRAY SCAN A(0,0), >5, TO I& would scan the entire array: elements (0,0)...(n,x). As mentioned earlier, since ARRAY SCAN records the relative index of the matched element, ARRAY SCAN A(0,0), >5, TO I& would store 2 in I& if A(1,0) > 5.

Options The options for ARRAY SCAN can be specified in any order, as long as the FOR option, if present, directly follows the closing parenthesis of the name of *array*.

Restrictions ARRAY SCAN cannot be used on arrays within UDT structures or on an array of Interfaces. However, ARRAY SCAN can be used with arrays of UDT structures - simply treat them as if they were an array of fixed-length strings.

To use ARRAY SCAN on an embedded UDT array, use DIM..AT to dimension a regular array (of the same type) directly "over the top" of the UDT array, and use ARRAY SCAN on that array. For example:

```
TYPE SalesType
  OrderNum AS LONG
  PartNumber(1 TO 20) AS STRING * 20
END TYPE
[statements]
DIM Sales AS SalesType
[statements]
DIM Temp(1 TO 20) AS STRING * 20 AT VARPTR(Sales.Partnumber(1))
ARRAY SCAN Temp(), FROM 1 TO LEN(Search$), = Search$, TO lResult&
ERASE Temp()
```

See also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SORT, DIM, LBOUND, PowerArray, REDIM, UBOUND

Example `ARRAY SCAN A&(5) FOR 10, > 64000&, TO B&`

Scans elements 5 through 14 of array *A&*, looking for the first element whose value is > *64000*, and stores the relative index of that element in *B&*.

`ARRAY SCAN A$(5) FOR 10,FROM 16 TO 25,COLLATE C$, = D$, TO B&`

Scans elements 5 through 14 of array *A$*, looking only at characters *16* to *25* of each element, using the order specified by collating string *C$*, looking for the first element whose value is equal to *D$*, and stores the relative index of that element in *B&*.

ARRAY SORT statement

ARRAY SORT statement

Purpose Sort all or part of a given array.

Syntax ***Numeric array:***

ARRAY SORT *darray*([*index*]) [FOR *count*] [,TAGARRAY *tarray()*] [,{ASCEND | DESCEND}]

String array:

**ARRAY SORT *dArray*([*index*]) [FOR *count*] [,FROM *startChar* TO *endChar*] [,COLLATE {UCASE |
cstring}] [,TAGARRAY *tarray()*] [,{ASCEND | DESCEND}]**

Custom sort array:

ARRAY SORT *darray*([*index*]) [FOR *count*] [,TAGARRAY *tarray()*] ,CALL *custfunc()*

Remarks ARRAY SORT sorts all or part of *darray*, an n-dimensional array, in ascending or descending order. *tarray* is a tag-along array whose elements are swapped in the same order as those in *darray* as the sort proceeds (you could sort an array of names and have an array of corresponding addresses tag along, for example). *tarray* must have at least as many elements as *darray*, since corresponding elements of *tarray* will be swapped during the sort.

Note that *tarray* does not have to be of the same type as *darray*. For example, you could have a array containing account numbers tag along with a string array containing user names:

```
DIM Users$(100 TO 500), AcctNum&(100 TO 500)
ARRAY SORT Users$(), TAGARRAY AcctNum&()
```

Together, *index* and *count* specify the portion of *darray* to be sorted. *index* specifies the element at which the sort is to begin, while *count* specifies the number of consecutive elements to be sorted. If *index* is omitted, the sort begins at the first element of *darray*. If *count* is omitted or is zero, the array is sorted from element *index* to the last element of *darray*. If both are omitted, the entire array is sorted:

```
DIM A&(1 TO 99)
ARRAY SORT A&(5)        'sorts elements 5..99 of A&
ARRAY SORT A&() FOR 10  'sorts elements 1..10 of A&
ARRAY SORT A&(9) FOR 20 'sorts elements 9..28 of A&
ARRAY SORT A&()         'sorts elements 1..99 of A&
```

Sorting numeric arrays

By default, arrays are sorted in ascending order. To sort in descending order, include the DESCEND keyword:

```
ARRAY SORT A&(), DESCEND  ' descending order
ARRAY SORT A&(), ASCEND   ' ascending order
ARRAY SORT A&()           ' ascending order
```

Sorting string arrays

When sorting a

array, the sort is performed in ascending order by default. In addition to DESCEND, ARRAY SORT provides the COLLATE UCASE and COLLATE *string* options.

COLLATE UCASE treats all lowercase letters as equal to their uppercase counterparts during the sort (elements "Bob" and "BOB" would be considered equal, for example):

```
DIM A$(1 TO 5)
A$(1) = "Bob"
A$(2) = "Jan"
A$(3) = "Linda"
A$(4) = "Ann"
A$(5) = "Jerry"
ARRAY SORT A$(), COLLATE UCASE, DESCEND
'sorts A$() in descending order; case-insensitive
```

COLLATE *cstring* is used to specify an entirely new sorting order. This can be used for a variety of purposes, the most obvious of which is the case of international character sets. The collate string *cstring* must contain exactly 256 characters, one for each of the ASCII codes 0-255, in the order that they would be sorted (from lowest to highest, if an ascending sort were performed on them).

Each position in the string represents the ASCII code of that value. The contents of the byte at that position tells PowerBASIC the "weight" or importance factor of that particular ASCII code. The default is that position 0 has a weight of 0, position 1 has a weight of 1, etc, so that CHR$(0) sorts first, CHR$(1) sorts next, and so on through CHR$(255).

Suppose you want the special character "ä" to have the same weight as the standard character "a". It's easy: construct a string of 256 characters, 0-255; then go to the position of "ä" (ASCII code 132), and change the contents of that byte so it is exactly equal to the code for "a" (97). The following code fragment constructs just such a collate string:

```
' Create a 256-character string:
FOR ix = 0 TO 255
  C$ = C$ + CHR$(ix)
NEXT
MID$(C$, 132 + 1) = CHR$(97)
```

We add one to the ASC value for MID$ because string positions start at 1, not 0. We can also use the expanded CHR$ function to create the same collating string using less code:

```
C$ = CHR$(0 TO 131, 97, 133 TO 255)
```

It is most important to remember the rule for creating a collating string, as it is easy to make an intuitive jump to the wrong conclusion. Each position in the string (1-256) represents the ASCII code with that value minus one (CHR$(0) to CHR$(255)). The contents of the byte at that position tell the ARRAY SORT procedure the new "weight" or importance factor for that particular code. This is exactly the technique used by the 80x86-assembler opcode XLAT.

Suppose you want CHR$(0) to sort at the very end of the sequence. To do that, you would set the byte at position 0+1 to CHR$(255) and the bytes at positions 0+2 to 0+256 to the values 0 to 254. The ASCII sequence in the collating string would appear like this: 255,0,1,2,3,4…254. Using the expanded CHR$ function, this is straightforward:

```
C$ = CHR$(255, 0 TO 254)
```

To sort upper case and lower case alphabetic characters as exactly equal, just set positions 97 to 122 (a-z) to the values 65-90 (A-Z). This is precisely how COLLATE UCASE is handled. With the collating method implemented by this procedure in PowerBASIC, it is possible for two or more ASCII codes to have equal "weight".

As mentioned earlier, many programmers make a common, fatal mistake by intuitively creating a collating string that is simply a list of ASCII codes, in the sequence they wish to sort. That is, they expect the byte which appears first in the string to sort first, the byte which appears next to sort second, so that creating a collate string from the BASIC code:

```
CHR$(65) + CHR$(66) + CHR$(67) + ...
```

…might cause the characters "ABC..." to be sorted first. *This technique will never work with the ARRAY statement and must be carefully avoided*. We describe it here only because it is a common error. While it is arguably more intuitive than the technique implemented in PowerBASIC, the reason it does not work is that it doesn't allow two or more ASCII codes to have the same "weight".

The following code builds a collating string compatible with the American OEM ASCII character set. For the fastest operation, this code should be run only once and the collating string should be made global.

```
GLOBAL cu AS STRING
FOR x = 0 TO 255
  cu = cu + CHR$(x)
NEXT
MID$(cu, 97+1, 26) = "ABCDEFGHIJKLMNOPQRSTUVWXYZ"
MID$(cu, 129+1, 6) = "ueaaaa"     ' üéâäàã
MID$(cu, 136+1, 9) = "eeeiiiAAE"  ' ëèïîìÄÂÉ
MID$(cu, 147+1, 8) = "ooouuyOU"   ' ôöòûùÿÖÜ
MID$(cu, 161+1, 5) = "iounN"      ' ìòùñÑ
MID$(cu, 168+1, 1) = "?"          ' ¿
[ your code goes here ]
ARRAY SORT MyArray$(), COLLATE cu
```

An alternative arrangement using the expanded CHR$ function may look like this:

```
cu = CHR$(0 TO 96, "ABCDEFGHIJKLMNOPQRSTUVWXYZ", _
        123 TO 128, "ueaaaa", _     ' üéâäàã
        135,        "eeeiiiAAE", _  ' ëèïîìÄÂÉ
        145 TO 146, "ooouuyOU", _   ' ôöòûùÿÖÜ
        155 TO 160, "iounN", _      ' ìòùñÑ
        166 TO 167, "?", _          ' ¿
        169 TO 255)
```

For example, the normal ascending ASCII sort order would be described by a string containing ASCII codes 0 through 255 in order:

```
C$ = CHR$(0 TO 255)
ARRAY SORT A$(), COLLATE C$
```

The normal descending ASCII sort order would be described by a collating string containing the reverse of the above:

```
C$ = STRREVERSE$(CHR$(0 TO 255))
ARRAY SORT A$(), COLLATE C$
```

COLLATE *string* can also be used with the ASCEND or DESCEND option. With ASCEND, the sort is performed in the order specified by COLLATE *string*; DESCEND sorts using the reverse of the order specified by COLLATE *string*:

```
ARRAY SORT A$(), COLLATE C$, DESCEND
```

The COLLATE string option is provided as a flexible means with which to specify the sorting order for strings containing international characters or other special symbols. Please keep in mind that the characters with ASCII code above CHR$(127) may have different meanings in different countries. The examples here assume that the default American OEM ASCII code page is in use.

When sorting a string array, all characters of each element of the array are normally considered when performing comparisons. To limit the comparison to a specific subset of characters, use FROM to specify the *startChar* position, and TO to specify the *endChar* position that ARRAY SORT will consider within each array element. For example, you could sort based on the zip code contained in the last 5 characters of a 40-character address string:

```
ARRAY SORT A$()                ' sorts all chars
ARRAY SORT A$(), FROM 36 TO 40 ' sorts 36 - 40 only/p>
```

By using the FROM..TO keywords, it also becomes possible to sort an array of User-Defined Types. In this case, ARRAY SORT can sort the array as if it were an array of fixed-length strings.

Sorting custom arrays:

In most cases, the standard numeric and string sorts should serve your needs very well. However, in the case of more complex data, it is frequently necessary to create multi-key sorts, or other unusual data sequences. Generally speaking, a multi-key sort is used when you wish to order data based upon multiple sections of a string or UDT. For example, you may wish to have customers sequenced by name -- but in the case of duplicate names, order each set of duplicates by ZIP code. With the custom array option, you can sort by any number of keys, in any sequence you may desire.

A custom array may be user-defined types, fixed-length strings, or nul-terminated strings. With a custom array sort, you can write your own simple function to tell PowerBASIC the correct sequence for any two array elements. In the following example, the array MyType() is sorted based upon the code you write in the user-written function named MyFunc().

```
ARRAY SORT MyType(), CALL MyFunc()
```

As PowerBASIC proceeds through the sort, each time it needs to compare two array elements, it calls your custom function (in this case named MyFunc) to determine the correct sequence of the two elements. The custom function you write must always have exactly two ByRef parameters with precisely the same data type as the sorted array, for nul-terminated and FIELD strings, they must contain the length. These are the two variables which you must compare to determine the correct sequence. Your custom function must return a long integer to tell the correct sequence. It returns -1 if the first parameter should precede the second parameter. It returns +1 if the second parameter should precede the first. It returns 0 if the parameters are equal. This affords the PowerBASIC programmer the ultimate tool in sorting capabilities. You can have any number of keys. You can sort ascending, descending, or some other special sequence. The conditions are now totally under your control. The following example show how easy it is to create a multi-key sort, even those based upon non-string members of a UDT.

```
Type TheType
  LastName   as String * 40
  FirstName  as String * 20
  BalanceDue as Currency
End Type
```

```
[statements]
Dim MyType(100) as TheType
[statements]
Array Sort MyType(), Call MyFunc()
[statements]
Function MyFunc(Param1 as TheType, Param2 as TheType) As Long
  If Param1.LastName < Param2.LastName Then
    Function = -1 : Exit Function
  End If
  If Param1.LastName > Param2.LastName Then
    Function = +1 : Exit Function
  End If
  If Param1.FirstName < Param2.FirstName Then
    Function = -1 : Exit Function
  End If
  If Param1.FirstName > Param2.FirstName Then
    Function = +1 : Exit Function
  End If
  If Param1.BalanceDue < Param2.BalanceDue Then
    Function = +1 : Exit Function
  End If
  If Param1.BalanceDue > Param2.BalanceDue Then
    Function = -1 : Exit Function
  End If
End Function
```

Notice that this function first sorts by last name in ascending sequence. If the last names are equal, it then sorts by first name in ascending sequence. If both names are equal, it then sorts by Balance Due in descending sequence so that the accounts with the highest balance appear first. This descending sequence is accomplished by switching the values -1/+1 in the final tests.

The array to be sorted, and the function parameters, must be fixed-length strings, nul-terminated strings, or user-defined types. PowerBASIC verifies that the size of the data and parameters are identical. However, to allow maximum flexibility, it does not require that the data types be the same. Therefore, for example, it's possible to sort an array of fixed-length strings using a function with UDT parameters as long as the data size is identical. It is the programmer's responsibility to ensure accuracy.

Sorting a multi-dimensional array

When sorting a multi-dimensional array, the array is treated as a single-dimension array containing all of the elements of the multi-dimensional array, in linear column-major order. That is, all elements where all dimensions (except the first), are held at their minimum bounds, will come first in memory. These are immediately followed by the elements where the second dimension is set to its next consecutive index value, etc.

For example, the elements of a two-dimensional array (i.e., DIM A(*n*,*x*)) would be stored in consecutive memory locations like this:

```
(0,0), …, (n,0), (0,1), …, (n,1), …, (0,x), …, (n,x)
```

In this case, ARRAY SORT A(0,0) FOR n+1 would sort only elements (0,0)...(n,0), while ARRAY SORT A(0,0) would sort the entire array: elements (0,0)…(n,x).

Be very careful when using ARRAY SORT with multi-dimensional arrays so as not to disrupt the organization of the data in the arrays.

Options The options for ARRAY SORT can be specified in any order, as long as the FOR option, if it is present, directly follows the closing parenthesis of the name of *darray*.

Restrictions ARRAY SORT cannot be used on arrays *within* UDT structures or on an array of Interfaces. However, ARRAY SORT can be used with arrays *of* UDT structures - simply treat them as if they were an array of fixed-length strings.

To use ARRAY SORT on an embedded UDT array, use DIM..AT to dimension a regular array (of the same type) directly "over the top" of the UDT array, and use ARRAY SORT on that array. For example:

```
TYPE SalesType
  OrderNum AS LONG
  PartNumber(1 TO 20) AS STRING * 20
END TYPE
[statements]
DIM Sales AS SalesType
[statements]
DIM Temp(1 TO 20) AS STRING * 20 AT VARPTR(Sales.Partnumber(1))
ARRAY SORT Temp()
ERASE Temp()
```

See also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, CHR$, DIM, LBOUND, PowerArray, REDIM, UBOUND

Example

```
A&(5) FOR 10, TAGARRAY B$(), DESCEND
```

Sorts elements 5 through 14 of array *A&* in descending order, tagging along elements 5 through 14 of array *B$*.

```
ARRAY SORT A#()
```

Sorts all elements of array *A#* in ascending order, using no tag-along array.

```
ARRAY SORT A$(5) FOR 10, FROM 16 TO 25, COLLATE C$, TAGARRAY D()
```

Sorts elements 5 to 14 of array *A$*, considering only characters 16 to 25 of each element, using the sort order specified by collating string *C$*, tagging along elements 5 to 14 of array *D.*

```
ARRAY SORT A$()
```

Sorts all elements of array *A$* in ascending order, considering all characters of each element, using no tag-along array.

```
ARRAY SORT MYTYPE(), USING MYFUNC()
```

Sorts all elements of the UDT array *MYTYPE*, using the custom UDT comparison function *MYFUNC()* to determine the sequence.

ARRAYATTR function

ARRAYATTR function

Purpose Return descriptive attributes of a given array.

Syntax `y = ARRAYATTR(Arr(), AttrNum)`

Remarks ARRAYATTR returns various descriptive attributes of an array, depending upon the value of *AttrNum*

AttrNum	**Definition**
0	Returns TRUE (-1) if the array is currently dimensioned, FALSE (0) if not.
1	Returns the data *type*, as defined in the following table. Note that the numeric equates listed on the right of the table are built into PowerBASIC, but the numeric values they represent are subject to change. Therefore, application code should always use the numeric equates rather than the numeric value, to ensure compatibility with future versions of PowerBASIC. The current data type definitions are:

Type	**Array type**	**Keyword**	**Equate**
0	Byte	BYTE	%VARCLASS_BYT
1	Word	WORD	%VARCLASS_WRD
2	Double-word	DWORD	%VARCLASS_DWD

4	Integer	INTEGER	%VARCLASS_INT
5	Long-integer	LONG	%VARCLASS_LNG
8	Quad-integer	QUAD	%VARCLASS_QUD
10	Single-precision	SINGLE	%VARCLASS_SNG
11	Double-precision	DOUBLE	%VARCLASS_DBL
12	Extended-precision	EXT	%VARCLASS_EXT
13	Currency	CURRENCY	%VARCLASS_CUR
14	Extended Currency	CURRENCYX	%VARCLASS_CUX
17	Variant	VARIANT	%VARCLASS_VRNT
18	Interface	INTERFACE	%VARCLASS_IFAC
19	GUID	GUID	%VARCLASS_GUID
20	UDT or Union	TYPE/UNION	%VARCLASS_TYPE
21	ANSI NulTrm string	ASCIIZ/STRINGZ * *n*	%VARCLASS_STRZ
22	Fixed-length string	STRING * *n*	%VARCLASS_FIX
23	Dynamic string	STRING	%VARCLASS_STR
24	Field string	FIELD	%VARCLASS_FLD
25	Wide NulTrm string	WSTRINGZ	%VARCLASS_WSTRZ
26	Wide FixLen string	WSTRING * *n*	%VARCLASS_WFIX
27	Wide Dynamic string	WSTRING * *n*	%VARCLASS_FLD
28	Wide Field string	WFIELD	%VARCLASS_WFLD

2	Returns TRUE (-1) if it is an array of pointers, FALSE (0) if not.
3	Returns the number of dimensions of the array. The lower and upper boundaries of each dimension can be retrieved with the LBOUND and UBOUND functions respectively
4	Returns the total number of elements in the array. For example, the array DIM A&(3,4,5) would comprise 120 elements (4 x 5 x 6 = 120).
5	Returns the array element size. For example, an array of Double-precision variables would be 8 bytes. For dynamic strings, the size of the string handle (4 bytes) is returned. For DISPATCH and INTERFACE arrays, ARRAYATTR returns the size of a pointer variable (4 bytes).

You should note that a GUID is stored internally as a 16 byte User-defined type. Therefore, ARRAYATTR returns %VARCLASS_TYPE.

See also DIM, LBOUND, UBOUND, PowerArray, REDIM

Example

```
DIM z(3,4,5) AS CURRENCYX
DIM x AS LONG, Answer AS STRING
FOR x = 0 TO 5
  Answer = Answer + FORMAT$(x)
  Answer = Answer + $TAB
  Answer = Answer + FORMAT$(ARRAYATTR(z(),x))
  Answer = Answer + $CRLF
NEXT x
' The results are stored in Answer:
```

Result

```
0       -1
1       14
2       0
3       3
4       120
5       8
```

ASC function

ASC function IMPROVED

Purpose Returns the character code of the character at the specified position in a

.

Syntax `y = ASC(string_expression [, position&])`

Remarks ASC returns the character code of a particular character in the string expression. If the string is an ANSI string, the returned value will be in the range of 0 to 255. If it is a Unicode string, the returned value will be in the range of 0 to 65535.

The optional *position&* parameter determines which character is to be checked. The first character is one, the second two, etc. If the *position&* parameter is missing, the first character is presumed. If *position&* is negative, ASC counts from the end of the string in reverse. That is, -1 specifies the last character, -2 specifies the second to last character, etc.

CHR$ is the natural complement of ASC. It produces a one-character string corresponding to its ASCII or Unicode argument.

Restrictions If the string passed is null (zero-length) or the position is zero or greater than the length of the string, the value -1 is returned.

See also ASC statement, CHR$

Example
```
x$ = "The ASCII value of A is" + STR$( ASC("A") )
```

Result
```
The ASCII value of A is 65
```

ASC statement

ASC statement IMPROVED

Purpose Replaces one character in a

by using its character code.

Syntax `ASC(stringvar, position&) = CharCode&`

Remarks The ASC statement replaces one character in a string variable. The *position&* parameter determines which character is replaced. The first character is one, the second two, etc. If *position&* is negative, ASC counts from the end of the string in reverse. That is, -1 specifies the last character, -2 specifies the second to last character, etc.

If the *stringVar* is ANSI, the *CharCode* must be in the range of 0 to 255. If Unicode, the *CharCode* must be in the range of 0 to 65535.

Restrictions The ASC statement cannot be used to extend the length of a string. If *string* is null (zero-length), or *position* is zero or greater than the length of *stringvar*, the operation is ignored.

See also ASC function, CHR$, MID$ statement

Example
```
A$ = "hello There"
ASC(A$,1) = 72 'replace 1st character with an "H"
```

ASM statement

ASM statement IMPROVED

Purpose Identify an assembly-language statement. PowerBASIC's Inline Assembler supports

8086/8088, 80286, 80386, 80486, Pentium, Floating-Point, SIMD and MMX instructions.

Syntax

{! | ASM} {*opcode* | *label*}
{! | ASM} ALIGN *boundary*

Remarks

This statement allows you to place assembly-language code within your PowerBASIC source code. An exclamation mark (!) serves as a shortcut for the ASM keyword.

Each group of ASM statements must preserve the following CPU registers if the assembler code causes them to change: EBX, ESI, EDI, ESP, EBP, and all segment registers. See Saving Registers for more information.

No other statements may appear on the same line as an ASM statement; however, comments are acceptable.

Any variable referenced in an assembly-language statement must be defined prior to use. For example:

```
x% = 10
! MOV AX, x%
```

You cannot access the target of a pointer with a single ASM statement as you might do in BASIC source code. Instead, you must use the pointer address indirectly. To simulate the BASIC statement INCR @x, you would write:

```
DIM x AS INTEGER PTR
ASM MOV EAX, x              ; EAX holds a pointer to an Integer
ASM INC WORD PTR [EAX]      ; Add one to target value
```

Labels can be created and accessed with the ASM statement as follows:

```
! CMP EAX, EBX
! JNE Done
...
! Done:
...
```

String literals of up to four characters may be used in Inline Assembler code:

```
! MOV AL, "a"        ; move char a into reg AL
! MOV AX, "ab"       ; move chars ab into reg AX
!                    ; "a" into AL, "b" into AH
! MOV EAX, "abcd"    ; move chars abcd into reg EAX
```

PowerBASIC recognizes either an apostrophe (') or a semi-colon (;) to specify a comment after a line of assembler code:

```
! PUSH EAX    ; save the EAX register
! PUSH EBX    ' save the EBX register
```

ALIGN

ASM ALIGN is used in critical situations to gain maximum efficiency from assembler code sections.

ASM ALIGN is used to round up the instruction location to a power of two address. The *boundary* parameter shown must be a power of two, in the range of 2 through 256.

PowerBASIC inserts NOP instructions into the code section to bring the instruction location up to the desired address. If the instruction location is already at a multiple of *boundary*, ALIGN has no effect.

The #ALIGN metastatement functions in the same respect as ASM ALIGN, but the ASM ALIGN statement is more suited to being used in a PREFIX/END PREFIX block.

Restrictions

Care should be exercised to ensure registers are appropriately preserved when Inline Assembler code is intermixed with BASIC statements. See Saving Registers for more information.

See also

The Inline Assembler, ASMDATA

Example

To add the values a&, b&, and c&, you would write:

```
LOCAL a&, b&, c&, z&
! MOV  EAX, a&
! ADD  EAX, b&
```

```
! ADD  EAX, c&
! MOV  z&, EAX
```

Notes

The follow lists outline the supported mnemonics, data types, operators, and registers that can be used with the ASM statement.

The ASM statement supports the following mnemonics:

AAA, AAD, AAM, AAS, ADC, ADD, ADDPD, ADDPS, ADDSD, ADDSS, ADDSUBPD, ADDSUBPS, ANDNPD, ANDNPS, ANDPD, ANDPS, AND

BLENDPD, BLENDPS, BLENDVPD, BLENDVPS, BOUND, BSF, BSR, BSWAP, BT, BTC, BTR, BTS

CALL, CBW, CWD, CDQ, CLC, CLD, CLFLUSH, CLI, CMC, CMOVA, CMOVAE, CMOVB, CMOVBE, CMOVC, CMOVE, CMOVG, CMOVGE, CMOVL, CMOVLE, CMOVNA, CMOVNAE, CMOVNB, CMOVNBE, CMOVNC, CMOVNE, CMOVNG, CMOVNGE, CMOVNL, CMOVNLE, CMOVNO, CMOVNP, CMOVNS, CMOVNZ, CMOVO, CMOVP, CMOVPE, CMOVPO, CMOVS, CMOVZ, CMP, CMPPD, CMPPS, CMPSB, CMPSD, CMPSS, CMPSW, CMPXCHG, CMPXCHG8B, COMISD, COMISS, CPUID, CRC32, CVTDQ2PD, CVTDQ2PS, CVTPD2DQ, CVTPD2PI, CVTPD2PS, CVTPI2PD, CVTPI2PS, CVTPS2DQ, CVTPS2PD, CVTPS2PI, CVTSD2SI, CVTSD2SS, CVTSI2SD, CVTSI2SS, CVTSS2SD, CVTSS2SI, CVTTPD2DQ, CVTTPD2PI, CVTTPS2DQ, CVTTPS2PI, CVTTSD2SI, CVTTSS2SI, CWDE

DAA, DAS, DEC, DIV, DIVPD, DIVPS, DIVSD, DIVSS, DPPD, DPPS

EMMS, ENTER, EXTRACTPS

F2XM1, FABS, FADD, FADDP, FBLD, FBSTP, FCHS, FCLEX, FCMOVB, FCMOVBE, FCMOVE, FCMOVNB, FCMOVNBE, FCMOVNE, FCMOVNU, FCMOVU, FCOM, FCOMI, FCOMIP, FCOMP, FCOMPP, FCOS, FDECSTP, FDIV, FDIVP, FDIVR, FDIVRP, FFREE, FIADD, FICOM, FICOMP, FIDIV, FIDIVR, FILD, FIMUL, FINCSTP, FINIT, FIST, FISTP, FISTTP, FISUB, FISUBR, FLD, FLD1, FLDCW, FLDENV, FLDL2E, FLDL2T, FLDLG2, FLDLN2, FLDPI, FLDZ, FMUL, FMULP, FNCLEX, FNINIT, FNLDCW, FNOP, FNSAVE, FNSTCW, FNSTENV, FNSTSW, FPATAN, FPREM, FPREM1, FPTAN, FRNDINT, FRSTOR, FSAVE, FSCALE, FSIN, FSINCOS, FSQRT, FST, FSTCW, FSTENV, FSTP, FSTSW, FSUB, FSUBP, FSUBR, FSUBRP, FTST, FUCOM, FUCOMI, FUCOMIP, FUCOMP, FUCOMPP, FWAIT, FXAM, FXCH, FXRSTOR, FXSAVE, FXTRACT, FYL2X, FYL2XP1

HADDPD, HADDPS, HLT, HSUBPD, HSUBPS

IDIV, IMUL, IN, INC, INSB, INSD, INSERTPS, INSW, INT, INTO, IRET, IRETD

JA, JAE, JB, JBE, JC, JE, JECXZ, JG, JGE, JL, JLE, JMP, JNA, JNAE, JNB, JNBE, JNC, JNE, JNG, JNGE, JNL, JNLE, JNO, JNP, JNS, JNZ, JO, JP, JPE, JPO, JS, JZ

LAHF, LAR, LDDQU, LDMXCSR, LDS, LEA, LEAVE, LES, LFENCE, LFS, LGS, LOCK, LODSB, LODSD, LODSW, LOOP, LOOPE, LOOPNE, LOOPNZ, LOOPZ, LSL, LSS

MASKMOVDQU, MASKMOVQ, MAXPD, MAXPS, MAXSD, MAXSS, MFENCE, MINPD, MINPS, MINSD, MINSS, MONITOR, MOV, MOVAPD, MOVAPS, MOVD, MOVDDUP, MOVDQA, MOVDQU, MOVDQ2Q, MOVHLPS, MOVHPD, MOVHPS, MOVLHPS, MOVLPD, MOVLPS, MOVMSKPD, MOVMSKPS, MOVNTDQA, MOVNTDQ, MOVNTI, MOVNTPD, MOVNTPS, MOVNTQ, MOVQ2DQ, MOVQ, MOVSB, MOVSD, MOVSHDUP, MOVSLDUP, MOVSS, MOVSW, MOVSX, MOVUPD, MOVUPS, MOVZX, MPSADBW, MUL, MULPD, MULPS, MULSD, MULSS, MWAIT

NEG, NOP, NOT

OR, ORPD, ORPS, OUT, OUTSB, OUTSD, OUTSW

PABSB, PABSD, PABSW, PACKSSDW, PACKSSWB, PACKUSDW, PACKUSWB,

PADDB, PADDD, PADDQ, PADDSB, PADDSW, PADDUSB, PADDUSW, PADDW, PALIGNR, PAND, PANDN, PAUSE, PAVGB, PAVGW, PBLENDVB, PBLENDW, PCMPEQB, PCMPEQD, PCMPEQW, PCMPEQQ, PCMPESTRI, PCMPESTRM, PCMPISTRI, PCMPISTRM, PCMPGTB, PCMPGTD, PCMPGTQ, PCMPGTW, PEXTRB, PEXTRD, PEXTRW, PHADDD, PHADDW, PHADDSW, PHMINPOSUW, PHSUBD, PHSUBSW, PHSUBW, PINSRB, PINSRD, PINSRW, PMADDUBSW, PMADDWD, PMAXSB, PMAXSD, PMAXSW, PMAXUB, PMAXUD, PMAXUW, PMINSB, PMINSD, PMINSW, PMINUB, PMINUD, PMINUW, PMOVMSKB, PMOVSXBW, PMOVSXBD, PMOVSXBQ, PMOVSXWD, PMOVSXWQ, PMOVSXDQ, PMOVZXBW, PMOVZXBD, PMOVZXBQ, PMOVZXWD, PMOVZXWQ, PMOVZXDQ, PMULDQ, PMULHRSW, PMULHUW, PMULHW, PMULLD, PMULLW, PMULUDQ, POP, POPA, POPAD, POPCNT, POPF, POPFD, POR, PREFETCHT0, PREFETCHT1, PREFETCHT2, PREFETCHNTA, PSADBW, PSHUFB, PSHUFD, PSHUFHW, PSHUFLW, PSHUFW, PSIGNB, PSIGND, PSIGNW, PSLLD, PSLLDQ, PSLLQ, PSLLW, PSRAD, PSRAW, PSRLD, PSRLDQ, PSRLD, PSRLQ, PSRLW, PSUBB, PSUBD, PSUBQ, PSUBW, PSUBSB, PSUBSW, PSUBUSB, PSUBUSW, PTEST, PUNPCKHBW, PUNPCKHDQ, PUNPCKHQDQ, PUNPCKHWD, PUNPCKLBW, PUNPCKLDQ, PUNPCKLQDQ, PUNPCKLWD, PUSH, PUSHA, PUSHAD, PUSHF, PUSHFD, PXOR

RCL, RCR, RCPPS, RCPSS, RDPMC, RDTSC, REP, REPE, REPNE, REPNZ, REPZ, RET, RETF, RETN, ROL, ROR, ROUNDPD, ROUNDPS, ROUNDSD, ROUNDSS, RSQRTPS, RSQRTSS

SAHF, SAL, SAR, SBB, SCASB, SCASD, SCASW, SETA, SETAE, SETB, SETBE, SETC, SETE, SETG, SETGE, SETL, SETLE, SETNA, SETNAE, SETNB, SETNBE, SETNC, SETNE, SETNG, SETNGE, SETNL, SETNLE, SETNO, SETNP, SETNS, SETNZ, SETO, SETP, SETPE, SETPO, SETS, SETZ, SFENCE, SHL, SHLD, SHR, SHRD, SHUFPD. SHUFPS, SQRTPD, SQRTPS, SQRTSD, SQRTSS, STC, STD, STI, STMXCSR, STOSB, STOSD, STOSW, SUB, SUBPD, SUBPS, SUBSD, SUBSS

TEST

UCOMISD, UCOMISS, UNPCKHPD, UNPCKHPS, UNPCKLPD, UNPCKLPS

VERR, VERW

WAIT

XADD, XCHG, XGETBV, XLAT, XOR, XORPD, XORPS, XRSTOR, XSAVE, XSETBV

The ASM statement supports the following data types and operators:

BYTE

DB, DD, DW, DWD, DWORD

FAR

NEAR

POINTER, PTR

QWD, QWORD

SHORT

TBY, TBYTE

WORD, WRD

The ASM statement supports the following registers:

Integer

32-bit	Low 16-bit	High 8-bit	Low 8-bit
EAX	AX	AH	AL
EBX	BX	BH	BL

ECX	CX	CH	CL
EDX	DX	DH	DL
ESI	SI		
EDI	DI		
ESP	SP		
EBP	BP		

Segments

```
CS, DS, ES, SS, FS, GS
```

MMX Registers

```
MM(0), MM(1), MM(2), MM(3), MM(4), MM(5), MM(6), MM(7)
MM0, MM1, MM2, MM3, MM4, MM5, MM6, MM7
```

Floating Point registers

```
ST(0), ST(1), ST(2), ST(3), ST(4), ST(5), ST(6), ST(7)
```

XMM registers

```
XMM(0), XMM(1), XMM(2), XMM(3), XMM(4), XMM(5), XMM(6), XMM(7)
XMM0, XMM1, XMM2, XMM3, XMM4, XMM5, XMM6, XMM7
```

ASM supports these special words

PowerBASIC supports three special reserved words, which are used to specify a return value from a procedure of the same type:

FUNCTION	**ASM mov FUNCTION, eax**
METHOD	**ASM mov METHOD, 3**
PROPERTY	**ASM mov PROPERTY, dx**

The above examples are the functional equivalent of the comparable BASIC syntax:

```
FUNCTION = x&
METHOD   = 3
PROPERTY = z%
```

The exception is that the assembler syntax allows you to assign a return value directly from an appropriate CPU register. Of course, these special reserved words may only be referenced within a procedure of the same type (FUNCTION may only be used in a user-defined function, etc.)

See Also #ALIGN, ASMDATA/END ASMDATA

ASM ALIGN statement

ASM statement IMPROVED

Purpose Identify an assembly-language statement. PowerBASIC's Inline Assembler supports 8086/8088, 80286, 80386, 80486, Pentium, Floating-Point, SIMD and MMX instructions.

Syntax
{! | ASM} {*opcode* | *label*}
{! | ASM} ALIGN *boundary*

Remarks This statement allows you to place assembly-language code within your PowerBASIC source code. An exclamation mark (!) serves as a shortcut for the ASM keyword.

Each group of ASM statements must preserve the following CPU registers if the assembler code causes them to change: EBX, ESI, EDI, ESP, EBP, and all segment registers. See Saving Registers for more information.

No other statements may appear on the same line as an ASM statement; however, comments are acceptable.

Any variable referenced in an assembly-language statement must be defined prior to use. For example:

```
x% = 10
! MOV AX, x%
```

You cannot access the target of a pointer with a single ASM statement as you might do in BASIC source code. Instead, you must use the pointer address indirectly. To simulate the BASIC statement INCR @x, you would write:

```
DIM x AS INTEGER PTR
ASM MOV EAX, x              ; EAX holds a pointer to an Integer
ASM INC WORD PTR [EAX]      ; Add one to target value
```

Labels can be created and accessed with the ASM statement as follows:

```
! CMP EAX, EBX
! JNE Done
...
! Done:
...
```

String literals of up to four characters may be used in Inline Assembler code:

```
! MOV AL, "a"         ; move char a into reg AL
! MOV AX, "ab"        ; move chars ab into reg AX
!                     ; "a" into AL, "b" into AH
! MOV EAX, "abcd"     ; move chars abcd into reg EAX
```

PowerBASIC recognizes either an apostrophe (') or a semi-colon (;) to specify a comment after a line of assembler code:

```
! PUSH EAX   ; save the EAX register
! PUSH EBX   ' save the EBX register
```

ALIGN

ASM ALIGN is used in critical situations to gain maximum efficiency from assembler code sections.

ASM ALIGN is used to round up the instruction location to a power of two address. The *boundary* parameter shown must be a power of two, in the range of 2 through 256.

PowerBASIC inserts NOP instructions into the code section to bring the instruction location up to the desired address. If the instruction location is already at a multiple of *boundary*, ALIGN has no effect.

The #ALIGN metastatement functions in the same respect as ASM ALIGN, but the ASM ALIGN statement is more suited to being used in a PREFIX/END PREFIX block.

Restrictions

Care should be exercised to ensure registers are appropriately preserved when Inline Assembler code is intermixed with BASIC statements. See Saving Registers for more information.

See also

The Inline Assembler, ASMDATA

Example

To add the values a&, b&, and c&, you would write:

```
LOCAL a&, b&, c&, z&
! MOV  EAX, a&
! ADD  EAX, b&
! ADD  EAX, c&
! MOV  z&, EAX
```

Notes

The follow lists outline the supported mnemonics, data types, operators, and registers that can be used with the ASM statement.

The ASM statement supports the following mnemonics:

AAA, AAD, AAM, AAS, ADC, ADD, ADDPD, ADDPS, ADDSD, ADDSS, ADDSUBPD, ADDSUBPS, ANDNPD, ANDNPS, ANDPD, ANDPS, AND

BLENDPD, BLENDPS, BLENDVPD, BLENDVPS, BOUND, BSF, BSR, BSWAP, BT, BTC, BTR, BTS

CALL, CBW, CWD, CDQ, CLC, CLD, CLFLUSH, CLI, CMC, CMOVA, CMOVAE,

CMOVB, CMOVBE, CMOVC, CMOVE, CMOVG, CMOVGE, CMOVL, CMOVLE, CMOVNA, CMOVNAE, CMOVNB, CMOVNBE, CMOVNC, CMOVNE, CMOVNG, CMOVNGE, CMOVNL, CMOVNLE, CMOVNO, CMOVNP, CMOVNS, CMOVNZ, CMOVO, CMOVP, CMOVPE, CMOVPO, CMOVS, CMOVZ, CMP, CMPPD, CMPPS, CMPSB, CMPSD, CMPSS, CMPSW, CMPXCHG, CMPXCHG8B, COMISD, COMISS, CPUID, CRC32, CVTDQ2PD, CVTDQ2PS, CVTPD2DQ, CVTPD2PI, CVTPD2PS, CVTPI2PD, CVTPI2PS, CVTPS2DQ, CVTPS2PD, CVTPS2PI, CVTSD2SI, CVTSD2SS, CVTSI2SD, CVTSI2SS, CVTSS2SD, CVTSS2SI, CVTTPD2DQ, CVTTPD2PI, CVTTPS2DQ, CVTTPS2PI, CVTTSD2SI, CVTTSS2SI, CWDE

DAA, DAS, DEC, DIV, DIVPD, DIVPS, DIVSD, DIVSS, DPPD, DPPS

EMMS, ENTER, EXTRACTPS

F2XM1, FABS, FADD, FADDP, FBLD, FBSTP, FCHS, FCLEX, FCMOVB, FCMOVBE, FCMOVE, FCMOVNB, FCMOVNBE, FCMOVNE, FCMOVNU, FCMOVU, FCOM, FCOMI, FCOMIP, FCOMP, FCOMPP, FCOS, FDECSTP, FDIV, FDIVP, FDIVR, FDIVRP, FFREE, FIADD, FICOM, FICOMP, FIDIV, FIDIVR, FILD, FIMUL, FINCSTP, FINIT, FIST, FISTP, FISTTP, FISUB, FISUBR, FLD, FLD1, FLDCW, FLDENV, FLDL2E, FLDL2T, FLDLG2, FLDLN2, FLDPI, FLDZ, FMUL, FMULP, FNCLEX, FNINIT, FNLDCW, FNOP, FNSAVE, FNSTCW, FNSTENV, FNSTSW, FPATAN, FPREM, FPREM1, FPTAN, FRNDINT, FRSTOR, FSAVE, FSCALE, FSIN, FSINCOS, FSQRT, FST, FSTCW, FSTENV, FSTP, FSTSW, FSUB, FSUBP, FSUBR, FSUBRP, FTST, FUCOM, FUCOMI, FUCOMIP, FUCOMP, FUCOMPP, FWAIT, FXAM, FXCH, FXRSTOR, FXSAVE, FXTRACT, FYL2X, FYL2XP1

HADDPD, HADDPS, HLT, HSUBPD, HSUBPS

IDIV, IMUL, IN, INC, INSB, INSD, INSERTPS, INSW, INT, INTO, IRET, IRETD

JA, JAE, JB, JBE, JC, JE, JECXZ, JG, JGE, JL, JLE, JMP, JNA, JNAE, JNB, JNBE, JNC, JNE, JNG, JNGE, JNL, JNLE, JNO, JNP, JNS, JNZ, JO, JP, JPE, JPO, JS, JZ

LAHF, LAR, LDDQU, LDMXCSR, LDS, LEA, LEAVE, LES, LFENCE, LFS, LGS, LOCK, LODSB, LODSD, LODSW, LOOP, LOOPE, LOOPNE, LOOPNZ, LOOPZ, LSL, LSS

MASKMOVDQU, MASKMOVQ, MAXPD, MAXPS, MAXSD, MAXSS, MFENCE, MINPD, MINPS, MINSD, MINSS, MONITOR, MOV, MOVAPD, MOVAPS, MOVD, MOVDDUP, MOVDQA, MOVDQU, MOVDQ2Q, MOVHLPS, MOVHPD, MOVHPS, MOVLHPS, MOVLPD, MOVLPS, MOVMSKPD, MOVMSKPS, MOVNTDQA, MOVNTDQ, MOVNTI, MOVNTPD, MOVNTPS, MOVNTQ, MOVQ2DQ, MOVQ, MOVSB, MOVSD, MOVSHDUP, MOVSLDUP, MOVSS, MOVSW, MOVSX, MOVUPD, MOVUPS, MOVZX, MPSADBW, MUL, MULPD, MULPS, MULSD, MULSS, MWAIT

NEG, NOP, NOT

OR, ORPD, ORPS, OUT, OUTSB, OUTSD, OUTSW

PABSB, PABSD, PABSW, PACKSSDW, PACKSSWB, PACKUSDW, PACKUSWB, PADDB, PADDD, PADDQ, PADDSB, PADDSW, PADDUSB, PADDUSW, PADDW, PALIGNR, PAND, PANDN, PAUSE, PAVGB, PAVGW, PBLENDVB, PBLENDW, PCMPEQB, PCMPEQD, PCMPEQW, PCMPEQQ, PCMPESTRI, PCMPESTRM, PCMPISTRI, PCMPISTRM, PCMPGTB, PCMPGTD, PCMPGTQ, PCMPGTW, PEXTRB, PEXTRD, PEXTRW, PHADDD, PHADDW, PHADDSW, PHMINPOSUW, PHSUBD, PHSUBSW, PHSUBW, PINSRB, PINSRD, PINSRW, PMADDUBSW, PMADDWD, PMAXSB, PMAXSD, PMAXSW, PMAXUB, PMAXUD, PMAXUW, PMINSB, PMINSD, PMINSW, PMINUB, PMINUD, PMINUW, PMOVMSKB, PMOVSXBW, PMOVSXBD, PMOVSXBQ, PMOVSXWD, PMOVSXWQ, PMOVSXDQ, PMOVZXBW, PMOVZXBD, PMOVZXBQ, PMOVZXWD, PMOVZXWQ, PMOVZXDQ, PMULDQ, PMULHRSW, PMULHUW, PMULHW, PMULLD, PMULLW, PMULUDQ, POP, POPA, POPAD, POPCNT, POPF, POPFD, POR, PREFETCHT0, PREFETCHT1,

PREFETCHT2, PREFETCHNTA, PSADBW, PSHUFB, PSHUFD, PSHUFHW, PSHUFLW, PSHUFW, PSIGNB, PSIGND, PSIGNW, PSLLD, PSLLDQ, PSLLQ, PSLLW, PSRAD, PSRAW, PSRLD, PSRLDQ, PSRLD, PSRLQ, PSRLW, PSUBB, PSUBD, PSUBQ, PSUBW, PSUBSB, PSUBSW, PSUBUSB, PSUBUSW, PTEST, PUNPCKHBW, PUNPCKHDQ, PUNPCKHQDQ, PUNPCKHWD, PUNPCKLBW, PUNPCKLDQ, PUNPCKLQDQ, PUNPCKLWD, PUSH, PUSHA, PUSHAD, PUSHF, PUSHFD, PXOR

RCL, RCR, RCPPS, RCPSS, RDPMC, RDTSC, REP, REPE, REPNE, REPNZ, REPZ, RET, RETF, RETN, ROL, ROR, ROUNDPD, ROUNDPS, ROUNDSD, ROUNDSS, RSQRTPS, RSQRTSS

SAHF, SAL, SAR, SBB, SCASB, SCASD, SCASW, SETA, SETAE, SETB, SETBE, SETC, SETE, SETG, SETGE, SETL, SETLE, SETNA, SETNAE, SETNB, SETNBE, SETNC, SETNE, SETNG, SETNGE, SETNL, SETNLE, SETNO, SETNP, SETNS, SETNZ, SETO, SETP, SETPE, SETPO, SETS, SETZ, SFENCE, SHL, SHLD, SHR, SHRD, SHUFPD. SHUFPS, SQRTPD, SQRTPS, SQRTSD, SQRTSS, STC, STD, STI, STMXCSR, STOSB, STOSD, STOSW, SUB, SUBPD, SUBPS, SUBSD, SUBSS

TEST

UCOMISD, UCOMISS, UNPCKHPD, UNPCKHPS, UNPCKLPD, UNPCKLPS

VERR, VERW

WAIT

XADD, XCHG, XGETBV, XLAT, XOR, XORPD, XORPS, XRSTOR, XSAVE, XSETBV

The ASM statement supports the following data types and operators:

BYTE

DB, DD, DW, DWD, DWORD

FAR

NEAR

POINTER, PTR

QWD, QWORD

SHORT

TBY, TBYTE

WORD, WRD

The ASM statement supports the following registers:

Integer

32-bit	Low 16-bit	High 8-bit	Low 8-bit
EAX	AX	AH	AL
EBX	BX	BH	BL
ECX	CX	CH	CL
EDX	DX	DH	DL
ESI	SI		
EDI	DI		
ESP	SP		
EBP	BP		

Segments

CS, DS, ES, SS, FS, GS

MMX Registers

MM(0), MM(1), MM(2), MM(3), MM(4), MM(5), MM(6), MM(7)

```
MM0, MM1, MM2, MM3, MM4, MM5, MM6, MM7
```

Floating Point registers

```
ST(0), ST(1), ST(2), ST(3), ST(4), ST(5), ST(6), ST(7)
```

XMM registers

```
XMM(0), XMM(1), XMM(2), XMM(3), XMM(4), XMM(5), XMM(6), XMM(7)
XMM0, XMM1, XMM2, XMM3, XMM4, XMM5, XMM6, XMM7
```

ASM supports these special words

PowerBASIC supports three special reserved words, which are used to specify a return value from a procedure of the same type:

FUNCTION	**ASM mov FUNCTION, eax**
METHOD	**ASM mov METHOD, 3**
PROPERTY	**ASM mov PROPERTY, dx**

The above examples are the functional equivalent of the comparable BASIC syntax:

```
FUNCTION = x&
METHOD   = 3
PROPERTY = z%
```

The exception is that the assembler syntax allows you to assign a return value directly from an appropriate CPU register. Of course, these special reserved words may only be referenced within a procedure of the same type (FUNCTION may only be used in a user-defined function, etc.)

See Also #ALIGN, ASMDATA/END ASMDATA

ASMDATA/END ASMDATA statements

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ASMDATA/END ASMDATA statements New!

Purpose Define a block where primitive read-only data is stored.

Syntax

```
ASMDATA BlockName
  DB  1, "ABC"$,  0
  DW  2, "XYZ"$$, 0
  DD  &H12345678
  DQ  1234567890
END ASMDATA
```

Remarks It is frequently convenient to define some data within the code section of your program. This data is read-only, so it may never be altered. An attempt to do so will result in a GPF (General Protection Fault), which will cause termination of your program. This type of data is generally accessed only by ASM code.

Defined Data can be placed inside of a Sub, Function, Method, or Property using ASM statements, but there are a number of pitfalls to that technique. When debugging, or when using TRACE, PROFILE, #DEBUG DISPLAY, ERL, ERL$, etc., PowerBASIC must insert special code in various places which makes if difficult (if not impossible) for you to access the data accurately. You don't know the size of the inserted code, so you'll have some difficulty addressing it accurately.

An ASMDATA block solves that problem entirely. It is designed for the sole purpose of defining data, and no extra code or extra data is ever inserted for any reason. Data within the block is never aligned, so you always know the exact location of each item. The ASMDATA block must be located outside of any Sub, Function, Method, or Property. However, the *BlockName* you assign is public, so it may be referenced from any place in your program. You may have one block on your program, or many.

By default, all ASMDATA blocks are positioned at the first available byte. This allows contiguous blocks to be accessed as though they were one larger block. You can align any or all of the blocks differently by preceding the block with an #ALIGN metastatement.

Labels and line numbers are not allowed in an ASMDATA block. If you need a reference point to a particular sub-section of your data, just split it into two or more blocks, using each *BlockName* as the reference point.

The only statements allowed within an ASMDATA block are DB, DD, DQ, and DW, so they do not need to be preceded by an ASM statement. An ANSI string literal expression may be placed in a DB statement, and a WIDE (unicode) string literal expression may be placed in a DW statement. A string literal expression may consist of quoted string literals, string equates, and the concatenation operators (&,+). You may also use CHR$(), SPACE$(), and STRING$() if they use only literal parameters.

You can access the address of an ASMDATA block with the CODEPTR() function. So, if you create a block named ABC, like this:

```
ASMDATA ABC
  DB  5,2,3
  DB  7,8,9
END ASMDATA
```

You would access it something like this:

```
AsmVar = CODEPTR(ABC)
```

Another option is to access it directly to a CPU register of your choice by using one of these opcodes:

```
ASM LEA EBX, abc
ASM MOV EBX, Offset abc
```

This would result in moving the first data byte (5) into register AL.

Or even move it directly to a 32-bit variable:

```
ASM MOV   AsmVar, Offset abc
```

See also ASM

ATN function

ATN function

Purpose Return the arctangent of an argument.

Syntax `y = ATN(numeric_expression)`

Remarks ATN returns the arctangent (Inverse Tangent) of *numeric_expression*; that is, the angle whose tangent is *numeric_expression*.

The result, as with all operations involving *angles* in PowerBASIC, is in *radians* rather than *degrees*. Although it is common to specify angles in degrees, the radian is a more convenient measurement for mathematical operations. One radian is defined as the angle at the center of a circle that subtends an arc equal in length to one radius. Since for all circles, using the constant π:

```
Circumference / radius = 2 * π
```

the length of the circumference of a circle is equal to *2 * π * radius*, and the angle of a full circle (360 degrees) is equal to *2 * π* radians.

To convert radians to degrees, just multiply the radian value by 180/π, or 57.29577951308232##. For example, the arctangent of 0.23456 can be converted this way:

```
t = ATN(.23456!)         't = 0.230395 (radians)
t = 57.29577951308232## * ATN(.23456!) 't= 13.200 (degrees)
```

To convert degrees to radians, multiply by 0.0174532925199433##. For example:

```
14 degrees = (0.0174532925199433## * 14) = 0.2443460952792062 radians
```

Rather than memorizing the radians/degrees conversion factors, calculate them for yourself by remembering this relationship: 2 π radians equals a full circle (360 degrees), so *1 π* radian is *180 / π* degrees. Conversely, 1 degree equals *π / 180* radians.

π is a transcendental constant, meaning that it has an infinite number of decimal places. To 15-place accuracy, adequate for most applications, π = 3.141592653589793##. This value can be closely approximated with the expression:

```
pi## = 4 * ATN(1)
```

Degrees-to-radians and radians-to-degrees conversions are good applications for user-defined functions.

The ATN function always returns an Extended-precision result.

The Tangent (TAN) of a value can be easily calculated with the TAN function.

The Hyperbolic Tangent (TANH) can be calculated:

```
TanH = (EXP(2 * Value) - 1) / (EXP(2 * Value) + 1)
```

The Inverse Hyperbolic Tangent (ARCTANH) of a value can be calculated:

```
ArcTanH = LOG((1 + Value) / (1 - Value)) / 2

' Useful Macro functions
MACRO Pi = 3.141592653589793##
MACRO DegreesToRadians(dpDegrees) = (dpDegrees*0.0174532925199433##)
MACRO RadiansToDegrees(dpRadians) = (dpRadians*57.29577951308232##)
```

See also COS, SIN, TAN

BEEP statement

BEEP statement

Purpose Sound a tone through the computer's speaker.

Syntax **BEEP**

Remarks BEEP plays the default Windows waveform sound, typically a ¼ second tone, through either the built-in speaker; or a sound card if installed (in which case the Windows "Default Beep" sound is played). The Default Beep can be configured in the Sounds section of Control Panel.

Restrictions The physical aspects of the built-in speaker may have an effect on the quality and level of the resultant sound.

BGR function

BGR function

Purpose Create a BGR color value from 3 primary color values or from an RGB value

Syntax
```
result& = BGR(red&, green&, blue&)
result& = BGR(rgbexpr&)
```

Remarks An RGB value is a long integer value in the range of 0 to &H00FFFFFF. It is used to specify a very precise color to various PowerBASIC functions and Windows API functions. The lowest three bytes of the value each specify the intensity of a primary color which combine to form the resultant color. Byte 1 (lowest) represents the red component, byte 2 the green, and byte 3 the blue. They can each take on a value in the range of 0 to 255. Byte 4 (highest) is always 0.

Some Windows API functions, such as those which reference Device Independent Bitmaps (DIB), require that the colors be specified in the reverse sequence (Blue-Green-Red instead of Red-Green-Blue). In order to maximize performance and execution speed, PowerBASIC statements and functions which reference these structures also use the BGR format. These include GRAPHIC GET BITS and GRAPHIC SET BITS. When used with 3 parameters, the BGR() function creates a BGR value from the three component values.

When used with one parameter, this function translates an RGB value to its BGR equivalent by swapping the first byte with the third byte, and returning the result.

For example, the RGB value of blue is &HFF0000. BGR() translates it to &H0000FF. Calling RGB() with that value converts it back to &HFF0000.

See also Built In RGB Color Equates, RGB

BIN$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

BIN$ function IMPROVED

Purpose Convert an integral value to a binary

.

Syntax
```
s$ = BIN$(IntVal [, Digits, LeadSpaces, TrailSpaces])
```

Remarks *IntVal* is a numeric expression in the range of a 64-bit Quad Integer (-9223372036854775808 to +9223372036854775807). Any fractional part of the value is rounded. The result string is always formatted as an integral number using all the significant digits in *IntVal*. It is never expressed in scientific notation.

If *Digits* is 0 (or not given), no leading characters will be added to the numeric field. If Digits is a positive number greater than 0, the result string will be prepended with leading zeros to achieve the desired length. If *Digits* is a negative number, leading spaces are added to reach the absolute length. *Digits* may be in the range of -64 to +64.

LeadSpaces specifies additional leading spaces to be prepended, regardless of the length of the numeric portion of the string.

TrailSpaces specifies additional trailing spaces to be appended to the end of the string.

See also DEC$, FORMAT$, HEX$, OCT$, STR$, TRIM$, USING$, VAL

BIT CALC statement

BIT CALC statement

Purpose Set or reset a bit in an variable (or implied bit-array) based upon the result of an expression.

Syntax **BIT CALC *intvar*, *bitnumber*, *calcexpr***

Remarks BIT CALC performs like a combination of the BIT SET and BIT RESET statements, offering the choice between set (1) and reset (0) according to the result of a numeric expression.

intvar An integral class variable (Byte, Word, Double-word, Integer, Long-integer or Quad-integer), or a variable forming the base of an implied bit-array.

bitnumber An integral class expression or numeric literal that specifies the bit number to adjust. Bit numbers start from zero (0), and extend to the size of the target variable or bit-array. For example, a 16-bit integer variable uses the range 0 to 15. An implied bit-array comprised of a Long-integer array with 100 elements (4 bytes * 100 = 400 bytes = 3200 bits) covers the bit range 0 to 3199.

calcexpr The value derived from bit zero of *calcexpr* determines the set or reset action. If bit zero contains a zero (0), the bit in *intvar* is reset; if bit zero in *calcexpr* contains a one (1), the bit in *intvar* is set. This action can be more easily remembered if we consider PowerBASIC performs an implied bitwise AND operation (*calcexpr* AND 1) to derive the set or reset action.

> **Care must be exercised to ensure that the bit index number (*bitnumber*) does not exceed the number of bits that can be validly accessed. For example, reading the 17th bit of a 16-bit scalar variable may trigger a General Protection Fault (GPF). Similarly, adjusting the 4097th bit of a bit-array derived from a 128-element DWORD array may cause similar problems. *bitnumber* is always zero-based, so the 129th bit of an implied bit-array is referenced in the BIT statement with *bitnumber* equal to 128. For example: x& = BIT(A?(1), 128).**

The first bit is the least-significant bit, which is bit number zero. For example:

```
 &H80FE =       10000000 11111110
(bit 15) MSB   ↑                 ↑   LSB (bit 0)
```

See also BIT function, BIT statement, BITS functions

Example

```
DIM dwStatus1 AS DWORD
DIM dwStatus2 AS DWORD
DIM iBit      AS INTEGER
DIM sResult1  AS STRING
DIM sResult2  AS STRING

FOR iBit = 0 TO 31
  BIT CALC dwStatus1, iBit, RND(0,1)
  BIT CALC dwStatus2, iBit, iBit MOD 3
NEXT iBit
sResult1 = BIN$(dwStatus1,32)
sResult2 = BIN$(dwStatus2,32)
```

Result

```
sResult1 = "01001101001110101110111010010101"
sResult2 = "10010010010010010010010010010010"
```

BIT function

BIT function

Purpose Return the value of a particular bit in an

variable (or in an implied bit-array)

Syntax ***flag* = BIT(*intvar*, *bitnumber*)**

Remarks The BIT function is used to determine the value of one particular bit in an integral-class variable or implied bit-array.

intvar The parameter *intvar* must be a variable, not an expression. The BIT function returns either 0 or 1 to indicate the value of the specified bit.

bitnumber The bit in question. The allowable range for the parameter is the same as that of a Long-integer. This makes it possible to have implicit bit-arrays of more than 2 billion bits in size. For such arrays, bits 0 to 15 are in the first word starting at *intvar*, bits 16-31 are in the next word, and so forth.

Implied bit-arrays are considered to start at the memory position of the variable *intvar*. For example, if *intvar* is itself an array variable, it is possible to access bits in any of the following elements of the array. See the array examples below.

> **Care must be exercised to ensure that the bit index number (*bitnumber*) does not exceed the number of bits that can be validly accessed. For example, reading the 17th bit of a 16-bit scalar variable may trigger a General Protection Fault (GPF). Similarly, adjusting the 4097th bit of a bit-array derived from a 128-element DWORD array may cause similar problems. *bitnumber* is always zero-based, so the 129th bit of an implied bit-array is referenced in the BIT statement with *bitnumber* equal to 128. For example: x& = BIT(A?(1), 128).**

The first bit is the least-significant bit, which is bit number zero. For example:

```
 &H80FE =       10000000 11111110
(bit 15) MSB   ↑               ↑   LSB (bit 0)
```

See also BIT CALC statement, BIT statement, BITS functions

Example

```
x% = 7
y% = BIT(x%, 2)
[statements]
DIM z%(1:2000000)  ' 32 million element bit-array
y% = BIT(z%(1),16) ' bit 0 of 2nd word of z%()
y% = BIT(z%(2000000),15)   ' MSB of last element
y% = BIT(z%(1), 31999999&) ' MSB of last element
```

BIT statement

BIT statement

Purpose Manipulate individual bits of an

variable (or in an implied bit-array), for storing values such as TRUE/FALSE (flag) settings quickly and efficiently.

Syntax **BIT {SET | RESET | TOGGLE} *intvar*, *bitnumber***

Remarks *intvar* must be one of the integral-class variable types: Byte, Word, Integer, Double-word, Long-integer, or Quad-integer.

The allowable range for the parameter *bitnumber* is the same as that of a Long-integer, making it possible to have implicit bit-arrays of more than 2 billion bits in size. Bits 0 to 15 are in the first word starting at *intvar*, bits 16-31 are in the next word, and so forth.

Implied bit-arrays are considered to start at the memory position of the variable *intvar*. For example, if *intvar* is itself an array variable, it is possible to access bits in any of the following elements of the array. See the array examples below.

> **Care must be exercised to ensure that the bit index number (*bitnumber*) does not exceed the number of bits that can be validly accessed. For example, adjusting the 17th bit of a 16-bit scalar variable may cause a subtle memory corruption problem, and/or may trigger a General Protection Fault (GPF). Similarly, adjusting the 4097th bit of a bit-array derived from a 128-element DWORD array may cause similar problems. *bitnumber* is always zero-based, so the 129th bit of an implied bit-array is referenced in the BIT statement with *bitnumber* equal to 128. For example: BIT SET A?(1), 128.**

The first bit position is the least significant bit (LSB), which is bit number zero. For example:

```
 &H80FE =       10000000 11111110
(bit 15) MSB                           LSB (bit 0)
```

SET Sets the indicated bit to one.

RESET Sets the indicated bit to zero.

TOGGLE Toggles the indicated bit: one becomes zero; zero becomes one.

See also BIT CALC statement, BIT function, BITS functions

Example

```
x% = 7
BIT SET x%, 2           ' Sets the 3rd bit (bit 2) to 1
BIT RESET x%, 10        ' Sets the 11th bit (bit 10) to 0
BIT TOGGLE x%, 5        ' Toggle bit 5
[statements]
DIM z%(1 TO 2000)       ' 32000 element bit-array
BIT SET z%(1), 37       ' Sets bit 5 of 3rd word to a 1
BIT TOGGLE z%(1),0      ' Toggle lowest bit in 1st word
BIT RESET z%(2000), 15  ' Clear the MSB of integer array element
                        ' 2000 (bit 31999 of the implied bit array,
                        ' numbered 0 to 31999)
BIT RESET z%(1), 31999  ' Clear the MSB of element 2000
                        ' (this is equivalent to the previous line)
```

BITS$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

BITS$ function New!

Purpose Copy

contents without modification.

Syntax

```
AnsiVar$  = BITS$(STRING,  StringExpr)
WideVar$$ = BITS$(WSTRING, StringEXpr)
```

Remarks This function copies the exact contents of a string expression to a string variable without making any ANSI/UNICODE conversions. It assumes that the data already matches the format specified by the director word STRING or WSTRING. This functionality will not often be needed, so a certain amount of caution should be used.

For example, in older versions of PowerBASIC, there were no WIDE string variables available. It was therefore necessary to store Unicode data in an ANSI byte string. In updating these programs, you may find you need to transfer this WIDE data to a WIDE variable, but without the automatic internal conversion normally provided by the compiler. BITS$ provides just that functionality. Of course, it can copy bytes from WIDE to ANSI as well.

See also BITS

BITS function

BITS function

Purpose Converts an integral value into another data type, based upon the bit pattern of the value. This is particularly helpful in converting between signed and unsigned representations.

Syntax ***resultvar* = BITS(*datatype*, *expression*)**

datatype The parameter *datatype* may be BYTE, WORD, DWORD, INTEGER, or LONG to specify the new data type which should be returned by the function.

expression An integral class variable, expression, or numeric literal, which designates the original value to be converted.

Remarks Since the integer value -1 and word value 65535 have the identical bit pattern of 1111111111111111, BITS(WORD,-1) would return the unsigned word value of 65535. Of course, BITS(INTEGER,65535) would then return the integer value -1. Other values and data types would follow the same pattern and rules.

This newer form of BITS condenses the functionality of the older forms (BITS%, BITS&, BITS?, BITS?? and BITS???) into a single function. In particular, this provides for the addition of new data types in future version of PowerBASIC, particularly those which may not have an associated type-specifier character.

See also BIT CALC statement, BIT function, BIT statement, BITS$, BITSE

BITSE function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

BITSE function

Purpose Compare integral values for equivalent bits regardless of sign.

Syntax ***x&* = BITSE(*nexp*, *nexp*, *bitsize*)**

Remarks This function allows you to compare two integral values for equivalent bit patterns, regardless of whether they are signed or unsigned values. The two numeric expressions (*nexp*) are the integral values to be compared, The bitsize parameter specifies the number of bits to be compared, 8, 16, or 32.

For example, the integer value -1 and the word value 65535 both have the identical bit pattern: 1111111111111111. The difference is simply the way the bits are interpreted by a program.

```
x& = BITSE( -1, 65535, 16)
```

The above example would cause the lowest 16 bits of the expressions to be compared. Since they are equal, the value TRUE (-1) is returned.

See also BITS

BUILD$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

BUILD$ function

Purpose Build or concatenate strings with very high efficiency.

Syntax ***x$*** **= BUILD$(*a$*,*b$*,*c$*,*d$*...)**

Remarks In some cases, string concatenation using the classic string operators can be a slow process. This is particularly true when there are many operands using longer strings. The BUILD$ function passes all the typical bottlenecks to create a new string at the greatest possible speed. The following 2 lines are functionally identical, but the BUILD$ version will execute substantially faster.

```
x$ = a$ + "bb" + c$ + y$(7) + y$(i&) + z$
x$ = BUILD$(a$, "bb", c$, y$(7), y$(i&), z$)
```

It's interesting to note that this string function could have been named APPEND$ or PREPEND$ because it performs these functionalities so well. For example, to prepend a topic number to *text$* while also adding a period at the end, you could execute:

```
text$ = BUILD$( "1) " & text$ & ".")
```

In order to extract the utmost efficiency, BUILD$() was designed to work with a very narrow definition. The component parameters must be dynamic string variables, either scalar or array, string literals, or string equates. They may not be expressions. There is virtually no limit as to the number of parameters.

The BUILD$() function is most valuable when you are concatenating numerous strings all at the same time. However, when you must add many string sections, in many separate operations, the StringBuilder object is much faster, and a more appropriate choice.

Generally speaking, the greater the number of parameters, the greater the increase in execution speed.

See also LET, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINGBUILDER, STRINSERT$, WRAP$

CALL statement

CALL statement

Purpose Invoke a procedure (Sub, Function, Method, Property, or FastProc).

Syntax `CALL ProcName [([arguments])] [TO result_var]`

Remarks The CALL statement has the following parts:

ProcName The name of a Sub, Function, Method, Property, or FastProc defined elsewhere in the program.

arguments An optional, comma-delimited list of variables, expressions, and constants to be passed to the procedure as parameters, for up to 32 parameters. If the CALL keyword is used, the *arguments* must be enclosed in parentheses.

You can omit the CALL keyword. If you do so, you may also omit the parentheses surrounding arguments. For example, the following lines are equivalent:

```
CALL MyProc(parm1, parm2)
MyProc(parm1, Parm2)
MyProc parm1, parm2
```

However, if the first parameter argument is enclosed in parentheses for any reason, the entire parameter list must be enclosed in parentheses. For example:

```
MyProc (3+z, b)     ' Valid syntax
MyProc ((3+z), b)  ' Valid syntax
MyProc (3+z), b     ' Invalid syntax
```

This updated syntax now permits macros to be called using the SUB-style convention if/when the macros expand directly to Function calls. For example:

```
MACRO sm(Msg) = SendMessage(a, Msg, b, c)
```

…can be called like this (when the return value is not required):

```
sm(x)
```

In all cases, the number and type of parameters passed must agree with the *arguments* in procedure definition.

Variant Arguments

You can think of a Variant as a kind of container, which can hold a variable of most any data type. If you call a procedure which requires a variant for one or more of its arguments, PowerBASIC will automatically convert a standard data type into a variant data type.

While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte

) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CALL ProcName(UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDT) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When you retrieve that UDT data (with Variant$), PowerBASIC understands the content and handles it accurately. However, other programming languages may not understand this technique, so it should be limited to PowerBASIC applications. This methodology is implemented in all of the PowerBASIC COLLECTION objects as it greatly enhances ease of coding and performance of the final executable.

Passing Parameters

In a procedure definition, every parameter is described by the data type, and the format used to pass it. The type may be any normal variable type, such as long, string, User-Defined Type, etc. The passing format describes how the value is presented to the procedure: by reference (BYREF), by value (BYVAL), or by reference to a copy

(BYCOPY).

BYREF When a parameter is passed by reference, it consists of a 4-byte address of the data. In this case, the original data can be modified by the procedure.

BYVAL When a parameter is passed by value, it consists of an actual copy of the data. Since the parameter is a copy, the original data cannot be modified by the procedure.

When you pass parameters from the calling code with an explicit BYVAL, you effectively switch off the compilers type-checking for that parameter. This can be useful in cases where the called code is expecting a BYREF parameter, and you wish to pass an address of another data type that would trigger a compile-time error without the BYVAL method. For example:

```
SUB TheSub(x AS STRINGZ) ' Address of x expected
  [statements]
END SUB
[statements]
DIM a$
a$ = "Dynamic string data"
CALL TheSub(BYVAL STRPTR(a$)) ' Pass data address
```

BYCOPY A parameter passed by copy is a special case; somewhat of a hybrid of the other two methods. When a procedure expects a parameter to be passed by reference, it expects to see a pointer to the data. In some cases, such as when the parameter is a calculated expression, it is not precisely possible to pass a pointer, since an expression result is a temporary value that does not exist in a permanent memory location. On the other hand, if you wish to ensure that the original data is not modified by the procedure, you can place a BYCOPY override in the *arguments* list.

In both cases, a copy of the data is stored in a temporary memory location, and the parameter consists of a 4-byte address of this temporary location. Another way to force BYCOPY is to enclose a variable name in parentheses, so it will appear to the compiler as an expression, rather than just a single variable.

Unless declared otherwise, parameters default to BYREF passing method. Expressions and constants are always passed BYCOPY. Fixed length strings, User-Defined Types, and full arrays are always passed BYREF.

```
CALL MySub (i&)         ' i& is passed by reference
CALL MySub (BYREF i&)   ' i& is passed by reference
CALL MySub (BYCOPY i&)  ' i& is passed by copy
CALL MySub ((i&))       ' i& is passed by copy
```

Unless declared otherwise, parameters default to the BYREF passing method. Expressions and constants are always passed BYCOPY. Full arrays are always passed BYREF.

Entire arrays are specified by using an empty set of parentheses after the array, while individual array elements are specified by subscript index number. For example:

```
CALL SumArray(a())      ' pass entire array 'a'
CALL SumArray(a(3))     ' pass element 3 of array 'a'
```

The CALL statement can be used to invoke functions, subs, methods, properties, or fastprocs. In this case, the return value of the function is simply discarded, unless the TO keyword is used to specify a return variable.

If a procedure expects a parameter by reference, it is possible to substitute a pointer by value, for the identical result. This is particularly useful with Fixed-length strings and Types:

```
DECLARE SUB a(z%)
DIM MyInt AS INTEGER, x AS INTEGER PTR
x = VARPTR(MyInt)
CALL a(MyInt)
 '   or
CALL a(BYVAL x)
 '   or
```

```
CALL a(BYVAL VARPTR(MyInt))
```

Of course, if the procedure is expecting a parameter by value, you may not pass the pointer, but rather the pointer target (i.e., CALL a(@x)).

PowerBASIC compilers have a limit of 32 parameters per SUB, FUNCTION, METHOD, and PROPERTY. To pass more than 32 parameters, construct a User-Defined Type (UDT) and pass (the address of) the UDT by reference (BYREF) instead.

Fixed-length strings, STRINGZ strings, and User-Defined Types/Unions may also be passed as BYVAL or OPTIONAL parameters, now. Try to avoid passing large items BYVAL, as it's terribly inefficient, and there is a maximum size limit of 64 Kb for a given parameter list. Arrays cannot be passed BYVAL.

When a procedure definition specifies either a BYREF parameter or a pointer variable parameter, the calling code may freely pass a BYVAL DWORD or a Pointer instead. While the use of the explicit BYVAL override in the calling code is optional, it is recommended for clarity. It is necessary to explicitly declare all pointer parameters as BYVAL (i.e., BYVAL X AS BYTE PTR). Failure to do so will generate a compile-time Error 549 ("BYVAL required with pointers").

A procedure may also be imported and exported within the same module. That is, a function in the module may be stated as EXPORT, while a DECLARE in the same module specifies it as an imported function by the option LIB "XXX.DLL", provided that XXX.DLL is the name of the module. This may be particularly valuable when you wish to build an #INCLUDE file with all of the DECLARE statements for a project.

For information on using OPTIONAL parameters, please see DECLARE, FUNCTION, METHOD, PROPERTY and SUB topics.

NOTHING — The reserved word NOTHING can be used to replace any OBJECT variable parameter. In this case, the compiler passes a null object (or a pointer to a null object if BYREF) in place of a typical parameter. While this simplifies some programming issues, the technique must be used with caution. If the target METHOD or FUNCTION is not expecting a null parameter, it could cause a fatal error condition.

TO *result_var* — This offers an optional way to assign a function return value to *result_var*. For example, the following code assigns the return value to x% in two different ways:

```
x% = MyFunCall
CALL MyFunCall TO x%
```

Restrictions — A thread Function may not be directly called or executed, except by a THREAD CREATE statement.

See also — CALL DWORD, DECLARE, FASTPROC, FUNCTION/END FUNCTION, METHOD, PROPERTY, SUB/END SUB, THREAD CREATE

CALL DWORD statement

CALL DWORD statement

Purpose — Invoke a Sub or Function indirectly.

Syntax

CALL DWORD ***TargetPtr***
CALL DWORD ***TargetPtr*** **USING** ***abc*****([*****arguments*****]) [TO** ***result_var*****]**

Remarks — CALL DWORD is an essential ingredient for implementing run-time (explicit) dynamic linking of DLLs, rather than the more common load-time (implicit) linking. This provides a way of constructing calls to APIs and DLLs that may not be present in all versions of Windows. This technique ensures that an application can start up successfully, even if Windows cannot resolve the location of the API or DLL function.

The first (simplified) form of CALL DWORD may be used if the target Sub/Function takes no parameters and offers no return value. It also requires STDCALL (

) calling conventions, which is used by the vast majority (99%+) of import procedures.

In all other cases, you must use the second form, with a USING clause to define the signature of the target Sun/Function.

TargetPtr A Double-word, Long-integer, or pointer variable that contains the address of the entry point of a procedure (Sub or Function). If the target Sub/Function is located in the same module, you can retrieve the address with the CODEPTR function. If it's located in an external DLL, use IMPORT ADDR to load it and get the address.

USING This option is used to define a model procedure declaration which matches all of the calling conventions desired to be used to invoke the target Sub/Function. For example, the following two calls to the function *MySubCall* are equivalent:

```
DECLARE SUB MySubCall
DIM PtrMySubCall AS DWORD
PtrMySubCall= CODEPTR(MySubCall)
[statements]
CALL MySubCall
CALL DWORD PtrMySubCall USING MySubCall
```

arguments An optional, comma-delimited list of variables, expressions, and constants to be passed to the procedure as parameters. In the CALL DWORD context, enclosing parentheses are required. The number and type of parameters passed must agree with the *arguments* of the procedure named by the USING clause. See CALL for more information on parameter passing methods.

TO *result_var* When calling a Function which returns a value, the TO keyword offers a way to assign the function return value to *result_var*.

Restrictions Thread Functions and Callback Functions may not be invoked with CALL DWORD. The DECLARE model for the USING clause may not specify a LIB or IMPORT option.

See also CALL, CODEPTR, DECLARE, FASTPROC, FUNCTION/END FUNCTION, IMPORT, SUB/END SUB, THREAD CREATE

CALLSTK statement

CALLSTK statement

Purpose Capture a complete representation of the stack frames in the call stack.

Syntax **CALLSTK *diskfilename$***

Remarks PowerBASIC creates a *stack frame* for each call to a Sub, Function, Method, or Property, and records each nested call in a *call stack*. The stack frame holds the parameters being passed to the routine, and providing space for local variable storage, etc. Since procedures can call other procedures to an almost limitless depth, there may be a substantial number of stack frames present at any given moment.

The CALLSTK statement can help provide answers to the age-old "how did I get here?" question. When combined with other debugging statements such as CALLSTK$, CALLSTKCOUNT, and TRACE, the programmer has a set of tools that can significantly reduce the amount of effort required to debug an application.

Executing a CALLSTK statement captures a representation of all of the stack frames that exist above the one that includes the CALLSTK statement. When the CALLSTK statement is executed, a standard sequential file (of the specified file name in *diskfilename$*) is created. The resulting disk file contains a list of every call to a procedure, and their associated parameter values, which are currently defined on the call stack.

diskfilename$ must be a legal file spec, may be a Long File Name (LFN), and may include a path. If the file cannot be created for any reason, the operation will be ignored and no run-time error will be generated. If present, CALLSTK overwrites the existing file.

If PBMAIN calls the SUB aaa(x&) which then calls the SUB bbb(y&), the CALLSTK from within bbb(y&) might look like this:

```
PBMAIN()
aaa(77)
bbb(-1)
```

Later, if bbb(y&) exited, then aaa(x&) called ccc(z&), the updated CALLSTK from within ccc(z&) might then appear as:

```
PBMAIN()
aaa(77)
ccc(33)
```

Numeric parameters are displayed in decimal, while pointer and array parameters display a decimal representation of the offset of the target value.

Restrictions CALLSTK can be invaluable during debugging, but it generates substantial additional code that should be avoided in a final release version of an application. If the source code contains #TOOLS OFF, all CALLSTK statements which remain in the program are ignored.

The CALLSTK statement is "thread-aware", displaying only stack frame details from the thread in which it was executed.

See also #TOOLS, CALLSTK$, CALLSTKCOUNT, FUNCNAME$, PROFILE, TRACE

Example

```
FUNCTION PBMAIN
  CALL Sb1(100)
END FUNCTION

SUB Sb1(x AS LONG)
  CALL Sb2(x + 1)
END SUB

SUB Sb2(y AS LONG)
  CALLSTK "Stack frame test.txt"
END SUB
```

Result

```
PBMAIN()
SB1(100)
SB2(101)
```

CALLSTK$ function

CALLSTK$ function

Purpose Retrieve the details of a specific stack frame from the call stack.

Syntax ***sfname$*** **= CALLSTK$(*n*)**

Remarks CALLSTK$(1) returns the name of the current Sub, Function, Method, or Property, and the value of each of the parameters at the time it was called. CALLSTK$(2) returns the name of the procedure which called the current one, as well as its parameters. Likewise, CALLSTK$(3) returns the one above it, and so forth.

If the CALLSTK$(*n*) parameter is outside the range of one (1) through the number of stack frames identified by CALLSTKCOUNT, an empty

is returned. parameters are displayed in decimal, while pointer and array parameters display a decimal representation of the offset of the target value.

Restrictions The CALLSTK$ function can be invaluable during debugging, but it generates substantial extra code which should be avoided in a final release version of an application. If the source code contains #TOOLS OFF, all CALLSTK$ functions which remain in the program return an empty string.

The CALLSTK$ function is "thread-aware", returning only stack frame details from the thread in which it was referenced.

See also #TOOLS, CALLSTK, CALLSTKCOUNT, FUNCNAME$, PROFILE, TRACE

Example

```
FOR x& = CALLSTKCOUNT TO 1 STEP -1
  A$ = A$ + CALLSTK$(x&)
NEXT x&
```

CALLSTKCOUNT function

CALLSTKCOUNT function

Purpose Retrieve the number of stack frames in the call stack. Used in conjunction with the CALLSTK$ function.

Syntax ***count&*** **= CALLSTKCOUNT**

Remarks CALLSTKCOUNT returns a Long-integer value that represents the total number of stack frames that currently exist on the application call stack.

Retrieve individual stack frame details with the CALLSTK$ function, or write them all to a disk file with the CALLSTK statement.

Restrictions The CALLSTKCOUNT function, when used in conjunction with the CALLSTK$ function, can be invaluable during debugging, but its use generates substantial extra code which should be avoided in a final release version of an application. If the source code contains #TOOLS OFF, all CALLSTKCOUNT functions which remain in the program return zero.

The CALLSTKCOUNT function is "thread-aware", returning only the stack frame count from the thread in which it was referenced.

See also #TOOLS, CALLSTK$, CALLSTK, FUNCNAME$, PROFILE, TRACE

Example

```
FOR x& = CALLSTKCOUNT TO 1 STEP –1
  A$ = A$ + CALLSTK$(x&)
NEXT x&
```

CB Callback functions

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CB Callback functions

Purpose In a Callback Function, return information about a message.

Syntax

```
CtlID    = CB.CTL
CtlMsg   = CB.CTLMSG
WinHndl  = CB.HNDL
Value    = CB.LPARAM
Msg      = CB.MSG
Value    = CB.WPARAM
CodeMsg  = CB.NMCODE
```

```
NmPtr   = CB.NMHDR
NmStruc = CB.NMHDR$
NmHndl  = CB.NMHWND
NmID    = CB.NMID
```

Remarks When an event occurs (like a user clicking on a button, a character typed into a text box, etc.) Windows sends a message to the

Callback Function, or the Dialog Callback Function. The CB functions are used to easily retrieve information about the message. These CB functions can only be used within a callback function.

Callback functions in Windows have a standard set of four parameters. For this reason, PowerBASIC allows you to ignore them and save some typing in your source code. The implied parameters are:

```
FUNCTION DlgCallback(BYVAL hDlg AS DWORD  _
  BYVAL wMsg AS LONG   _
  BYVAL wParam AS LONG _
  BYVAL lParam AS LONG)
```

Generic Callback Functions

CB.HNDL This function returns the window handle of the parent dialog. This is the value specified by the *hDlg* parameter above.

CB.MSG Each type of message sent to your callback function has a unique numeric value, such as %WM_COMMAND, %WM_NOTIFY, etc. CB.MSG will return the actual numeric message value of the message being processed. The definitions of the numeric values in other CB functions (CB.LPARAM, CB.WPARAM, CB.CTL, etc.) can only be ascertained once CB.MSG is identified. Therefore, callback functions usually test the value of CB.MSG first.

CB.WPARAM When Windows sends a message to a callback function, the wParam value contains different values, depending on the nature of the particular message (CB.MSG). In other words, CB.WPARAM returns a message-dependent value.

CB.LPARAM When Windows sends a message to a callback function, the lParam value contains different values, depending on the nature of the particular message (CB.MSG). In other words, CB.LPARAM returns a message-dependent value.

%WM_COMMAND Specific Callback Functions

CB.CTL If CB.MSG = %WM_COMMAND, this function returns the ID number assigned to the control with the

statement. For other values of CB.MSG, it returns message-dependent values. This value is sent as the low-order word of the wParam parameter. It's functionally equivalent to LO(WORD, wParam&) in a conventional function, or LO(WORD, CB.WPARAM) in a DDT Callback Function.

CB.CTLMSG If CB.MSG = %WM_COMMAND, this function returns the specific control message describing the event which occurred. For example, CB.CTLMSG returns %BN_CLICKED when the user clicks a button. For other values of CB.MSG, it returns message-dependent values. This value is sent as the high-order word of the wParam parameter. It's functionally equivalent to HI(WORD, wParam&) in a conventional function, or HI(WORD, CB.WPARAM) in a DDT Callback Function.

%WM_NOTIFY Specific Callback Functions

CB.NMCODE If CB.MSG = %WM_NOTIFY, this function returns the specific notification message describing the event which occurred. For example, CB.NMCODE returns %NM_SETFOCUS when the described control gains the

. For other values of CB.MSG, the value returned is meaningless.

CB.NMHDR If CB.MSG = %WM_NOTIFY, this function returns the address (a

) to the NMHDR [UDT] for this notification message. NMHDR is defined as:

```
Type NMHDR
  hwndFrom  as DWord  ' Handle of the control sending the message
  idfrom    as DWord  ' Identifier of the control sending the message
  code      as Long   ' Notification code
End Type
```

Some notification messages (%NM_CHAR, %NM_CLICK, etc.) require an extended version of the NM structure. However, all NM structures begin with an NMHDR UDT, so the pointer returned here is always accurate. For other values of CB.MSG, the pointer returned by CB.NMHDR is meaningless.

**CB.NMHDR$** If CB.MSG = %WM_NOTIFY, this function returns the contents of the NMHDR UDT as a dynamic string. If the notification message is one which requires an extended version of the NM structure, the string returned contains all of the data for the extended UDT. However, in all cases, the first 12 bytes of the returned string will be the contents of NMHDR. You can use TYPE SET to assign the string data to an appropriate user-defined type. For other values of CB.MSG, the string returned by CB.NMHDR$ is meaningless.

The following notification messages use the extended NM structures as listed, so an appropriately longer string is returned:

Message	UDT
%NM_CLICK	NMMOUSE
%NM_RCLICK	NMMOUSE
%NM_NCHITTEST	NMMOUSE
%NM_KEYDOWN	NMKEY
%NM_SETCURSOR	NMMOUSE
%NM_CHAR	NMCHAR
%NM_TOOLTIPSCREATED	NMTOOLTIPSCREATED

Other special notify messages may use a different extended NM structure than those listed above. To ensure compatibility, you can include an optional numeric parameter to specify the size of the special UDT you are using:

```
TYPE SET NotifyUDT = CB.NMHDR$(sizeof(NotifyUDT))
```

CB.NMHWND If CB.MSG = %WM_NOTIFY, this function returns the handle of the control which sent this message. For other values of CB.MSG, the value returned is meaningless.

CB.NMID If CB.MSG = %WM_NOTIFY, this function returns the ID number assigned to this control. For other values of CB.MSG, the value returned is meaningless.

Restrictions These functions are only valid inside a Callback Function. The CB Callback functions replace CBMSG, CBHNDL, CBLPARAM, CBWPARAM, CBCTL, and CBCTLMSG . Note these functions are no longer supported, so update your code to use the new syntax.

See also Callbacks, Dynamic Dialog Tools

CBYT function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific variable type.

Syntax

```
bytevar?           = CBYT(numeric_expression)
currencyvar@       = CCUR(numeric_expression)
currencyextvar@@   = CCUX(numeric_expression)
doublevar#         = CDBL(numeric_expression)
doublewordvar???   = CDWD(numeric_expression)
extendedvar##      = CEXT(numeric_expression)
integervar%        = CINT(numeric_expression)
longintvar&        = CLNG(numeric_expression)
quadintvar&&       = CQUD(numeric_expression)
singlevar!         = CSNG(numeric_expression)
wordvar??          = CWRD(numeric_expression)
```

Remarks Each of these functions converts a

expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

Function	Result type
CBYT	Byte
CCUR	Currency
CCUX	Extended-currency
CDBL	Double-precision floating-point
CDWD	Double-word
CEXT	Extended-precision floating-point
CINT	Integer
CLNG	Long-integer
CQUD	Quad-integer
CSNG	Single-precision floating-point
CWRD	Word

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also CEIL, CVI and associated functions, FIX, INT, MKI$ and associated functions

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CCUR function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific variable type.

Syntax

```
bytevar?           = CBYT(numeric_expression)
currencyvar@       = CCUR(numeric_expression)
currencyextvar@@   = CCUX(numeric_expression)
doublevar#         = CDBL(numeric_expression)
doublewordvar???   = CDWD(numeric_expression)
extendedvar##      = CEXT(numeric_expression)
integervar%        = CINT(numeric_expression)
longintvar&        = CLNG(numeric_expression)
quadintvar&&       = CQUD(numeric_expression)
singlevar!         = CSNG(numeric_expression)
wordvar??          = CWRD(numeric_expression)
```

Remarks Each of these functions converts a

expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

Function	Result type
CBYT	Byte
CCUR	Currency
CCUX	Extended-currency
CDBL	Double-precision floating-point
CDWD	Double-word
CEXT	Extended-precision floating-point
CINT	Integer
CLNG	Long-integer
CQUD	Quad-integer
CSNG	Single-precision floating-point
CWRD	Word

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also CEIL, CVI and associated functions, FIX, INT, MKI$ and associated functions

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CCUX function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific variable type.

Syntax

```
bytevar?           = CBYT(numeric_expression)
currencyvar@       = CCUR(numeric_expression)
currencyextvar@@   = CCUX(numeric_expression)
doublevar#         = CDBL(numeric_expression)
doublewordvar???   = CDWD(numeric_expression)
extendedvar##      = CEXT(numeric_expression)
integervar%        = CINT(numeric_expression)
longintvar&        = CLNG(numeric_expression)
quadintvar&&       = CQUD(numeric_expression)
singlevar!         = CSNG(numeric_expression)
wordvar??          = CWRD(numeric_expression)
```

Remarks Each of these functions converts a

expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

Function	Result type
CBYT	Byte
CCUR	Currency
CCUX	Extended-currency
CDBL	Double-precision floating-point
CDWD	Double-word
CEXT	Extended-precision floating-point
CINT	Integer
CLNG	Long-integer
CQUD	Quad-integer
CSNG	Single-precision floating-point
CWRD	Word

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also CEIL, CVI and associated functions, FIX, INT, MKI$ and associated functions

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CDBL function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific variable type.

Syntax

```
bytevar?            = CBYT(numeric_expression)
currencyvar@        = CCUR(numeric_expression)
currencyextvar@@    = CCUX(numeric_expression)
doublevar#          = CDBL(numeric_expression)
doublewordvar???    = CDWD(numeric_expression)
extendedvar##       = CEXT(numeric_expression)
integervar%         = CINT(numeric_expression)
longintvar&         = CLNG(numeric_expression)
quadintvar&&        = CQUD(numeric_expression)
singlevar!          = CSNG(numeric_expression)
wordvar??           = CWRD(numeric_expression)
```

Remarks Each of these functions converts a

expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

Function	Result type
CBYT	Byte
CCUR	Currency
CCUX	Extended-currency
CDBL	Double-precision floating-point

CDWD	Double-word
CEXT	Extended-precision floating-point
CINT	Integer
CLNG	Long-integer
CQUD	Quad-integer
CSNG	Single-precision floating-point
CWRD	Word

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also CEIL, CVI and associated functions, FIX, INT, MKI$ and associated functions

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CDWD function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific variable type.

Syntax

```
bytevar?           = CBYT(numeric_expression)
currencyvar@       = CCUR(numeric_expression)
currencyextvar@@   = CCUX(numeric_expression)
doublevar#         = CDBL(numeric_expression)
doublewordvar???   = CDWD(numeric_expression)
extendedvar##      = CEXT(numeric_expression)
integervar%        = CINT(numeric_expression)
longintvar&        = CLNG(numeric_expression)
quadintvar&&       = CQUD(numeric_expression)
singlevar!         = CSNG(numeric_expression)
wordvar??          = CWRD(numeric_expression)
```

Remarks Each of these functions converts a

expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

Function	Result type
CBYT	Byte
CCUR	Currency
CCUX	Extended-currency
CDBL	Double-precision floating-point
CDWD	Double-word
CEXT	Extended-precision floating-point
CINT	Integer
CLNG	Long-integer
CQUD	Quad-integer
CSNG	Single-precision floating-point
CWRD	Word

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also CEIL, CVI and associated functions, FIX, INT, MKI$ and associated functions

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CEIL function

CEIL function

Purpose Convert a

variable or expression into an value, by returning the smallest integral value that is greater than or equal to its argument.

Syntax ***intvar* = CEIL(*numeric_expression*)**

Remarks The CEIL function rounds upward, returning the smallest integral value that is greater than or equal to *numeric_expression*. For example, *y* = CEIL(1.5) places the value 2 into *y*.

See also CINT, FIX, FRAC, INT, ROUND

Example

```
' Display the ceiling for a series of values
FOR W! = -1.5! TO 1.5! STEP 0.5!
  x$ = "CEIL" + FORMAT$(W!, "* 0.00") + _
```

```
    " =" + FORMAT$(CEIL(W!), "* 0.00")
NEXT W!
```

Result

```
CEIL -1.50 = -1.00
CEIL -1.00 = -1.00
CEIL -0.50 =  0.00
CEIL  0.00 =  0.00
CEIL  0.50 =  1.00
CEIL  1.00 =  1.00
CEIL  1.50 =  2.00
```

CEXT function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific variable type.

Syntax

```
bytevar?           = CBYT(numeric_expression)
currencyvar@       = CCUR(numeric_expression)
currencyextvar@@   = CCUX(numeric_expression)
doublevar#         = CDBL(numeric_expression)
doublewordvar???   = CDWD(numeric_expression)
extendedvar##      = CEXT(numeric_expression)
integervar%        = CINT(numeric_expression)
longintvar&        = CLNG(numeric_expression)
quadintvar&&       = CQUD(numeric_expression)
singlevar!         = CSNG(numeric_expression)
wordvar??          = CWRD(numeric_expression)
```

Remarks Each of these functions converts a

expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

Function	Result type
CBYT	Byte
CCUR	Currency
CCUX	Extended-currency
CDBL	Double-precision floating-point
CDWD	Double-word
CEXT	Extended-precision floating-point
CINT	Integer
CLNG	Long-integer
CQUD	Quad-integer
CSNG	Single-precision floating-point
CWRD	Word

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also CEIL, CVI and associated functions, FIX, INT, MKI$ and associated functions

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CHDIR statement

CHDIR statement

Purpose Change the current (default) directory on the default drive, or any other drive (similar to the DOS CHDIR command). CHDIR affects only the default drive for the current program.

Syntax **CHDIR *path***

Remarks *path* is a string expression containing either a relative or an explicit directory name. The directory name can be constructed from a (DOS-Style) Short File Name (SFN) directory name, a Long File Name (LFN) directory name, or a combination of the two. Also, *path* may be prefixed with a drive letter and colon (i.e., "D:") to change the current directory on a non-default drive.

The current directory is the location where your program will perform file operations by default. Thus:

```
CHDIR "\DATA"
```

changes to the \DATA subdirectory on the current drive, and:

```
CHDIR "..\DATA2"
```

changes the current directory to a directory whose parent is also the parent to the original directory. The double-period implies the parent directory.

```
CHDIR "J:\Program Files\Internet Explorer"
```

changes the current directory of Drive J. Drive J need not be the current default drive.

If *path* does not specify a valid directory on the target drive, a run-time Error 76 occurs ("Path not found").

A program that changes the current directory on the default drive also changes its active directory.

path may also be used with UNC names (i.e., \\server\share), but their use is subject to operating system restrictions.

Restrictions CHDIR is not intended to change the current default drive. Use CHDRIVE instead.

See also CHDRIVE, CURDIR$, MKDIR, RMDIR

CHDRIVE statement

CHDRIVE statement

Purpose Change the current default drive.

Syntax `CHDRIVE drive`

Remarks *drive* is a string expression whose first character is a letter from A to the highest logical drive letter. The trailing colon (:) that DOS uses is optional in PowerBASIC. If *drive* does not indicate a valid drive, a run-time Error 76 occurs ("Path not found").

See also CHDIR, CURDIR$, MKDIR, RMDIR

Example

```
SDrive$ = "C"
CHDRIVE SDrive$   ' change to the C: drive
```

CHRBYTES function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CHRBYTES function New!

Purpose Determine the size of a single character in a variable.

Syntax `siz& = CHRBYTES(MyStringVar)`

Remarks This function is used to determine whether a particular string variable contains ANSI characters or Unicode (wide) characters, ANSI characters are stored in 1 byte, so the function returns 1 if the variable is a dynamic string, stringz, string*n, or field string. Unicode characters are stored in 2 bytes, so the function returns 2 if the variable is a wstring, wstringz, wstring*n, or wfield string. This function may be particularly valuable in some macros which use string variables.

See Also LEN, SIZEOF

ChrToOem$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CHRTOOEM$ function New!

Purpose Translates a

of ANSI/WIDE characters to OEM byte characters.

Syntax `o$ = ChrToOem$(AnsiOrWide$)`

Remarks *AnsiOrWide$* contains a series of ANSI characters or WIDE (16-bit) characters, ChrToOem$ translates it into OEM byte characters.

See also OemToChr$, ChrToUtf8$, Utf8ToChr$

ChrToUtf8$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ChrToUtf8$ function New!

Purpose Translates a string of ANSI/WIDE characters to UTF-8 byte characters.

Syntax `o$ = ChrToUtf8$(AnsiOrWide$)`

Remarks *AnsiOrWide$* contains a series of ANSI characters or WIDE (16-bit) characters, ChrToUtf8$ translates it into UTF-8 byte characters.

See also ChrToOem$, OemToChr$, Utf8ToChr$

CHOOSE function

CHOOSE function IMPROVED

Purpose Return one of several values, based upon the value of an index.

Syntax

```
y  = CHOOSE(index&,  choice1 [, choice2] ...[ELSE choice9])
y& = CHOOSE&(index&, choice1 [, choice2] ...[ELSE choice9])
y$ = CHOOSE$(index&, choice1 [, choice2] ...[ELSE choice9])
y  = CHOOSE([BIT]   index&, choice1 [, choice2] ...[ELSE choice9])
y& = CHOOSE&([BIT]  index&, choice1 [, choice2] ...[ELSE choice9])
y$ = CHOOSE$([BIT]  index&, choice1 [, choice2] ...[ELSE choice9])
y$ = CHOOSE$([BITS] index&, choice1 [, choice2] ...[ELSE choice9])
```

Remarks These functions may take any number of choice parameters. They return one of the parameters, or a combination of them, based upon the value of *index&*. In the standard form, *index&* makes the choice based upon the sequence of the parameters. That is, if *index&* is one, *choice1* is returned. If two, *choice2* is returned, etc. If *index&* is not equal to one of the choice values, the default value is returned to the calling code.

CHOOSE expects choices of any

type. CHOOSE& expects choices optimized for an integral data type. CHOOSE$ expects choices of type. CHOOSE% is recognized as a valid synonym for CHOOSE&.

ELSE If no match is made with one of the choice values, the value zero (0) or an empty (zero-length) string is normally returned. However, if an ELSE clause is included as the last choice, its value is returned as the default value. For example:

```
ChoiceVar$ = CHOOSE$(7,"ONE", "TWO" ELSE "NUL")
```

In this case, the ELSE expression "NUL" is returned.

BIT If the BIT option is included, the selection is based upon the first bit set (lowest to highest) in *index&*. That is, the lowest bit (1) returns *choice1*, the next bit (2) returns *choice2*, the next bit (4) returns *choice3*, the next bit(8) returns *choice4*, etc. Evaluation of *index&* stops as soon as one set bit is found. This is particularly valuable when used with an ENUMERATION which also uses the BIT option, to describe a set of attributes for an item in your program.

BITS This is similar to the BIT option, but is only available with the CHOOSE$() version. *index&* is evaluated in the same general fashion, but the function may return multiple choices, as a concatenated string, if more than one bit is set. For example:

```
x$ = CHOOSE$(BITS 5, "Computer ", "Laptop ", "Desktop ")
```

Since the value 5 consists of 2 bits (the lowest and third-lowest) set, the first and third strings are concatenated and returned to the caller. In this case, "Computer Desktop " is the result.

Restrictions PowerBASIC only evaluates the selected choice(s) at run-time, not all of them. This ensures optimum execution speed, as well as the elimination of unanticipated side effects.

See also IIF, IIF&, IIF$, MAX, MAX&, MAX$, MIN, MIN&, MIN$, SWITCH, SWITCH&, SWITCH$, SELECT

Example

```
y& = 4
a$ = CHOOSE$(y&, "Bill", "Bob", "Bruce", "Barry")
```

Result

```
a$ = "Barry"
```

CHR$ function

CHR$/CHR$$ function IMPROVED

Purpose Converts one or more numeric character codes (ANSI or UNICODE), code ranges, and/or into a single string containing the corresponding character(s).

Syntax

```
s$  = CHR$(expression [,expression] [,...])
s$  = CHR$(string_expression [,...])
s$$ = CHR$$(x& TO y&, ...)
```

Remarks The CHR$() form of the function creates a string of ANSI (1-byte) characters. Arguments must be ANSI (1-byte) characters, or codes in the range of 0 to 255. The CHR$$() form of the function creates a string of WIDE (2-byte) characters. Arguments must be WIDE (2-byte) characters, or codes in the range of 0 to 65535. Generally speaking, PowerBASIC handles ANSI/WIDE conversions for you, automatically and transparently. However, there are just a few functions (CHR$, PEEK$, POKE$, STRING$, etc.) which are ambiguous, by definition, and require that the programmer choose the appropriate result type (ANSI or WIDE). Use CHR$ for ANSI results, or use CHR$$ for Unicode results. In the remainder of these remarks, CHR$ is used to represent both CHR$ and CHR$$.

CHR$ creates and returns a string. There are three forms of arguments available, and they may be intermixed in a single CHR$ function. The created string may contain no characters, one character, or multiple characters, depending upon the arguments you use. You may specify any number of arguments for this function.

If the argument is a numeric expression, it is translated into the character defined by that number. A character code of -1 is treated as a special case. If you use it as an argument, CHR$ returns an empty (zero length) string for that character. For example, CHR$(65, -1, 66) returns "AB".

CHR$(x& TO y&) returns a sequence of all characters from CHR$(x&) through CHR$(y&) inclusive. The characters may be ascending or descending in sequence. For example, CHR$(65 TO 70) returns the string "ABCDEF". CHR$(52 T0 50) returns the string "432", and CHR$(65 TO 65) returns the string "A".

If the argument is a string expression, the characters are simply copied into the newly created string at the specified position. The expanded CHR$ definition is intended to assist in the encoding of longer strings, to avoid the need for concatenation operations.

For example, the CHR$ function can be used to create COLLATE strings for the ARRAY SORT and ARRAY SCAN statements at run-time, and can be used to create string equates at compile time:

```
$colstring = CHR$(0 TO 131, 97, 133 TO 255)
```

The following lines are functionally equivalent, and return the same string result:

```
a$ = CHR$("Line1", 13, 10, "Line2")
a$ = "Line1" & CHR$(13) & CHR$(10) & "Line2"
a$ = "Line1" & $CRLF & "Line2"
```

CHR$ complements the ASC function, which returns the numeric character code of a nominated character in a string.

See also ARRAY SCAN, ARRAY SORT, ASC function, ASC statement, NUL$, SPACE$, STRING$

Example

```
H$ = CHR$("a$=", $DQ, 33, $DQ+$DQ, 35 TO 39, 40, $DQ)
```

Result

```
a$="!""#$%&'("
```

CHR$$ function

CHR$/CHR$$ function IMPROVED

Purpose Converts one or more numeric character codes (ANSI or UNICODE), code ranges, and/or into a single string containing the corresponding character(s).

Syntax

```
s$  = CHR$(expression [,expression] [,...])
s$  = CHR$(string_expression [,...])
s$$ = CHR$$(x& TO y&, ...)
```

Remarks The CHR$() form of the function creates a string of ANSI (1-byte) characters. Arguments must be ANSI (1-byte) characters, or codes in the range of 0 to 255. The CHR$$() form of the function creates a string of WIDE (2-byte) characters. Arguments must be WIDE (2-byte) characters, or codes in the range of 0 to 65535. Generally speaking, PowerBASIC handles ANSI/WIDE conversions for you, automatically and transparently. However, there are just a few functions (CHR$, PEEK$, POKE$, STRING$, etc.) which are ambiguous, by definition, and require that the programmer choose the appropriate result type (ANSI or WIDE). Use CHR$ for ANSI results, or use CHR$$ for Unicode results. In the remainder of these remarks, CHR$ is used to represent both CHR$ and CHR$$.

CHR$ creates and returns a string. There are three forms of arguments available, and they may be intermixed in a single CHR$ function. The created string may contain no characters, one character, or multiple characters, depending upon the arguments you use. You may specify any number of arguments for this function.

If the argument is a numeric expression, it is translated into the character defined by that number. A character code of -1 is treated as a special case. If you use it as an argument, CHR$ returns an empty (zero length) string for that character. For example, CHR$(65, -1, 66) returns "AB".

CHR$(x& TO y&) returns a sequence of all characters from CHR$(x&) through CHR$(y&) inclusive. The characters may be ascending or descending in sequence. For example, CHR$(65 TO 70) returns the string "ABCDEF". CHR$(52 T0 50) returns the string "432", and CHR$(65 TO 65) returns the string "A".

If the argument is a string expression, the characters are simply copied into the newly created string at the specified position. The expanded CHR$ definition is intended to assist in the encoding of longer strings, to avoid the need for concatenation operations.

For example, the CHR$ function can be used to create COLLATE strings for the ARRAY SORT and ARRAY SCAN statements at run-time, and can be used to create string equates at compile time:

```
$colstring = CHR$(0 TO 131, 97, 133 TO 255)
```

The following lines are functionally equivalent, and return the same string result:

```
a$ = CHR$("Line1", 13, 10, "Line2")
a$ = "Line1" & CHR$(13) & CHR$(10) & "Line2"
a$ = "Line1" & $CRLF & "Line2"
```

CHR$ complements the ASC function, which returns the numeric character code of a nominated character in a string.

See also ARRAY SCAN, ARRAY SORT, ASC function, ASC statement, NUL$, SPACE$, STRING$

Example

```
H$ = CHR$("a$=", $DQ, 33, $DQ+$DQ, 35 TO 39, 40, $DQ)
```

Result

```
a$="!""#$%&'("
```

CINT function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific variable type.

Syntax

```
bytevar?          = CBYT(numeric_expression)
currencyvar@      = CCUR(numeric_expression)
currencyextvar@@  = CCUX(numeric_expression)
doublevar#        = CDBL(numeric_expression)
doublewordvar???  = CDWD(numeric_expression)
extendedvar##     = CEXT(numeric_expression)
integervar%       = CINT(numeric_expression)
longintvar&       = CLNG(numeric_expression)
quadintvar&&      = CQUD(numeric_expression)
singlevar!        = CSNG(numeric_expression)
wordvar??         = CWRD(numeric_expression)
```

Remarks Each of these functions converts a

expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

Function	Result type
CBYT	Byte
CCUR	Currency
CCUX	Extended-currency
CDBL	Double-precision floating-point
CDWD	Double-word
CEXT	Extended-precision floating-point
CINT	Integer
CLNG	Long-integer
CQUD	Quad-integer
CSNG	Single-precision floating-point
CWRD	Word

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also CEIL, CVI and associated functions, FIX, INT, MKI$ and associated functions

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CLASS/END CLASS block

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLASS/END CLASS Block

Purpose Create the code and data for an object.

Syntax

```
CLASS name  [$GUID] [COMMON] [OPTIMIZE] [AS COM | AS EVENT]
  INSTANCE ClassName AS STRING
  Class Method code blocks...
    INTERFACE name $GUID  [AS EVENT]
    INHERIT IUNKNOWN
    Method and Property code blocks...
  END INTERFACE
  EVENT SOURCE interface-name
END CLASS
```

Remarks CLASS / END CLASS statements enclose the Interface implementation(s) and Instance variable declarations of a Class. METHOD and PROPERTY blocks contain the code to be executed on an object. INSTANCE statements define the variables which are unique to each instance of an object of this class.

The name and optional $GUID are supplied by the programmer to identify the class. By default, a class is considered private, so that the methods are accessible only from within the EXE or DLL where it is defined. The AS COM attribute makes the class available externally, to virtually any process which is COM-aware.

	With a private class, the $GUID may be freely omitted, as PowerBASIC can readily identify the class by name. With a published COM class, you should insert a specific GUID of your choice. If omitted, a random GUID will be created by the compiler, but it will change every time you compile the program. This will be difficult to synchronize with other programs which wish to identify and access your object.
COMMON	The optional COMMON descriptor may be included to specify that this class may be freely referenced by and between linked unit modules (Host/Main or SLL). This has the added side effect of ensuring that the class will not be removed by #OPTIMIZE CODE ON.
AS EVENT	If a class is an Event Source (it generates events rather than handling events), one or more EVENT SOURCE statements are included to name the event interfaces. The event interfaces must be declared and implemented separately. An event is generated by executing a RAISEEVENT statement or an OBJECT RAISEEVENT statement in the class. If a class is an Event Handler (it contains code to handle an event generated by an Event Source), the AS EVENT attribute must appear on the CLASS statement and each INTERFACE statement. An Event Handler is also known as an "Event Sink".
OPTIMIZE	With code optimization enabled (#OPTIMIZE CODE ON), PowerBASIC removes code for subs and functions which are not called. Where possible, this technique is even applied to individual methods and property methods within classes.

Of course, if an object variable is transferred out of the current module (to another EXE/SLL/DLL), there is no way to determine (at compile-time) which methods may be called on it at run-time, so none can be safely removed. COM, COMMON, and EVENT classes allow variables to be transferred out of the module, so they block removal of any code in the class.

The OPTIMIZE descriptor allows you to control this code optimization to a high degree. If you specify the OPTIMIZE option, you are stating that no object variables on this class will be transferred out of the module. Therefore, PowerBASIC is free to remove any code in the class which is not referenced. This is a powerful tool which can allow you to substantially reduce the size of your program.

The OPTIMIZE rules can be summarized:

1. If a class is marked COM, COMMON, or EVENT, no methods or property methods are ever removed from it.
2. If a class is marked OPTIMIZE, you state that no object variables from this class will be transferred out of the module. Methods which are not referenced are removed from the final code. OPTIMIZE may not be combined with COM, COMMON, or EVENT.
3. If no classes in the module are marked COM, COMMON, or EVENT, all classes are considered to be marked OPTIMIZE. All methods in all classes which are not referenced are extracted from the final code.

See also #OPTIMIZE, EVENT SOURCE, EVENTS, INSTANCE, INTERFACE (Direct), INTERFACE (IDBind), Just what is COM?, METHOD, PROPERTY, RAISEEVENT, What is an object, anyway?

CLIP$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIP$ function New!

Purpose Delete characters from a

.

Syntax

```
s$ = CLIP$(LEFT  StringExpression, Count&)
s$ = CLIP$(RIGHT StringExpression, Count&)
s$ = CLIP$(MID   StringExpression, Start&, Count&)
```

Remarks

LEFT — Returns the contents of *StringExpression* with *Count&* characters removed from the left side.

RIGHT — Returns the contents of *StringExpression* with *Count&* characters removed from the right side.

MID — Returns the contents of *StringExpression* with *Count&* characters removed starting at position *Start&*. The first character is considered position 1, the second position 2...

If *Count&* is negative, or *Start&* is less than one, the return value is undefined.

Restrictions If *Count&* is less than one, the entire string is returned. If *Start&* is less than one, the results are undefined.

See also EXTRACT$, LTRIM$, MID$, REMOVE$, REPLACE, RTRIM$, SHRINK$, STRINSERT$, STRDELETE$, TRIM$, UNWRAP$

CLIPBOARD GET BITMAP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIPBOARD statement IMPROVED

Purpose Copy data to/from the Windows ClipBoard.

Syntax

```
CLIPBOARD GET BITMAP  TO ClipVar [, ClipResult]
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
CLIPBOARD GET TEXT    TO StrgVar [, ClipResult]
CLIPBOARD GET UNICODE TO StrgVar [, ClipResult]
CLIPBOARD RESET [, ClipResult]
CLIPBOARD SET BITMAP  ClipHndl [, ClipResult]
CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]
CLIPBOARD SET TEXT    StrgExpr [, ClipResult]
CLIPBOARD SET UNICODE StrgExpr [, ClipResult]
```

ClipHndl A Long Integer or Dword value which specifies the 32-bit handle of a

passed to the clipboard.

ClipResult A Long Integer or Dword variable which receives a true result (-1) if the operation was successful, or a false result (0) if it failed.

ClipVar A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP.

StrgExpr	A string expression which specifies data to be passed to the clipboard.
StrgVar	A variable which receives string data from the clipboard.

Remarks

The Windows ClipBoard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the ClipBoard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between TEXT, OEMTEXT, and UNICODE. When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

`CLIPBOARD GET BITMAP TO` ***`ClipVar`*** **`[,`** ***`ClipResult`*** **`]`**

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the ClipBoard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

`CLIPBOARD GET OEMTEXT TO` ***`AnsiStrgVar`*** **`[,`** ***`ClipResult`*** **`]`**

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

`CLIPBOARD GET TEXT TO` ***`StrgVar`*** **`[,`** ***`ClipResult`*** **`]`**

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

`CLIPBOARD RESET [,` ***`ClipResult`*** **`]`**

The contents of the CLIPBOARD are deleted.

`CLIPBOARD SET BITMAP` ***`ClipHndl`*** **`[,`** ***`ClipResult`*** **`]`**

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a GRAPHIC CONTROL, GRAPHIC WINDOW, or GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use CONTROL HANDLE to obtain the handle to the GRAPHIC CONTROL.

`CLIPBOARD SET OEMTEXT` ***`StrgExpr`*** **`[,`** ***`ClipResult`*** **`]`**

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

`CLIPBOARD SET TEXT` ***`StrgExpr`*** **`[,`** ***`ClipResult`*** **`]`**

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms of CLIPBOARD will not be supported in future versions of PowerBASIC.

`CLIPBOARD GET UNICODE TO AnsiStrgVar [, ClipResult]`

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

`CLIPBOARD SET UNICODE AnsiStrgExpr [, ClipResult]`

A UniCode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLIPBOARD GET OEMTEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIPBOARD statement IMPROVED

Purpose Copy data to/from the Windows ClipBoard.

Syntax

```
CLIPBOARD GET BITMAP  TO ClipVar [, ClipResult]
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
CLIPBOARD GET TEXT    TO StrgVar [, ClipResult]
CLIPBOARD GET UNICODE TO StrgVar [, ClipResult]
CLIPBOARD RESET [, ClipResult]
CLIPBOARD SET BITMAP  ClipHndl [, ClipResult]
CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]
CLIPBOARD SET TEXT    StrgExpr [, ClipResult]
CLIPBOARD SET UNICODE StrgExpr [, ClipResult]
```

ClipHndl A Long Integer or Dword value which specifies the 32-bit handle of a

passed to the clipboard.

ClipResult A Long Integer or Dword variable which receives a true result (-1) if the operation was successful, or a false result (0) if it failed.

ClipVar A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP.

StrgExpr A string expression which specifies data to be passed to the clipboard.

StrgVar A

variable which receives string data from the clipboard.

Remarks The Windows ClipBoard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the ClipBoard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between TEXT, OEMTEXT, and UNICODE. When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

CLIPBOARD GET BITMAP TO *ClipVar* [, *ClipResult*]

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the ClipBoard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

CLIPBOARD GET OEMTEXT TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD GET TEXT TO *StrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD RESET [, *ClipResult*]

The contents of the CLIPBOARD are deleted.

CLIPBOARD SET BITMAP *ClipHndl* [, *ClipResult*]

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a GRAPHIC CONTROL, GRAPHIC WINDOW, or GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use CONTROL HANDLE to obtain the handle to the GRAPHIC CONTROL.

CLIPBOARD SET OEMTEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

CLIPBOARD SET TEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms

of CLIPBOARD will not be supported in future versions of PowerBASIC.

`CLIPBOARD GET UNICODE TO AnsiStrgVar [, ClipResult]`

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

`CLIPBOARD SET UNICODE` ***`AnsiStrgExpr`*** **`[, ClipResult]`**

A UniCode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLIPBOARD GET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIPBOARD statement IMPROVED

Purpose Copy data to/from the Windows ClipBoard.

Syntax

```
CLIPBOARD GET BITMAP  TO ClipVar [, ClipResult]
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
CLIPBOARD GET TEXT    TO StrgVar [, ClipResult]
CLIPBOARD GET UNICODE TO StrgVar [, ClipResult]
CLIPBOARD RESET [, ClipResult]
CLIPBOARD SET BITMAP  ClipHndl [, ClipResult]
CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]
CLIPBOARD SET TEXT    StrgExpr [, ClipResult]
CLIPBOARD SET UNICODE StrgExpr [, ClipResult]
```

ClipHndl A Long Integer or Dword value which specifies the 32-bit handle of a

passed to the clipboard.

ClipResult A Long Integer or Dword variable which receives a true result (-1) if the operation was successful, or a false result (0) if it failed.

ClipVar A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP.

StrgExpr A string expression which specifies data to be passed to the clipboard.

StrgVar A

variable which receives string data from the clipboard.

Remarks The Windows ClipBoard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the ClipBoard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between TEXT, OEMTEXT, and UNICODE. When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

CLIPBOARD GET BITMAP TO *ClipVar* [, *ClipResult*]

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the ClipBoard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

CLIPBOARD GET OEMTEXT TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD GET TEXT TO *StrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD RESET [, *ClipResult*]

The contents of the CLIPBOARD are deleted.

CLIPBOARD SET BITMAP *ClipHndl* [, *ClipResult*]

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a GRAPHIC CONTROL, GRAPHIC WINDOW, or GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use CONTROL HANDLE to obtain the handle to the GRAPHIC CONTROL.

CLIPBOARD SET OEMTEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

CLIPBOARD SET TEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms of CLIPBOARD will not be supported in future versions of PowerBASIC.

CLIPBOARD GET UNICODE TO AnsiStrgVar [, ClipResult]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte

ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD SET UNICODE *AnsiStrgExpr* [, ClipResult]

A UniCode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLIPBOARD GET UNICODE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIPBOARD statement IMPROVED

Purpose Copy data to/from the Windows ClipBoard.

Syntax

```
CLIPBOARD GET BITMAP  TO ClipVar [, ClipResult]
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
CLIPBOARD GET TEXT    TO StrgVar [, ClipResult]
CLIPBOARD GET UNICODE TO StrgVar [, ClipResult]
CLIPBOARD RESET [, ClipResult]
CLIPBOARD SET BITMAP  ClipHndl [, ClipResult]
CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]
CLIPBOARD SET TEXT    StrgExpr [, ClipResult]
CLIPBOARD SET UNICODE StrgExpr [, ClipResult]
```

ClipHndl A Long Integer or Dword value which specifies the 32-bit handle of a

passed to the clipboard.

ClipResult A Long Integer or Dword variable which receives a true result (-1) if the operation was successful, or a false result (0) if it failed.

ClipVar A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP.

StrgExpr A string expression which specifies data to be passed to the clipboard.

StrgVar A

variable which receives string data from the clipboard.

Remarks The Windows ClipBoard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the ClipBoard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between TEXT, OEMTEXT, and

UNICODE. When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

`CLIPBOARD GET BITMAP TO` ***`ClipVar`*** **`[,`** ***`ClipResult`*** **`]`**

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the ClipBoard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

`CLIPBOARD GET OEMTEXT TO` ***`AnsiStrgVar`*** **`[,`** ***`ClipResult`*** **`]`**

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

`CLIPBOARD GET TEXT TO` ***`StrgVar`*** **`[,`** ***`ClipResult`*** **`]`**

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

`CLIPBOARD RESET [,` ***`ClipResult`*** **`]`**

The contents of the CLIPBOARD are deleted.

`CLIPBOARD SET BITMAP` ***`ClipHndl`*** **`[,`** ***`ClipResult`*** **`]`**

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a GRAPHIC CONTROL, GRAPHIC WINDOW, or GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use CONTROL HANDLE to obtain the handle to the GRAPHIC CONTROL.

`CLIPBOARD SET OEMTEXT` ***`StrgExpr`*** **`[,`** ***`ClipResult`*** **`]`**

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

`CLIPBOARD SET TEXT` ***`StrgExpr`*** **`[,`** ***`ClipResult`*** **`]`**

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms of CLIPBOARD will not be supported in future versions of PowerBASIC.

`CLIPBOARD GET UNICODE TO AnsiStrgVar [, ClipResult]`

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

`CLIPBOARD SET UNICODE` ***`AnsiStrgExpr`*** **`[, ClipResult]`**

A UniCode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLIPBOARD RESET statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIPBOARD statement IMPROVED

Purpose Copy data to/from the Windows ClipBoard.

Syntax

```
CLIPBOARD GET BITMAP  TO ClipVar [, ClipResult]
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
CLIPBOARD GET TEXT    TO StrgVar [, ClipResult]
CLIPBOARD GET UNICODE TO StrgVar [, ClipResult]
CLIPBOARD RESET [, ClipResult]
CLIPBOARD SET BITMAP  ClipHndl [, ClipResult]
CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]
CLIPBOARD SET TEXT    StrgExpr [, ClipResult]
CLIPBOARD SET UNICODE StrgExpr [, ClipResult]
```

ClipHndl A Long Integer or Dword value which specifies the 32-bit handle of a

passed to the clipboard.

ClipResult A Long Integer or Dword variable which receives a true result (-1) if the operation was successful, or a false result (0) if it failed.

ClipVar A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP.

StrgExpr A string expression which specifies data to be passed to the clipboard.

StrgVar A

variable which receives string data from the clipboard.

Remarks The Windows ClipBoard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the ClipBoard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between TEXT, OEMTEXT, and UNICODE. When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

CLIPBOARD GET BITMAP TO *ClipVar* [, *ClipResult*]

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the ClipBoard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

CLIPBOARD GET OEMTEXT TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD GET TEXT TO *StrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD RESET [, *ClipResult*]

The contents of the CLIPBOARD are deleted.

CLIPBOARD SET BITMAP *ClipHndl* [, *ClipResult*]

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a GRAPHIC CONTROL, GRAPHIC WINDOW, or GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use CONTROL HANDLE to obtain the handle to the GRAPHIC CONTROL.

CLIPBOARD SET OEMTEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

CLIPBOARD SET TEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms of CLIPBOARD will not be supported in future versions of PowerBASIC.

CLIPBOARD GET UNICODE TO AnsiStrgVar [, ClipResult]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD SET UNICODE *AnsiStrgExpr* [, ClipResult]

A UniCode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLIPBOARD SET BITMAP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIPBOARD statement IMPROVED

Purpose Copy data to/from the Windows ClipBoard.

Syntax

```
CLIPBOARD GET BITMAP  TO ClipVar [, ClipResult]
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
CLIPBOARD GET TEXT    TO StrgVar [, ClipResult]
CLIPBOARD GET UNICODE TO StrgVar [, ClipResult]
CLIPBOARD RESET [, ClipResult]
CLIPBOARD SET BITMAP  ClipHndl [, ClipResult]
CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]
CLIPBOARD SET TEXT    StrgExpr [, ClipResult]
CLIPBOARD SET UNICODE StrgExpr [, ClipResult]
```

ClipHndl A Long Integer or Dword value which specifies the 32-bit handle of a

passed to the clipboard.

ClipResult A Long Integer or Dword variable which receives a true result (-1) if the operation was successful, or a false result (0) if it failed.

ClipVar A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP.

StrgExpr A string expression which specifies data to be passed to the clipboard.

StrgVar A

variable which receives string data from the clipboard.

Remarks The Windows ClipBoard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the ClipBoard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between TEXT, OEMTEXT, and UNICODE. When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

```
CLIPBOARD GET BITMAP TO ClipVar [, ClipResult]
```

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the ClipBoard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

CLIPBOARD GET OEMTEXT TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD GET TEXT TO *StrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD RESET [, *ClipResult*]

The contents of the CLIPBOARD are deleted.

CLIPBOARD SET BITMAP *ClipHndl* [, *ClipResult*]

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a GRAPHIC CONTROL, GRAPHIC WINDOW, or GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use CONTROL HANDLE to obtain the handle to the GRAPHIC CONTROL.

CLIPBOARD SET OEMTEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

CLIPBOARD SET TEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms of CLIPBOARD will not be supported in future versions of PowerBASIC.

CLIPBOARD GET UNICODE TO AnsiStrgVar [, ClipResult]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD SET UNICODE *AnsiStrgExpr* [, ClipResult]

A UniCode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLIPBOARD SET OEMTEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIPBOARD statement IMPROVED

Purpose Copy data to/from the Windows ClipBoard.

Syntax

```
CLIPBOARD GET BITMAP  TO ClipVar [, ClipResult]
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
CLIPBOARD GET TEXT    TO StrgVar [, ClipResult]
CLIPBOARD GET UNICODE TO StrgVar [, ClipResult]
CLIPBOARD RESET [, ClipResult]
CLIPBOARD SET BITMAP  ClipHndl [, ClipResult]
CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]
CLIPBOARD SET TEXT    StrgExpr [, ClipResult]
CLIPBOARD SET UNICODE StrgExpr [, ClipResult]
```

ClipHndl A Long Integer or Dword value which specifies the 32-bit handle of a

passed to the clipboard.

ClipResult A Long Integer or Dword variable which receives a true result (-1) if the operation was successful, or a false result (0) if it failed.

ClipVar A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP.

StrgExpr A string expression which specifies data to be passed to the clipboard.

StrgVar A

variable which receives string data from the clipboard.

Remarks The Windows ClipBoard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the ClipBoard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between TEXT, OEMTEXT, and UNICODE. When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

CLIPBOARD GET BITMAP TO *ClipVar* [, *ClipResult*]

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the ClipBoard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

CLIPBOARD GET OEMTEXT TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

`CLIPBOARD GET TEXT TO` ***`StrgVar`*** **`[,`** ***`ClipResult`*** **`]`**

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

`CLIPBOARD RESET [,` ***`ClipResult`*** **`]`**

The contents of the CLIPBOARD are deleted.

`CLIPBOARD SET BITMAP` ***`ClipHndl`*** **`[,`** ***`ClipResult`*** **`]`**

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a GRAPHIC CONTROL, GRAPHIC WINDOW, or GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use CONTROL HANDLE to obtain the handle to the GRAPHIC CONTROL.

`CLIPBOARD SET OEMTEXT` ***`StrgExpr`*** **`[,`** ***`ClipResult`*** **`]`**

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

`CLIPBOARD SET TEXT` ***`StrgExpr`*** **`[,`** ***`ClipResult`*** **`]`**

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms of CLIPBOARD will not be supported in future versions of PowerBASIC.

`CLIPBOARD GET UNICODE TO AnsiStrgVar [, ClipResult]`

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

`CLIPBOARD SET UNICODE` ***`AnsiStrgExpr`*** **`[, ClipResult]`**

A UniCode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLIPBOARD SET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIPBOARD statement IMPROVED

Purpose Copy data to/from the Windows ClipBoard.

Syntax

```
CLIPBOARD GET BITMAP  TO ClipVar [, ClipResult]
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
CLIPBOARD GET TEXT    TO StrgVar [, ClipResult]
```

CLIPBOARD GET UNICODE TO *StrgVar* [, *ClipResult*]
CLIPBOARD RESET [, *ClipResult*]
CLIPBOARD SET BITMAP *ClipHndl* [, *ClipResult*]
CLIPBOARD SET OEMTEXT *StrgExpr* [, *ClipResult*]
CLIPBOARD SET TEXT *StrgExpr* [, *ClipResult*]
CLIPBOARD SET UNICODE *StrgExpr* [, *ClipResult*]

ClipHndl A Long Integer or Dword value which specifies the 32-bit handle of a

passed to the clipboard.

ClipResult A Long Integer or Dword variable which receives a true result (-1) if the operation was successful, or a false result (0) if it failed.

ClipVar A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP.

StrgExpr A string expression which specifies data to be passed to the clipboard.

StrgVar A

variable which receives string data from the clipboard.

Remarks The Windows ClipBoard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the ClipBoard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between TEXT, OEMTEXT, and UNICODE. When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

CLIPBOARD GET BITMAP TO *ClipVar* [, *ClipResult*]

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the ClipBoard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

CLIPBOARD GET OEMTEXT TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD GET TEXT TO *StrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD RESET [, *ClipResult*]

The contents of the CLIPBOARD are deleted.

CLIPBOARD SET BITMAP *ClipHndl* [, *ClipResult*]

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a GRAPHIC CONTROL, GRAPHIC WINDOW, or GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use CONTROL HANDLE to obtain the handle to the GRAPHIC CONTROL.

CLIPBOARD SET OEMTEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

CLIPBOARD SET TEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

> **The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms of CLIPBOARD will not be supported in future versions of PowerBASIC.**

CLIPBOARD GET UNICODE TO AnsiStrgVar [, ClipResult]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD SET UNICODE *AnsiStrgExpr* [, ClipResult]

A UniCode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLIPBOARD SET UNICODE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CLIPBOARD statement IMPROVED

Purpose Copy data to/from the Windows ClipBoard.

Syntax

```
CLIPBOARD GET BITMAP  TO ClipVar [, ClipResult]
CLIPBOARD GET OEMTEXT TO AnsiStrgVar [, ClipResult]
CLIPBOARD GET TEXT    TO StrgVar [, ClipResult]
CLIPBOARD GET UNICODE TO StrgVar [, ClipResult]
CLIPBOARD RESET [, ClipResult]
CLIPBOARD SET BITMAP  ClipHndl [, ClipResult]
CLIPBOARD SET OEMTEXT StrgExpr [, ClipResult]
CLIPBOARD SET TEXT    StrgExpr [, ClipResult]
CLIPBOARD SET UNICODE StrgExpr [, ClipResult]
```

ClipHndl	A Long Integer or Dword value which specifies the 32-bit handle of a passed to the clipboard.
ClipResult	A Long Integer or Dword variable which receives a true result (-1) if the operation was successful, or a false result (0) if it failed.
ClipVar	A Long Integer or Dword variable which receives a 32-bit handle of a newly created GRAPHIC BITMAP.
StrgExpr	A string expression which specifies data to be passed to the clipboard.
StrgVar	A variable which receives string data from the clipboard.

Remarks

The Windows ClipBoard provides support for the transfer of various types of data between applications, or even different parts of a single application. The concept is simple -- save some data on the ClipBoard and retrieve it later. In most cases, it's just used to transfer plain text, so the PowerBASIC CLIPBOARD statement concentrates on the common data formats. With text transfer, you can just read or write a string. With bitmaps, a GRAPHIC BITMAP is used for this purpose.

When you retrieve data using CLIPBOARD, the original copy always remains in the CLIPBOARD, so the operation can be repeated any number of times. When you store data on the CLIPBOARD, your original copy remains unchanged. The data is copied, with no change of ownership.

The clipboard can hold multiple data items, but only one of each data format at a time. Generally speaking, multiple data items are only used to store a single piece of data in multiple formats to ensure it can be retrieved successfully later. However, you should note that Windows automatically converts string data between TEXT, OEMTEXT, and UNICODE. When you store data in one of those forms, it's not necessary to repeat it with the others.

You must execute a CLIPBOARD RESET to empty the clipboard before storing new data items.

Each form of the CLIPBOARD statement offers an optional ClipResult variable. If the requested operation is deemed successful by Windows, this variable is assigned the value TRUE (-1). If it fails, the value FALSE (0) is assigned instead. You should note that the success test is not a comprehensive one. It tests only the operation, not the validity of the data.

There are nine general forms of the CLIPBOARD statement:

CLIPBOARD GET BITMAP TO *ClipVar* [, *ClipResult*]

A new GRAPHIC BITMAP is automatically created. A Bitmap is copied from the ClipBoard and stored in this newly created GRAPHIC BITMAP. The handle of the new GRAPHIC BITMAP is assigned to the *ClipVar*, a DWord or Long Integer variable. If the operation is not successful, the value zero (0) is assigned instead.

CLIPBOARD GET OEMTEXT TO *AnsiStrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. If necessary, it is converted to OEM Text format, the format used by the Windows Console. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD GET TEXT TO *StrgVar* [, *ClipResult*]

A text string is retrieved from the CLIPBOARD, and assigned to the string variable specified by *StrgVar*, which may be ANSI or WIDE format. If necessary, the text is automatically converted to match the format of the target variable. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD RESET [, *ClipResult*]

The contents of the CLIPBOARD are deleted.

CLIPBOARD SET BITMAP *ClipHndl* [, *ClipResult*]

A GRAPHIC BITMAP, specified by *ClipHndl*, is stored on the CLIPBOARD. The GRAPHIC BITMAP may be a GRAPHIC CONTROL, GRAPHIC WINDOW, or

GRAPHIC BITMAP. When passing a GRAPHIC CONTROL to the Clipboard, use CONTROL HANDLE to obtain the handle to the GRAPHIC CONTROL.

CLIPBOARD SET OEMTEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data is assumed to use characters in the OEM character set.

CLIPBOARD SET TEXT *StrgExpr* [, *ClipResult*]

A text string, specified by *StrExpr*, is stored on the CLIPBOARD. The string data may be in either ANSI or WIDE format.

The following two functions, with UNICODE options, were specifically designed for older versions of PowerBASIC which did not support wide Unicode strings. They may only be used with legacy programs which must store wide characters in an ANSI string variable. They should be converted to the TEXT option with wide string variables as soon as possible, as these forms of CLIPBOARD will not be supported in future versions of PowerBASIC.

CLIPBOARD GET UNICODE TO AnsiStrgVar [, ClipResult]

A text string is retrieved from the CLIPBOARD, and assigned to the ANSI string variable specified by *AnsiStrgVar*. Even though the string variable uses 1-byte ANSI characters, the data is represented as 2-byte wide Unicode characters. If no text can be retrieved, a nul (zero-length) string is assigned instead.

CLIPBOARD SET UNICODE *AnsiStrgExpr* [, ClipResult]

A UniCode text string, stored in ANSI variables and constants, is stored on the CLIPBOARD.

CLNG function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific variable type.

Syntax

```
bytevar?            = CBYT(numeric_expression)
currencyvar@        = CCUR(numeric_expression)
currencyextvar@@    = CCUX(numeric_expression)
doublevar#          = CDBL(numeric_expression)
doublewordvar???    = CDWD(numeric_expression)
extendedvar##       = CEXT(numeric_expression)
integervar%         = CINT(numeric_expression)
longintvar&         = CLNG(numeric_expression)
quadintvar&&        = CQUD(numeric_expression)
singlevar!          = CSNG(numeric_expression)
wordvar??           = CWRD(numeric_expression)
```

Remarks Each of these functions converts a

expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

Function	Result type
CBYT	Byte
CCUR	Currency
CCUX	Extended-currency
CDBL	Double-precision floating-point
CDWD	Double-word

CEXT	Extended-precision floating-point
CINT	Integer
CLNG	Long-integer
CQUD	Quad-integer
CSNG	Single-precision floating-point
CWRD	Word

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also CEIL, CVI and associated functions, FIX, INT, MKI$ and associated functions

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CLOSE statement

CLOSE statement

Purpose Conclude I/O (input/output) to / from a file or device.

Syntax `CLOSE [[#] filenum& [, [#] filenum&] ...]`

Remarks CLOSE ends the relationship between a PowerBASIC *file number* and the disk file or device that was associated with it by an OPEN statement. Any pending I/O operations on the file/device are concluded, buffers are flushed and released, and the disk directory information (if any) for that file is updated.

If no file number is specified, CLOSE closes all open files.

If the file was opened using OPEN HANDLE, the CLOSE statement is still needed, although it does not tell the operating system to close the file. In this special case, the file was already open when OPEN HANDLE provided access to it, and will remain open after CLOSE disassociates the file from PowerBASIC.

CLOSE works with all types of files and devices (disk files, devices,

, , , etc).

The number symbols (#) are optional but recommended for clarity.

See also COMM CLOSE, FILEATTR, FLUSH, OPEN, TCP CLOSE, UDP CLOSE

CLSID$ function

CLSID$ function

Purpose Return a 16-byte GUID string (128-bit GUID format string) containing a CLSID associated with a unique ProgramID string of a COM object or component.

Syntax `a$ = CLSID$(ProgramID$)`

Remarks A CLSID string is a 128-bit (16-byte) binary string representing the GUID or UUID of a COM object/component. A CLSID string is not in a human-readable format.

You can convert textual ID name of a COM object/component into a CLSID string with the CLSID$ function. CLSID examines the system registry in order to determine the CLSID string associated with the *ProgramID$* string.

The *ProgramID$* parameter is not case-sensitive, so "MSAGENT.CONTROL.2", "MSAgent.Control.2" and "msagent.control.2" all refer to the same COM object/component. If the *ProgramID$* cannot be found, or if any error occurs during the lookup and conversion process, CLSID$ will not set the ERR system variable, but will return an empty string.

To convert the binary CLSID string into human-readable GUID/UUID format, use the GUIDTXT$ function. CLSID$ is the complement to the PROGID$ function.

PowerBASIC programmers rarely, if ever, need to deal with CLSID strings in order to utilize a COM object or component.

a$ The return string may be assigned to a dynamic string, fixed-length or nul-terminated string (at least 16 bytes long), or (typically) a GUID variable. See DIM for more information.

See also DIM, GUID$, GUIDTXT$, INTERFACE (Direct), INTERFACE (IDBind), ISNOTHING, ISOBJECT, LET (with Objects), OBJECT, OBJACTIVE, OBJPTR, OBJRESULT, PROGID$, What does a Class look like?, What is an object, anyway?

Example

```
MSWordClassID$ = CLSID$("word.application.8")
IF LEN(MSWordClassID$) = 16 THEN
  ' Success getting the CLSID$ of MSWord
  a$ = PROGID$(MSWordClassID$)
  'a$ holds "Word.Application.8"
  b$ = GUIDTXT$(MSWordClassID$)
  'b$ holds "{000209FF-0000-0000-C000-000000000046}"
END IF
```

CODEPTR function

CODEPTR function IMPROVED

Purpose Obtain a 32-bit address of a label, Sub, Function, or Fastproc.

Syntax

```
AddrVar = CODEPTR(Label)
AddrVar = CODEPTR(ProcName)
```

Remarks CODEPTR retrieves the address of a Label, Sub, Function, or FastProc. The first form may be used to get the address of a label located within the same procedure. The second form is used to obtain the address of a Sub, Function, or FastProc.

CODEPTR is particularly useful when it is necessary to pass the address of a SUB or FUNCTION to PowerBASIC or Windows to specify a Callback Function.

Restrictions CODEPTR cannot obtain the address of a METHOD or PROPERTY as direct access to them would constitute an illegal operation.

See also STRPTR, VARPTR, CALL DWORD

Example

```
#COMPILE EXE
SUB MySub()
END SUB

FUNCTION PBMAIN
  LOCAL MySubPtr AS LONG, X AS STRING
  MySubPtr = CODEPTR(MySub) ' Address of MySub()
  X = "MySub() is located at address " + FORMAT$(MySubPtr))
END FUNCTION
```

COMBOBOX ADD statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a COMBOBOX control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the combobox.

id& The control identifier assigned with CONTROL ADD COMBOBOX.

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the %CBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number *(item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by item&, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg*, *id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id&* [,*item&*] TO *txtv$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the CONTROL GET TEXT statement instead.

COMBOBOX GET USER *hDlg, id&, item&* TO *datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX INSERT *hDlg, id&, item&, StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT hDlg, id&, item&, StrExpr

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD COMBOBOX, CONTROL GET TEXT

COMBOBOX DELETE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a COMBOBOX control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the combobox.

id& The control identifier assigned with CONTROL ADD COMBOBOX.

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks

In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the %CBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by item&, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg*, *id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc.

If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the CONTROL GET TEXT statement instead.

COMBOBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg*, *id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg*, *id&*, *item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT hDlg, id&, item&, StrExpr

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD COMBOBOX, CONTROL GET TEXT

COMBOBOX FIND statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a COMBOBOX control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the combobox.

id& The control identifier assigned with CONTROL ADD COMBOBOX.

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in

CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the %CBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number *(item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by item&, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg*, *id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg, id&* [,*item&*] TO *txtv$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the CONTROL GET TEXT statement instead.

COMBOBOX GET USER *hDlg, id&, item&* TO *datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX INSERT *hDlg, id&, item&, StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT hDlg, id&, item&, StrExpr

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD COMBOBOX, CONTROL GET TEXT

COMBOBOX FIND EXACT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a COMBOBOX control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the combobox.

id& The control identifier assigned with CONTROL ADD COMBOBOX.

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the %CBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number *(item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by item&, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg*, *id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the CONTROL GET TEXT statement instead.

COMBOBOX GET USER *hDlg, id&, item&* TO *datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX INSERT *hDlg, id&, item&, StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT hDlg, id&, item&, StrExpr

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of

Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD COMBOBOX, CONTROL GET TEXT

COMBOBOX GET COUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a COMBOBOX control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the combobox.

id& The control identifier assigned with CONTROL ADD COMBOBOX.

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the

COMBOBOX has the %CBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number *(item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by item&, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg*, *id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the CONTROL GET TEXT statement instead.

COMBOBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg*, *id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg*, *id&*, *item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT hDlg, id&, item&, StrExpr

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg*, *id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD COMBOBOX, CONTROL GET TEXT

COMBOBOX GET SELCOUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a COMBOBOX control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the combobox.

id& The control identifier assigned with CONTROL ADD COMBOBOX.

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the %CBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number *(item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by item&, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg*, *id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the CONTROL GET TEXT statement instead.

COMBOBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg*, *id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg*, *id&*, *item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT hDlg, id&, item&, StrExpr

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg*, *id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD COMBOBOX, CONTROL GET TEXT

COMBOBOX GET SELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a COMBOBOX control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the combobox.

id& The control identifier assigned with CONTROL ADD COMBOBOX.

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the %CBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number *(item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by item&, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg*, *id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the CONTROL GET TEXT statement instead.

COMBOBOX GET USER *hDlg, id&, item&* TO *datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX INSERT *hDlg, id&, item&, StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT hDlg, id&, item&, StrExpr

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD COMBOBOX, CONTROL GET TEXT

COMBOBOX GET STATE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a COMBOBOX control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the combobox.

id& The control identifier assigned with CONTROL ADD COMBOBOX.

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the %CBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number *(item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by item&, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg*, *id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the CONTROL GET TEXT statement instead.

COMBOBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg*, *id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg*, *id&*, *item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT hDlg, id&, item&, StrExpr

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg*, *id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD COMBOBOX, CONTROL GET TEXT

COMBOBOX GET TEXT statement

Keyword Template

COMBOBOX statement IMPROVED

Purpose Manipulate a COMBOBOX control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the combobox.

id& The control identifier assigned with CONTROL ADD COMBOBOX.

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the %CBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number *(item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by item&, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg*, *id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the CONTROL GET TEXT statement instead.

COMBOBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg*, *id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg*, *id&*, *item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT hDlg, id&, item&, StrExpr

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg*, *id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD COMBOBOX, CONTROL GET TEXT

COMBOBOX GET USER statement

Keyword Template

Purpose

Syntax

Remarks
See also
Example

COMBOBOX statement IMPROVED

Purpose Manipulate a COMBOBOX control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the combobox.

id& The control identifier assigned with CONTROL ADD COMBOBOX.

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the %CBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number *(item&)* is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by item&, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg*, *id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the CONTROL GET TEXT statement instead.

COMBOBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg*, *id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg*, *id&*, *item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT hDlg, id&, item&, StrExpr

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg*, *id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD COMBOBOX, CONTROL GET TEXT

COMBOBOX INSERT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a COMBOBOX control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the combobox.

id& The control identifier assigned with CONTROL ADD COMBOBOX.

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the %CBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number *(item&)* is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by item&, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg*, *id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the CONTROL GET TEXT statement instead.

COMBOBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg*, *id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg*, *id&*, *item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT hDlg, id&, item&, StrExpr

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg*, *id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD COMBOBOX, CONTROL GET TEXT

COMBOBOX RESET statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a COMBOBOX control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the combobox.

id& The control identifier assigned with CONTROL ADD COMBOBOX.

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A
variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the %CBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number *(item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by item&, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg*, *id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the CONTROL GET TEXT statement instead.

COMBOBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT hDlg, id&, item&, StrExpr

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD COMBOBOX, CONTROL GET TEXT

COMBOBOX SELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a COMBOBOX control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg — Handle of the dialog that owns the combobox.

id& — The control identifier assigned with CONTROL ADD COMBOBOX.

item& — Position of data in the COMBOBOX. First string=1, second=2...

NumExpr — A numeric expression passed as a parameter.

StrExpr — A string expression passed as a parameter.

txtv$ — A

variable to which result text is assigned.

datav& — A long integer variable to which result data is assigned.

Remarks

In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the %CBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number *(item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by item&, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg*, *id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the CONTROL GET TEXT statement instead.

COMBOBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT hDlg, id&, item&, StrExpr

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD COMBOBOX, CONTROL GET TEXT

COMBOBOX SET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a COMBOBOX control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
```

```
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg	Handle of the dialog that owns the combobox.
id&	The control identifier assigned with CONTROL ADD COMBOBOX.
item&	Position of data in the COMBOBOX. First string=1, second=2...
NumExpr	A numeric expression passed as a parameter.
StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks

In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the %CBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number *(item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by item&, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg*, *id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the CONTROL GET TEXT statement instead.

COMBOBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg, id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT hDlg, id&, item&, StrExpr

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD COMBOBOX, CONTROL GET TEXT

COMBOBOX SET USER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a COMBOBOX control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
```

```
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the combobox.

id& The control identifier assigned with CONTROL ADD COMBOBOX.

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the %CBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number *(item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by item&, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg*, *id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the CONTROL GET TEXT statement instead.

COMBOBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg*, *id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg, id&, item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT hDlg, id&, item&, StrExpr

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD COMBOBOX, CONTROL GET TEXT

COMBOBOX UNSELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMBOBOX statement IMPROVED

Purpose Manipulate a COMBOBOX control in order to set/retrieve data.

Syntax

```
COMBOBOX ADD hDlg, id&, StrExpr [TO datav&]
COMBOBOX DELETE hDlg, id&, item&
COMBOBOX FIND hDlg, id&, item&, StrExpr TO datav&
COMBOBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
COMBOBOX GET COUNT hDlg, id& TO datav&
COMBOBOX GET SELCOUNT hDlg, id& TO datav&
COMBOBOX GET SELECT hDlg, id& TO datav&
COMBOBOX GET STATE hDlg, id&, item& TO datav&
COMBOBOX GET TEXT hDlg, id& [,item&] TO txtv$
```

```
COMBOBOX GET USER hDlg, id&, item& TO datav&
COMBOBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
COMBOBOX RESET hDlg, id&
COMBOBOX SELECT hDlg, id&, item&
COMBOBOX SET TEXT hDlg, id&, item&, StrExpr
COMBOBOX SET USER hDlg, id&, item&, NumExpr
COMBOBOX UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the combobox.

id& The control identifier assigned with CONTROL ADD COMBOBOX.

item& Position of data in the COMBOBOX. First string=1, second=2...

NumExpr A numeric expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the COMBOBOX control which is the subject of the statement is identified by the handle of the dialog that owns the COMBOBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD COMBOBOX.

COMBOBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the COMBOBOX control. If the COMBOBOX has the %CBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

COMBOBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the COMBOBOX. The item number (*item&*) is indexed to one (1=first, 2=second, and so on).

COMBOBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number *(item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the COMBOBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by item&, and ending with the last string in the COMBOBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire COMBOBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

COMBOBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

COMBOBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the list box of the COMBOBOX is retrieved, and assigned to the long integer variable specified by *datav&*. Since this is a single-selection list box, the retrieved value will always be either zero or one.

COMBOBOX GET SELECT *hDlg*, *id&* TO *datav&*

The index of the currently selected item in the list box of the COMBOBOX is retrieved, and assigned to the variable specified by *datav&*. The index is 1 for the first item, 2 for the second item, etc. If there is no current selection, the value zero (0) is assigned.

COMBOBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

COMBOBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the COMBOBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc. If *item&* is missing, or contains the value zero, the selected text is returned (or an empty string if none is selected). If you wish to retrieve the text found in the edit box portion of the COMBOBOX (regardless of whether it was typed or selected), you should use the CONTROL GET TEXT statement instead.

COMBOBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. COMBOBOX user values are assigned with the COMBOBOX SET USER statement. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

COMBOBOX RESET *hDlg*, *id&*

Delete all contents of the specified COMBOBOX.

COMBOBOX SELECT *hDlg*, *id&*, *item&*

The string value specified by *item&* is chosen as selected text for the COMBOBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc.

COMBOBOX SET TEXT hDlg, id&, item&, StrExpr

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the COMBOBOX was created with the style %CBS_SORT. If you wish to sort all of the items, use COMBOBOX DELETE followed by COMBOBOX ADD instead.

COMBOBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a COMBOBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with COMBOBOX SET USER, and retrieved with COMBOBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these COMBOBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

COMBOBOX UNSELECT *hDlg, id&*

All items in a COMBOBOX control are set to an unselected state.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD COMBOBOX, CONTROL GET TEXT

COMM CLOSE statement

COMM CLOSE statement

Purpose Close an open serial port.

Syntax `COMM CLOSE [#] hComm [, [#] hComm ...]`

Remarks Closes one or more communication ports, as specified by the PowerBASIC file number held in each *hComm* parameter. COMM CLOSE ends the relationship between a PowerBASIC file number, and the serial port device that was previously associated with it by the COMM OPEN statement.

The Number symbol (#) prefix is optional, but recommended for the purposes of clarity.

It is also recommended that you explicitly close any serial port that you have opened before your application terminates. Note that COMM CLOSE is a synonym for CLOSE.

See also Serial Communications, CLOSE, COMM function, COMM LINE, COMM OPEN, COMM PRINT, COMM RECV, COMM RESET, COMM SEND, COMM SET, COMM TIMEOUT

Example

```
COMM CLOSE #hComm, 5 ' Close hComm and file number 5
```

COMM function

COMM function IMPROVED

Purpose Retrieve the value or status of a communications parameter.

Syntax `lResult& = COMM([#] hComm, Comfunc)`

Remarks *hComm* is the PowerBASIC file number as was used by the COMM OPEN statement to open the communications port. Select a *Comfunc* keyword from the following table to retrieve the associated setting.

Comfunc	***value* (TRUE <> 0, FALSE = 0)**
BAUD	Port Baud Rate (9600, 14400, 19200, etc).
BREAK	TRUE/FALSE Break is asserted. Break is generally used to "get the attention" of the connected modem, terminal or system.
BYTE	Number of bits per byte (4, 5, 6, 7, or 8).
CD	TRUE/FALSE Carrier Detect state; synonym for RLSD *(READ-ONLY)*. When CD is TRUE, the DCE (modem) has a suitable connection on the communications channel present. When CD is FALSE, there is no suitable connection.
CTS	TRUE/FALSE Clear-To-Send state is returned (READ-ONLY).
CTSFLOW	TRUE/FALSE Enable CTS output flow control (Input signal). When CTSFLOW is enabled, it causes the DTE (computer) to stop sending data whenever the CTS signal is set to logic low by the DCE (modem). Transmission continues when the DCE (modem) sets the CTS signal back to logic high. The CTS signal is usually used in response to an RTS signal.
DSR	TRUE/FALSE Data-Set-Ready state is returned (READ-ONLY).
DSRFLOW	TRUE/FALSE Enable DSR output flow control (Input signal). When DSRFLOW is enabled, it causes the DTE (computer) to stop sending data whenever the DSR signal is set to logic low by the DCE (modem). Transmission is enabled when the DSR signal returns to logic high. The DSR signal is often used in conjunction with CTS in response to a RTS signal.
DSRSENS	TRUE/FALSE Enable DSR sensitivity. When DSRSENS is enabled, data received by the DTE (computer) is placed into the receive buffer only if DSR is set to logic high. If DSR is set low, received data is discarded. Enabling DSRSENS allows DSR to enable or disable the DTE (the computer) to receive data from the DTE (the modem). DSRSENS is rarely used in practical communications situations.
DTRFLOW	TRUE/FALSE Enable DTR handshaking flow control (Output signal). When DTRFLOW is enabled, it signals that the DCE (modem) should prepare to connect to the communications channel. DTR is usually used for modem on-hook/off-hook control, but can also be used in conjunction with DSR for handshaking.
DTRLINE	TRUE/FALSE Enable DTR line. When enabled, DTRLINE leaves the DTR line active when the port is closed by the DTE (computer). This ensures that the DCE (modem) does not close the communications channel when the port is closed.
NULL	TRUE/FALSE Null ($NUL) bytes are discarded when read.
PARITY	TRUE/FALSE Enable parity checking. This mode must be enabled for the other Parity options to be selected.
PARITYCHAR	Character to use for parity error replacement. PARITY must be enabled.
PARITYREPL	TRUE/FALSE Enable character replacement on parity error. PARITY must be enabled.
PARITYTYPE	0 = None, 1 = Odd, 2 = Even, 3 = Mark, 4 = Space. PARITY must be enabled. Default = 0.
RING	TRUE/FALSE Ring indicator is on *(READ-ONLY)*. When RING returns TRUE, a ringing signal is being received on the communications channel (by the modem). RING approximates the state of the ringing signal; however, it may not be reported accurately on all Windows platforms.
RLSD	Receive-line-signal-detect *(READ-ONLY)*. See CD/Carrier Detect above.
RTSFLOW	Ready To Send (Output signal). 0 = Disable, 1 = Enable, 2 = Handshake, 3 = Toggle. **Toggle** is used for half-duplex (2-wire) operations to "reverse" the line. While the DTE (computer) is busy sending data, it raises the

	RTS signal and the DCE (modem) blocks its data receive channel. When RTS signal reverts to logic low, the DCE (modem) reverts to transmit mode and the DTE (computer) switches to receive mode. **Handshake** mode causes the DTE (computer) to check the receive buffer (RXQUE) after each character is placed into the buffer. When the buffer is 5/6th full, the RTS signal is dropped. When the receive buffer drops to below 1/6th full, RTS is raised again
`RXBUFFER`	Size of the receive buffer in bytes.
`RXQUE`	Characters currently in the receive buffer *(READ-ONLY)*.
`STOP`	0 = 1 stop bits, 1 = 1.5 stop bits, 2 = 2 stop bits.
`TXBUFFER`	Size of the transmit buffer in bytes. In some cases, Windows may not be able to report the transmit size.
`TXQUE`	Characters currently in the transmit buffer *(READ-ONLY)*.
`XINPFLOW`	TRUE/FALSE Enable XON/XOFF input flow control. When the DTE (computer) receive buffer is full, an XOFF character is sent to the DCE (modem) to instruct it to halt transmission. When the DCE is ready to resume transmission, an XON character is sent to the DCE. Typically, XOFF is sent when the receive buffer has less than 1/16th remaining, and XON is sent when the receive buffer drops to less than 1/16th of its maximum size. Default = FALSE.
`XOUTFLOW`	TRUE/FALSE Enable XON/XOFF out flow control. When enabled, the DCE (modem) sends an XOFF to the DTE (computer) to halt data transmission to the DCE. When the DCE is ready to receive more data, an XON character is sent. XOUTFLOW typically uses the same 1/16th rules as XINPFLOW. Default = FALSE.

Common baud rates range from 110 to 256000. There are equates defined in the WIN32API.INC file, prefixed with %CBR_ to assist you with specifying a common baud rate, but you are not restricted to a limited set of rates.

PowerBASIC sets the ERR system variable if an error occurs when using the COMM function.

The Number symbol (#) prefix is optional, but recommended for the purposes of clarity.

Restrictions Due to differences between Win32 operating systems, parameters (such as the TXBUFFER and TXQUE) may not be *queried* successfully in all circumstances.

See also Serial Communications, COMM CLOSE, COMM LINE, COMM OPEN, COMM PRINT, COMM RECV, COMM RESET, COMM SEND, COMM SET, COMM TIMEOUT

Example

```
Qty& = COMM(#hComm, RXQUE)
x$ = "The receive buffer contains " + _
        FORMAT$(Qty&) + " bytes of data."

Qty& = COMM(#hComm, TXBUFFER) - COMM(#hComm, TXQUE)
x$ = "There is room for " + FORMAT$(Qty&) + _
  " bytes in the transmit buffer."
```

COMM LINE statement

COMM LINE statement IMPROVED

Purpose Receive a CR/LF ($CRLF) terminated "line" of data from a serial port.

Syntax **`COMM LINE [INPUT] [#] `*`hComm, string_var`***

Remarks Read a delimited line of data from the receive buffer, where a "line" is defined as a stream of data that is terminated by a CR/LF (carriage return and linefeed, $CRLF, or CHR$(13,10)). COMM LINE INPUT is ideal for retrieving modem response strings in reply to "AT" commands sent to a modem.

hComm is the file number you used with COMM OPEN, an integer in the range of 1 to

32767. The Number symbol (#) prefix is optional, but recommended for clarity.

COMM LINE reads the receive buffer up to the next $CRLF character pair. The $CRLF bytes are removed from the buffer but do not form part of the string data returned by COMM LINE. Note that if there is no $CRLF pair in the receive buffer, the statement will wait indefinitely for a complete $CRLF terminated line of data. In this sense, COMM LINE is a blocking statement. The COMM TIMEOUT statement can be used to specify COMM timeouts limits.

The data received is assigned to the *string_var*. The character mode of the *string_var* must match the CHR option in COMM OPEN (ANSI/WIDE). If not, an error 5 (Illegal function call) will be generated, and no data will be received.

The EOF function may also be used with COMM LINE (and TCP LINE) to detect that an incomplete line was received. Normally, the COMM LINE statement reads data until a $CRLF character pair is found, and in that case, EOF will return false (zero). However, if a timeout does occur, COMM LINE will return whatever data has been accumulated, and set EOF to logical TRUE (non-zero).

In many cases, it would be prudent to test EOF after every COMM LINE statement to verify that a full line has been received. In some cases, you may wish to execute the statement one or more additional times, combining the data, in order to obtain a full line of text.

See also Serial Communications, COMM CLOSE, COMM function, COMM OPEN, COMM PRINT, COMM RECV, COMM RESET, COMM SEND, COMM SET, COMM TIMEOUT, EOF

Example

```
COMM PRINT #hComm, "AT"
SLEEP 1000 ' delay for modem to respond
DO
  COMM LINE INPUT #hComm, a$
  CALL DisplayResponse(a$) ' display the modem echo
LOOP UNTIL LEN(a$)
```

COMM OPEN statement

COMM OPEN statement IMPROVED

Purpose Open a serial port.

Syntax `COMM OPEN "COMn" AS [#] hComm [CHR = ANSI|WIDE]`

Remarks Opens a serial port to begin communications, creating a relationship between a file number and a specific serial port device.

COM*n* Identifies the serial port number, for example, COM1, COM4, etc. A colon must not follow the port specification. See Restrictions below.

hComm A numeric expression specifying an unused PowerBASIC file number, in the range of 1 to 32767. This is typically provided by the FREEFILE function. The Number symbol (#) prefix is optional, but recommended for clarity.

If the port was not opened successfully, the ERR system variable will contain the error code. Before actual communications through the port can commence, you must configure the communication parameters by using a COMM SET statement for each parameter.

Restrictions A colon may not be used in the port name, as was common in DOS code. COMM OPEN cannot use an operating system file handle, nor open a port that is already in use. When opening ports above COM9, Windows requires the port name to be specified using the following syntax:

```
COMM OPEN "\\.\COM15" AS #hComm
```

See also Serial Communications, COMM CLOSE, COMM function, COMM LINE, COMM PRINT, COMM RECV, COMM RESET, COMM SEND, COMM SET, COMM TIMEOUT,

FREEFILE, OPEN

Example

```
DIM hComm AS LONG
hComm = FREEFILE
COMM OPEN "COM1" AS #hComm
COMM OPEN "COM2" AS #5
```

COMM PRINT statement

COMM PRINT statement IMPROVED

Purpose Send a string of text through a serial port with optional CR/LF.

Syntax `COMM PRINT [#] hComm, string_expression [;] [TO CharCountVar]`

Remarks The text data contained in string_*expression* is sent to the serial port associated with the file number *hComm*. The number symbol (#) is optional.

The data is sent in the character form specified in the COMM OPEN statement. If CHR=WIDE was given, the data is sent in wide Unicode characters. Otherwise, it is sent in ANSI bytes. The data will be converted to the appropriate form automatically.

This statement is a variation of COMM SEND, but is usually used with text only. Each string_*expression* sent is automatically followed by a Carriage-Return and Line-Feed pair to delimit the line. However, if a trailing semi-colon (;) is added, the CR/LF is suppressed.

If the optional "TO *CharCountVar*" clause is included, a count of the number of characters written is assigned to it. This count includes the CR/LF, if utilized. This will allow you to gauge the success of the operation. If a TimeOut occurred, this value will be less than expected, and a run-time error 24 (Device Timeout) will be generated.

COMM PRINT is ideal for sending "AT" commands to a modem. Omit the trailing semicolon for this purpose, since you would want the CR/LF to be sent along with the data.

See also Serial Communications, COMM CLOSE, COMM function, COMM LINE, COMM OPEN, COMM RECV, COMM RESET, COMM SEND, COMM SET, COMM TIMEOUT

COMM RECV statement

COMM RECV statement IMPROVED

Purpose Receive binary data from a serial port.

Syntax `COMM RECV [#] hComm, count&, string_var`

Remarks Retrieve the *count&* number of bytes from the receive buffer, placing the results in *string_var*. Program execution will halt until *count&* bytes are available, so it is wise to check how many bytes are available before making a COMM RECV request. You can do this by checking the RXQUE value with the COMM function, as shown in the example below.

hComm is the file number you used with COMM OPEN, an integer in the range of 1 to 32767. The Number symbol (#) prefix is optional, but recommended for clarity.

The data received is assigned to the *string_var*. The character mode of the *string_var* must match the CHR option in COMM OPEN (ANSI/WIDE). If not, an error 5 (Illegal function call) will be generated, and no data will be received.

See also Serial Communications, COMM CLOSE, COMM function, COMM LINE, COMM OPEN, COMM PRINT, COMM RESET, COMM SEND, COMM SET, COMM TIMEOUT

Example

```
Qty& = COMM(#hComm, RXQUE)
COMM RECV #hComm, Qty&, a$
```

COMM RESET statement

COMM RESET statement

Purpose Disable flow control for a given serial port.

Syntax `COMM RESET [#] hComm, FLOW`

Remarks Switches off all flow control to the serial port as specified by the file number stored in *hComm*.

The Number symbol (#) prefix is optional, but recommended for the purposes of clarity.

See also Serial Communications, COMM CLOSE, COMM function, COMM LINE, COMM OPEN, COMM PRINT, COMM RECV, COMM SEND, COMM SET, COMM TIMEOUT

COMM SEND statement

COMM SEND statement IMPROVED

Purpose Send a string of data through a serial port.

Syntax `COMM SEND [#] hComm, string_expression TO [CharCountVar]`

Remarks The data contained in *string_expression* is sent to the serial port associated with the file number hComm. The number symbol (#) is optional.

The data is sent in the character form specified in the COMM OPEN statement. If CHR=WIDE was given, the data is sent in wide Unicode characters. Otherwise, it is sent in ANSI bytes. The data will be converted to the appropriate form automatically.

With COMM SEND, no delimiters are added to the data. If a trailing CR/LF is needed, it's usually best to use COMM PRINT instead.

If the optional "TO *CharCountVar*" clause is included, a count of the number of characters written is assigned to it. This will allow you to gauge the success of the operation. If a TimeOut occurred, this value will be less than expected, and a run-time error 24 (Device Timeout) will be generated.

See also Serial Communications, COMM CLOSE, COMM function, COMM LINE, COMM OPEN, COMM PRINT, COMM RECV, COMM RESET, COMM SET, COMM TIMEOUT

Example

```
A$ = "ATDT1,555-1234;"
COMM SEND #hComm, a$
```

COMM SET statement

COMM SET statement IMPROVED

Purpose Set communication options for a serial port.

Syntax `COMM SET [#] hComm, Comfunc = value`

Remarks Set the parameters needed to communicate with a serial port. This must always be done before you can send and receive data through the port.

To configure the communication parameters, use keywords from the following table to specify the *Comfunc* as well as a suitable *value* chosen from the range applicable to the *Comfunc* parameter you want to set. If an error occurs when attempting to set a parameter, PowerBASIC sets the ERR system variable to indicate the error number. While each parameter must be set individually, it is also possible to change certain parameters without the need to close and re-establish communications.

COMM SET keywords table

Comfunc	***value* (TRUE <> 0, FALSE = 0)**
`BAUD`	Port Baud Rate (9600, 14400, 19200, etc). See notes below.
`BREAK`	TRUE/FALSE Break is asserted. Break is generally used to "get the attention" of the connected modem, terminal or system.
`BYTE`	Number of bits per byte (4, 5, 6, 7, or 8).
`CD`	TRUE/FALSE Carrier Detect state; synonym for RLSD *(READ-ONLY)*. When CD is TRUE, the DCE (modem) has a suitable connection on the communications channel present. When CD is FALSE, there is no suitable connection.
`CTSFLOW`	TRUE/FALSE Enable CTS output flow control (Input signal). When CTSFLOW is enabled, it causes the DTE (computer) to stop sending data whenever the CTS signal is set to logic low by the DCE (modem). Transmission continues when the DCE (modem) sets the CTS signal back to logic high. The CTS signal is usually used in response to an RTS signal.
`DSRFLOW`	TRUE/FALSE Enable DSR output flow control (Input signal). When DSRFLOW is enabled, it causes the DTE (computer) to stop sending data whenever the DSR signal is set to logic low by the DCE (modem). Transmission is enabled when the DSR signal returns to logic high. The DSR signal is often used in conjunction with CTS in response to a RTS signal.
`DSRSENS`	TRUE/FALSE Enable DSR sensitivity. When DSRSENS is enabled, data received by the DTE (computer) is placed into the receive buffer only if DSR is set to logic high. If DSR is set low, received data is discarded. Enabling DSRSENS allows DSR to enable or disable the DTE (the computer) to receive data from the DTE (the modem). DSRSENS is rarely used in practical communications situations.
`DTRFLOW`	TRUE/FALSE Enable DTR handshaking flow control (Output signal). When DTRFLOW is enabled, it signals that the DCE (modem) should prepare to connect to the communications channel. DTR is usually used for modem on-hook/off-hook control, but can also be used in conjunction with DSR for handshaking.
`DTRLINE`	TRUE/FALSE Enable DTR line. When enabled, DTRLINE leaves the DTR line active when the port is closed by the DTE (computer). This ensures that the DCE (modem) does not close the communications channel when the port is closed.
`NULL`	TRUE/FALSE Null ($NUL) bytes are discarded when read.
`PARITY`	TRUE/FALSE Enable parity checking. This mode must be enabled for the other Parity options to be selected.
`PARITYCHAR`	Character to use for parity error replacement. PARITY must be enabled.
`PARITYREPL`	TRUE/FALSE Enable character replacement on parity error. PARITY must be enabled.
`PARITYTYPE`	0 = None, 1 = Odd, 2 = Even, 3 = Mark, 4 = Space. PARITY must be enabled. Default = 0.
`RING`	TRUE/FALSE Ring indicator is on *(READ-ONLY)*. When RING returns TRUE, a ringing signal is being received on the communications channel (by the modem). RING approximates the state of the ringing signal; however, it may not be reported accurately on all Windows platforms.
`RLSD`	Receive-line-signal-detect *(READ-ONLY)*. See CD/Carrier Detect above.

`RTSFLOW`	Ready To Send (Output signal). 0 = Disable, 1 = Enable, 2 = Handshake, 3 = Toggle. **Toggle** is used for half-duplex (2-wire) operations to "reverse" the line. While the DTE (computer) is busy sending data, it raises the RTS signal and the DCE (modem) blocks its data receive channel. When RTS signal reverts to logic low, the DCE (modem) reverts to transmit mode and the DTE (computer) switches to receive mode. **Handshake** mode causes the DTE (computer) to check the receive buffer (RXQUE) after each character is placed into the buffer. When the buffer is 5/6th full, the RTS signal is dropped. When the receive buffer drops to below 1/6th full, RTS is raised again.
`RXBUFFER`	Size of the receive buffer in bytes.
`RXQUE`	Characters currently in the receive buffer *(READ-ONLY)*.
`STOP`	0 = 1 stop bits, 1 = 1.5 stop bits, 2 = 2 stop bits.
`TXBUFFER`	Size of the transmit buffer in bytes. In some cases, Windows may not be able to report the transmit size.
`TXQUE`	Characters currently in the transmit buffer *(READ-ONLY)*.
`XINPFLOW`	TRUE/FALSE Enable XON/XOFF input flow control. When the DTE (computer) receive buffer is full, an XOFF character is sent to the DCE (modem) to instruct it to halt transmission. When the DCE is ready to resume transmission, an XON character is sent to the DCE. Typically, XOFF is sent when the receive buffer has less than 1/16th remaining, and XON is sent when the receive buffer drops to less than 1/16th of its maximum size. Default = FALSE.
`XOUTFLOW`	TRUE/FALSE Enable XON/XOFF out flow control. When enabled, the DCE (modem) sends an XOFF to the DTE (computer) to halt data transmission to the DCE. When the DCE is ready to receive more data, an XON character is sent. XOUTFLOW typically uses the same 1/16th rules as XINPFLOW. Default = FALSE.

Common baud rates range from 110 to 256000. There are equates defined in the WIN32API.INC file, prefixed with %CBR_ to assist you with specifying a common baud rate, but you are not restricted to a limited set of rates.

Attempting to set a READ-ONLY attribute will result in a compile-time Error 542 ("May not be altered").

The Number symbol (#) prefix is optional, but recommended for the purposes of clarity.

See also Serial Communications, COMM CLOSE, COMM function, COMM LINE, COMM OPEN, COMM PRINT, COMM RECV, COMM RESET, COMM SEND, COMM TIMEOUT

Example To open a communication port and initialize it for use, you will need to set the following parameters (the selection is typical, but is mainly for demonstration purposes - you may choose your own settings as necessary)

```
' Minimum settings
COMM SET #hComm, BAUD     = 9600   ' 9600 baud
COMM SET #hComm, BYTE     = 8      ' 8 bits
COMM SET #hComm, PARITY   = %FALSE ' No parity
COMM SET #hComm, STOP     = 0      ' 1 stop bit
COMM SET #hComm, TXBUFFER = 2048   ' transmit buffer
COMM SET #hComm, RXBUFFER = 4096   ' receive buffer

' Optional settings for flow control
COMM SET #hComm, CTSFLOW  = 1  ' Enable CTS
COMM SET #hComm, RTSFLOW  = 1  ' Enable RTS
COMM SET #hComm, XINPFLOW = 0  ' Disable XON/OFF
                               ' Input flow control
COMM SET #hComm, XOUTFLOW = 0  ' Disable XON/XOFF
```

```
                                        ' Output flow control
```

COMM TIMEOUT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COMM TIMEOUT statement New!

Purpose Place a limit on the time to complete a operation.

Syntax `COMM TIMEOUT [#] hComm, TimeOutMS&`

Remarks COMM TIMEOUT allows you to specify how long a COMM operation should wait to send or receive a byte of data. This value is measured in milliseconds. If the specified number of milliseconds elapses without a response, the COMM operation will fail and a run-time error 24 (Device Timeout) will be generated.

See also Serial Communications, COMM CLOSE, COMM function, COMM LINE, COMM OPEN, COMM PRINT, COMM RECV, COMM RESET, COMM SEND, COMM SET, COMM TIMEOUT, FREEFILE, OPEN

COMMAND$ function

COMMAND$ function

Purpose Return the command-line arguments used to start the program.

Syntax
```
s$ = COMMAND$
s$ = COMMAND$(ArgNum)
```

Remarks COMMAND$ returns everything that was typed following the program name. Some operating system manuals refer to this text as the trailer or command tail. You can use COMMAND$ to collect run-time arguments, like filenames, and program options.

Depending upon the optional argument number, COMMAND$ will return either the complete trailer, or just one of the arguments. If the *ArgNum* is zero (0), or not present, the complete trailer is returned. If the *ArgNum* is greater than zero, the trailer is parsed to return an individual argument (1 = first argument. 2 = second argument, etc.). If the *ArgNum* is greater than the number of arguments, a null (zero-length) is returned.

Arguments are delimited by one or more blank spaces. If blank spaces are significant, you should enclose the argument in double quotes ("). Any such double-quotes are stripped from the return value by COMMAND$. If a zero-length quoted string ("") is found, it is ignored entirely.

For example, consider a program named FASTSORT.EXE that reads data from one file, sorts it, and puts the result in a new file. Using COMMAND$ lets you specify the input and output file names when the program is invoked:

```
FASTSORT.EXE cust.dta cust.new
```

When FASTSORT begins execution, COMMAND$ or COMMAND$(0) would return:

```
cust.dta cust.new
```

COMMAND$(1) would return:

```
cust.dta
```

COMMAND$(2) would return:

```
cust.new
```

Restrictions In some recent versions of Windows, file association and drag-drop file operations cause filenames to be enclosed with double-quote marks when they are passed in COMMAND$. It would be wise to ensure that your applications are prepared for this possibility. Some operating systems automatically enclose the command-line in double-quote marks.

PowerBASIC imposes no arbitrary limits on the length of the string returned by COMMAND$ but, the operating system may impose limits. Such limits may become evident, for example, when attempting to Drag and Drop a large number of files onto an EXE within Windows Explorer. Usually, attempting to drop more files than the operating system permits will result in an operating system warning message.

Within the IDE, a COMMAND$ command-line parameter can be specified for the purposes of testing in both Compile and Execute and Compile and Debug modes.

See also JOIN$, PARSE, PARSE$, PARSECOUNT, PATHNAME$, PATHSCAN$, WINMAIN

Example

```
#COMPILE EXE
FUNCTION PBMAIN
  IF TRIM$(COMMAND$) = "" THEN
    EXIT FUNCTION  ' No command-line params given, just quit
  ELSEIF INSTR(COMMAND$, "/Q") THEN
    ' Process the /Q option
  ELSEIF INSTR(COMMAND$, "/W") THEN
    ' Process the /W option
  END IF
END FUNCTION
```

CONTROL ADD statement

CONTROL ADD "custom-control" statement

Purpose Add a custom control to a DDT dialog.

Syntax **CONTROL ADD classname$, *hDlg*, *id&*, *txt$*, *x*, *y*, *xx*, *yy* [, [*style&*] [, [*exstyle&*]]] [[,] CALL *callback*]**

classname$* A registered custom control or common control class name, for example, "MSCTLS_STATUSBAR32", etc. *classname$ may be a string expression, quoted string literal, or a string equate.

hDlg Handle of the dialog in which the control will be created.

id& Unique identifier for the control. Equates are recommended for clarity of the source code.

txt$* Text to be displayed in the control, if any. *txt$ may be a string expression,

, or string constant, and may be zero length.

x, y expressions, variables, or numeric literal values, specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.

xx Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog.

yy Integral expression, variable, or numeric literal value, specifying the height of the control

The height is given in the same terms (pixels or dialog units) as the parent dialog..

style& Primary style of the custom control. There are no default style values for a custom control. Many standard Windows common controls require the %WS_CHILD and %WS_VISIBLE styles to be explicitly specified, or the control may not be visible or function correctly. Please consult the control's documentation for information on its primary and extended styles.

exstyle& Extended style of the custom control. As with *style&* above, there are no default extended style values for a custom control - the statement should explicitly include all required primary and extended styles for the control.

callback Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the custom control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the control Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the messages are handled by the DDT engine.

Remarks When the user interacts with the control, a message is sent to the designated Callback Function. If there is no Callback Function designated, the message is sent to the callback for the dialog.

The *style&* and *exstyle&* values are dependent on the type of custom control or common control being used. The notification messages sent to your callback are also dependent on the type of custom control or common control being used.

When the Callback Function receives a %WM_COMMAND message, the identity of the control sending the message can be found with the CB.CTL function. Use the CB.CTLMSG function to retrieve the notification message value in your callback. However, many Windows common controls send %WM_NOTIFY messages (to the parent dialog's callback, not the control callback) rather than the more conventional %WM_COMMAND messages. In such cases, the meaning of the message parameters CB.WPARAM and CB.LPARAM will vary according to the type of notification message being processed.

Restrictions Custom controls may require special handling other than the DDT generic functions (CONTROL SET COLOR, CONTROL SET FONT, etc.). Consult the controls documentation for information.

See also #MESSAGES, Dynamic Dialog Tools, CONTROL HANDLE, CONTROL SEND,

CONTROL ADD BUTTON statement

CONTROL ADD BUTTON statement

Purpose Add a command button to a dialog. A command button is a button that causes an action to occur when the button is clicked. A common example of a command button is the "OK" button on a message box dialog.

Syntax **`CONTROL ADD BUTTON, hDlg, id&, txt$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]`**

hDlg Handle of the dialog in which the button will be created. The dialog will become the parent of the command button.

id& Unique identifier for the button in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate *%NewAccount* is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

However, it is typical for a dialog to include an OK and/or a Cancel button, represented by the predefined equates *%IDOK* and *%IDCANCEL* respectively. A button with an ID of *%IDOK* is triggered (clicked) when the ENTER key is pressed by the user, and a button with the ID of *%IDCANCEL* is triggered when the ESCAPE key is pressed. These and other predefined "standard" equates can be found in the WIN32API.INC and DDT.INC files.

txt$	Text to be displayed in the button. An ampersand (&) may be included in *txt$* to specify a hot-key. See the Remarks section below. OK and Cancel/Close buttons do not usually contain accelerators, since such buttons usually respond to the ENTER and ESCAPE keystrokes, respectively.
x, y	expressions, variables, or numeric literal values, specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.
xx	Integral expression, variable, or numeric literal value, specifying the width of the button. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 50 dialog units.
yy	Integral expression, variable, or numeric literal value, specifying the height of the button. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 14 dialog units.
style&	Primary style of the button. The default button style comprises %BS_CENTER, %BS_VCENTER, and %WS_TABSTOP. The default style is used if both the primary and extended style parameters are omitted from the statement. For example:

```
CONTROL ADD BUTTON, hDlg, id&, txt$, 100, 100, 150, 200, , , _
  CALL ButtonCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary button style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%BS_BOTTOM	Place the text at the bottom of the button.
%BS_CENTER	Center the text horizontally in the button. (default)
%BS_DEFAULT	Create a button with a heavy black border. The user can select this button by pressing the ENTER key. This style is useful for enabling the user to quickly select the most likely option. You can only have one Default button per dialog. It is recommended to make *id&* = 1, or *id&* = %IDOK for this control. Synonym of %BS_DEFPUSHBUTTON.
%BS_DEFPUSHBUTTON	Synonym of %BS_DEFAULT.
%BS_FLAT	Create a flat button (without the raised 3D look).
%BS_LEFT	Place the text on the left side of the button.
%BS_MULTILINE	Wrap the caption text across multiple lines, if the text string is too long to fit on a single line. To force a wrap, insert a $CR (or $CRLF) into the caption text at the desired wrap position.
%BS_NOTIFY	Enable a button to send the %BN_KILLFOCUS and %BN_SETFOCUS notification messages to the button Callback Function.
%BS_PUSHLIKE	Button state alternates (toggles) between normal (raised) and depressed (sunken) modes.
%BS_RIGHT	Place the text on the right side of the button.

%BS_TOP	Place the text at the top edge of the button.
%BS_VCENTER	Center the text vertically in the button. (default)
%WS_BORDER	Add a thin line border around the control.
%WS_DISABLED	Create a control that is initially disabled. A disabled control cannot receive input from the user. Use the CONTROL ENABLE statement to re-enable the button.
%WS_GROUP	Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start.
%WS_TABSTOP	Allow button control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. (default)

exstyle& Extended style of the button control. The default extended button style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended style parameters are omitted from the CONTROL ADD BUTTON statement, in the same manner as *style&* above.

The extended button style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_LEFT	The button has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The button has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.
%WS_EX_TRANSPARENT	Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.

callback Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks If the ampersand (&) character appears in the *txt$* parameter, the letter that follows will be displayed underscored. This adds a control accelerator (hot-key) to enable the user to directly "click" a control, simply by pressing and holding the ALT key while pressing the specified hot-key. For example, "E&xit" makes ALT+x the hot-key.

On Windows XP and Windows 2000 you may need to press the ALT key before

Control Accelerators are made visible. You can set if Command Accelerators are visible when using the ALT key or all the time in the Windows Display Settings.

Unless the %BS_FLAT style is used, the button is drawn on the dialog using a 3-dimensional look. When the user clicks a button, a message is sent to the Callback Function designated for the button. If there is no Callback Function designated, the message is sent to the callback for the dialog.

In general, if the control Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE, if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Notification messages are sent to the Callback Function, with CB.MSG = %WM_COMMAND, CB.CTL holding the ID (id&) of the control, and CB.CTLMSG holding the following values:

%BN_CLICKED	Sent when the user clicks a mouse button, or activates the button with the hot-key (unless the button has been disabled).
%BN_DISABLE	Sent when a button is disabled.
%BN_KILLFOCUS	Sent when a button loses the keyboard focus. The button must include the %BS_NOTIFY style.
%BN_SETFOCUS	Sent when a button receives the keyboard focus. The button must include the %BS_NOTIFY style.

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also Dynamic Dialog Tools, CONTROL GET TEXT, CONTROL SET FONT, CONTROL SET TEXT

CONTROL ADD CHECK3STATE statement

CONTROL ADD CHECK3STATE statement

Purpose

Add an auto 3-state checkbox to a dialog. This is commonly used to indicate a selection that may be True (set or checked), False (unset or cleared) or Indeterminate (grayed), and is often found in dialogs that provide "multiple choice" options.

Syntax

```
CONTROL ADD CHECK3STATE, hDlg, id&, txt$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]
```

hDlg

Handle of the dialog in which the 3-state checkbox will be created. The dialog will become the parent of the control.

id&

Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the *%AutoLogoff* equate is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

txt$

Text to be displayed in the 3-state checkbox. An ampersand (&) may be included in *txt$* to specify a hot-key. See the Remarks section below.

x, y	expressions, variables, or numeric literal values, specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.
xx	Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units.
yy	Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 14 dialog units.
style&	Primary style of the 3-state checkbox control. The default 3-state checkbox style comprises %BS_LEFT, %BS_VCENTER, and %WS_TABSTOP. The default style is used only if both the primary and extended style parameters are omitted from the statement. For example:

```
CONTROL ADD CHECK3STATE, hDlg, id&, txt$,
100, 100, 40, 14, , , _
  CALL Check3Callback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary 3-state checkbox style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%BS_BOTTOM	Place the text at the bottom of the control.
%BS_CENTER	Center the text horizontally in the control.
%BS_FLAT	Create a flat control (without the raised 3D look).
%BS_LEFT	Place the text on the left side of the checkbox. Also see %BS_LEFTTEXT. (default)
%BS_LEFTTEXT	Place the checkbox to the right of the text portion of the control. Combine with %BS_RIGHT to right-align text against the left side of the checkbox control.

%BS_MULTILINE	Wrap the caption text across multiple lines, if the text string is too long to fit on a single line. To force a wrap, insert a $CR (or $CRLF) into the caption text at the desired wrap position.
%BS_NOTIFY	Enable a control to send the %BN_KILLFOCUS and %BN_SETFOCUS messages to the callback.
%BS_PUSHLIKE	Button state alternates (toggles) between normal (raised) and depressed (sunken) modes.
%BS_RIGHT	Place the text on the right side of the checkbox. Also see %BS_LEFTTEXT.
%BS_TOP	Place the text at the top of the control.
%BS_VCENTER	Center the text vertically in the control. (default)
%WS_DISABLED	Create a control that is initially disabled. A disabled control cannot receive input from the user.
%WS_GROUP	Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the

		group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start.
	%WS_TABSTOP	Allow the 3-state checkbox to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. (default)

exstyle&

Extended style of the 3-state checkbox control. The default extended 3-state checkbox style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended style parameters are omitted from the CONTROL ADD CHECK3STATE statement, in the same manner as style& above.

The extended 3-state checkbox style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_LEFT	The control has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another

		language that supports reading order alignment; otherwise, the style is ignored.
	%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
	%WS_EX_TRANSPARENT	Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.
	%WS_EX_WINDOWEDGE	Apply a raised edge border to the control.
callback	Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control. In general, if the control Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.	

Remarks

If the ampersand (&) character appears in the *txt$* parameter, the letter that follows will be displayed underscored. This adds a control accelerator (hot-key) to enable the user to directly "click" a control, simply by pressing and holding the ALT key while pressing the specified hot-key. For example, "Set s&tate" makes ALT+t the hot-key.

When the user clicks a 3-state checkbox, a message is sent to the Callback Function designated for the control. If there is no Callback Function designated, the message is sent to the callback for the dialog.

If the control callback processes the notification message, it should return TRUE (non-zero) to prevent the message being passed needlessly to the dialog callback, and eventually to the DDT engine itself.

Notification messages are sent to the Callback Function, with CB.MSG = %WM_COMMAND, CB.CTL holding the ID (id&) of the control, and CB.CTLMSG holding the following values:

%BN_CLICKED	Sent when the user clicks a mouse button, or activates the control with the hot-key (unless the control has been disabled).
%BN_DISABLE	Sent when a control is disabled.
%BN_KILLFOCUS	Sent when a control loses the keyboard focus. The control must include the %BS_NOTIFY style.
%BN_SETFOCUS	Sent when a control receives the keyboard focus. The control must include the %BS_NOTIFY style.

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also

Dynamic Dialog Tools, CONTROL ADD CHECKBOX, CONTROL ADD OPTION, CONTROL GET CHECK, CONTROL SET CHECK, CONTROL SET COLOR, CONTROL SET FONT

CONTROL ADD CHECKBOX statement

CONTROL ADD CHECKBOX statement

Purpose Add an auto-checkbox to a dialog. This is typically used to indicate a True/False or on/off selection, and is common in dialogs that offer choices of options to a user.

Syntax **CONTROL ADD CHECKBOX, *hDlg*, *id&*, *txt$*, *x*, *y*, *xx*, *yy* [, [*style&*] [, [*exstyle&*]]] [[,] CALL *callback*]**

hDlg	Handle of the dialog in which the checkbox will be created. The dialog will become the parent of the control.
id&	Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate *%DisableUser* is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.
txt$	Text to be displayed next to the checkbox. An ampersand (&) may be included in *txt$* to specify a hot-key. See the Remarks section below.
x, y	expressions, variables, or numeric literal values, specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.
xx	Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units.
yy	Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 14 dialog units.

style&

Primary style of the checkbox control. The default checkbox style comprises %BS_LEFT, %BS_VCENTER, and %WS_TABSTOP. The default style is used only if both the primary and extended parameters are omitted from the statement. For example:

```
CONTROL ADD CHECKBOX, hDlg, id&, txt$, 100, 100, 40, 14, , , _
  CALL CheckboxCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary checkbox style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%BS_BOTTOM	Place the text at the bottom of the control.
%BS_CENTER	Center the text horizontally in the control.
%BS_LEFT	Place the text on the left side of the label portion of the control. Also see %BS_LEFTTEXT. (default)
%BS_LEFTTEXT	Place the checkbox to the right of the text portion of the control. Combine with %BS_RIGHT to right-align text against the left side of the checkbox control.
%BS_MULTILINE	Wrap the caption text across multiple lines, if the text string is too long to fit on a single line. To force a wrap, insert a $CR (or $CRLF) into the caption text at the desired wrap position.
%BS_NOTIFY	Enable a control to send the %BN_KILLFOCUS and %BN_SETFOCUS messages to the callback.
%BS_PUSHLIKE	Button state alternates (toggles) between normal (raised) and depressed (sunken) modes.
%BS_RIGHT	Place the text on the right side of the label portion of the control. Also see %BS_LEFTTEXT.
%BS_TOP	Place the text at the top of the control.
%BS_VCENTER	Center the text vertically in the control. (default)
%WS_DISABLED	Create a control that is initially disabled. A disabled control cannot receive input from the user.
%WS_GROUP	Define the start of a group of controls. The first control

	in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start.
%WS_TABSTOP	Allow checkbox control to receive the keyboard focus when the user presses the TAB and SHIFT+TAB keys. Pressing the TAB key changes the keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB moves it to the previous control with % WS_TABSTOP. (default)

exstyle& Extended style of the checkbox control. The default extended checkbox style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD CHECKBOX statement, in the same manner as style& above.

The extended checkbox style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_LEFT	The control has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_TRANSPARENT	Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.
%WS_EX_WINDOWEDGE	Apply a raised edge border to the control.

callback Optional name of a Callback Function that receives all %WM_COMMAND and % WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

In general, when the control Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks If the ampersand (&) character appears in the *txt$* parameter, the letter that follows will be displayed underscored. This adds a control accelerator (hot-key) to enable the user to directly "click" a control, simply by pressing and holding the ALT key while pressing the specified hot-key. For example, "O&ption " makes ALT+p the hot-key.

When the user clicks a control, a message is sent to the Callback Function designated for the control. If there is no Callback Function designated, the message is sent to the callback for the dialog.

If the control callback processes the notification message, it should return TRUE (non-zero) to prevent the message being passed needlessly to the dialog callback, and eventually to the DDT engine itself.

Notification messages are sent to the Callback Function, with CB.MSG = %WM_COMMAND, CB.CTL holding the ID (id&) of the control, and CB.CTLMSG holding the following values:

%BN_CLICKED	Sent when the user clicks a mouse button or activates the control with the hot-key (unless the control has been disabled).
%BN_DISABLE	Sent when a control is disabled.
%BN_KILLFOCUS	Sent when a control loses the keyboard focus. The control must include the %BS_NOTIFY style.
%BN_SETFOCUS	Sent when a control receives the keyboard focus. The control must include the %BS_NOTIFY style.

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also Dynamic Dialog Tools, CONTROL ADD CHECK3STATE, CONTROL ADD OPTION, CONTROL GET CHECK, CONTROL SET CHECK, CONTROL SET COLOR, CONTROL SET FONT

CONTROL ADD COMBOBOX statement

CONTROL ADD COMBOBOX statement

Purpose Add a combo box to a dialog. A combo box is often used to allow a user to select an item from a predefined list, or enter a fresh (unlisted) item. A combo box may contain only text strings. To put numbers in a combo box, convert them to

with the FORMAT$, USING$, or STR$ functions.

Syntax **CONTROL ADD COMBOBOX, *hDlg*, *id&*, [*items$()*], *x*, *y*, *xx*, *yy* [, [*style&*] [, [*exstyle&*]]] [[,] CALL *callback*]**

hDlg Handle of the dialog in which the combo box will be created. The dialog will become the parent of the control.

id& Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate *%StockNumberList* is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers

items$() Optional dynamic (variable length) string array, containing the initial items to be displayed in the combo box. Items are copied from the array to the combo box, starting at the lowest subscript of the array (LBOUND), continuing on toward the end of the array, until an empty string is encountered, or the highest subscript is reached. If an array with an LBOUND of zero (the default) is specified, be sure that the 1st element (0) contains data.

To create a combo box that is initially empty, either omit this parameter, or specify an array whose first element contains an empty string. If the combo box uses the %CBS_SORT style, the items are sorted alphanumerically as they are added to the combo box.

x, y expressions, variables, or numeric literal values, specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.

xx	Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is around 100 dialog units.
yy	Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units.
style&	Primary style of the control.

There are three types of combo boxes: **simple**, **dropdown**, and **dropdownlist**. A **simple** combo box consists of a text box control and a list box; the list box is always displayed. A **dropdown** combo box consists of a text box control and a list box; the list box is not displayed unless the user clicks an icon. A **dropdownlist** combo box consists of a label control (not editable) and a list box; the list box is not displayed unless the user clicks an icon.

Combo box style	List box control	Text box control
Simple	No	Yes
Dropdown (default)	Yes	Yes
Dropdownlist	Yes	No

Note that some styles of combo box are mutually exclusive. In other words, you cannot combine certain styles that may conflict with one another. For example, you cannot specify %CBS_SIMPLE and %CBS_DROPDOWN at the same time.

The default combo box style comprises %CBS_DROPDOWN, %CBS_SORT, and %WS_TABSTOP. The default style is used only if both the primary and extended style parameter values are omitted from the statement. For example:

```
CONTROL ADD COMBOBOX, hDlg, id&, txt$(), 100, 100, 100, 40, , , CALL
ComboCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary combo box style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%CBS_AUTOHSCROLL	Automatically scroll the text in the text box to the right when the user types a character at the end of the line. If this style is not set, only text that fits within the rectangular boundary is allowed.
%CBS_DISABLENOSCROLL	Show a disabled vertical scroll bar in the list box when the box does not contain enough items to scroll. Without this style, the scroll bar is hidden when the list box does not contain enough items.
%CBS_DROPDOWN	Similar to %CBS_SIMPLE, except that the list box is not displayed unless the user selects the icon next to the edit control. (default)
%CBS_DROPDOWNLIST	Similar to %CBS_DROPDOWN, except that the text box is replaced by a (non-editable) label item that displays the current selection in the list box.
%CBS_HASSTRINGS	The combo box will contain strings. (persistent)
%CBS_LOWERCASE	Convert to lowercase any uppercase characters entered into the text box control portion of the combo box.
%CBS_NOINTEGRALHEIGHT	Create the list box portion of the combo box with exactly the size specified by the CONTROL ADD COMBOBOX statement. Without this style,

	Windows reduces the height of the list box portion of the combo box so that it does not display any partial (clipped) items.
%CBS_SIMPLE	Display the list box at all times. The current selection in the list box is displayed in the text box.
%CBS_SORT	Automatically sorts strings added to the combo box. (default)
%CBS_UPPERCASE	Convert any characters entered into the text box of a combo box into uppercase.
%WS_DISABLED	Create a control that is initially disabled. A disabled control cannot receive input from the user. Use the CONTROL ENABLE statement to re-enable a disabled control.
%WS_GROUP	Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group.
%WS_TABSTOP	Allow combo box control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. (default)
%WS_VSCROLL	Allow the control to display a vertical scroll bar if the list is longer than the height of the combo box. Use in conjunction with %CBS_DISABLENOSCROLL to make the scroll bar visible at all times.

Do not intermix list box styles with similarly named combo box styles as the numeric values of similar styles can produce unexpected results. For example, %LBS_SORT =&H2 and %CBS_SORT = &H100. Combo box styles are prefixed with %CBS.

exstyle& Extended style of the combo box control. The default extended combo box style comprises %WS_EX_LEFT, and %WS_EX_CLIENTEDGE. The default extended style is only used if both the primary and extended parameters are omitted from the CONTROL ADD COMBOBOX statement, in the same manner as *style&* above.

The extended combo box style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control. (default)
%WS_EX_LEFT	The control has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_TRANSPARENT	Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control

	have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.
%WS_EX_WINDOWEDGE	Apply a raised edge border to the control.

callback Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

In general, when the control Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks When the user selects an item or edits the text of a combo box, a message is sent to the Callback Function designated for the combo box. If there is no Callback Function designated then the message is sent to the callback for the dialog.

If the control callback processes the notification message, it should return TRUE (non-zero) to prevent the message being passed needlessly to the dialog callback, and eventually to the DDT engine itself.

Notification messages are sent to the Callback Function, with CB.MSG = %WM_COMMAND, CB.CTL holding the ID (id&) of the control, and CB.CTLMSG holding the following values:

%CBN_CLOSEUP	Sent when the list box of a combo box has been closed.
%CBN_DBLCLK	Sent when the user double-clicks a string in the list box of a combo box.
%CBN_DROPDOWN	Sent when the list box of a combo box is about to be made visible.
%CBN_EDITCHANGE	Sent after the user has taken an action that may have altered the text in the text box portion of a combo box. Unlike the %CBN_EDITUPDATE notification message, this notification message is sent after Windows updates the screen.
%CBN_EDITUPDATE	Sent when the text box portion of a combo box is about to display altered text. This notification message is sent after the control has formatted the text, but before it displays the text.
%CBN_ERRSPACE	Sent when a combo box cannot allocate enough memory to meet a specific request.
%CBN_KILLFOCUS	Sent when a combo box loses the keyboard focus.
%CBN_SELCHANGE	Sent when the selection in the list box of a combo box is about to be changed, as a result of the user either clicking in the list box or changing the selection by using the arrow keys.
%CBN_SELCANCEL	Sent when the user selects an item, but then selects another control or closes the dialog box. It indicates the user's initial selection is to be ignored.
%CBN_SELENDOK	Sent when the user selects a list item, or selects an item and then closes the list. It indicates that the user's selection is to be processed.
%CBN_SETFOCUS	Sent when a combo box receives the keyboard focus.

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also Dynamic Dialog Tools, COMBOBOX, CONTROL SET COLOR, CONTROL SET FONT

CONTROL ADD FRAME statement

CONTROL ADD FRAME statement

Purpose Add a frame to a dialog. This is also known as a "group" control, and is typically drawn around controls to indicate a visual association between such controls. A frame control is often used around related Option controls.

Syntax `CONTROL ADD FRAME, hDlg, id&, txt$, x, y, xx, yy [, [style&] [, [exstyle&]]]`

hDlg Handle of the dialog in which the frame will be created. The dialog will become the parent of the control.

id& Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate *%RelatedItems* is more informative than a literal value such as 497. If you will not be changing the text in a frame control after it is created, you may use -1 for the *id&*; however, best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

txt$* Text to be displayed in the frame. An ampersand (&) may be included in *txt$ to specify a hot-key. See the Remarks section below.

x, y expressions, variables, or numeric literal values, specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.

xx Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units.

yy Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 14 dialog units.

style& Primary style of the frame control. The default frame style comprises %BS_LEFT, and %BS_TOP. The default style is used only if both the primary and extended parameters are omitted from the statement. For example:

```
CONTROL ADD FRAME, hDlg, id&, txt$, 100, 100, 40, 14, , ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary frame style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%BS_CENTER	Center the text horizontally in the frame.
%BS_LEFT	Place the text on the left side of the frame. (default)
%BS_GROUPBOX	Display a frame in which other controls can be positioned to infer a "visual association" or relationship between those controls. (persistent)
%BS_MULTILINE	Wrap the caption text across multiple lines if the text

		string is too long to fit on a single line. Wrapping is not automatic, but the line wrap position can be specified by inserting a $CR (or $CRLF) character at the desired wrap position in the caption text.
	%BS_RIGHT	Place the text on the right side of the frame.
	%BS_TOP	Place the text at the top of the frame. (persistent) Note: the %BS_TOP style is persistent - the frame control does not support %BS_BOTTOM alignment.
	%WS_GROUP	Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start.
	%WS_DISABLED	Create a control that is initially disabled. A disabled frame control is displayed with grayed text.

exstyle& Extended style of the frame control. The default extended frame style comprises % WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD FRAME statement, in the same manner as *style&* above.

The extended combo box style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_LEFT	The control has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_TRANSPARENT	Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.
%WS_EX_WINDOWEDGE	Apply a raised edge border to the control.

Remarks A frame control does not send messages to its parent dialog and does not require or support a Callback.

See also Dynamic Dialog Tools, CONTROL GET TEXT, CONTROL SET COLOR, CONTROL SET FONT, CONTROL SET TEXT

CONTROL ADD HEADER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL ADD HEADER statement New!

Purpose	Add a header control to a dialog.
Syntax	`CONTROL ADD HEADER, hDlg, ID, Txt$, x, y, wide, high [,style] [,exstyle] [,CALL CallBack]`
Remarks	Handle of the dialog on which the header control will be placed. The dialog will become the parent of the control.
ID	A unique numeric identifier for this control which is specified by the programmer. It must be an integral value in the range of 1 to 65535. This ID is usually specified with a numeric equate for clarity of the code. For example, the equate %IDC_HEADER1 is more informative than a literal value such as 497. PowerBASIC recommends that identifier values should start at 100 to avoid conflict with any of the standard predefined identifiers.
Txt$	Text to associate with the Header control. A Header control does not display this text, so it is common to set this value to a null, empty string literal ("" or $NUL).
x, y	Integral expressions which specify the location of the control within the dialog client area. X is the horizontal position, and Y is the vertical position. 0,0 refers to the upper left corner of the Dialog. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.
wide, high	Integral expressions which specify the overall width and height of the header area.
style	Optional primary style of the header control. This value can be a combination of the values below, combined together with the OR operator to form a bitmask. If style is omitted, the default combination is %WS_CHILD OR %WS_VISIBLE.

%WS_CHILD	The control is a child window.
%WS_VISIBLE	The control is visible.
%WS_BORDER	Add a thin line border around the header control.

exstyle	Optional extended style of the header control.
callback	Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control. If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.
See Also	HEADER

CONTROL ADD GRAPHIC statement

CONTROL ADD GRAPHIC statement IMPROVED

Purpose	Add a static graphic control to a dialog for drawing, pictures, text, etc.

Syntax	**`CONTROL ADD GRAPHIC, hDlg, ID, Txt$, x, y, nWide, nHigh [,style] [,exstyle] [,CALL CallBack]`**
hDlg	Handle of the dialog in which the graphic control will be placed. The dialog will become the parent of the control.
ID	A unique numeric identifier for this control which is specified by the programmer. It must be an integral value in the range of 1 to 65535. This ID is usually specified with a numeric equate for clarity of the code. For example, the equate %IDC_GRAPHIC1 is more informative than a literal value such as 497. PowerBASIC recommends that identifier values should start at 100 to avoid conflict with any of the standard predefined identifiers.
Txt$	Text to associate with the Graphic control. A Graphic control does not display this text, so it is common to set this value to a null, empty string literal ("" or $NUL).
x, y	Integral expressions which specify the location of the control within the dialog client area. X is the horizontal position, and Y is the vertical position. 0,0 refers to the upper left corner of the Dialog. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.
nWide, nHigh	Integral expressions which specify the overall width and height of the image area. If you choose a style which includes a border, the client area will be slightly smaller, in order to accommodate it. You use GRAPHIC GET CLIENT to determine the exact client size available to you. The width and height are given in the same terms (pixels or dialog units) as the parent dialog.
style	Optional primary style of the image control. This value can be a combination of the values below, combined together with the OR operator to form a bitmask. If *style* is omitted, the default combination is %WS_CHILD OR %WS_VISIBLE OR %SS_OWNERDRAW.

%SS_NOTIFY	Send %STN_CLICKED and %STN_DBLCLK notification messages to the Callback Function when the user clicks or double-clicks the control.
%SS_SUNKEN	Draw a half-sunken border around the graphic control.
%WS_BORDER	Add a thin line border around the graphic control.
%WS_DLGFRAME	Create a graphic control that has a border of the style typically used with dialog boxes.

exstyle — Optional extended style of the graphic control. This value can be a combination of the values below, combined together with the OR operator to form a bitmask. If *exstyle* is omitted, there is no default extended style.

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).

callback — Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks — A graphic control is typically used with graphic statements to draw graphs, pictures, text, etc. After you create a graphic control, you would normally use GRAPHIC ATTACH to select it as the target of subsequent GRAPHIC statements. However, if there is no selected graphic target at the time of creation, the new Graphic Control is automatically attached and selected.

A graphic control will only send notification messages to a callback if the %SS_NOTIFY style is used. Notification messages are sent to the callback function with CB.MSG = %WM_COMMAND, CB.CTL holding the ID (*id&*) of the control, and CB.CTLMSG holding one of the following values:

%STN_CLICKED	Sent when the user clicks a mouse button on the graphic control (unless the image control has been disabled).
%STN_DBLCLK	Sent when the user double-clicks on a graphic control (unless the control has been disabled).
%STN_DISABLE	Sent when a graphic control has been disabled.
%STN_ENABLE	Sent when a graphic control has been enabled.

When a callback function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

All PowerBASIC graphical displays are persistent -- they will be automatically redrawn when altered or temporarily covered by another window.

See also Dynamic Dialog Tools, GRAPHIC ATTACH, GRAPHIC COLOR, GRAPHIC SCALE, GRAPHIC SET FONT, GRAPHIC STYLE, GRAPHIC WIDTH, GRAPHIC WINDOW

CONTROL ADD IMAGE statement

CONTROL ADD IMAGE statement

Purpose Add a (non-resizing) image control to a dialog. This is typically used to display a bitmap or icon stored in a resource file.

Syntax **CONTROL ADD IMAGE, *hDlg*, *id&*, *image$*, *x*, *y*, *xx*, *yy* [, [*style&*] [, [*exstyle&*]]] [[,] CALL *callback*]**

hDlg Handle of the dialog in which the image will be created. The dialog will become the parent of the control.

id& Unique identifier for the image in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate *%WizardBMP* is more informative than a literal value such as 497. If you will not be changing the image in the control after it is created, you may use -1 for the id&; however, best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

image$* Name of the bitmap or icon in the resource file. If the image resource uses an integral identifier, *image$ should begin with a Number symbol (#) followed by the identifier in an ASCII format, e.g., "#998" or FORMAT$(rcid&, "\##"). Otherwise, use the text identifier name for the image.

x, y expressions, variables, or numeric literal values, specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.

xx Integral expression, variable, or numeric literal value, specifying the width of the image. The width is given in the same terms (pixels or dialog units) as the parent dialog. This value is ignored unless the %SS_CENTERIMAGE style is specified.

yy Integral expression, variable, or numeric literal value, specifying the height of the image. The height is given in the same terms (pixels or dialog units) as the parent dialog. This value is ignored unless the %SS_CENTERIMAGE style is specified.

style& Primary style of the image control. This value can be a combination of the values below, combined together with the OR operator to form a bitmask.

In addition, the initial image format may be specified explicitly as either %SS_ICON or % SS_BITMAP, or the image format may be omitted completely.

If the image format is specified, it must match the format of the file specified in *image$*.

However, if the image format is **not** specified, PowerBASIC will examine the file to determine the correct image format to use.

%SS_BITMAP	Display only bitmap images. Also see %SS_ICON. (persistent)
%SS_CENTERIMAGE	If the image is smaller than the label, fill the rest of the label with the color of the pixel in the top left corner of the image.
%SS_ICON	Display only icon images. Also see %SS_ICON. (persistent)
%SS_NOTIFY	Send %STN_CLICKED and %STN_DBLCLK notification messages to the Callback Function when the user clicks or double-clicks the control.
%SS_SUNKEN	Draw a half-sunken border around the image control.
%WS_GROUP	Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start.

exstyle& Extended style of the image control. The default extended image control style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD IMAGE statement, in the same manner as *style&* above.

The extended image control style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_LEFT	The control has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_TRANSPARENT	Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.

callback Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

In general, when the control Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks The bitmap or icon used in the image is not resized to fit the control. If your control is 64 dialog units wide and your icon or bitmap is only 32, half of the image will be blank. For best results, icons should be 32x32 pixels.

Once an image control has been created, the images it displays can be changed with the CONTROL SET IMAGE statement, but only if the images are of the same format as the original. For example, if an image control was initially created showing a bitmap file, all subsequent image changes must also be bitmap images. However, if the image format must be changed at run-time, for example, because icons are to be displayed instead of bitmaps, there are a couple of options. For example, the application could use separate controls for each image format, or the existing control could be destroyed, and a new control created with an image of the opposite format.

An image control will only send notification messages to a callback if the %SS_NOTIFY style is used. Notification messages are sent to the Callback Function with CB.MSG = %WM_COMMAND, CB.CTL holding the ID (*id&*) of the control, and CB.CTLMSG holding the following values:

%STN_CLICKED	Sent when the user clicks a mouse button on the image control (unless the image control has been disabled).
%STN_DBLCLK	Sent when the user double-clicks on an image control (unless the control has been disabled).
%STN_DISABLE	Sent when an image control has been disabled.
%STN_ENABLE	Sent when an image control has been enabled.

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also Dynamic Dialog Tools, CONTROL ADD GRAPHIC, CONTROL ADD IMAGEX, CONTROL ADD IMGBUTTON, CONTROL ADD IMGBUTTONX, CONTROL SET IMAGE, CONTROL SET IMAGEX, CONTROL SET IMGBUTTON, CONTROL SET IMGBUTTONX

CONTROL ADD IMAGEX statement

CONTROL ADD IMAGEX statement

Purpose Add a stretched image control to a dialog. This is typically used to display bitmaps and icons, which are automatically stretched or condensed to fill the controls client area.

Syntax **CONTROL ADD IMAGEX, *hDlg*, *id&*, *image$*, *x*, *y*, *xx*, *yy* [, [*style&*] [, [*exstyle&*]]] [[,] CALL *callback*]**

hDlg Handle of the dialog in which the image will be created. The dialog will become the parent of the control.

id& Unique identifier for the image in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate *%BackgroundIMG* is more informative than a literal value such as 497. If you will not be changing the image in the control after it is created, you may use -1 for the *id&*; however, best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

image$* Name of the bitmap or icon in the resource file. If the image resource uses an integral identifier, *image$ should begin with a Number symbol (#) followed by the identifier in an ASCII format, e.g., "#998" or FORMAT$(rcid&, "\##"). Otherwise, use the text identifier name for the image.

x, y expressions, variables, or numeric literal values, specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.

xx	Integral expression, variable, or numeric literal value, specifying the width of the image. The width is given in the same terms (pixels or dialog units) as the parent dialog.
yy	Integral expression, variable, or numeric literal value, specifying the height of the image. The height is given in the same terms (pixels or dialog units) as the parent dialog.
style&	Primary style of the stretched image control. In addition to the image control styles listed below, the initial image format may be specified explicitly as either %SS_ICON or %SS_BITMAP, or you may choose not to specify the image format at all. If the image format is specified, it must match the format of the file specified in *image$*. However, if the image format is **not** specified, PowerBASIC will examine the file to determine the correct image format to use. This value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%SS_BITMAP	Display only bitmap images. Also see %SS_ICON. (persistent)
%SS_ICON	Display only icon images. Also see %SS_ICON. (persistent)
%SS_NOTIFY	Send %STN_CLICKED and %STN_DBLCLK notification messages to the Callback Function when the user clicks or double-clicks the control.
%SS_SUNKEN	Draw a half-sunken border around the image control.
%WS_GROUP	Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start.

exstyle&	Extended style of the stretched image control. The default extended image style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD IMAGEX statement, in the same manner as *style&* above. The extended stretched image style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_LEFT	The control has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_TRANSPARENT	Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.

callback	Optional name of a Callback Function that receives all %WM_COMMAND and %

WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

In general, when the control Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks The bitmap or icon used in the image is resized to fit the control. If your control is 64 dialog units wide and your icon or bitmap is only 32, it will be stretched to cover the entire control. For best results, icons should be 32x32 pixels.

An image control will only send notification messages to a callback if the %SS_NOTIFY style is used. Notification messages are sent to the Callback Function with CB.MSG = %WM_COMMAND, CB.CTL holding the ID (*id&*) of the control, and CB.CTLMSG holding the following values:

%STN_CLICKED	Sent when the user clicks a mouse button on the image control (unless the image control has been disabled).
%STN_DBLCLK	Sent when the user double-clicks on an image control (unless the control has been disabled).
%STN_DISABLE	Sent when an image control has been disabled.
%STN_ENABLE	Sent when an image control has been enabled.

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

Restrictions Under Windows 95/98/ME, an attempt to stretch an icon significantly above 64x64 may fail due to internal limits that vary between those particular versions of Windows. Bitmaps are not affected in this manner. Windows NT/2000/XP systems do not impose any comparable limitations on either icons or bitmaps.

See also Dynamic Dialog Tools, CONTROL ADD GRAPHIC, CONTROL ADD IMAGE, CONTROL ADD IMGBUTTON, CONTROL ADD IMGBUTTONX, CONTROL SET IMAGE, CONTROL SET IMAGEX, CONTROL SET IMGBUTTON, CONTROL SET IMGBUTTONX

CONTROL ADD IMGBUTTON statement

CONTROL ADD IMGBUTTON statement

Purpose Add an image button to a dialog. Image buttons are often used to enhance the appearance of a dialog.

Syntax **CONTROL ADD IMGBUTTON, *hDlg*, *id&*, *image$*, *x*, *y*, *xx*, *yy* [, [*style&*] [, [*exstyle&*]]] [[,] CALL *callback*]**

hDlg Handle of the dialog in which the button will be created. The dialog will become the parent of the control.

id& Unique identifier for the button in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate *%IconButton1* is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

However, it is typical for a dialog to include an OK and/or a Cancel button, represented by the predefined equates %IDOK and %IDCANCEL respectively. A button with an ID of %IDOK is triggered (clicked) when the ENTER key is pressed by the user, and a button with the ID of %IDCANCEL is triggered when the ESCAPE key is pressed. These and other predefined "standard" equates can be found in the WIN32API.INC and DDT.INC files.

image$	Name of the bitmap or icon in the resource file. If the image resource uses an integral identifier, *image$* should begin with a Number symbol (#) followed by the identifier in an ASCII format, e.g., "#998". Otherwise, use the text identifier name for the image.
x, y	expressions, variables, or numeric literal values, specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.
xx	Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units.
yy	Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 14 dialog units.
style&	Primary style of the image button control. The default image button style is %WS_TABSTOP. The default style is used only if both the primary and extended parameters are omitted from the statement. For example:

```
CONTROL ADD IMGBUTTON, hDlg, id&, txt$, 100, 100, 150, 200, , , _
  CALL ImgButtonCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary image button style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%BS_DEFAULT	Create the button with a heavy black border. The user can select this button by pressing the ENTER key. This style is useful for enabling the user to quickly select the most likely option. There may only be one Default button per dialog.
%BS_FLAT	Create a flat button (without the raised 3D look).
%BS_NOTIFY	Enable a button to send the %BN_KILLFOCUS and %BN_SETFOCUS notification messages to the button Callback Function.
%WS_DISABLED	Create a control that is initially disabled. A disabled control cannot receive input from the user. Use the CONTROL ENABLE statement to re-enable the button.
%WS_GROUP	Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start.
%WS_TABSTOP	Allow button control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. (default)

exstyle&	Extended style of the image button control. The default extended image button style comprises %WS_EX_LEFT. The default extended style is only used if both the primary and extended parameters are omitted from the CONTROL ADD IMGBUTTON statement, in the same manner as *style&* above. The extended image button style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_LEFT	The button has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The button has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.
%WS_EX_TRANSPARENT	Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.

callback	Optional name of a Callback Function that receives all %WM_COMMAND and % WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control. Generally speaking, if the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.
Remarks	The bitmap or icon used in the button is not resized to fit the button. If your button is 64 dialog units wide and your icon or bitmap is only 32, half of the button will be blank. For best results, icons should be 32x32 pixels. An image button is drawn on the dialog using a 3-dimensional look, unless the % BS_FLAT style is specified. When the user clicks on the image button, a message is sent to the button's Callback Function. If there is no Callback Function designated, the message is sent to the callback for the dialog. Notification messages are sent to the Callback Function with CB.MSG = % WM_COMMAND, CB.CTL holding the ID (*id&*) of the control, and CB.CTLMSG holding the following values:

%BN_CLICKED	Sent when the user clicks a mouse button, or activates the button with the hot-key (unless the button has been disabled).
%BN_DISABLE	Sent when a button is disabled.
%BN_KILLFOCUS	Sent when a button loses the keyboard focus. The button must include the %BS_NOTIFY style.
%BN_SETFOCUS	Sent when a button receives the keyboard focus. The button must include the %BS_NOTIFY style.

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also Dynamic Dialog Tools, CONTROL ADD GRAPHIC, CONTROL ADD IMAGE, CONTROL ADD IMAGEX, CONTROL ADD IMGBUTTONX, CONTROL SET IMAGE, CONTROL SET IMAGEX, CONTROL SET IMGBUTTON, CONTROL SET IMGBUTTONX

CONTROL ADD IMGBUTTONX statement

CONTROL ADD IMGBUTTONX statement

Purpose Add a stretched image button to a dialog. Stretched image buttons are often used to enhance the appearance of a dialog, with the image being automatically stretched or condensed to fill the control.

Syntax `CONTROL ADD IMGBUTTONX, hDlg, id&, image$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]`

hDlg Handle of the dialog in which the button will be created. The dialog will become the parent of the control.

id& Unique identifier for the button in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate *%IconButton2* is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

However, it is typical for a dialog to include an OK and/or a Cancel button, represented by the predefined equates %IDOK and %IDCANCEL respectively. A button with an ID of %IDOK is triggered (clicked) when the ENTER key is pressed by the user, and a button with the ID of %IDCANCEL is triggered when the ESCAPE key is pressed. These and other predefined "standard" equates can be found in the WIN32API.INC and DDT.INC files.

image$* Name of the bitmap or icon in the resource file. If the image resource uses an integral identifier, *image$ should begin with a Number symbol (#) followed by the identifier in an ASCII format, e.g., "#998". Otherwise, use the text identifier name for the image.

x, y expressions, variables, or numeric literal values, specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.

xx Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units.

yy Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 14 dialog units.

style& Primary style of the stretched image button. The default image button style is %WS_TABSTOP. The default style is used if both the primary and extended style parameters are omitted from the statement. For example:

```
CONTROL ADD IMGBUTTONX, hDlg, id&, txt$, 100, 100, 150, 200, , , _
  CALL ImgButtonxCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary stretched image button style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%BS_DEFAULT	Create the button with a heavy black border. The user can select this button by pressing the ENTER key. This style is useful for enabling the user to quickly select the most likely option. There may only be one Default button per dialog.
%BS_FLAT	Create a flat button (without the raised 3D look).

%BS_NOTIFY	Enable a button to send the %BN_KILLFOCUS and %BN_SETFOCUS notification messages to the button Callback Function.
%WS_DISABLED	Create a control that is initially disabled. A disabled control cannot receive input from the user. Use the CONTROL ENABLE statement to re-enable the button.
%WS_GROUP	Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start.
%WS_TABSTOP	Allow button control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. (default)

exstyle& Extended style of the stretched image button control. The default extended button style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD IMGBUTTONX statement, in the same manner as *style&* above.

The extended stretched image style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_LEFT	The button has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The button has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.
%WS_EX_TRANSPARENT	Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.

callback Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks The bitmap or icon used in the button is resized to fit the button. If your button is 64 dialog units wide and your icon or bitmap is only 32, it will be stretched to cover the entire button. For best results, icons should be 32x32 pixels.

The image button is drawn on the dialog using a 3-dimensional look, unless the %BS_FLAT style is specified. When the user clicks a button, a message is sent to the

Callback Function designated for the button. If there is no Callback Function designated, the message is sent to the callback for the dialog.

Notification messages are sent to the Callback Function with CB.MSG = %WM_COMMAND, CB.CTL holding the ID (*id&*) of the control, and CB.CTLMSG holding the following values:

%BN_CLICKED	Sent when the user clicks a mouse button, or activates the button with the hot-key (unless the button has been disabled).
%BN_DISABLE	Sent when a button is disabled.
%BN_KILLFOCUS	Sent when a button loses the keyboard focus. The button must include the %BS_NOTIFY style.
%BN_SETFOCUS	Sent when a button receives the keyboard focus. The button must include the %BS_NOTIFY style.

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also Dynamic Dialog Tools, CONTROL ADD GRAPHIC, CONTROL ADD IMAGE, CONTROL ADD IMAGEX, CONTROL ADD IMGBUTTON, CONTROL SET IMAGE, CONTROL SET IMAGEX, CONTROL SET IMGBUTTON, CONTROL SET IMGBUTTONX

CONTROL ADD LABEL statement

CONTROL ADD LABEL statement

Purpose Add a text label to a dialog. A text label is similar to a conventional static control.

Syntax **`CONTROL ADD LABEL, hDlg, id&, txt$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]`**

hDlg Handle of the dialog in which the label will be created. The dialog will become the parent of the control.

id& Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate *%BlockTitle* is more informative than a literal value such as 497. If you will not be changing the text in a line control after it is created, you may use -1 for the *id&*; however, best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

txt$* Text to be displayed in text label. An ampersand (&) may be included in *txt$ to specify a hot-key. See the Remarks section below.

x, y expressions, variables, or numeric literal values, specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.

xx Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units.

yy Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 8 dialog units.

style& Primary style of the label control. The default label style is %SS_LEFT. The default style is used if both the primary and extended style parameters are omitted from the statement. For example:

```
CONTROL ADD LABEL, hDlg, id&, txt$, 100, 100, 150, 200, , , _
  CALL LabelCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary label style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%SS_CENTER	Horizontally center the caption text. The text is formatted before it is displayed. Words that extend past the end of a line are automatically wrapped to the beginning of the next centered line.
%SS_CENTERIMAGE	Vertically center the caption text. The text is not wrapped even if it extends beyond the width of the control.
%SS_ENDELLIPSIS	Replace the end of the given with ellipsis as needed to fit the result in the specified rectangle. Windows NT/2000/XP only.
%SS_ETCHEDFRAME	Draw the frame of the control using an etched edge style.
%SS_ETCHEDHORZ	Draw the horizontal edges of the control using an etched edge style.
%SS_ETCHEDVERT	Draw the vertical edges of the control using an etched edge style.
%SS_LEFT	Left-align the given text. The text is formatted before it is displayed. Words that extend past the end of a line are automatically wrapped to the beginning of the next left-aligned line. (default)
%SS_NOPREFIX	Prevent interpretation of ampersand (&) characters in the label text as control accelerator prefix characters. These are normally displayed with the ampersand removed and the next character in the string underscored.
%SS_NOTIFY	Send %STN_CLICKED and %STN_DBLCLK notification messages to the Callback Function when the user clicks or double-clicks the control.
%SS_NOWORDWRAP	Left-align the given text. Tabs are expanded but words are not wrapped. Text that extends past the end of a line is clipped.
%SS_PATHELLIPSIS	Replace the file path portion of the given string with ellipsis as needed to fit the result in the specified rectangle. Windows 2000/XP only.
%SS_RIGHT	Right-align the given text. The text is formatted before it is displayed. Words that extend past the end of a line are automatically wrapped to the beginning of the next right-aligned line.
%SS_SIMPLE	The caption text is left-aligned. If the control is colored, color is only applied to the region containing the caption text, and the remainder of the control is drawn in standard colors.
%SS_SUNKEN	Draw a half-sunken border around the label control.
%SS_WORDELLIPSIS	Truncate text that does not fit, adding ellipsis as needed. Windows NT/2000/XP only
%WS_GROUP	Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style.

	The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group.

exstyle& Extended style of the label control. The default extended label style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD LABEL statement, in the same manner as *style&* above.

The extended label style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_LEFT	The control has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_TRANSPARENT	Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.
%WS_EX_WINDOWEDGE	Apply a raised edge border to the control.

callback Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks If the ampersand (&) character appears in the *txt$* parameter, the letter that follows will be displayed underscored. This adds a control accelerator (hot-key) to enable the user to directly "click" the control that immediately follows in the Tab-Order after the Label control, simply by pressing and holding the ALT key while pressing the specified hot-key. For example, "Choose &Security Level" makes ALT+S the hot-key.

A label control will only send messages to a callback if the %SS_NOTIFY style is used. The following notifications are sent to the Callback Function:

%STN_CLICKED	Sent when the user clicks a mouse button, or activates the button with the hot-key (unless the button has been disabled).
%STN_DBLCLK	Sent when the user double-clicks on a label control (unless the control has been disabled).
%STN_DISABLE	Sent when a button is disabled.
%STN_ENABLE	Sent when a label control has been enabled.

Use the CONTROL SET TEXT statement to change the text in a label control and CONTROL SET FONT to change the font used in a label control. This is only possible if the label has a unique ID value (i.e., id& should not be -1).

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also Dynamic Dialog Tools, CONTROL GET TEXT, CONTROL SET COLOR, CONTROL SET FONT, CONTROL SET TEXT

CONTROL ADD LINE statement

CONTROL ADD LINE statement

Purpose Add a line control to a dialog. A line control may also be a rectangle (empty or filled).

Syntax
```
CONTROL ADD LINE, hDlg, id&, txt$, x, y, xx, yy [, [style&] [,
[exstyle&]]] [[,] CALL callback]
```

hDlg Handle of the dialog in which the line will be created. The dialog will become the parent of the control.

id& Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate *%SeparatorLeft* is more informative than a literal value such as 497. If you will not be changing the size or location of a line control after it is created, you may use -1 for the id. Otherwise, best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

txt$* Text to associate with the line control. A line control does not display text, so it is possible to use this string for your own purposes; however, an ampersand (&) may be included in *txt$ to specify a hot-key. See the Remarks section below.

x, y expressions, variables, or numeric literal values, specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.

xx Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units.

yy Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 1 dialog unit.

style& Primary style of the line control. The default line style is %SS_ETCHEDFRAME. The default style is used if both the primary and extended style parameters are omitted from the statement. For example:

```
CONTROL ADD LINE, hDlg, id&, "", 100, 100, 150, 1, , , CALL
LineCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary line style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%SS_BLACKFRAME	Draw a box with the frame drawn in the same color as the window frames. This color is black in the default Windows color scheme.
%SS_BLACKRECT	Draw a rectangle filled with the current window frame color. This color is black in the default Windows color scheme.
%SS_ETCHEDFRAME	Draw the frame of the control using an etched edge

	style. (default)
%SS_ETCHEDHORZ	Draw the horizontal edges of the control using an etched edge style.
%SS_ETCHEDVERT	Draw the vertical edges of the control using an etched edge style.
%SS_GRAYFRAME	Draw a box with the frame drawn with the same color as the screen background (desktop). This color is gray in the default Windows color scheme.
%SS_GRAYRECT	Draw a rectangle filled with the current screen background color. This color is gray in the default Windows color scheme.
%SS_NOPREFIX	Prevent interpretation of any ampersand (&) characters in the control's text as a control accelerator prefix characters. These normally are displayed with the ampersand removed and the next character in the string underscored.
%SS_NOTIFY	Sends %STN_CLICKED and %STN_DBLCLK notification messages to the line controls Callback Function when the user clicks or double-clicks the line control.
%SS_RIGHTJUST	Force the bottom-right corner of the control to remain fixed when the control is resized. Only the top and left sides are adjusted to accommodate a new image.
%SS_WHITEFRAME	Draw a box with the frame drawn with the same color as the window backgrounds. This color is white in the default Windows color scheme.
%SS_WHITERECT	Draw a rectangle filled with the current window background color. This color is white in the default Windows color scheme.

exstyle& Extended style of the line control. The default extended line style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD LINE statement, in the same manner as *style&* above.

The extended line control style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_LEFT	The control has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_TRANSPARENT	Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.
%WS_EX_WINDOWEDGE	Apply a raised edge border to the control.

callback Optional name of a Callback Function that receives all %WM_COMMAND and %

WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control. The Callback Function will only receive messages if the %SS_NOTIFY style is used.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks

If the ampersand (&) character appears in the *txt$* parameter, the letter that follows will be displayed underscored. This adds a control accelerator (hot-key) to enable the user to directly "click" the control that immediately follows in the Tab-Order after the Line control, simply by pressing and holding the ALT key while pressing the specified hot-key. For example, "&Test Suite " makes ALT+T the hot-key.

A line control will only send messages to a callback if the %SS_NOTIFY style is used. The following notifications are sent to the Callback Function:

%STN_CLICKED	Sent when the user clicks a line control (unless the control has been disabled).
%STN_DBLCLK	Sent when the user double-clicks a line control (unless the control has been disabled).
%STN_DISABLE	Sent when a line control has been disabled.
%STN_ENABLE	Sent when a line control has been enabled.

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also

Dynamic Dialog Tools, CONTROL HANDLE, CONTROL SEND

CONTROL ADD LISTBOX statement

CONTROL ADD LISTBOX statement

Purpose

Add a list box control to a dialog. A list box contains a set of predefined entries that permit a user to select one or more items. A list box may contain

, images, or both. To put numbers in a list box, convert them to strings with the FORMAT$, USING$, or STR$ functions.

Syntax

CONTROL ADD LISTBOX, *hDlg*, *id&*, [*items$()*], *x*, *y*, *xx*, *yy* [, [*style&*] [, [*exstyle&*]]] [[,] CALL *callback*]

hDlg

Handle of the dialog in which the list box will be created. The dialog will become the parent of the control.

id&

Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate %PickList is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

items$()

Optional dynamic (variable length) string array containing the initial items to be displayed in the list box. Items are copied from the array to the list box, starting at the lowest subscript of the array (LBOUND), continuing on toward the end of the array until an empty string is encountered, or the highest subscript is reached. If an array with an LBOUND of zero (the default) is specified, be sure that the 1st element (0) contains data. Also see Restrictions below.

To create a list box that is initially empty, either omit this parameter, or specify an array whose first element contains an empty string. If the list box uses the %LBS_SORT style, the items are sorted alphanumerically as they are added to the list box.

x, y	expressions, variables, or numeric literal values, specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.
xx	Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 100 dialog units.
yy	Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units.

style&

Primary style of the list box control. The default list box style comprises %LBS_SORT, %LBS_NOTIFY, %WS_TABSTOP, and %WS_VSCROLL (along with the %WS_EX_CLIENTEDGE extended style). The default list box style is used if both the primary and extended style parameters are omitted from the statement. For example:

```
CONTROL ADD LISTBOX, hDlg, id&, items$(), 100, 100, 150, 200, , , _
  CALL ListboxCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary list box style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%LBS_DISABLENOSCROLL	Show a disabled vertical scroll bar in the list box when the box does not contain enough items to scroll. Without this style, the scroll bar is hidden when the list box does not contain enough items. Used in conjunction with the %WS_VSCROLL style.
%LBS_EXTENDEDSEL	Allow selection of multiple items in the list box by using the SHIFT key with mouse and/or keyboard actions.
%LBS_MULTICOLUMN	List box has multiple columns, and can be scrolled horizontally. To set the width, send the %LB_SETCOLUMNWIDTH message to the list box control.
%LBS_MULTIPLESEL	Allow selection of multiple items in the list box (without needing to use the SHIFT key) with mouse and/or keyboard actions.
%LBS_NOINTEGRALHEIGHT	Force the size of the list box to be exactly the size specified when the control is created. Otherwise, Windows may resize the list box to ensure that items are not partially displayed (clipped).
%LBS_NOSEL	The list box can contain items that can be viewed but not selected.
%LBS_NOTIFY	Send the callback a message whenever the user clicks or double-clicks a string in the list box.
%LBS_SORT	Automatically sort strings added to the list box in alphanumeric order.
%LBS_STANDARD	Equivalent to the combination of %LBS_SORT, %LBS_NOTIFY, %WS_VSCROLL and %WS_BORDER styles.
%LBS_USETABSTOPS	Expand tab (TAB, CHR(9)) characters. The default tab positions are for every 32 dialog units. To change the tab stop positions, send the %LB_SETTABSTOPS message to the list box control.
%WS_DISABLED	Create a control that is initially disabled. A disabled control cannot receive input from the user.

%WS_HSCROLL	Allow the control to display a horizontal scroll bar. By default this is disabled unless the controls horizontal scroll width has been configured by sending a %LB_SETHORIZONTALEXTENT message to the control. Use in conjunction with %LBS_DISABLENOSCROLL to make the scroll bar(s) visible at all times.
%WS_GROUP	Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group.
%WS_TABSTOP	Allow the control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. (default)
%WS_VSCROLL	Allow the control to display a vertical scroll bar if the list is longer than the height of the list box. Use in conjunction with %LBS_DISABLENOSCROLL to make the scroll bar(s) visible at all times.

Do not intermix list box styles with similarly named combo box styles as the numeric values of similar styles can produce unexpected results. For example, %LBS_SORT =&H2 and %CBS_SORT = &H100. List box styles are prefixed with %LBS.

exstyle&

Extended style of the list box control. The default extended list box style comprises %WS_EX_CLIENTEDGE, and %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD LISTBOX statement, in the same manner as *style&* above.

The extended list box style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_LEFT	The control has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_TRANSPARENT	Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.
%WS_EX_WINDOWEDGE	Apply a raised edge border to the control.

callback

Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks The following notifications are sent to the Callback Function:

%LBN_DBLCLK	Sent when the user double-clicks a string in the list portion of a list box.
%LBN_ERRSPACE	Sent when a list box cannot allocate enough memory to meet a specific request.
%LBN_KILLFOCUS	Sent when a list box loses the keyboard focus.
%LBN_SELCANCEL	Sent when the user selects an item, but then selects another control or closes the dialog box. It indicates the user's initial selection is to be ignored.
%LBN_SELCHANGE	Sent when the selection in the list box is about to be changed as a result of the user either clicking in the list box or changing the selection by using the arrow keys.
%LBN_SETFOCUS	Sent when a list box receives the keyboard focus.

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,736 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL SET COLOR, CONTROL SET FONT, LISTBOX

CONTROL ADD LISTVIEW statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL ADD LISTVIEW statement

Purpose Add a ListView control to a dialog. A ListView displays a set of predefined data items in one or more columns. The user may then view the items, selecting one or more of them for use in the program at a later time.

Syntax `CONTROL ADD LISTVIEW, hDlg, id&, txt$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]`

hDlg Handle of the dialog in which the ListView will be created. The dialog will become the parent of the control.

id& Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate %PickList is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

txt$ Text to associate with the ListView control. A ListView control does not display this text, so it is common to set this value to a null, empty string literal ("").

x,y expressions, variables, or numeric literal values specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.

xx,yy — Integral expressions, variable, or numeric literal values, specifying the width and height of the control. *xx* is the width and *yy* is the height, given in the same terms (pixels or dialog units) as the parent dialog.

style& — Primary style of the ListView control. The default ListView style comprises %WS_TABSTOP, %LVS_REPORT, and %LVS_SHOWSELALWAYS. This default ListView style is used if the style parameters are omitted from the statement, as in the following example:

```
CONTROL ADD LISTVIEW, hDlg, id&, "", 100, 100, 150, 200, , , CALL
LVCallback()
```

If you include explicit style values, they replace the default values. That is, they are not added to the default styles values - your code must specify all necessary primary and extended style parameters.

The primary ListView style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%LVS_ALIGNLEFT	Items are left-aligned in icon and small icon view.
%LVS_ALIGNTOP	Items are aligned with the top of the control in icon and small icon view.
%LVS_AUTOARRANGE	Icons are automatically kept arranged.
%LVS_EDITLABELS	Item text can be edited by the user. The parent window must process notification messages.
%LVS_ICON	This style specifies icon view.
%LVS_LIST	This style specifies list view.
%LVS_NOCOLUMNHEADER	In report view, there are no headers on the columns.
%LVS_NOLABELWRAP	Item text is displayed on a single line in icon view.
%LVS_NOSCROLL	No scroll bars are provided. Incompatible with list view and report view.
%LVS_NOSORTHEADER	Report view column headers are flat, not like buttons. User can not click on the header to generate a column click notification.
%LVS_OWNERDATA	This style specifies a virtual ListView control.
%LVS_OWNERDRAWFIXED	The owner window can paint items in report view.
%LVS_REPORT	This style specifies report view. The first column is always left-aligned and columns have headers.
%LVS_SHAREIMAGELISTS	The image list will not be deleted when the control is destroyed.
%LVS_SHOWSELALWAYS	Selections are always shown, even without the focus.
%LVS_SINGLESEL	Only one item at a time can be selected. By default, multiple items may be selected.
%LVS_SMALLICON	This style specifies small icon view.
%LVS_SORTASCENDING	Item indexes are sorted as added in ascending order.
%LVS_SORTDESCENDING	Item indexes are sorted as added in descending order.
%WS_DISABLED	Create a control that is initially disabled. A disabled control cannot receive input from the user.
%WS_GROUP	Define the start of a group of controls. The first

		control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group.
	%WS_TABSTOP	Allow the control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP.

exstyle& Extended style of the ListView control. The default extended style is %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD LISTVIEW statement, in the same manner as *style&* above.

The extended ListView style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_LEFT	The control has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_TRANSPARENT	Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.
%WS_EX_WINDOWEDGE	Apply a raised edge border to the control.

callback Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification messages.

See also Dynamic Dialog Tools, CONTROL SET COLOR, CONTROL SET FONT, HEADER, LISTVIEW

CONTROL ADD OPTION statement

CONTROL ADD OPTION statement

Purpose Add an option button to a dialog. An option button is just like a conventional "radio button" control.

Syntax **CONTROL ADD OPTION, *hDlg*, *id&*, *txt$*, *x*, *y*, *xx*, *yy* [, [*style&*] [, [*exstyle&*]]] [[,] CALL *callback*]**

hDlg Handle of the dialog in which the option button will be created. The dialog will become the parent of the control.

id& Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate *%DefCon5* is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

txt$* Text to be displayed next to the option button. An ampersand (&) may be included in *txt$ to specify a hot-key. See the Remarks section below.

x, y expressions, variables, or numeric literal values, specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.

xx Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 40 dialog units.

yy Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 14 dialog units.

style& Primary style of the option button control. The default option button styles are %WS_TABSTOP, %BS_LEFT, and %BS_VCENTER. The default styles are used if both the primary and extended style parameters are omitted from the statement. For example:

```
CONTROL ADD OPTION, hDlg, id&, txt$, 100, 100, 150, 200, , , _
  CALL OptionButtonCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not in addition to the default style values - your code must specify all necessary primary and extended style parameters.

The primary option button style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%BS_BOTTOM	Place the text at the bottom of the control.
%BS_CENTER	Center the text horizontally in the control.
%BS_LEFT	Place the text on the left side of the control. Also see %BS_LEFTTEXT. (default)
%BS_LEFTTEXT	Place the option button to the right of the text portion of the control. Combine with %BS_RIGHT to right-align text against the left side of the option button.
%BS_MULTILINE	Wrap the caption text across multiple lines, if the text string is too long to fit on a single line. To force a wrap, insert a $CR (or $CRLF) into the caption text at the desired wrap position.
%BS_NOTIFY	Enable the %BN_KILLFOCUS and %BN_SETFOCUS notification messages for the option button.
%BS_PUSHLIKE	Button state alternates (toggles) between normal (raised) and depressed (sunken) modes.
%BS_RIGHT	Place the text on the right side of the control. Also see %BS_LEFTTEXT.
%BS_TOP	Place the text at the top of the control.
%BS_VCENTER	Center the text vertically in the control. (default)

%WS_DISABLED	Create a control that is initially disabled. A disabled control cannot receive input from the user.
%WS_GROUP	Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group. Groups configured this way permit the arrow keys to shift focus between the controls within the group, and focus can jump from group to group with the usual TAB and SHIFT+TAB keys. Both tab stops and groups are permitted to wrap from the end of the tab order back to the start.
%WS_TABSTOP	Allow the option control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. (default)

exstyle& Extended style of the option button control. The default extended option button style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended style parameters are omitted from the CONTROL ADD OPTION statement completely, in the same manner as *style&* above.

The extended option button style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_LEFT	The control has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_TRANSPARENT	Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.
%WS_EX_WINDOWEDGE	Apply a raised edge border to the control.

callback Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks Option buttons are used for presenting a list of choices, only one of which may be selected. So, there is no point in having just a single option button. If what you want is to allow turning a single item on or off, use a Checkbox instead.

When a group of option buttons are created, you should explicitly set the "selected" and "unselected" state of all option buttons, using the CONTROL SET OPTION statement to set the Check State of all the buttons in the group.

In addition, the first OPTION control in a group should have the style %WS_GROUP (to mark the beginning of a group of buttons) and %WS_TABSTOP. The remainder of the OPTION controls in the group should not have %WS_GROUP or %WS_TABSTOP styles. However, the very next non-OPTION control to appear in the tab order after the group should be given the %WS_GROUP and %WS_TABSTOP styles (the latter may depend on the type of control it is). If there are no other controls after the group, add % WS_GROUP to the first control in the dialog. This ensures that keyboard navigation with the arrow keys will operate within the group of OPTION controls, and that the TAB and SHIFT+TAB keys will switch focus between whole groups of controls (instead of individual controls as is common when each group member has the %WS_TABSTOP style).

If the ampersand (&) character appears in the *txt$* parameter, the letter that follows will be displayed underscored. This adds a control accelerator (hot-key) to enable the user to directly select the Option control, simply by pressing and holding the ALT key while pressing the specified hot-key. For example, "Level &3" makes ALT+3 the hot-key.

When the user clicks an option button, a message is sent to the Callback Function designated for the control. If there is no Callback Function designated then the message is sent to the callback for the dialog.

The following notifications are sent to the Callback Function:

%BN_CLICKED	Sent when the user clicks a mouse button, or activates the button with the hot-key (unless the button has been disabled).
%BN_KILLFOCUS	Sent then the option button loses keyboard focus, provided the button has the %BS_NOTIFY style.
%BN_SETFOCUS	Sent when the option button receives keyboard focus, provided the option button has the %BS_NOTIFY style.

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

See also Dynamic Dialog Tools, CONTROL ADD CHECK3STATE, CONTROL ADD CHECKBOX, CONTROL GET CHECK, CONTROL SET COLOR, CONTROL SET FONT, CONTROL SET OPTION

Example Refer to the example in the CONTROL SET OPTION topic.

CONTROL ADD PROGRESSBAR statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL ADD PROGRESSBAR statement

Purpose Add a ProgressBar control to a dialog. A ProgressBar is a rectangle that is gradually filled, left to right, as some work progresses.

Syntax **CONTROL ADD PROGRESSBAR, *hDlg*, *id&*, *txt$*, *x*, *y*, *xx*, *yy* [, [*style&*] [, [*exstyle&*]]] [[,] CALL *callback*]**

hDlg Handle of the dialog in which the ProgressBar will be created. The dialog will become the

	parent of the control.
id&	Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate %PickList is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.
txt$	Text to associate with the ProgressBar control. A ProgressBar control does not display this text, so it is common to set this value to a null, empty string literal ("").
x,y	expressions, variables, or numeric literal values specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.
xx,yy	Integral expressions, variable, or numeric literal values, specifying the width and height of the control. *xx* is the width and *yy* is the height, given in the same terms (pixels or dialog units) as the parent dialog.

style&

Primary style of the ProgressBar control. The default ProgressBar style is %WS_BORDER. This default style is used if both the primary and extended style parameters are omitted from the statement, as in the following example:

```
CONTROL ADD PROGRESSBAR, hDlg, id&, "",90,90,90,20, , , CALL
PBCallback()
```

If you include explicit style values, they replace the default values. That is, they are not added to the default styles values - your code must specify all necessary primary and extended style parameters.

The primary style value can be a combination of the standard window values, and the values specific to a ProgressBar (below), which are combined together with the OR operator to form a bitmask:

%PBS_SMOOTH	The bar is smooth rather than segmented.
%PBS_VERTICAL	The control is advanced vertically.

exstyle&

Extended style of the control. The value can be a combination of the values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_WINDOWEDGE	Apply a raised edge border to the control.

callback

Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification messages.

See also

Dynamic Dialog Tools, CONTROL SET COLOR, PROGRESSBAR

CONTROL ADD SCROLLBAR statement

CONTROL ADD SCROLLBAR statement

Purpose	Add a scroll bar control to a dialog. A scroll bar allows the user to scroll information left and right, or up and down. Your program, in response to notification messages from the scroll bar control, must do the actual scrolling itself.
Syntax	**`CONTROL ADD SCROLLBAR, hDlg, id&, txt$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]`**
hDlg	Handle of the dialog in which the scroll bar will be created. The dialog will become the parent of the control.
id&	Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate *%ReportScrollUpDown* is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.
txt$	Text to associate with the scroll bar. A scroll bar control does not display text, so it is possible to use this for your own purposes; however, an ampersand (&) may be included in *txt$* to specify a (hidden) hot-key. See the Remarks section below. Typically, this parameter is specified as an empty string ("") or a $NUL string equate.
x, y	expressions, variables, or numeric literal values, specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.
xx	Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 10 dialog units.
yy	Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 11 dialog units.
style&	Primary style of the scroll bar control. The default scroll bar style is %SBS_HORZ; however, if the width is less than the height, the control is automatically switched to %SBS_VERT, regardless of whether %SBS_HORZ is specified or not. If %SBS_VERT is specified, the control will always be created as a vertical scroll bar regardless of the dimensions of the control. The default style is used if both the primary and extended style parameters are omitted from the statement. For example:

```
CONTROL ADD SCROLLBAR, hDlg, id&, txt$, 100, 100, 150, 14, , , _
  CALL Scrollbar1Callback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary scroll bar style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%SBS_BOTTOMALIGN	Align the bottom edge of the scroll bar with the bottom edge of the dialog, and use the default height of system scroll bars. Used with %SBS_HORZ.
%SBS_HORZ	Make the control a horizontal scroll bar (default - see style& above).
%SBS_LEFTALIGN	Align the left edge of the scroll bar with the left edge of the dialog, and use the default width of system scroll bars. Used with %SBS_VERT.
%SBS_RIGHTALIGN	Align the right edge of the scroll bar with the right edge of the dialog, and use the default width of system scroll

	bars. Used with %SBS_VERT.
%SBS_TOPALIGN	Align the top edge of the scroll bar with the top edge of the window, and use the default height of system scroll bars. Used with %SBS_HORZ.
%SBS_VERT	Make the control a vertical scroll bar (see style& above).
%WS_DISABLED	Create a control that is initially disabled. A disabled control cannot receive input from the user.
%WS_GROUP	Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group.
%WS_TABSTOP	Allow the scrollbar control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP.

exstyle& Extended style of the scroll bar control. The default extended scroll bar style comprises %WS_EX_LEFT. The default extended style is used if both the primary and extended style parameters are omitted from the CONTROL ADD SCROLLBAR statement, in the same manner as *style&* above.

The extended scroll bar style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_LEFT	The control has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_WINDOWEDGE	Apply a raised edge border to the control.

callback Optional name of a Callback Function that receives all %WM_COMMAND and % WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE non-zero) if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages automatically.

Remarks If the ampersand (&) character appears in the *txt$* parameter, the letter that follows will become a control accelerator (hot-key) to enable the user to directly select the scroll bar control, simply by pressing and holding the ALT key while pressing the specified hot-key. For example, "&9" makes ALT+9 the hot-key. The actual text in *txt$* is not displayed in a scroll bar control.

When the user clicks on a scroll bar, drags the thumb (also called the scroll box), or initiates a scroll event with the keyboard, a message is sent to the Callback Function designated for the control. If there is no Callback Function designated, the message is sent to the callback for the dialog.

The following notifications are sent to the Callback Function:

%WM_HSCROLL	Sent when the user adjusts a horizontal scroll bar.

%WM_VSCROLL	Sent when the user adjusts a vertical scroll bar.

When a Callback Function receives a %WM_HSCROLL or %WM_VSCROLL message, it should retrieve and set the scroll bar control settings through the GetScrollInfo API and SCROLLBAR SET POS function calls. Be sure to use the %SB_CTL flag with these API functions, rather than the %SB_HORZ or %SB_VERT flags.

See also Dynamic Dialog Tools, CONTROL HANDLE, CONTROL SEND, CONTROL SET COLOR, SCROLLBAR

CONTROL ADD STATUSBAR statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL ADD STATUSBAR statement

Purpose Add a StatusBar control to a dialog. A StatusBar is a horizontal window, typically at the bottom of a dialog client area, which displays various kinds of status information. It can be divided into parts to display multiple items.

Syntax **CONTROL ADD STATUSBAR, *hDlg*, *id&*, *txt$*, *x*, *y*, *xx*, *yy* [, [*style&*] [, [*exstyle&*]]] [[,] CALL *callback*]**

hDlg Handle of the dialog in which the StatusBar will be created. The dialog will become the parent of the control.

id& Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate %PickList is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

txt$ Text to initially display in the StatusBar control.

x,y expressions to specify control location. In the case of a StatusBar, location parameters are ignored since the control is placed on the top or the bottom of the dialog, based upon the chosen style. These location parameters are usually defined as 0, 0.

xx,yy Integral expressions to specify control size. In the case of a ToolBar, size parameters are ignored since the control is created with a default size. These size parameters are usually defined as 0, 0.

style& Primary style of the StatusBar control. The default StatusBar style is %CCS_BOTTOM. This default style is used if both the primary and extended style parameters are omitted from the statement, as in the following example:

```
CONTROL ADD STATUSBAR, hDlg, id&, "", 5, 5, 5, 5, , , CALL SBCallback()
```

If you include explicit style values, they replace the default values. That is, they are not added to the default styles values - your code must specify all necessary primary and extended style parameters.

%CCS_TOP	The StatusBar is placed at the top of the dialog.
%CCS_BOTTOM	The StatusBar is placed at the bottom of the dialog.

%SBARS_SIZEGRIP	A sizegrip is added to the StatusBar.
%SBARS_TOOLTIPS	Use this style to enable tooltips.

exstyle& Extended style of the StatusBar control. The extended StatusBar style value can be a combination of the values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_WINDOWEDGE	Apply a raised edge border to the control.

callback Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification messages.

See also Dynamic Dialog Tools, CONTROL SET FONT, STATUSBAR

CONTROL ADD TAB statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL ADD TAB statement

Purpose Add a Tab Control to a dialog. A Tab Control is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab.

Syntax `CONTROL ADD TAB, hDlg, id&, txt$, x, y, xx, yy [, [style&] [, [exstyle&]]] [[,] CALL callback]`

hDlg Handle of the dialog in which the Tab Control will be created. The dialog will become the parent of the control.

id& Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate %PickList is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

txt$ Text to associate with the Tab Control. A Tab Control does not display this text, so it is common to set this value to a null, empty string literal ("").

x,y expressions, variables, or numeric literal values specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.

xx,yy — Integral expressions, variable, or numeric literal values, specifying the width and height of the control. *xx* is the width and *yy* is the height, given in the same terms (pixels or dialog units) as the parent dialog.

style& — Primary style of the Tab control. The default Tab style is %WS_CHILD and %WS_TABSTOP. This default style is used if both the primary and extended style parameters are omitted from the statement, as in the following example:

```
CONTROL ADD TAB, hDlg, id&, "",90,90,200,90, , , CALL PBCallback()
```

If you include explicit style values, they replace the default values. That is, they are not added to the default styles values - your code must specify all necessary primary and extended style parameters.

The primary style value can be a combination of the standard window values, and the values specific to a Tab Control (below), which are combined together with the OR operator to form a bitmask:

%TCS_FORCEICONLEFT	Icons are forced to the left
%TCS_FORCELABELLEFT	Labels are forced to the left
%TCS_FIXEDWIDTH	All tabs are the same size
%TCS_RAGGEDRIGHT	Tabs are not stretched
%TCS_FOCUSONBUTTONDOWN	Tabs receive the focus when clicked
%TCS_OWNERDRAWFIXED	Parent window is responsible for drawing tabs
%TCS_TOOLTIPS	A Tooltip control is associated with the control
%TCS_FOCUSNEVER	Tab never receives the focus

exstyle& — Extended style of the control. The value can be a combination of the values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_WINDOWEDGE	Apply a raised edge border to the control.

callback — Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks — When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification messages.

See also — Dynamic Dialog Tools, CONTROL SET FONT, TAB

CONTROL ADD TEXTBOX statement

CONTROL ADD TEXTBOX statement

Purpose — Add a text box control to a dialog. A text box is very similar to a conventional edit control, and it is used to enter text into an application. Text boxes support single-line and multiple-line input.

Syntax	**CONTROL ADD TEXTBOX, *hDlg*, *id&*, *txt$*, *x*, *y*, *xx*, *yy* [, [*style&*] [, [*exstyle&*]]] [[,] CALL *callback*]**
hDlg	Handle of the dialog in which the text box will be created. The dialog will become the parent of the control.
id&	Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate *%CustomerName* is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.
txt$	Default text to be displayed in text box. txt$ may be a , string equate, or string expression. *txt$* can be empty if there is no default text.
x, y	expressions, variables, or numeric literal values, specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.
xx	Integral expression, variable, or numeric literal value, specifying the width of the control. The width is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 100 dialog units.
yy	Integral expression, variable, or numeric literal value, specifying the height of the control. The height is given in the same terms (pixels or dialog units) as the parent dialog. The most common value used in the Microsoft Dialog Editor and Visual Studio is 12 dialog units.
style&	Primary style of the text box control. The default text box style comprises % WS_TABSTOP, %WS_BORDER, %ES_LEFT, and %ES_AUTOHSCROLL. The default style is used if both the primary and extended style parameters are omitted from the statement. For example:

```
CONTROL ADD TEXTBOX, hDlg, id&, txt$, 100, 100, 150, 200, , , _
  CALL EditControlCallback() ' Use default styles
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary primary and extended style parameters.

The primary text box style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%ES_AUTOHSCROLL	Automatically scroll text to the right by 10 characters when the user types a character at the end of the line. When the user presses the ENTER key, scroll all text back to position zero.
%ES_AUTOVSCROLL	Automatically scroll text up one page when the user presses the ENTER key on the last line. This must be combined with the %ES_WANTRETURN and % ES_MULTILINE styles. Also see %WS_VSCROLL.
%ES_CENTER	Center text in a multi-line edit control.
%ES_LEFT	Left-aligns text. (default)
%ES_LOWERCASE	Convert all characters to lowercase as they are typed into the edit control.
%ES_MULTILINE	Allow the control to accept multiple lines of input. By default, the ENTER key activates the default button on the dialog. To use the ENTER key as a carriage return in the text box control, include the %ES_WANTRETURN style. If the %ES_AUTOHSCROLL style is included, the control automatically scrolls horizontally when the caret goes past the right edge of the control. Otherwise, the control

	automatically wraps words to the beginning of the next line when necessary. The control size determines the position of the word wrap.
%ES_NOHIDESEL	Negate the default behavior for a text box. The default behavior hides the selection when the control loses the input focus, and inverts the selection when the control receives the input focus. If you specify %ES_NOHIDESEL, the selected text is inverted, even if the control does not have the focus.
%ES_NUMBER	Allow only digits ("0123456789") instead of characters. Although Windows does not consider the negation symbol (-) or period symbol (.) to be digits, subclassing a TextBox that does not use %ES_NUMBER and rejecting "unwanted" keystrokes is common practice among advanced programmers.
%ES_OEMCONVERT	Text is converted from the windows character set to OEM, then back to Windows, as it is entered.
%ES_PASSWORD	Display an asterisk (*) for each character typed into the control in order to obscure the password.
%ES_READONLY	Prevent the user from typing or editing text in the control. Text can still be selected and copied from the control to the clipboard with the mouse.
%ES_RIGHT	Right-align text in a multi-line text box.
%ES_UPPERCASE	Convert all characters to uppercase as they are typed into the control.
%ES_WANTRETURN	Allow the ENTER key to insert a carriage return in a multi-line text box. Otherwise, the ENTER key works as the dialog box's default push button. This style has no effect on a single-line text box.
%WS_BORDER	Add a thin line border around the text box control.
%WS_HSCROLL	Add a horizontal scroll bar to the edit control, when used in conjunction to the %ES_AUTOHSCROLL style.
%WS_GROUP	Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group.
%WS_TABSTOP	Allow the textbox control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP. (default)
%WS_VSCROLL	Add a vertical scroll bar to the edit control. This style should be used in conjunction to the %ES_MULTILINE and %ES_AUTOVSCROLL styles.

exstyle& Extended style of the text box control. The default extended text box style comprises %WS_EX_CLIENTEDGE with %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD TEXTBOX statement, in the same manner as *style&* above.

The extended text box style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_LEFT	The control has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The control has generic "right-aligned" properties. This style has an effect only if the shell language is

	Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_TRANSPARENT	Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.
%WS_EX_WINDOWEDGE	Apply a raised edge border to the control.

callback Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks If you specify the %ES_AUTOHSCROLL style, the control automatically scrolls horizontally when the caret goes past the right edge of the control. To start a new line, the user must press the ENTER key.

If you do not specify %ES_AUTOHSCROLL, the control automatically wraps words to the beginning of the next line when necessary. A new line is also started if the user presses the ENTER key. The control size determines the position of the word wrap.

The following notifications are sent to the Callback Function:

%EN_CHANGE	Sent when the user has taken an action that may have altered text in the text box. Unlike the %EN_UPDATE notification, this message is sent after Windows updates the screen. Programmatically changing the text in a control also triggers this message.
%EN_ERRSPACE	Sent when the text box cannot allocate enough memory to meet a specific request.
%EN_HSCROLL	Sent when the user clicks a multi-line text box's horizontal scroll bar. The callback is notified before the screen is updated.
%EN_KILLFOCUS	Sent when an edit control loses the keyboard focus.
%EN_MAXTEXT	Sent when the current text insertion has exceeded the specified number of characters for the text box. The text insertion is truncated.
%EN_SETFOCUS	Sent when an edit control receives the keyboard focus.
%EN_UPDATE	Sent when a text box is about to display altered text. This notification message is sent after the control has formatted the text, but before it displays the text. Also see %EN_CHANGE.
%EN_VSCROLL	Sent when the user clicks a text box's vertical scroll bar. The callback is notified before the screen is updated.

When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification message.

Use CONTROL GET TEXT to retrieve the text from a text box control, and use

CONTROL SET TEXT to change the text in a text box control. Changing the text in a text box control (in response to a %EN_CHANGE or %EN_UPDATE message) will trigger a second set of %EN_CHANGE and %EN_UPDATE messages. Unless this is compensated for, these notifications can unwittingly cause an endless loop.

For example, the following is potentially fatal:

```
CALLBACK FUNCTION EditControlCallback()
  IF CB.CTL = %ID_EDITBOX1 AND CB.CTLMSG = %EN_CHANGE THEN
    CONTROL SET TEXT CB.HNDL, CB.CTL, "New Text"
    EXIT FUNCTION
  END IF
  [statements]
```

As CONTROL SET TEXT is a "blocking" statement (that is, the statement does not complete until the text has been changed), it is a simple matter to block the endless loop effect:

```
CALLBACK FUNCTION EditControlCallback()
  STATIC EditBusy&
  IF CB.CTL = %ID_EDITBOX1 AND CB.CTLMSG = %EN_CHANGE THEN
    IF EditBusy& THEN EXIT FUNCTION
    EditBusy& = -1
    CONTROL SET TEXT CB.HNDL, CB.CTL, "New Text"
    RESET EditBusy&
    EXIT FUNCTION
  END IF
  [statements]
```

See also Dynamic Dialog Tools, CONTROL GET TEXT, CONTROL SET COLOR, CONTROL SET FONT, CONTROL SET TEXT

CONTROL ADD TOOLBAR statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL ADD TOOLBAR statement

Purpose Add a ToolBar control to a dialog. A ToolBar overlays part of a dialog's client area, typically at the top.

Syntax **CONTROL ADD TOOLBAR, *hDlg*, *ID*, *Txt$*, *x*, *y*, *nWide*, *nHigh* [,*style*] [,*exstyle&*] [,CALL *callback*]**

hDlg Handle of the dialog in which the ToolBar will be created. The dialog will become the parent of the control.

ID Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate %PickList is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

Txt$ Text to associate with the ToolBar control. A ToolBar control does not display this text, so it is common to set this value to a null, empty string literal ("" or $NUL).

x,y	Integral expressions which specify the location of the control within the dialog client area. In the case of a ToolBar, size parameters are ignored since the control is created with a default position. These size parameters are usually omitted.
nWide, *nHigh*	Integral expressions which specify the overall width and height of the control. In the case of a ToolBar, size parameters are ignored since the control is created with a default size. These size parameters are usually omitted.
style	Optional primary style of the ToolBar control. The default ToolBar style is %WS_CHILD or %WS_VISIBLE or %WS_BORDER or %CCS_TOP or %TBSTYLE_FLAT. This default style is used if both the primary and extended style parameters are omitted from the statement, as in the following example:

```
CONTROL ADD TOOLBAR, hDlg, id&, "", 1, 1, 1, 1, , , CALL TBCallback()
```

If you include explicit style values, they replace the default values. That is, they are not added to the default styles values - your code must specify all necessary primary and extended style parameters.

The primary ToolBar style value can be a combination of the values below, combined together with the OR operator to form a bitmask:

%CCS_TOP	The ToolBar is placed at the top of the dialog.
%CCS_BOTTOM	The ToolBar is placed at the bottom of the dialog.

exstyle& Optional extended style of the ToolBar control. The extended ToolBar style value can be a combination of the values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_WINDOWEDGE	Apply a raised edge border to the control.

callback Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. Generally speaking, ToolBar command messages result from clicking a ToolBar Button, so the message is sent to the callback specified in TOOLBAR ADD BUTTON or the dialog callback specified in

. Message routing by button allows you to easily determine which button generated the event, and eliminates virtually all %WM_COMMAND messages here. This callback is primarily used to process %WM_NOTIFY messages.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks When a Callback Function receives a message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the notification messages.

See also DIALOG SHOW MODAL, DIALOG SHOW MODELESS, Dynamic Dialog Tools, CONTROL SET FONT, TOOLBAR

CONTROL ADD TREEVIEW statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL ADD TREEVIEW statement

Purpose Add a TreeView control to a dialog. A TreeView displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. The user may view the items, selecting them for use in the program at a later time.

Syntax **CONTROL ADD TREEVIEW, *hDlg*, *id&*, *txt$*, *x*, *y*, *xx*, *yy* [, [*style&*] [, [*exstyle&*]]] [[,] CALL *callback*]**

hDlg Handle of the dialog in which the TreeView will be created. The dialog will become the parent of the control.

id& Unique identifier for the control in the range 1 to 65535, frequently specified with numeric equates for clarity of the code. For example, the equate %PickList is more informative than a literal value such as 497. Best practice suggests identifiers should start at 100 to avoid conflict with any of the standard predefined identifiers.

txt$ Text to associate with the TreeView control. A TreeView control does not display this text, so it is common to set this value to a null, empty string literal ("").

x,y expressions, variables, or numeric literal values specifying the location of the control inside the dialog client area. *x* is the horizontal position, and *y* is the vertical position. 0,0 refers to the upper left corner of the dialog box client area. Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.

xx,yy Integral expressions, variable, or numeric literal values, specifying the width and height of the control. *xx* is the width and *yy* is the height, given in the same terms (pixels or dialog units) as the parent dialog.

style& Primary style of the TreeView control. The default TreeView style comprises %WS_TABSTOP, %TVS_HASBUTTONS, %TVS_LINESATROOT, %TVS_HASLINES, and %TVS_SHOWSELALWAYS. This default TreeView style is used if the style parameters are omitted from the statement, as in the following example:

```
CONTROL ADD TREEVIEW, hDlg, id&, "", 100, 100, 150, 200, , , CALL
TVCallback()
```

If you include explicit style values, they replace the default values. That is, they are not added to the default styles values - your code must specify all necessary primary and extended style parameters.

The primary TreeView style value can be a combination of the values below, combined together with the OR operator to form a bitmask:

%TVS_HASBUTTONS	Displays +- signs next to parent items so the user can expand or collapse a list of child items.
%TVS_HASLINES	Uses lines to show the hierarchy of data items.
%TVS_LINESATROOT	Uses lines to link items at the root level.
%TVS_EDITLABELS	Allows the user to edit the labels of the data items.
%TVS_DISABLEDRAGDROP	Prevents drag and drop
%TVS_SHOWSELALWAYS	A selected item remains selected when the control loses focus.
%TVS_NOTOOLTIPS	Disables ToolTips.
%TVS_CHECKBOXES	Enables check boxes for items with an image.
%TVS_TRACKSELECT	Enables hot tracking.
%TVS_SINGLEEXPAND	Only one item can be expanded at a time.
%TVS_INFOTIP	Obtains ToolTip information.

%TVS_FULLROWSELECT	The entire row of a selected item is highlighted.
%TVS_NOSCROLL	Disables horizontal and vertical scrolling.
%TVS_NONEVENHEIGHT	Sets the height of items to an odd height.
%TVS_NOHSCROLL	Disables horizontal scrolling.
%WS_DISABLED	Create a control that is initially disabled. A disabled control cannot receive input from the user.
%WS_GROUP	Define the start of a group of controls. The first control in each group should also use %WS_TABSTOP style. The next %WS_GROUP control in the tab order defines the end of this group and the start of a new group.
%WS_TABSTOP	Allow the control to receive keyboard focus when the user presses the TAB and SHIFT+TAB keys. The TAB key shifts keyboard focus to the next control with the %WS_TABSTOP style, and SHIFT+TAB shifts focus to the previous control with %WS_TABSTOP.

exstyle& Extended style of the TreeView control. The default extended style is %WS_EX_LEFT. The default extended style is used if both the primary and extended parameters are omitted from the CONTROL ADD TREEVIEW statement, in the same manner as style& above.

The extended TreeView style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_CLIENTEDGE	Apply a sunken edge border to the control.
%WS_EX_LEFT	The control has generic "left-aligned" properties. (default)
%WS_EX_RIGHT	The control has generic "right-aligned" properties. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment; otherwise, the style is ignored.
%WS_EX_STATICEDGE	Apply a three-dimensional border style to the control (intended to be used for items that do not accept user input).
%WS_EX_TRANSPARENT	Controls/windows beneath the control are drawn before the control is drawn. The control is deemed transparent because elements behind the control have already been painted - the control itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.
%WS_EX_WINDOWEDGE	Apply a raised edge border to the control.

callback Optional name of a Callback Function that receives all %WM_COMMAND and %WM_NOTIFY messages for the control. See the #MESSAGES metastatement to choose which messages will be received. If a callback for the control is not designated, you must create a dialog Callback Function to process messages from your control.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

Remarks When a Callback Function receives a %WM_COMMAND message, it should explicitly test the value of CB.CTL and CB.CTLMSG to guarantee it is responding appropriately to the messages.

See also Dynamic Dialog Tools, CONTROL SET COLOR, CONTROL SET FONT, TREEVIEW

CONTROL DISABLE statement

CONTROL DISABLE statement

Purpose Disable a control so that it no longer receives any messages or accepts user interaction.

Syntax `CONTROL DISABLE hDlg, id&`

Remarks hDlg refers to the dialog that owns the control. *id&* is the unique control identifier as assigned to the control with a

statement.

A disabled control will not receive any messages when clicked with the mouse or selected with the keyboard. Most, but not all, controls will redraw themselves as "gray" when disabled.

See also Dynamic Dialog Tools, CONTROL ENABLE, CONTROL KILL

CONTROL ENABLE statement

CONTROL ENABLE statement

Purpose Enable a control so that it can receive messages when the user interacts with it via the mouse or keyboard.

Syntax `CONTROL ENABLE hDlg, id&`

Remarks *hDlg* refers to the dialog that owns the control. *id&* is the unique control identifier as assigned to the control with a

statement.

An enabled control will receive messages when clicked with the mouse or selected with the keyboard.

See also Dynamic Dialog Tools, CONTROL DISABLE, CONTROL KILL

CONTROL GET CHECK statement

CONTROL GET CHECK statement

Purpose Get the Check State of a CHECK3STATE, CHECKBOX, or OPTION button.

Syntax `CONTROL GET CHECK hDlg, id& TO lResult&`

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with a

statement.

lResult& receives the Check State of the control as follows:

lResult&	Check State of control
0 (Zero)	Button is unchecked (unset, or cleared)
1 (One)	Button is checked (set)
2 (Two)	Button is indeterminate (grayed) (CHECK3STATE only)

Note that a grayed (indeterminate) CHECK3STATE control does not mean the control is disabled. Rather, the Check State of the control is both checked and unchecked.

See also Dynamic Dialog Tools, CONTROL ADD CHECK3STATE, CONTROL ADD CHECKBOX, CONTROL ADD OPTION, CONTROL SET CHECK, CONTROL SET OPTION, TREEVIEW GET CHECK, TREEVIEW SET CHECK

CONTROL GET CLIENT statement

CONTROL GET CLIENT statement

Purpose Return the client size of the specified child control.

Syntax **`CONTROL GET CLIENT hDlg, id& TO w&, h&`**

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with a

statement.

The size of the control client area is placed in the *w&* (width) and *h&* (height) variables. The size is specified in the same terms (pixels or dialog units) as the parent dialog.

See also Dynamic Dialog Tools, CONTROL GET LOC, CONTROL GET SIZE, CONTROL SET CLIENT, CONTROL SET CLIENT, CONTROL SET LOC, CONTROL SET SIZE, DIALOG UNITS, DIALOG PIXELS, GRAPHIC GET CLIENT

CONTROL GET LOC statement

CONTROL GET LOC statement

Purpose Get the location of the specified control in a dialog.

Syntax **`CONTROL GET LOC hDlg, id& TO x&, y&`**

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with a

statement.

The location of the top left corner of the control is placed in the *x&* (horizontal location) and *y&* (vertical location) variables. The location is relative to the upper-left corner of the client area in the parent dialog. The coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.

See also Dynamic Dialog Tools, CONTROL GET CLIENT, CONTROL GET SIZE, CONTROL SET LOC, CONTROL SET SIZE

CONTROL GET SIZE statement

CONTROL GET SIZE statement

Purpose Get the size of a control in the specified dialog.

Syntax **`CONTROL GET SIZE hDlg, id& TO nWide&, nHigh&`**

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with a

statement.

The width is placed in the *nWide&* and the height is placed in *nHigh&* variables. The coordinates are specified in the same terms (pixels or dialog units) as the parent dialog.

See also Dynamic Dialog Tools, CONTROL GET CLIENT, CONTROL GET LOC, CONTROL SET LOC, CONTROL SET SIZE

CONTROL GET TEXT statement

CONTROL GET TEXT statement

Purpose Get the text from a control.

Syntax `CONTROL GET TEXT hDlg, id& TO txt$`

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with a

statement. Any text in the control is placed into the *txt$* variable.

With combo boxes, CONTROL GET TEXT returns the text entered in the edit portion of the control. To retrieve the selected text from the list portion of a combo box or a list box control, use the COMBOBOX GET TEXT statement or LISTBOX GET TEXT statement respectively.

See also Dynamic Dialog Tools, COMBOBOX GET TEXT, CONTROL SET TEXT, LISTBOX GET TEXT, LISTVIEW GET TEXT, TREEVIEW GET TEXT

CONTROL GET USER statement

CONTROL GET USER statement

Purpose Retrieve a value from the user data area of a DDT control.

Syntax `CONTROL GET USER hDlg, id&, index& TO retvar&`

Remarks Each DDT control has a user data area consisting of eight Long-integer values which may be used at the programmer's discretion to save relevant data. CONTROL GET USER allows one of the values to be retrieved, based upon the index parameter value (1 through 8).

hDlg refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with a

statement.

index& is the index number of the user data value to retrieve, in the range 1 to 8 inclusive.

retvar& receives the Long-integer data value store in the nominated user data index.

Restrictions Data in the user data area is lost when the control is destroyed. The data area is completely separate from the %GWL_USERDATA area maintained by Windows.

See also Dynamic Dialog Tools, COMBOBOX GET USER, COMBOBOX SET USER, CONTROL SET USER, DIALOG GET USER, DIALOG SET USER, LISTBOX GET USER, LISTBOX SET USER, LISTVIEW GET USER, LISTVIEW SET USER, TREEVIEW GET USER, TREEVIEW SET USER

CONTROL HANDLE statement

CONTROL HANDLE statement

Purpose Return a window handle for the specified control ID.

Syntax `CONTROL HANDLE hDlg, id& TO hCtl&`

Remarks *hDlg* refers to the dialog that owns the control. *id&* is the unique control identifier as assigned to the control with a

statement.

The returned value is a window handle for the control, assigned by Windows when the control was initially created, uniquely identifying the control from all other controls. Some API functions require a window handle value rather than a control ID value.

See also Dynamic Dialog Tools, CONTROL SEND, WINDOW GET ID, WINDOW GET PARENT

CONTROL HIDE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL HIDE statement New!

Purpose Make a

invisible.

Syntax `CONTROL HIDE HDlg, ID&`

Remarks The Control identified by the *HDlg*/*ID&* combination is made invisible.

HDlg is the handle of the dialog which owns the control. *ID&* is the unique control identifier assigned to the control with CONTROL ADD.

See Also CONTROL NORMALIZE, CONTROL SET SIZE, DIALOG HIDE, DIALOG NORMALIZE

CONTROL KILL statement

CONTROL KILL statement

Purpose Remove a control from a dialog.

Syntax `CONTROL KILL hDlg, id&`

Remarks *hDlg* refers to the dialog that owns the control. *id&* is the unique control identifier as assigned to the control with a

statement.

The control is destroyed and removed from the dialog. The Callback Function for the control or dialog will no longer receive messages for the control.

Restrictions A control should not be destroyed while processing a notification message from the same control, but it is permissible to kill a different control in the notification handler. If is absolutely necessary to kill a control while processing one of its notification messages, use the PostMessage API function (or the DIALOG POST or CONTROL POST statements) to post a user-defined message to the dialog callback, and kill the control when processing the user-defined message.

See also Dynamic Dialog Tools, CONTROL DISABLE, CONTROL ENABLE

Example

```
' How to avoid "suicide" conditions
```

```
CALLBACK FUNCTION DlgCallBack() AS LONG
  SELECT CASE CB.MSG
    CASE %WM_COMMAND
      IF CB.CTLMSG = %BN_CLICKED AND CB.CTL = %MyBtn THEN
        DIALOG POST CB.HNDL, %WM_USER + 999&, 0, 0
      END IF
    CASE %WM_USER + 999&
      CONTROL KILL CB.HNDL, %MyBtn
      FUNCTION = 1
  END SELECT
END FUNCTION
```

CONTROL NORMALIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL NORMALIZE statement New!

Purpose Make a
visible.

Syntax **CONTROL NORMALIZE *HDlg, ID&***

Remarks The Control identified by the HDlg/ID& combination is made visible.

HDlg is the handle of the dialog which owns the control. *ID&* is the unique control identifier assigned to the control with CONTROL ADD.

See also CONTROL HIDE, CONTROL SET SIZE, DIALOG HIDE, DIALOG NORMALIZE

CONTROL POST statement

CONTROL POST statement

Purpose Place a message in the message queue to be processed at the leisure of the target control.

Syntax **CONTROL POST *hDlg, id&, Msg&, wParam&, lParam&***

Remarks CONTROL POST places the message in the message queue and returns immediately. The message is processed by the control at a later time, when it reads the message from the queue.

This behavior is quite different to the CONTROL SEND statement, which forces the control to process the message immediately before returning. Since CONTROL POST is an asynchronous operation, it is not possible to retrieve a return code from the message.

hDlg refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with a
statement.

Msg& is the message you want to post to the control.

wParam& is the first message parameter. *lParam&* is the second message parameter. The values of *wParam&* and *lParam&* are message-dependent. By Default, PowerBASIC passes these parameters BYVAL. If the target control is expected to alter the values held by variables passed in the *wParam&* and *lParam&* parameters, pass them using VARPTR() or the changes will likely be discarded.

Note that the address of the data must remain valid until after the control has processed the message and accessed the data. In this case, using STATIC or GLOBAL variables can be very important or a General Protection Fault (GPF) may occur (that is, if the variables have gone out of scope by the time the message is processed).

An example of posting the addresses of variables to a control:

```
' Retrieve an Edit controls Current Selection
' Sel1& and Sel2& must be STATIC or GLOBAL
CONTROL POST CB.HNDL, %ID_EDIT6, %EM_GETSEL, VARPTR(Sel1&),
VARPTR(Sel2&)
```

CONTROL POST returns immediately after the placing the message in the queue.

Restrictions

To post a custom message to a control, use a message value in the range of (%WM_USER + 500) to (%WM_USER + &H07FFF), or use the RegisterWindowMessage API to obtain a unique message value from the operating system. Using messages with a numeric value of less then %WM_USER + 500 may conflict with Windows Common Control messages.

See also

Dynamic Dialog Tools, CONTROL HANDLE, CONTROL SEND, DIALOG POST, DIALOG SEND

Example

```
' Programmatically post a click message to a button:
CONTROL POST hDlg, %ID_BTN1, %BM_CLICK, 0, 0
```

CONTROL REDRAW statement

CONTROL REDRAW statement

Purpose

Schedule a designated control to be redrawn.

Syntax

CONTROL REDRAW *hDlg*, *id&*

Remarks

CONTROL REDRAW invalidates the target control and schedules a redraw event to occur.

hDlg refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with a

statement.

Restrictions

Redrawing of individual controls is considered a low priority event, and a control redraw may not happen instantly if there are pending messages in the message queue. That is, pending messages in the message queue may need to be processed before the scheduled redraw event occurs.

It is not advisable to use CONTROL REDRAW or DIALOG REDRAW within the %WM_PAINT and associated message handling code, or an infinite redraw loop could occur.

See also

Dynamic Dialog Tools, CONTROL SET COLOR, DIALOG SET COLOR, DIALOG REDRAW

Example

```
CONTROL REDRAW hDlg, %ID_LABEL1
```

CONTROL SEND statement

CONTROL SEND statement

Purpose Send a message to a control.

Syntax **CONTROL SEND *hDlg*, *id&*, *Msg&*, *wParam&*, *lParam&* [TO *lResult&*]**

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with a

statement.

Msg& is the message you want to send the control.

wParam& is the first message parameter. *lParam&* is the second message parameter. The values of *wParam&* and *lParam&* are message-dependent. By default, PowerBASIC passes these parameters BYVAL. If the target control is expected to return or alter the values passed in the *wParam&* and *lParam&* parameters, pass them using VARPTR or the return values will be discarded. For example:

```
' Retrieve an Edit control's Current Selection
CONTROL SEND CB.HNDL, %ID_EDIT1, %EM_GETSEL, VARPTR(Sel1&),
VARPTR(Sel2&)
```

CONTROL SEND does not return from execution until the control's callback has processed the message. This synchronous behavior is quite different to the behavior of CONTROL POST, which simply places the message in the control's message queue (for processing at a later time) and immediately returns. On this basis, CONTROL SEND can receive a return value from the message, but CONTROL POST cannot.

TO The return value from the message can optionally be assigned to *lResult&*.

If CONTROL SEND sends a message that arrives back in the same callback as the message originated, care should be exercised to ensure that critical STATIC and GLOBAL variables are not unexpectedly altered by the second message processing code in the callback. This is known as re-entrant code design.

Restrictions To send a custom message to a dialog, use a message value in the range of (%WM_USER + 500) to (%WM_USER + &H07FFF), or use the RegisterWindowMessage API to obtain a unique message value from the operating system. Using messages with a numeric value of less then %WM_USER + 500 may conflict with Windows Common Control messages.

See also Dynamic Dialog Tools, CONTROL HANDLE, CONTROL POST, DIALOG POST, DIALOG SEND

Example

```
' Programmatically click a button:
CONTROL SEND hDlg, %ID_BTN1, %BM_CLICK, 0, 0
```

CONTROL SET CHECK statement

CONTROL SET CHECK statement

Purpose Set the Check State for a CHECK3STATE or CHECKBOX control.

Syntax **CONTROL SET CHECK *hDlg*, *id&*, *checkstate&***

Remarks With a checkbox control, the Check State is set (checked) when an 'X' symbol is shown in the check box. The Check State is deemed unset (unchecked or cleared) when the check box is empty.

A CHECK3STATE control supports a third state, known as indeterminate. In this state, the check box is grayed.

hDlg refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the button control with a statement.

For CHECKBOX controls, set *checkstate&* to zero (0) to uncheck (unset or clear) the Check State of the control, or one (1) to check (set) the Check State of the control.

For CHECK3STATE controls, set *checkstate&* to zero (0) to uncheck (unset or clear) the Check State of the control, one (1) to check (set) the Check State (display an 'X' symbol in the box), or two (2) to set the indeterminate state (display a grayed check box).

To set the Check State of OPTION controls, use the CONTROL SET OPTION statement.

See also Dynamic Dialog Tools, CONTROL ADD CHECK3STATE, CONTROL ADD CHECKBOX, CONTROL ADD OPTION, CONTROL GET CHECK, CONTROL SET OPTION, TREEVIEW GET CHECK, TREEVIEW SET CHECK

CONTROL SET CLIENT statement

CONTROL SET CLIENT statement IMPROVED

Purpose Change the size of a control to a specific client area size.

Syntax `CONTROL SET CLIENT hDlg, id&, nWide&, nHigh&`

Remarks Client size may be smaller than total size, depending on the type of borders used. The client area is the part inside the borders of a control, which varies depending upon the style and exstyle at creation. In a control without borders, the client size and total size is the same. As an alternate example, a control with the %WS_BORDER style will typically have a client area a few pixels smaller than the total size.

hDlg Handle of the dialog that owns the control.

id& The unique control identifier, assigned to the control with the statement.

nWide&, *nHigh&* Integral expressions, variables, or numeric literal values, specifying the desired size of the client area. Width and height are specified in pixels or dialog units, depending upon the system used when the parent dialog was created.

Graphic Controls Beginning with this version of PowerBASIC, GRAPHIC CONTROLS may be resized with CONTROL SET CLIENT, GRAPHIC SET CLIENT, CONTROL SET SIZE, and GRAPHIC SET SIZE.

When you change the size of a graphic control, the original bitmap is copied, pixel for pixel, to the newly resized control. Any expanded area is filled with the current background color. Your program draws to it in the normal fashion for a bitmap of the new size.

If a clip area had been established to create margins, it is reset. If scaled coordinates had been established, they are also reset, as neither would be appropriate for the altered size. You can enable these attributes again with GRAPHIC SCALE or GRAPHIC SET CLIP, based upon the new size of the drawing area.

See also Dynamic Dialog Tools, CONTROL GET CLIENT, CONTROL GET LOC, CONTROL GET SIZE, CONTROL SET LOC, CONTROL SET SIZE, GRAPHIC SET CLIENT, GRAPHIC SET SIZE

CONTROL SET COLOR statement

CONTROL SET COLOR statement

Purpose Set the color of a control to a specific RGB foreground and background color.

Syntax **CONTROL SET COLOR *hDlg*, *id&*, *foreclr&*, *backclr&***

Remarks *hDlg* identifies the control's parent dialog, and *id&* is the unique control identifier as assigned to the control with a

statement.

Color values of *foreclr&* and *backclr&* must be in the range of &H0 to &H00FFFFFF. RGB can be a useful function to derive a 32-bit color value from discrete Red, Green and Blue values:

foreclr& The foreground color parameter *foreclr&* is used to set the color of the text displayed in the control. If *foreclr&* = -1&, the default foreground text color is used.

backclr& The *backclr&* parameter specifies the color of the background behind the text in the control. If *backclr&* = -1&, the default background text color is used. If *backclr&* = -2&, the text background is not painted, allowing the background to show "through" the text. The non-visible background style may produce undesirable side effects with some controls. For example, on a FRAME control, the caption text will appear superimposed over an unbroken frame.

In 16-bit or greater color-depth mode, the specified RGB color is used when the background of the control is drawn. However, in 8-bit (256-color) mode, the color system works quite differently. Behind the scenes in Windows, the base system palette usually contains 20 solid colors that are not dithered when drawn on the controls background. These solid-colors are ideal for control background colors with DDT dialogs in 256-color mode.

Conversely, when using a non-solid RGB color value, Windows will dither (approximate) the color to draw the control, using combinations of two or more colors. This usually produces an undesirable pattern effect.

To avoid these problems when in 256-color mode, controls should be colored with one of the 20 standard (solid) system colors, or the default color should be used instead. PowerBASIC includes the following 10 built-in equates for help with the selection of a standard solid color:

```
%RGB_BLACK %RGB_BLUE %RGB_GREEN %RGB_CYAN %RGB_RED
%RGB_MAGENTA %RGB_YELLOW %RGB_WHITE %RGB_GRAY %RGB_LIGHTGRAY
```

Many non standard colors are also built into the compiler, see the Built In RGB Color Equates topic for a complete list.

If you prefer to disable color in 256-color mode, the number of colors can be easily tested with the following code:

```
' Determine number of colors
LOCAL hDC AS DWORD, iColors AS LONG

hDC = GetWindowDC(GetDeskTopWindow())
iColors = 2& ^ (GetDeviceCaps(hDC, %BITSPIXEL) * GetDeviceCaps(hDC, %
PLANES))
ReleaseDC GetDeskTopWindow(), hDC
IF iColors > 256 THEN _
  CONTROL SET COLOR hDlg, idctl&, -1, RGB(0,255,100)
```

In 256-color mode on most computers, the values of the standard 20 system colors can be found by requesting the first and last 10 (0 to 9, and 246 to 255 inclusive) entries from the GetSystemPaletteEntries API function, as follows:

```
' Fill array with solid colors
DIM hDC AS DWORD, Cols AS LONG, x AS LONG

hDC = GetWindowDC(GetDesktopWindow)
Cols = GetDeviceCaps(hDC, %NUMRESERVED)
REDIM lp(1 TO Cols) AS LONG
x& = GetSystemPaletteEntries(hDC, 0, Cols \ 2, BYVAL VARPTR(lp(1)))
```

```
x& = GetSystemPaletteEntries(hDC, 256 - x&, Cols - x&, BYVAL
VARPTR(lp(x& + 1)))
ReleaseDC GetDesktopWindow, hDC
' Array lp() now contains the solid color table
```

For more information on working with palettes in 256-color mode, please consult WIN32.HLP or visit http://msdn.microsoft.com.

Restrictions

Windows does not permit the color of standard push button controls, line controls, image controls, image buttons, and most common controls to be altered by the standard CONTROL SET COLOR techniques.

To create a colored push button or colored region on a dialog, the preferred solution is to use an IMGBUTTON/IMAGEBUTTONX or IMAGE/IMAGEX control, with a suitably colored bitmap. Some common controls offer specific ways to set their color. For example, the background color of a List View control can be set with the %LVM_SETBKCOLOR message.

When dynamically changing colors of a control from within a callback (i.e., after the DIALOG SHOW statement), a CONTROL SET COLOR statement should be immediately followed by an explicit CONTROL REDRAW statement.

Without this forced control redraw, the control background color change may not become evident to the user until the control is eventually repainted in the normal course of user interaction. For example, a normal repaint may only occur if the control becomes obscured and then uncovered by another window. Ensuring a timely repaint of the control will guarantee the control maintains an up-to-date appearance at all times.

When updating the colors of multiple controls at the same time, a DIALOG REDRAW is usually more efficient than multiple CONTROL REDRAW statements.

See also

Built In RGB Color Equates, Dynamic Dialog Tools, CONTROL GET CLIENT, CONTROL GET SIZE, CONTROL REDRAW, CONTROL SET FONT, DIALOG REDRAW, DIALOG SET COLOR

Example

```
' Set the color with discrete RGB values
CONTROL SET COLOR hDlg, idBtn&, RGB(255,255,255), RGB(0,0,255)

' Or we could use the built-in equates:
CONTROL SET COLOR hDlg, idBtn&, %RGB_WHITE, %RGB_BLUE
```

CONTROL SET FOCUS statement

CONTROL SET FOCUS statement

Purpose

Set the keyboard focus to the specified control.

Syntax

CONTROL SET FOCUS *hDlg*, *id&*

Remarks

hDlg refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with a

statement.

The control that owns the focus will receive all keyboard messages. Many controls change their appearance when they receive (and lose) keyboard focus, usually by the display of a "focus rectangle" around or on the control that has keyboard focus. Only one control can have keyboard focus at any moment, and situations can arise where no controls have focus.

Controls that include a "notify" style (i.e., %BS_NOTIFY) will receive a notification message when focus is gained or lost. That is, when one such control loses focus, it receives a message to that effect and the control gaining focus may also receive an appropriate focus notification message.

When a control gains focus the parent dialog will also be set as the foreground window.

Windows does not guarantee the order in which focus notification messages are dispatched to the control losing focus and the control gaining focus. Applications should not rely on the order in which these types of messages are received.

Restrictions CONTROL SET FOCUS cannot be used to set the focus of a control in a separate thread.

See also Dynamic Dialog Tools

CONTROL SET FONT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

CONTROL SET FONT statement IMPROVED

Purpose Select a font to be used for a particular Windows Control.

Syntax `CONTROL SET FONT hDlg, id&, FontHndl&`

hDlg Handle of the dialog in which owns the control.

id& Unique identifier for the control which was assigned with a statement.

FontHndl& The numeric handle returned by the FONT NEW statement when the font was created.

Remarks The font specified by *FontHndl&* is selected to be used by this particular control, until or unless it is changed with another CONTROL SET FONT statement. If you specify a *FontHndl&* of zero, the font is changed back to the original default font chosen by PowerBASIC.

You can predefine virtually any number of fonts and attributes by executing FONT NEW statements for each of them. That makes them ready for immediate use when selected by CONTROL SET FONT, GRAPHIC SET FONT, and XPRINT SET FONT.

See also DIALOG DEFAULT FONT, FONT END, FONT NEW, GRAPHIC SET FONT, XPRINT SET FONT

CONTROL SET IMAGE statement

CONTROL SET IMAGE statement

Purpose Change the icon or bitmap displayed in an IMAGE control. The new image is not re-sized to fit the size of the control.

Syntax `CONTROL SET IMAGE hDlg, id&, newimage$`

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with the CONTROL ADD IMAGE statement.

newimage$* specifies the name of the bitmap or icon in the resource file. If the image resource uses an identifier, *newimage$ should begin with a Number symbol (#), followed by the integer identifier in ASCII format. For example, "#998". Otherwise, the text identifier name should be used.

Restrictions Images can only be exchanged with images of the same type. That is, if the control is displaying a bitmap then the replacement image must also be a bitmap. If the control is displaying an icon, the replacement image must also be an icon. For best results, icons should be 32x32 pixels.

> **When an image is changed, CONTROL SET IMAGE automatically releases the old image from memory. Previous versions of PowerBASIC placed the onus on the programmer to release the old image handle.**

See also Dynamic Dialog Tools, CONTROL ADD GRAPHIC, CONTROL ADD IMAGE, CONTROL ADD IMAGEX, CONTROL ADD IMGBUTTON, CONTROL ADD IMGBUTTONX, CONTROL GET CLIENT, CONTROL GET SIZE, CONTROL SET IMAGEX, CONTROL SET IMGBUTTON, CONTROL SET IMGBUTTONX

CONTROL SET IMAGEX statement

CONTROL SET IMAGEX statement

Purpose Change the icon or bitmap displayed in an IMAGEX control. The new image is re-sized to fit the size of the control.

Syntax `CONTROL SET IMAGEX hDlg, id&, newimage$`

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with the CONTROL ADD IMAGEX statement.

newimage$ specifies the name of the bitmap or icon in the resource file. If the image resource uses an

identifier, *newimage$* should begin with a Number symbol (#), followed by the integer identifier in ASCII format. For example, "#998". Otherwise, the text identifier name should be used.

Restrictions Images can only be exchanged with images of the same type. That is, if the control is displaying a bitmap then the replacement image must also be a bitmap. If the control is displaying an icon, the replacement image must also be an icon. For best results, icons should be 32x32 pixels.

> **When an image is changed, CONTROL SET IMAGEX automatically releases the old image from memory. Previous versions of PowerBASIC placed the onus on the programmer to release the old image handle.**

See also Dynamic Dialog Tools, CONTROL ADD GRAPHIC, CONTROL ADD IMAGE, CONTROL ADD IMAGEX, CONTROL ADD IMGBUTTON, CONTROL ADD IMGBUTTONX, CONTROL SET IMAGE, CONTROL SET IMGBUTTON, CONTROL SET IMGBUTTONX

CONTROL SET IMGBUTTON statement

CONTROL SET IMGBUTTON statement

Purpose Change the icon or bitmap displayed in an IMAGE control. The new image is not re-sized to fit the size of the control.

Syntax `CONTROL SET IMGBUTTON hDlg, id&, newimage$`

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with the CONTROL ADD IMGBUTTON statement.

newimage$ specifies the name of the bitmap or icon in the resource file. If the image resource uses an

identifier, *newimage$* should begin with a Number symbol (#), followed by the integer identifier in ASCII format. For example, "#998". Otherwise, the text identifier name should be used.

Restrictions

Images can only be exchanged with images of the same type. That is, if the control is displaying a bitmap then the replacement image must also be a bitmap. If the control is displaying an icon, the replacement image must also be an icon. For best results, icons should be 32x32 pixels.

When an image is changed, CONTROL SET IMGBUTTON automatically releases the old image from memory. Previous versions of PowerBASIC placed the onus on the programmer to release the old image handle.

See also

Dynamic Dialog Tools, CONTROL ADD GRAPHIC, CONTROL ADD IMAGE, CONTROL ADD IMAGEX, CONTROL ADD IMGBUTTON, CONTROL ADD IMGBUTTONX, CONTROL SET IMAGE, CONTROL SET IMAGEX, CONTROL SET IMGBUTTONX

CONTROL SET IMGBUTTONX statement

CONTROL SET IMGBUTTONX statement

Purpose

Change the icon or bitmap displayed in an IMAGEX control. The new image is re-sized to fit the size of the control.

Syntax

`CONTROL SET IMGBUTTONX hDlg, id&, newimage$`

Remarks

hDlg refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with the CONTROL ADD IMGBUTTONX statements.

newimage$ specifies the name of the bitmap or icon in the resource file. If the image resource uses an

identifier, *newimage$* should begin with a Number symbol (#), followed by the integer identifier in ASCII format. For example, "#998". Otherwise, the text identifier name should be used.

Restrictions

Images can only be exchanged with images of the same type. That is, if the control is displaying a bitmap then the replacement image must also be a bitmap. If the control is displaying an icon, the replacement image must also be an icon. For best results, icons should be 32x32 pixels.

When an image is changed, CONTROL SET IMGBUTTONX automatically releases the old image from memory. Previous versions of PowerBASIC placed the onus on the programmer to release the old image handle.

See also

Dynamic Dialog Tools, CONTROL ADD GRAPHIC, CONTROL ADD IMAGE, CONTROL ADD IMAGEX, CONTROL ADD IMGBUTTON, CONTROL ADD IMGBUTTONX, CONTROL SET IMAGE, CONTROL SET IMAGEX, CONTROL SET IMGBUTTON

CONTROL SET LOC statement

CONTROL SET LOC statement

Purpose

Move the control to a new location in the dialog.

Syntax `CONTROL SET LOC hDlg, id&, x&, y&`

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with a statement.

x& and *y&* specify the new location for the upper left corner of the control. These coordinates are relative to the upper left corner of the client area of the parent dialog (0,0), and are specified in the same terms (pixels or dialog units) as the parent dialog.

The location coordinates may be negative or larger than the width of the parent dialog's client area, causing the control to be clipped (partially displayed) or completely hidden.

This technique is often employed to capture the ENTER key, by creating a default button (%BS_DEFAULT) and positioning the control outside of the client area of the dialog - even though the control is not visible, it is still active and can respond to control accelerator keystrokes, etc.

See also Dynamic Dialog Tools, CONTROL GET CLIENT, CONTROL GET LOC, CONTROL GET SIZE, CONTROL SET SIZE

CONTROL SET OPTION statement

CONTROL SET OPTION statement

Purpose Set the Check State for an OPTION (radio) control, and unset the Check State for other OPTION buttons in a group.

Syntax `CONTROL SET OPTION hDlg, id&, minid&, maxid&`

Remarks The Check State is deemed set (checked) when the check box is selected, and unset (unchecked or clear) if the check box is empty. Only one OPTION control in a group of OPTION controls should ever have its Check State set at any given time. OPTION controls in a group should be assigned unique sequential identifier numbers.

hDlg refers to the dialog that owns the OPTION controls.

id& is the unique control identifier as assigned to the button control with a CONTROL ADD OPTION statement. CONTROL SET OPTION sets the Check State for this control, and unsets the Check State for all of the remaining OPTION controls whose identifiers are included in the range *minid&* through *maxid&*, inclusive.

The first OPTION control in a group should have the style %WS_GROUP to mark the beginning of a group of buttons, and the first non-OPTION control after the group should also have this style set. If there are no other controls after the group, add %WS_GROUP to the first control in the dialog. This ensures keyboard navigation with the arrow buttons will operate within the group of OPTION controls.

See also Dynamic Dialog Tools, CONTROL ADD OPTION, CONTROL GET CHECK

Example

```
#INCLUDE "DDT.INC"
%OPT1 = 101
%OPT2 = 102
%OPT3 = 103
%OPT4 = 104
%OPT5 = 105

FUNCTION PBMAIN
  DIM hDlg AS DWORD
  DIALOG NEW 0, "OPTION control test", , ,100, 100, _
    %WS_SYSMENU OR %WS_CAPTION TO hDlg
  CONTROL ADD OPTION, hDlg, %OPT1, "Option 1", 10, 6, 50, 14, _
    %WS_GROUP OR %WS_TABSTOP
  CONTROL ADD OPTION, hDlg, %OPT2, "Option 2", 10, 20, 50, 14
```

```
  CONTROL ADD OPTION, hDlg, %OPT3, "Option 3", 10, 34, 50, 14
  CONTROL ADD OPTION, hDlg, %OPT4, "Option 4", 10, 48, 50, 14
  CONTROL ADD OPTION, hDlg, %OPT5, "Option 5", 10, 62, 50, 14
  CONTROL ADD BUTTON, hDlg, %IDOK, "OK", 25, 80, 50, 14, _
    %WS_GROUP OR %WS_TABSTOP

  ' Set the initial state to OPTION button 3
  CONTROL SET OPTION hDlg, %OPT3, %OPT1, %OPT5

  DIALOG SHOW MODAL hDlg
END FUNCTION
```

CONTROL SET SIZE statement

CONTROL SET SIZE statement IMPROVED

Purpose Change the size of a

.

Syntax **CONTROL SET SIZE *hDlg, id&, nWide&, nHigh&***

Remarks Overall size may be larger than client size, depending on the type of borders used. The client area is the part inside the borders of a control, which varies depending upon the style and exstyle at creation. Overall size includes the borders. In a control without borders, the client size and total size is the same. However, a control with the %WS_BORDER style will typically have a client area a few pixels smaller than the total size.

hDlg Handle of the dialog that owns the control.

nWide&, nHigh& Integral numeric expressions which specify the desired size of the overall area. Width and height are specified in pixels or dialog units, depending upon the system used when the parent dialog was created.

Graphic Controls Beginning with this version of PowerBASIC, GRAPHIC CONTROLS may be resized with CONTROL SET CLIENT, GRAPHIC SET CLIENT, CONTROL SET SIZE, and GRAPHIC SET SIZE.

When you change the size of a graphic control, the original bitmap is copied, pixel for pixel, to the newly resized control. Any expanded area is filled with the current background color. Your program draws to it in the normal fashion for a bitmap of the new size.

If a clip area had been established to create margins, it is reset. If scaled coordinates had been established, they are also reset, as neither would be appropriate for the altered size. You can enable these attributes again with GRAPHIC SCALE or GRAPHIC SET CLIP, based upon the new size of the drawing area.

See also Dynamic Dialog Tools, CONTROL GET CLIENT, CONTROL GET LOC, CONTROL GET SIZE, CONTROL SET LOC, GRAPHIC SET CLIENT, GRAPHIC SET SIZE

CONTROL SET TEXT statement

CONTROL SET TEXT statement

Purpose Change the text in a control.

Syntax **CONTROL SET TEXT *hDlg, id&, txt$***

Remarks *hDlg* refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with a statement.

txt$ is the new text for the control. Any existing text in the control is replaced with the new text.

See also Dynamic Dialog Tools, CONTROL GET TEXT

CONTROL SET USER statement

CONTROL SET USER statement

Purpose Set a value in the user data area of a DDT control.

Syntax `CONTROL SET USER hDlg, id&, index&, usrval&`

Remarks Each DDT control has a user data area consisting of eight Long-integer values which may be used at the programmer's discretion to save relevant data. CONTROL SET USER allows one of the values to be set, based upon the index parameter value (1 through 8).

hDlg refers to the dialog that owns the control.

id& is the unique control identifier as assigned to the control with a statement.

index& is the index number of the user data value to set, in the range 1 to 8 inclusive.

usrval& is the Long-integer data value to store in the user data area.

Restrictions Data in the user data area is lost when the control is destroyed. The data area is completely separate from the %GWL_USERDATA area maintained by Windows.

See also Dynamic Dialog Tools, COMBOBOX GET USER, COMBOBOX SET USER, CONTROL GET USER, DIALOG GET USER, DIALOG SET USER, LISTBOX GET USER, LISTBOX SET USER, LISTVIEW GET USER, LISTVIEW SET USER, TREEVIEW GET USER, TREEVIEW SET USER

CONTROL SHOW STATE statement

CONTROL SHOW STATE statement

Purpose Change the visible state of a control.

Syntax `CONTROL SHOW STATE hDlg, id&, showstate& [TO lResult&]`

Remarks CONTROL SHOW STATE is used to alter the state and/or appearance of the specified control, identified by the parent dialog handle *hDlg*, and control *id&* unique identifier combination.

showstate& can be one of the following (with a value in the range from 0 to 10) as defined in the WIN32API.INC file):

%SW_HIDE	Hide the control.
%SW_MAXIMIZE	Maximize the specified control.
%SW_MINIMIZE	Minimize the specified control.
%SW_RESTORE	Activate and display the control. If the control is minimized or maximized, Windows restores it to its original size and position. An application should specify this flag when restoring a minimized control.
%SW_SHOW	Activate the control and display it in its current size and position.

%SW_SHOWMAXIMIZED	Synonym of %SW_MAXIMIZE.
%SW_SHOWMINIMIZED	Activate the control and minimize it.
%SW_SHOWNA	Display the control in its current state without activating it. The currently active window/control remains active.
%SW_SHOWNOACTIVATE	Display the control in its most recent size and position without activating it. The currently active window/control remains active.
%SW_SHOWNORMAL	Activate and display the control. If the control is minimized or maximized, it is restored it to its original size and position.

If the optional TO clause is included, the *lResult&* variable is assigned the value zero if the control was previously not visible, or non-zero if it was previously visible.

See also Dynamic Dialog Tools, CONTROL DISABLE, CONTROL ENABLE, DIALOG SHOW STATE

COS function

COS function

Purpose Return the cosine of an angle.

Syntax **y = COS(*numeric_expression*)**

Remarks *numeric_expression* is an angle specified in radians. To convert radians to degrees, multiply by 57.29577951308232##. To convert degrees to radians, multiply by 0.0174532925199433##. For more information on radians, see the ATN function.

COS returns an Extended-precision value that always ranges between -1 and +1 inclusive.

The Inverse Cosine (ARCCOS) of a value can be calculated as follows:

```
pi## = 3.141592653589793##
ArcCos = pi## / 2 - ATN(Value / SQR(1 - Value * Value))
```

The Hyperbolic Cosine (COSH) of a value can also be calculated:

```
CosH = (EXP(Value) + EXP(-Value)) / 2
```

The Inverse Hyperbolic Cosine (ARCCOSH) of a value can also be calculated:

```
ArcCosH = LOG(Value + SQR(Value * Value - 1))

' Useful Macro functions
MACRO Pi = 3.141592653589793##
MACRO DegreesToRadians(dpDegrees) = (dpDegrees*0.0174532925199433##)
MACRO RadiansToDegrees(dpRadians) = (dpRadians*57.29577951308232##)
```

See also ATN, SIN, TAN

Example

```
pi## = 3.141592653589793##
' we could also use pi## = ATN(1) * 4
FOR I& = 0 TO 360 STEP 45
  x$ = "Cosine of " + FORMAT$(I&, "* 0") + _
    " degrees = " + FORMAT$(COS(pi## / 180 * _
    I&), "* 0.00")
NEXT I&
```

Result

```
Cosine of   0 degrees =  1.00
Cosine of  45 degrees =  0.71
Cosine of  90 degrees =  0.00
Cosine of 135 degrees = -0.71
Cosine of 180 degrees = -1.00
```

```
Cosine of 225 degrees = -0.71
Cosine of 270 degrees =  0.00
Cosine of 315 degrees =  0.71
Cosine of 360 degrees =  1.00
```

CQUD function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific variable type.

Syntax

```
bytevar?         = CBYT(numeric_expression)
currencyvar@     = CCUR(numeric_expression)
currencyextvar@@ = CCUX(numeric_expression)
doublevar#       = CDBL(numeric_expression)
doublewordvar??? = CDWD(numeric_expression)
extendedvar##    = CEXT(numeric_expression)
integervar%      = CINT(numeric_expression)
longintvar&      = CLNG(numeric_expression)
quadintvar&&     = CQUD(numeric_expression)
singlevar!       = CSNG(numeric_expression)
wordvar??        = CWRD(numeric_expression)
```

Remarks Each of these functions converts a

expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

Function	Result type
CBYT	Byte
CCUR	Currency
CCUX	Extended-currency
CDBL	Double-precision floating-point
CDWD	Double-word
CEXT	Extended-precision floating-point
CINT	Integer
CLNG	Long-integer
CQUD	Quad-integer
CSNG	Single-precision floating-point
CWRD	Word

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also CEIL, CVI and associated functions, FIX, INT, MKI$ and associated functions

Example
```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result
```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CSET statement

CSET statement

Purpose Center a

within the space of another string or User-Defined Type.

Syntax `CSET [ABS] result_var = string_expression [USING string_expression]`

Remarks CSET centers a string into the space of another string or variable of a User-Defined Type.

ABS: If ABS is specified, or *ustring_expression* is null (empty), CSET leaves the padding positions unchanged from their original content, rather than replacing them with spaces.

USING: If *string_expression* is shorter then *result_var*, CSET centers *string_expression* within *result_var,* padding both sides with the first character in *ustring_expression*, or spaces if not specified.

If *string_expression* is longer than *result_var*, CSET truncates *string_expression* from the right until it fits in *result_var*.

CSET can be used to assign the content of a User-Defined Type to a User-Defined Type variable of a different class, or assign a dynamic string to a User-Defined Type. For example:

```
CSET MyType = MyType2
CSET MyType = a$
```

LSET and RSET work similarly, but performs left and right-justification respectively.

See also CSET$, GET, LET, LET (With Types), LSET, LSET$, PUT, RESET, RSET, RSET$, STRINSERT$, TYPE SET

Example
```
a$ = RTRIM$(REPEAT$(5,"COOL "))
CSET ABS a$ = "..PowerBASIC.."
' result: "COOL ..PowerBASIC.. COOL"
CSET a$ = "PowerBASIC" USING "*"
' result: "*******PowerBASIC*******"
```

CSET$ function

CSET$ function

Purpose Return a

containing a centered (padded) string.

Syntax `result_var = CSET$(string_expression, strlen& [USING ustring_expression])`

Remarks CSET$ centers the string *string_expression* into a string of *strlen&* characters.

USING — If *ustring_expression* is null (empty) or is not specified, CSET$ pads *string_expression* with space characters. Otherwise, CSET$ pads the string with the first character of *ustring_expression*.

If *string_expression* is shorter then *strlen&*, CSET$ centers *string_expression* within *result_var,* padding both sides as described above; otherwise, CSET$ returns the left-most *strlen&* bytes of *string_expression*.

See also — CSET, GET, LET, LSET, LSET$, PUT, RESET, RSET, RSET$, STRINSERT$, TYPE SET

Example

```
a$ = CSET$("PowerBASIC", 20)
' result: "     PowerBASIC     "

a$ = CSET$("PowerBASIC",20 USING "*")
' result: "*****PowerBASIC*****"
```

CSNG function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose — Convert a value to specific variable type.

Syntax

```
bytevar?           = CBYT(numeric_expression)
currencyvar@       = CCUR(numeric_expression)
currencyextvar@@   = CCUX(numeric_expression)
doublevar#         = CDBL(numeric_expression)
doublewordvar???   = CDWD(numeric_expression)
extendedvar##      = CEXT(numeric_expression)
integervar%        = CINT(numeric_expression)
longintvar&        = CLNG(numeric_expression)
quadintvar&&       = CQUD(numeric_expression)
singlevar!         = CSNG(numeric_expression)
wordvar??          = CWRD(numeric_expression)
```

Remarks — Each of these functions converts a expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

Function	Result type
CBYT	Byte
CCUR	Currency
CCUX	Extended-currency
CDBL	Double-precision floating-point
CDWD	Double-word
CEXT	Extended-precision floating-point
CINT	Integer
CLNG	Long-integer
CQUD	Quad-integer
CSNG	Single-precision floating-point
CWRD	Word

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also CEIL, CVI and associated functions, FIX, INT, MKI$ and associated functions

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

CURDIR$ function

CURDIR$ function

Purpose Return the current directory path for the specified drive.

Syntax `s$ = CURDIR$[(drive$)]`

Remarks *drive$* is an optional string expression, containing the drive letter of the target disk drive. If *drive$* is not specified or is an empty

, the current directory path is returned for the *default* drive.

See also CHDRIVE, CHDIR

Example

```
FUNCTION PBMAIN
  LOCAL FullCurrentPath$
  LOCAL CurrentDrive$
  FullCurrentPath$ = CURDIR$
  IF MID$(CURDIR$,2,1) = ":" THEN
    CurrentDrive$ = LEFT$(CURDIR$,2)
  END IF
END FUNCTION
```

CVBYT function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose Extracts

data from an ANSI .

Syntax

```
bytevar?          = CVBYT(stringexpr [, offset])
curvar@           = CVCUR(stringexpr [, offset])
cuxvar@@          = CVCUX(stringexpr [, offset])
doublevar#        = CVD  (stringexpr [, offset])
doublewordvar??? = CVDWD(stringexpr [, offset])
```

```
extendedvar##    = CVE  (stringexpr [, offset])
integervar%      = CVI  (stringexpr [, offset])
longintvar&      = CVL  (stringexpr [, offset])
quadintvar&&     = CVQ  (stringexpr [, offset])
singlevar!       = CVS  (stringexpr [, offset])
wordvar??        = CVWRD(stringexpr [, offset])
```

Remarks

The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The MKx$ functions are complementary to the CVx functions. Do not confuse these functions with the VAL function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or UDT which consists of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a WIDE *StringExpr*. If Offset is not given, it is presumed to be one (1).

For example: "Value& = CVL(x$, 3)" would extract the 3rd through 6th bytes of x$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x$ must be at least 6 bytes long.

Function	Variable	Converts to
CVBYT	1-byte string	Byte
CVCUR	8-byte string	Currency
CVCUX	8-byte string	Extended-currency
CVD	8-byte string	Double-precision float
CVDWD	4-byte string	Double-word
CVE	10-byte string	Extended-precision float
CVI	2-byte string	Integer
CVL	4-byte string	Long-integer
CVQ	8-byte string	Quad-integer
CVS	4-byte string	Single-precision float
CVWRD	2-byte string	Word

Restrictions

Expressions involving Numeric Equates and conditional compilation (#IF) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode  = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also

MKBYT$ and associated functions

CVCUR function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose Extracts

data from an ANSI .

Syntax

```
bytevar?           = CVBYT(stringexpr [, offset])
curvar@            = CVCUR(stringexpr [, offset])
cuxvar@@           = CVCUX(stringexpr [, offset])
doublevar#         = CVD  (stringexpr [, offset])
doublewordvar???   = CVDWD(stringexpr [, offset])
extendedvar##      = CVE  (stringexpr [, offset])
integervar%        = CVI  (stringexpr [, offset])
longintvar&        = CVL  (stringexpr [, offset])
quadintvar&&       = CVQ  (stringexpr [, offset])
singlevar!         = CVS  (stringexpr [, offset])
wordvar??          = CVWRD(stringexpr [, offset])
```

Remarks The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The MKx$ functions are complementary to the CVx functions. Do not confuse these functions with the VAL function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or UDT which consists of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a WIDE *StringExpr*. If Offset is not given, it is presumed to be one (1).

For example: "Value& = CVL(x$, 3)" would extract the 3rd through 6th bytes of x$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x$ must be at least 6 bytes long.

Function	Variable	Converts to
CVBYT	1-byte string	Byte
CVCUR	8-byte string	Currency
CVCUX	8-byte string	Extended-currency
CVD	8-byte string	Double-precision float
CVDWD	4-byte string	Double-word
CVE	10-byte string	Extended-precision float
CVI	2-byte string	Integer
CVL	4-byte string	Long-integer
CVQ	8-byte string	Quad-integer
CVS	4-byte string	Single-precision float
CVWRD	2-byte string	Word

Restrictions Expressions involving Numeric Equates and conditional compilation (#IF) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode  = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also MKBYT$ and associated functions

CVCUX function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose Extracts

data from an ANSI .

Syntax

```
bytevar?          = CVBYT(stringexpr [, offset])
curvar@           = CVCUR(stringexpr [, offset])
cuxvar@@          = CVCUX(stringexpr [, offset])
doublevar#        = CVD  (stringexpr [, offset])
doublewordvar??? = CVDWD(stringexpr [, offset])
extendedvar##     = CVE  (stringexpr [, offset])
integervar%       = CVI  (stringexpr [, offset])
longintvar&       = CVL  (stringexpr [, offset])
quadintvar&&      = CVQ  (stringexpr [, offset])
singlevar!        = CVS  (stringexpr [, offset])
wordvar??         = CVWRD(stringexpr [, offset])
```

Remarks The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The MKx$ functions are complementary to the CVx functions. Do not confuse these functions with the VAL function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or UDT which consists of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a WIDE *StringExpr*. If Offset is not given, it is presumed to be one (1).

For example: "Value& = CVL(x$, 3)" would extract the 3rd through 6th bytes of x$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x$ must be at least 6 bytes long.

Function	Variable	Converts to
CVBYT	1-byte string	Byte
CVCUR	8-byte string	Currency
CVCUX	8-byte string	Extended-currency
CVD	8-byte string	Double-precision float
CVDWD	4-byte string	Double-word
CVE	10-byte string	Extended-precision float
CVI	2-byte string	Integer
CVL	4-byte string	Long-integer
CVQ	8-byte string	Quad-integer
CVS	4-byte string	Single-precision float
CVWRD	2-byte string	Word

Restrictions Expressions involving Numeric Equates and conditional compilation (#IF) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode  = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also MKBYT$ and associated functions

CVD function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose Extracts

data from an ANSI .

Syntax

```
bytevar?          = CVBYT(stringexpr [, offset])
curvar@           = CVCUR(stringexpr [, offset])
cuxvar@@          = CVCUX(stringexpr [, offset])
doublevar#        = CVD  (stringexpr [, offset])
doublewordvar???  = CVDWD(stringexpr [, offset])
extendedvar##     = CVE  (stringexpr [, offset])
integervar%       = CVI  (stringexpr [, offset])
longintvar&       = CVL  (stringexpr [, offset])
quadintvar&&      = CVQ  (stringexpr [, offset])
singlevar!        = CVS  (stringexpr [, offset])
wordvar??         = CVWRD(stringexpr [, offset])
```

Remarks The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The MKx$ functions are complementary to the CVx functions. Do not confuse these functions with the VAL function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or UDT which consists of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a WIDE *StringExpr*. If Offset is not given, it is presumed to be one (1).

For example: "Value& = CVL(x$, 3)" would extract the 3rd through 6th bytes of x$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x$ must be at least 6 bytes long.

Function	Variable	Converts to
CVBYT	1-byte string	Byte
CVCUR	8-byte string	Currency
CVCUX	8-byte string	Extended-currency
CVD	8-byte string	Double-precision float
CVDWD	4-byte string	Double-word
CVE	10-byte string	Extended-precision float
CVI	2-byte string	Integer

CVL	4-byte string	Long-integer
CVQ	8-byte string	Quad-integer
CVS	4-byte string	Single-precision float
CVWRD	2-byte string	Word

Restrictions Expressions involving Numeric Equates and conditional compilation (#IF) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode  = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also MKBYT$ and associated functions

CVDWD function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose Extracts

data from an ANSI .

Syntax

```
bytevar?          = CVBYT(stringexpr [, offset])
curvar@           = CVCUR(stringexpr [, offset])
cuxvar@@          = CVCUX(stringexpr [, offset])
doublevar#        = CVD  (stringexpr [, offset])
doublewordvar???  = CVDWD(stringexpr [, offset])
extendedvar##     = CVE  (stringexpr [, offset])
integervar%       = CVI  (stringexpr [, offset])
longintvar&       = CVL  (stringexpr [, offset])
quadintvar&&      = CVQ  (stringexpr [, offset])
singlevar!        = CVS  (stringexpr [, offset])
wordvar??         = CVWRD(stringexpr [, offset])
```

Remarks The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The MKx$ functions are complementary to the CVx functions. Do not confuse these functions with the VAL function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or UDT which consists of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a WIDE *StringExpr*. If Offset is not given, it is presumed to be one (1).

For example: "Value& = CVL(x$, 3)" would extract the 3rd through 6th bytes of x$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x$ must be at least 6 bytes long.

Function	Variable	Converts to
CVBYT	1-byte string	Byte
CVCUR	8-byte string	Currency

CVCUX	8-byte string	Extended-currency
CVD	8-byte string	Double-precision float
CVDWD	4-byte string	Double-word
CVE	10-byte string	Extended-precision float
CVI	2-byte string	Integer
CVL	4-byte string	Long-integer
CVQ	8-byte string	Quad-integer
CVS	4-byte string	Single-precision float
CVWRD	2-byte string	Word

Restrictions Expressions involving Numeric Equates and conditional compilation (#IF) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode  = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also MKBYT$ and associated functions

CVE function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose Extracts

data from an ANSI .

Syntax

```
bytevar?          = CVBYT(stringexpr [, offset])
curvar@           = CVCUR(stringexpr [, offset])
cuxvar@@          = CVCUX(stringexpr [, offset])
doublevar#        = CVD  (stringexpr [, offset])
doublewordvar???  = CVDWD(stringexpr [, offset])
extendedvar##     = CVE  (stringexpr [, offset])
integervar%       = CVI  (stringexpr [, offset])
longintvar&       = CVL  (stringexpr [, offset])
quadintvar&&      = CVQ  (stringexpr [, offset])
singlevar!        = CVS  (stringexpr [, offset])
wordvar??         = CVWRD(stringexpr [, offset])
```

Remarks The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The MKx$ functions are complementary to the CVx functions. Do not confuse these functions with the VAL function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or UDT which consists of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a WIDE *StringExpr*. If Offset is not given, it is presumed to be one (1).

For example: "Value& = CVL(x$, 3)" would extract the 3rd through 6th bytes of x$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x$ must be at least 6 bytes long.

Function	Variable	Converts to
CVBYT	1-byte string	Byte
CVCUR	8-byte string	Currency
CVCUX	8-byte string	Extended-currency
CVD	8-byte string	Double-precision float
CVDWD	4-byte string	Double-word
CVE	10-byte string	Extended-precision float
CVI	2-byte string	Integer
CVL	4-byte string	Long-integer
CVQ	8-byte string	Quad-integer
CVS	4-byte string	Single-precision float
CVWRD	2-byte string	Word

Restrictions

Expressions involving Numeric Equates and conditional compilation (#IF) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode  = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also

MKBYT$ and associated functions

CVI function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose

Extracts

data from an ANSI .

Syntax

```
bytevar?         = CVBYT(stringexpr [, offset])
curvar@          = CVCUR(stringexpr [, offset])
cuxvar@@         = CVCUX(stringexpr [, offset])
doublevar#       = CVD  (stringexpr [, offset])
doublewordvar??? = CVDWD(stringexpr [, offset])
extendedvar##    = CVE  (stringexpr [, offset])
integervar%      = CVI  (stringexpr [, offset])
longintvar&      = CVL  (stringexpr [, offset])
quadintvar&&     = CVQ  (stringexpr [, offset])
singlevar!       = CVS  (stringexpr [, offset])
wordvar??        = CVWRD(stringexpr [, offset])
```

Remarks

The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The MKx$ functions are complementary to the CVx functions. Do not confuse these functions with the VAL function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or UDT which consists of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a WIDE *StringExpr*. If Offset is not given, it is presumed to be one (1).

For example: "Value& = CVL(x$, 3)" would extract the 3rd through 6th bytes of x$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x$ must be at least 6 bytes long.

Function	Variable	Converts to
CVBYT	1-byte string	Byte
CVCUR	8-byte string	Currency
CVCUX	8-byte string	Extended-currency
CVD	8-byte string	Double-precision float
CVDWD	4-byte string	Double-word
CVE	10-byte string	Extended-precision float
CVI	2-byte string	Integer
CVL	4-byte string	Long-integer
CVQ	8-byte string	Quad-integer
CVS	4-byte string	Single-precision float
CVWRD	2-byte string	Word

Restrictions Expressions involving Numeric Equates and conditional compilation (#IF) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode  = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also MKBYT$ and associated functions

CVL function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose Extracts

data from an ANSI .

Syntax

```
bytevar?         = CVBYT(stringexpr [, offset])
curvar@          = CVCUR(stringexpr [, offset])
cuxvar@@         = CVCUX(stringexpr [, offset])
doublevar#       = CVD  (stringexpr [, offset])
doublewordvar??? = CVDWD(stringexpr [, offset])
extendedvar##    = CVE  (stringexpr [, offset])
integervar%      = CVI  (stringexpr [, offset])
longintvar&      = CVL  (stringexpr [, offset])
quadintvar&&     = CVQ  (stringexpr [, offset])
singlevar!       = CVS  (stringexpr [, offset])
```

```
wordvar??          = CVWRD(stringexpr [, offset])
```

Remarks The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The MKx$ functions are complementary to the CVx functions. Do not confuse these functions with the VAL function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or UDT which consists of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a WIDE *StringExpr*. If Offset is not given, it is presumed to be one (1).

For example: "Value& = CVL(x$, 3)" would extract the 3rd through 6th bytes of x$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x$ must be at least 6 bytes long.

Function	Variable	Converts to
CVBYT	1-byte string	Byte
CVCUR	8-byte string	Currency
CVCUX	8-byte string	Extended-currency
CVD	8-byte string	Double-precision float
CVDWD	4-byte string	Double-word
CVE	10-byte string	Extended-precision float
CVI	2-byte string	Integer
CVL	4-byte string	Long-integer
CVQ	8-byte string	Quad-integer
CVS	4-byte string	Single-precision float
CVWRD	2-byte string	Word

Restrictions Expressions involving Numeric Equates and conditional compilation (#IF) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode  = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also MKBYT$ and associated functions

CVQ function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose Extracts

data from an ANSI .

Syntax

```
bytevar?           = CVBYT(stringexpr [, offset])
curvar@            = CVCUR(stringexpr [, offset])
cuxvar@@           = CVCUX(stringexpr [, offset])
```

```
doublevar#        = CVD  (stringexpr [, offset])
doublewordvar??? = CVDWD(stringexpr [, offset])
extendedvar##     = CVE  (stringexpr [, offset])
integervar%       = CVI  (stringexpr [, offset])
longintvar&       = CVL  (stringexpr [, offset])
quadintvar&&      = CVQ  (stringexpr [, offset])
singlevar!        = CVS  (stringexpr [, offset])
wordvar??         = CVWRD(stringexpr [, offset])
```

Remarks

The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The MKx$ functions are complementary to the CVx functions. Do not confuse these functions with the VAL function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or UDT which consists of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a WIDE *StringExpr*. If Offset is not given, it is presumed to be one (1).

For example: "Value& = CVL(x$, 3)" would extract the 3rd through 6th bytes of x$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x$ must be at least 6 bytes long.

Function	Variable	Converts to
CVBYT	1-byte string	Byte
CVCUR	8-byte string	Currency
CVCUX	8-byte string	Extended-currency
CVD	8-byte string	Double-precision float
CVDWD	4-byte string	Double-word
CVE	10-byte string	Extended-precision float
CVI	2-byte string	Integer
CVL	4-byte string	Long-integer
CVQ	8-byte string	Quad-integer
CVS	4-byte string	Single-precision float
CVWRD	2-byte string	Word

Restrictions

Expressions involving Numeric Equates and conditional compilation (#IF) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode  = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also

MKBYT$ and associated functions

CVS function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE,

CVI, CVL, CVQ, CVS and CVWRD functions

Purpose Extracts

data from an ANSI .

Syntax

```
bytevar?          = CVBYT(stringexpr [, offset])
curvar@           = CVCUR(stringexpr [, offset])
cuxvar@@          = CVCUX(stringexpr [, offset])
doublevar#        = CVD  (stringexpr [, offset])
doublewordvar??? = CVDWD(stringexpr [, offset])
extendedvar##     = CVE  (stringexpr [, offset])
integervar%       = CVI  (stringexpr [, offset])
longintvar&       = CVL  (stringexpr [, offset])
quadintvar&&      = CVQ  (stringexpr [, offset])
singlevar!        = CVS  (stringexpr [, offset])
wordvar??         = CVWRD(stringexpr [, offset])
```

Remarks The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The MKx$ functions are complementary to the CVx functions. Do not confuse these functions with the VAL function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or UDT which consists of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a WIDE *StringExpr*. If Offset is not given, it is presumed to be one (1).

For example: "Value& = CVL(x$, 3)" would extract the 3rd through 6th bytes of x$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x$ must be at least 6 bytes long.

Function	Variable	Converts to
CVBYT	1-byte string	Byte
CVCUR	8-byte string	Currency
CVCUX	8-byte string	Extended-currency
CVD	8-byte string	Double-precision float
CVDWD	4-byte string	Double-word
CVE	10-byte string	Extended-precision float
CVI	2-byte string	Integer
CVL	4-byte string	Long-integer
CVQ	8-byte string	Quad-integer
CVS	4-byte string	Single-precision float
CVWRD	2-byte string	Word

Restrictions Expressions involving Numeric Equates and conditional compilation (#IF) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode  = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also MKBYT$ and associated functions

CVWRD function

CVBYT, CVCUR, CVCUX, CVD, CVDWD, CVE, CVI, CVL, CVQ, CVS and CVWRD functions

Purpose Extracts

data from an ANSI .

Syntax

```
bytevar?         = CVBYT(stringexpr [, offset])
curvar@          = CVCUR(stringexpr [, offset])
cuxvar@@         = CVCUX(stringexpr [, offset])
doublevar#       = CVD  (stringexpr [, offset])
doublewordvar??? = CVDWD(stringexpr [, offset])
extendedvar##    = CVE  (stringexpr [, offset])
integervar%      = CVI  (stringexpr [, offset])
longintvar&      = CVL  (stringexpr [, offset])
quadintvar&&     = CVQ  (stringexpr [, offset])
singlevar!       = CVS  (stringexpr [, offset])
wordvar??        = CVWRD(stringexpr [, offset])
```

Remarks The CVx functions return a number corresponding to a binary pattern stored in a ANSI string value. The binary pattern is the internal format used by PowerBASIC to store these values in memory. This format follows the IEEE standard wherever it applies. The MKx$ functions are complementary to the CVx functions. Do not confuse these functions with the VAL function, which converts a number stored as a printable text string (such as "123.45") into a numeric expression.

In all but the most extreme cases, *StringExpr* must be an ANSI string or UDT which consists of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CVx functions allow you to retrieve values beyond the first byte of the *StringExpr*. In this case, the optional *offset* parameter tells the byte position where the conversion should begin. This is the byte position, not the character position, even with a WIDE *StringExpr*. If Offset is not given, it is presumed to be one (1).

For example: "Value& = CVL(x$, 3)" would extract the 3rd through 6th bytes of x$ and convert these 4 bytes to the corresponding Long-integer value. In this example, x$ must be at least 6 bytes long.

Function	Variable	Converts to
CVBYT	1-byte string	Byte
CVCUR	8-byte string	Currency
CVCUX	8-byte string	Extended-currency
CVD	8-byte string	Double-precision float
CVDWD	4-byte string	Double-word
CVE	10-byte string	Extended-precision float
CVI	2-byte string	Integer
CVL	4-byte string	Long-integer
CVQ	8-byte string	Quad-integer
CVS	4-byte string	Single-precision float
CVWRD	2-byte string	Word

Restrictions Expressions involving Numeric Equates and conditional compilation (#IF) may also include the CVQ function. This allows you to easily assign numeric values to an equate, based upon a meaningful mnemonic. In this context, the CVQ expression is limited to a length of eight bytes. For example:

```
%Mode  = CVQ("DEBUG")
%Style = CVQ("Cool")
```

CVS limits string display to seven significant digits.

See also MKBYT$ and associated functions

CWRD function

CBYT, CCUR, CCUX, CDBL, CDWD, CEXT, CINT, CLNG, CQUD, CSNG, and CWRD functions

Purpose Convert a value to specific variable type.

Syntax

```
bytevar?          = CBYT(numeric_expression)
currencyvar@      = CCUR(numeric_expression)
currencyextvar@@  = CCUX(numeric_expression)
doublevar#        = CDBL(numeric_expression)
doublewordvar???  = CDWD(numeric_expression)
extendedvar##     = CEXT(numeric_expression)
integervar%       = CINT(numeric_expression)
longintvar&       = CLNG(numeric_expression)
quadintvar&&      = CQUD(numeric_expression)
singlevar!        = CSNG(numeric_expression)
wordvar??         = CWRD(numeric_expression)
```

Remarks Each of these functions converts a

expression to a particular variable type. In each case, *numeric_expression* must be within the legal range for the result type. The *numeric_expression* will be rounded if necessary.

Function	Result type
CBYT	Byte
CCUR	Currency
CCUX	Extended-currency
CDBL	Double-precision floating-point
CDWD	Double-word
CEXT	Extended-precision floating-point
CINT	Integer
CLNG	Long-integer
CQUD	Quad-integer
CSNG	Single-precision floating-point
CWRD	Word

These conversion functions are rarely needed as PowerBASIC automatically performs any necessary conversions when executing an assignment statement or passing parameters. For example:

```
e% = f#
```

is equivalent to:

```
e% = CINT(f#)
```

In the case of the functions that convert to

values, the fractional part of the number is rounded. If the fractional part is exactly .5 then it rounds to the nearest even integral value. For example, CINT(1.5) returns 2, CINT(.5) returns 0, and CLNG(-0.6) returns -1.

Restrictions CSNG limit string display to 7 significant digits.

See also CEIL, CVI and associated functions, FIX, INT, MKI$ and associated functions

Example

```
' Calculate CINT for a series of values
FOR I! = 2.4! TO 2.65! STEP 0.05!
  x$ = FORMAT$(I!, "0.00") + " is" + STR$(CINT(I!))
NEXT I!
```

Result

```
2.40 is 2
2.45 is 2
2.50 is 2
2.55 is 3
2.60 is 3
2.65 is 3
```

DATA statement

DATA statement

Purpose Declare string constants within the source code to be read by READ$ function.

Syntax **DATA ["]*item*["] [[, ["]*item*["]] ...]**

Remarks DATA statements may only appear inside of Subs, Functions, Method, or Properties, and are visible only to the code in the procedure in which they appear. Each procedure may therefore have its own private data.

Data may consist of virtually any text characters. Data items may be enclosed in quotes to preserve leading/trailing spaces, which are otherwise stripped during compilation.

Restrictions There is a limit of 64 Kilobytes and 16384 separate data items per procedure. Previous versions of PowerBASIC ignored plain text located immediately after a quoted literal up to the next comma or end-of-line; however, this is no longer acceptable and generates an Error 477 ("Syntax error").

DATA statements cannot extend across more than one physical source code line using line continuation characters. Special care should be used when formatting DATA statements, especially if the data is to contain underscore and/or colon characters. The following examples highlight data items in blue:

If an underscore appears after a comma, it is treated as the start of a quoted data string, rather than a line continuation character:

```
' Three data items exist in this line:
DATA "Tom", "Dick", _Harry
```

The colon (statement separator) character, when used within unquoted string data, performs as a regular statement separator:

```
' Two data items and a separate statement
DATA "Tom","Dick" : Harry& = 1
```

However, if a colon character appears within a quoted data string, it is treated as part of the data string:

```
' 3 data items
DATA "Tom",Dick,":Harry& = 1"
```

See also DATACOUNT, READ$, VAL

Example

```
DATA "Abc", Bob, "Sally", 123
DATA 456.78, "  leading space"
DATA embedded "quotes within data"
```

DATACOUNT function

DATACOUNT function

Purpose Return the total count of the number of local DATA items that can be read with the READ$ function.

Syntax `Count% = DATACOUNT`

Remarks DATACOUNT only returns the number of DATA items in the Sub, Function, Method, or Property in which it appears (i.e., local DATA statements). While it is not possible to directly read data from outside of the scope of current procedure, global data can be emulated easily by placing it inside a procedure returns data to the calling code. There is a limit of 64 Kilobytes and 16384 separate data items per procedure.

See also DATA, READ$

Example

```
FUNCTION GetCategories(Category() AS STRING) AS LONG
  LOCAL x AS INTEGER
  REDIM Category(1 TO DATACOUNT) AS STRING
  FOR x = 1 TO DATACOUNT
    Category(x) = READ$(x)
  NEXT x
  FUNCTION = DATACOUNT
  DATA Animal, Mineral, Vegetable, Alien
END FUNCTION
```

DATE$ system variable

DATE$ system variable

Purpose Set or retrieve the system date.

Syntax

```
DATE$ = s$      ' sets system date according to s$
s$ = DATE$      ' s$ now contains system date
```

Remarks Assigning a properly formatted

value to DATE$ sets the system date. You can also assign DATE$ to a string variable, which stores 10 characters in the form "mm-dd-yyyy", where *mm* represents the month, *dd* the day, and *yyyy* the year.

To change the date, your date string must be formatted in one of the following ways:

```
mm-dd-yy
mm/dd/yy
mm-dd-yyyy
mm/dd/yyyy
```

For example, DATE$ = "11-09-84" sets the system date to November 9, 1984.

Restrictions The year assigned to the DATE$ system variable must be within the range 1980 to 2099. DATE$ never returns locale-specific date formats. When assigning a two digit year, any value less than 81 will be assumed to be in the 2000's and any value greater than 80 will be assumed to be in the 1900's.

See also DAYNAME$, MONTHNAME$, POWERTIME, TIME$

DAYNAME$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DAYNAME$ function New!

Purpose Converts a Day-of-Week number to the associated name.

Syntax `s$ = DAYNAME$(DayNumber&)`

Remarks The DAYNAME$ function converts a Day-of-Weeek number into a

representing its associated name. The argument must be in the range of 0 through 6, representing the names Sunday, Monday, etc.

See also DATE$, MONTHNAME$, POWERTIME

DEC$ function

DEC$ function New!

Purpose Convert an integral value to a decimal

.

Syntax `s$ = DEC$(IntVal [, Digits, LeadSpaces, TrailSpaces])`

Remarks *IntVal* is a

expression in the range of a 64-bit Quad Integer (-9223372036854775808 to +9223372036854775807). Any fractional part of the value is rounded. If the value is negative, the leading minus sign occupies one digit position. The result string is always formatted as an integral number using all the significant digits in *IntVal*. It is never expressed in scientific notation.

If *Digits* is 0 (or not given), no leading characters will be added to the numeric field. If *Digits* is a positive number greater than 0, the result string will be prepended with leading zeros to achieve the desired length. If *Digits* is a negative number, leading spaces are added to reach the absolute length. *Digits* may be in the range of -20 to +20.

LeadSpaces specifies additional leading spaces to be prepended, regardless of the length of the numeric portion of the string.

TrailSpaces specifies additional trailing spaces to be appended to the end of the string.

See also BIN$, FORMAT$, HEX$, OCT$, STR$, TRIM$, USING$, VAL

DECLARE statement

DECLARE statement IMPROVED

Purpose Explicitly declare a Sub or Function.

Syntax

```
DECLARE SUB ProcName [ALIAS "AliasName"] [(arguments)] <Descriptors>
DECLARE FUNCTION ProcName [ALIAS "AliasName"] [(arguments)] <Descriptors>
AS RetType
```

```
DECLARE CALLBACK FUNCTION ProcName [[()] AS LONG]
DECLARE THREAD FUNCTION ProcName (BYVAL var AS (LONG | DWORD}) AS {LONG |
DWORD}
```

Remarks The DECLARE statement has the following parts:

ProcName The name of the Sub or Function to be declared. For Functions, a type-specifier may be appended (just like an ordinary variable name) to specify the

of the Function's return value, in place of the [AS *RetType*] clause.

> **Future versions of PowerBASIC will not support type-specifier symbols for the Function return type. Specify the return data type with an explicit AS *RetType* clause in all DECLARE and FUNCTION definitions to ensure future compatibility.**

ALIAS An alias clause may be used to specify an alternate name to be used for imported or exported procedures. This allows you to interact with outside modules (DLL or EXE) using a different procedure name. The alias name must be specified by a string literal which provides the name and capitalization of the procedure in the external DLL.

This option is particularly useful if you want to abbreviate a long name, or if the original name of a function contains characters that are illegal in PowerBASIC. The alias name is the actual name used in the other module, while the *ProcName* is the word you use in your PowerBASIC program. For example:

```
DECLARE SUB ShortName ALIAS "VeryLongProcName"()
DECLARE FUNCTION LegalName ALIAS "Illegal$Name"()
```

Although a *ProcName* must be unique, you may use the same *AliasName* in multiple declarations. This is particularly useful for avoiding AS ANY in cases where a procedure is designed to receive several different types of parameters.

```
DECLARE FUNCTION AddAtom    LIB "KERNEL32.DLL" ALIAS
"AddAtomA" (lpString AS STRINGZ) AS WORD
DECLARE FUNCTION AddIntAtom LIB "KERNEL32.DLL" ALIAS "AddAtomA" (BYVAL
lpString AS DWORD) AS WORD
```

> **The ALIAS clause is very important when importing or exporting Subs and Functions from DLLs. Omitting the ALIAS clause or incorrectly capitalizing the alias name are common causes of DLL load failure problems. Please refer to the SUB and FUNCTION sections for more information.**

Descriptors

You may optionally add one or more descriptor words (Import, Export, Common, Private, ThreadSafe, BDecl, CDecl, SDecl) to provide specific functionality. They may be added to the DECLARE as a comma delimited list. You should note that some of them are mutually exclusive.

IMPORT A string literal or equate that specifies the name of the module in which an imported procedure is located. This allows you to call Subs or Functions that reside in DLLs. The legacy word LIB may be substituted for IMPORT.

EXPORT This descriptor identifies a Sub or Function which may be accessed between Dynamic Link Libraries (DLLs), and/or the main executable which links them. If a procedure is not marked EXPORT, it is hidden from these other modules. The EXPORT attribute may be added to a Sub/Function defined elsewhere, by specifying EXPORT in a DECLARE statement. EXPORT can even be added to a Sub/Function in an SLL with a DECLARE in the host module.

COMMON A COMMON Sub/Function is one which may be called between linked unit modules (Host or SLL). If the Common Sub/Function is not present in this module, it is presumed to be found in a separate linked module (Host or SLL). It is not necessary to DECLARE a COMMON Sub or Function in the Host Module. If you choose to do so, it is generally advisable to omit the COMMON descriptor, as its presence will force the SLL to be linked, whether needed or not.

PRIVATE A PRIVATE Sub/Function is one which may only be accessed from within the current PowerBASIC program or library. Even if not specified, this is the default mode of operation.

THREADSAFE With the THREADSAFE option, PowerBASIC automatically establishes a semaphore which allows only one thread to execute the Sub/Function at a time. Other callers must wait until the first thread exits the THREADSAFE procedure before they are allowed to begin.

BDECL Specifies that the declared procedure uses the legacy BASIC/Pascal calling convention. Parameters are pushed on the stack from left to right, and the called procedure is responsible for removing them. BDECL should only be used when necessary to match outside modules.

CDECL Specifies that the declared procedure uses the C calling convention. Parameters are pushed on the stack from right to left, and the calling code is responsible for removing them. CDECL should only be used when necessary to match outside modules.

When a procedure is imported or exported, PowerBASIC automatically creates a lowercase ALIAS, prefixed with an underscore. The following two declarations are equivalent, indicating how the default ALIAS name would be created by PowerBASIC:

```
DECLARE SUB C_Function CDECL ()
DECLARE SUB C_Function CDECL ALIAS "_c_function" ()
```

SDECL This is the default convention, and should be used whenever possible. SDECL (and its synonym STDCALL), specifies the "Standard Calling Convention" for Windows. Parameters are pushed on the stack from right to left, and the called procedure is responsible for removing them.

CALLBACK Callback Functions are reserved for use with Dynamic Dialog Tools (DDT) functions. No parameters should be specified, as data is retrieved with the CALLBACK (CB) functions. Parentheses and the AS LONG return type may be added for clarity.

THREAD Thread functions are reserved for use with the THREAD CREATE statement. It must take exactly one Long Integer parameter by value (BYVAL LONG), and must return a Long Integer value (AS LONG). It is permissible to substitute DWORD for both of these items.

Passing parameters

Arguments Contains the name(s) or the type of each parameter, in the order they are passed, for up to 32 parameters. If you wish to call a SUB or FUNCTION in a DLL, you must describe the target SUB or FUNCTION with an explicit DECLARE statement. The DECLARE must physically precede any reference to the target procedure.

Previous versions of PowerBASIC required that you create an explicit DECLARE statement if you wished to execute a SUB or function which did not physically precede the reference to it. This extra work is no longer required, as PowerBASIC resolves all forward references to internal procedures automatically.

The complete *arguments* list must be specified for each routine. Each parameter may be defined in one of three ways:

- List only its type name (INTEGER, DOUBLE, etc.)
- List a variable name with a type-specifier appended (count%, txt$)
- Use the AS clause to specify the type (count AS INTEGER, text AS STRING * 100, etc.).

Legal type names for *arguments* include ANY, ASCIIZ, BYTE, CUR, CUX, DOUBLE, DWORD, EXT, INTEGER, LONG, PTR, QUAD, SINGLE, STRING, STRINGZ, WORD, WSTRING, WSTRINGZ and ARRAY. The ARRAY keyword is used in conjunction with one of the other types to specify an entire array of that type. For example:

```
DECLARE SUB KerPlunk(INTEGER ARRAY, DOUBLE)
```

declares a procedure called *KerPlunk*, which takes an entire Integer array and a Double-precision variable as parameters. You can also name the parameters using the AS keyword:

```
DECLARE SUB KerPlunk(iArray() AS INTEGER, dVar AS DOUBLE)
```

The following four declare statements are equivalent:

```
DECLARE SUB KerPlunk(x) ' if DEFINT A-Z is in effect
DECLARE SUB KerPlunk(x%)
DECLARE SUB Plunk(x AS INTEGER)
DECLARE SUB KerPlunk(INTEGER)
```

When parameters are passed by reference (BYREF), the address of the variable passed to the routine is placed on the stack. When they are passed by value (BYVAL), the actual data is placed on the stack. You can use the BYVAL or BYREF keywords to specify that a parameter should always be passed in a known format.

Using ANY disables type checking for a particular parameter, and passes the address of the variable on the stack. Since the internal format of variables differ greatly by type, you must use caution to be certain your code knows the data type in each invocation. Normally, a second parameter is used to specify the actual type of the ANY parameter.

When a Sub/Function definition specifies either a BYREF parameter or a pointer variable parameter, the calling code may freely pass a BYVAL DWORD or a pointer instead. While the use of the explicit BYVAL override in the calling code is optional, it is recommended for clarity. It is necessary to explicitly declare all pointer parameters as BYVAL (BYVAL x AS BYTE PTR). Failure to do so will generate compile-time Error 549 ("BYVAL required with pointers").

Additional information on BYVAL/BYREF/BYCOPY parameter passing can be found in the CALL statement topic.

Using OPTIONAL/OPT

DECLARE statements may specify one or more parameters as optional by preceding the parameter with either the keyword OPTIONAL (or the abbreviation OPT). Optional parameters are only allowed with CDECL or SDECL calling conventions, not BDECL.

When a parameter is declared optional, all subsequent parameters in the declaration are optional as well, whether or not they specify an explicit OPTIONAL or OPT directive. The following two lines are equivalent, with both second and third parameters being optional:

```
DECLARE SUB sABC(a&, OPTIONAL BYVAL b&, OPTIONAL BYVAL c&) AS LONG
DECLARE SUB sABC(a&, OPT BYVAL b&, BYVAL c&) AS LONG
```

VARIANT variables are particularly well suited for use as an optional parameter. If the calling code omits an optional VARIANT parameter, (BYVAL or BYREF), PowerBASIC (and most other compilers) substitute a variant of type %VT_ERROR which contains an error value of %DISP_E_PARAMNOTFOUND (&H80020004). In this case, you can check for this value directly, or use the ISMISSING() function to determine whether the parameter was physically passed or not.

When optional parameters (other than VARIANT) are omitted in the calling code, the stack area normally reserved for those parameters is zero-filled.

If the parameter is defined as a BYVAL parameter, it will have the value zero. For TYPE or UNION variables passed BYVAL, the compiler will pass a string of binary zeroes of length SIZEOF(*Type*_or_*union*_var).

If the parameter is defined as a BYREF *parameter*, VARPTR (*Varname*) will equal zero; when this is true, any attempt to use *Varname* in your code will result in a General Protection Fault or memory corruption. You should use the ISMISSING() function first to determine whether it is safe to access the parameter.

AS type — You may specify the type of data returned by a Function to the calling code. If you do not specify a type, PowerBASIC assumes that the Function returns the data type specified by a DEF*type* statement. However, if no DEF*type* or AS *type* has been specified, a compile-time error is generated.

Therefore, there are two ways to specify the return type of a Function:

- Include a type-specifier character at the end of *ProcName*
- Include the AS *type* clause as the last part of the DECLARE statement (this is the

recommended syntax to ensure compatibility with future versions of PowerBASIC).

For example, the following statements are equivalent:

```
DECLARE FUNCTION aFunction?()
DECLARE FUNCTION aFunction() AS BYTE
```

While most FUNCTION calling conventions are fairly well defined throughout the industry, there are a few exceptions. In the case of functions which return a Quad Integer value, some programming languages (including PowerBASIC) return the quad value in the FPU, while others return it in EDX:EAX. PowerBASIC automatically detects the method used by imported functions and adjusts accordingly for you, but that's not a feature found in other compilers. Therefore, we recommend that you do not EXPORT QUAD FUNCTIONS unless they will only be accessed by PowerBASIC programs. A simple equivalent functionality would be to return the quad-integer value to the caller in a BYREF QUAD parameter.

Restrictions A Sub/Function may be imported and exported within the same module. That is, a function in the module may be stated as EXPORT, while a DECLARE in the same module specifies it as an imported function by the option LIB "filename.dll", as long as FILENAME.DLL is the name of the module. This may be particularly valuable when you wish to build an #INCLUDE file with all of the DECLARE statements for a project.

See also #EXPORT, #LINK, CALL, CALL DWORD, FASTPROC, FUNCTION/END FUNCTION, IMPORT, ISMISSING, SUB/END SUB, THREAD CREATE

Example

```
' Main program
DECLARE SUB Calculate LIB "A.DLL" (EXT, CUR, QUAD, INTEGER)
…
CALL Calculate(w##, x@, y&&, z%)
```

DECR statement

DECR statement

Purpose Decrement a variable by 1; Decrement a pointer by the size of its target; or decrement the target of a numeric pointer by 1.

Syntax `DECR variable`

Remarks *variable* can be a

variable or a pointer variable. When DECR is used with a numeric variable, 1 is subtracted from the numeric variable.

If DECR is used on the target of a numeric pointer variable (i.e., DECR @IntPtr), the target numeric variable is decremented by one. However, when using DECR on a pointer variable, the value of the pointer variable is decremented by the size of its target.

For example, given a pointer to element 1000 of an Integer array, DECR of the pointer variable itself would result in a decrement of 2, which should point to the previous element in the array (element 999). This is because an Integer is two bytes wide, so the pointer value is reduced by 2 bytes.

See also INCR, LET

Example

```
DIM x&, LongPtr AS LONG POINTER
DECR x&
DECR LongPtr
DECR @LongPtr
```

DEFBYT statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose Declare the default type for variable identifiers that begin with specified letters.

Syntax **`DEFtype letter_range [, letter_range] [, ...]`**

Remarks *type* represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word).

letter_range is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M).

DEFtype Tells the compiler that variables and user-defined functions, whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a type specifier, a compile-time error is generated. If however, there was a preceding DEF*type* statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEF*type* statements. If there is overlap between two DEF*type* statements, no error is generated; but the definition of the latter DEF*type* statement overrides the former where the two overlap.

The DEF*type* statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using DIM, INSTANCE, LOCAL, STATIC, THREADED, or GLOBAL.

Restrictions Def*type* only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a #DIM ALL statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1  ' A is Integer
  B = 2  ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also #DIM ALL, DIM, INSTANCE, LOCAL, STATIC, THREADED, GLOBAL

DEFCUR statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose Declare the default type for variable identifiers that begin with specified letters.

Syntax **`DEFtype letter_range [, letter_range] [, ...]`**

Remarks *type* represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word).

letter_range — is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M).

DEFtype — Tells the compiler that variables and user-defined functions, whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a type specifier, a compile-time error is generated. If however, there was a preceding DEF*type* statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEF*type* statements. If there is overlap between two DEF*type* statements, no error is generated; but the definition of the latter DEF*type* statement overrides the former where the two overlap.

The DEF*type* statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using DIM, INSTANCE, LOCAL, STATIC, THREADED, or GLOBAL.

Restrictions — Def*type* only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a #DIM ALL statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1  ' A is Integer
  B = 2  ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also — #DIM ALL, DIM, INSTANCE, LOCAL, STATIC, THREADED, GLOBAL

DEFCUX statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose — Declare the default type for variable identifiers that begin with specified letters.

Syntax — `DEFtype letter_range [, letter_range] [, ...]`

Remarks — *type* represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word).

letter_range — is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M).

DEFtype — Tells the compiler that variables and user-defined functions, whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a type specifier, a compile-time error is generated. If however, there was a preceding DEF*type* statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEF*type* statements. If there is overlap between two DEF*type* statements, no error is generated; but the definition of the latter DEF*type* statement overrides the former where the two overlap.

The DEF*type* statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using DIM, INSTANCE, LOCAL, STATIC, THREADED, or GLOBAL.

Restrictions Def*type* only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a #DIM ALL statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1  ' A is Integer
  B = 2  ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also #DIM ALL, DIM, INSTANCE, LOCAL, STATIC, THREADED, GLOBAL

DEFDBL statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose Declare the default type for variable identifiers that begin with specified letters.

Syntax `DEFtype letter_range [, letter_range] [, ...]`

Remarks *type* represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word).

letter_range is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M).

DEFtype Tells the compiler that variables and user-defined functions, whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a type specifier, a compile-time error is generated. If however, there was a preceding DEF*type* statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEF*type* statements. If there is overlap between two DEF*type* statements, no error is generated; but the definition of the latter DEF*type* statement overrides the former where the two overlap.

The DEF*type* statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using DIM, INSTANCE, LOCAL, STATIC, THREADED, or GLOBAL.

Restrictions Def*type* only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a #DIM ALL statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
```

```
FUNCTION PBMAIN
  A = 1  ' A is Integer
  B = 2  ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also #DIM ALL, DIM, INSTANCE, LOCAL, STATIC, THREADED, GLOBAL

DEFDWD statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose Declare the default type for variable identifiers that begin with specified letters.

Syntax `DEFtype letter_range [, letter_range] [, ...]`

Remarks *type* represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word).

letter_range is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M).

DEFtype Tells the compiler that variables and user-defined functions, whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a type specifier, a compile-time error is generated. If however, there was a preceding DEF*type* statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEF*type* statements. If there is overlap between two DEF*type* statements, no error is generated; but the definition of the latter DEF*type* statement overrides the former where the two overlap.

The DEF*type* statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using DIM, INSTANCE, LOCAL, STATIC, THREADED, or GLOBAL.

Restrictions Def*type* only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a #DIM ALL statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1  ' A is Integer
  B = 2  ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also #DIM ALL, DIM, INSTANCE, LOCAL, STATIC, THREADED, GLOBAL

DEFEXT statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL,

DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose Declare the default type for variable identifiers that begin with specified letters.

Syntax **DEF*type* *letter_range* [, *letter_range*] [, ...]**

Remarks *type* represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word).

letter_range is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M).

DEFtype Tells the compiler that variables and user-defined functions, whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a type specifier, a compile-time error is generated. If however, there was a preceding DEF*type* statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEF*type* statements. If there is overlap between two DEF*type* statements, no error is generated; but the definition of the latter DEF*type* statement overrides the former where the two overlap.

The DEF*type* statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using DIM, INSTANCE, LOCAL, STATIC, THREADED, or GLOBAL.

Restrictions Def*type* only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a #DIM ALL statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1  ' A is Integer
  B = 2  ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also #DIM ALL, DIM, INSTANCE, LOCAL, STATIC, THREADED, GLOBAL

DEFINT statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose Declare the default type for variable identifiers that begin with specified letters.

Syntax **DEF*type* *letter_range* [, *letter_range*] [, ...]**

Remarks *type* represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word).

letter_range is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M).

DEFtype Tells the compiler that variables and user-defined functions, whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a type specifier, a compile-time error is generated. If however, there was a preceding DEF*type* statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEF*type* statements. If there is overlap between two DEF*type* statements, no error is generated; but the definition of the latter DEF*type* statement overrides the former where the two overlap.

The DEF*type* statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using DIM, INSTANCE, LOCAL, STATIC, THREADED, or GLOBAL.

Restrictions Def*type* only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a #DIM ALL statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1  ' A is Integer
  B = 2  ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also #DIM ALL, DIM, INSTANCE, LOCAL, STATIC, THREADED, GLOBAL

DEFLNG statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose Declare the default type for variable identifiers that begin with specified letters.

Syntax `DEFtype letter_range [, letter_range] [, ...]`

Remarks *type* represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word).

letter_range is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M).

DEFtype Tells the compiler that variables and user-defined functions, whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a type specifier, a compile-time error is generated. If however, there was a preceding DEF*type* statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEF*type* statements. If there is overlap between two DEF*type* statements, no error is generated; but the definition of the latter DEF*type* statement overrides the former where the two overlap.

The DEF*type* statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using DIM, INSTANCE, LOCAL, STATIC, THREADED, or GLOBAL.

Restrictions Def*type* only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a #DIM ALL statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1  ' A is Integer
  B = 2  ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also #DIM ALL, DIM, INSTANCE, LOCAL, STATIC, THREADED, GLOBAL

DEFQUD statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose Declare the default type for variable identifiers that begin with specified letters.

Syntax `DEFtype letter_range [, letter_range] [, ...]`

Remarks *type* represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word).

letter_range is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M).

DEFtype Tells the compiler that variables and user-defined functions, whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a type specifier, a compile-time error is generated. If however, there was a preceding DEF*type* statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEF*type* statements. If there is overlap between two DEF*type* statements, no error is generated; but the definition of the latter DEF*type* statement overrides the former where the two overlap.

The DEF*type* statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using DIM, INSTANCE, LOCAL, STATIC, THREADED, or GLOBAL.

Restrictions Def*type* only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a #DIM ALL statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1  ' A is Integer
```

```
  B = 2  ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also #DIM ALL, DIM, INSTANCE, LOCAL, STATIC, THREADED, GLOBAL

DEFSNG statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose Declare the default type for variable identifiers that begin with specified letters.

Syntax `DEFtype letter_range [, letter_range] [, ...]`

Remarks *type* represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word).

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Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1  ' A is Integer
  B = 2  ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also #DIM ALL, DIM, INSTANCE, LOCAL, STATIC, THREADED, GLOBAL

DEFSTR statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG,

DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose Declare the default type for variable identifiers that begin with specified letters.

Syntax `DEFtype letter_range [, letter_range] [, ...]`

Remarks *type* represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word).

letter_range is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M).

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Restrictions Def*type* only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a #DIM ALL statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1  ' A is Integer
  B = 2  ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also #DIM ALL, DIM, INSTANCE, LOCAL, STATIC, THREADED, GLOBAL

DEFWRD statement

DEFBYT, DEFCUR, DEFCUX, DEFDBL, DEFDWD, DEFEXT, DEFINT, DEFLNG, DEFQUD, DEFSNG, DEFSTR and DEFWRD statements

Purpose Declare the default type for variable identifiers that begin with specified letters.

Syntax `DEFtype letter_range [, letter_range] [, ...]`

Remarks *type* represents one of PowerBASIC's variable types: INT (Integer), LNG (Long-integer), QUD (Quad-integer), SNG (Single-precision floating-point), DBL (Double-precision floating-point), EXT (Extended-precision floating-point), CUR (Currency), CUX (Extended-currency), STR (String), BYT (Byte), WRD (Word), and DWD (Double-word).

letter_range is either a single alphabetic character (A through Z, case insignificant), or a range of letters (two letters separated by a hyphen, for example, A-M).

DEFtype — Tells the compiler that variables and user-defined functions, whose names begin with the specified letter or range of letters, are of the specified type.

Normally, when the compiler finds a variable name without a type specifier, a compile-time error is generated. If however, there was a preceding DEF*type* statement such as DEFINT A-Z, the variable would default to that type (in this case, an Integer variable).

You may use multiple DEF*type* statements. If there is overlap between two DEF*type* statements, no error is generated; but the definition of the latter DEF*type* statement overrides the former where the two overlap.

The DEF*type* statement may not be supported in future editions of PowerBASIC, so we recommend explicit variable declarations, using DIM, INSTANCE, LOCAL, STATIC, THREADED, or GLOBAL.

Restrictions — Def*type* only applies to implicitly-defined variables. It has no effect on variables that are defined explicitly. If a #DIM ALL statement exists in the application then Deftype statements will have no effect, #DIM ALL requires all variables to be defined explicitly

Example

```
DEFINT A-E, G, Q, Y-Z
DEFCUX B, F, H-P, R-X
FUNCTION PBMAIN
  A = 1  ' A is Integer
  B = 2  ' B is Extended-currency.
  [statements]
END FUNCTION
```

See Also — #DIM ALL, DIM, INSTANCE, LOCAL, STATIC, THREADED, GLOBAL

DESKTOP GET CLIENT statement

DESKTOP GET CLIENT statement

Purpose — Retrieve the size of the client area of the desktop, in pixels.

Syntax — `DESKTOP GET CLIENT TO ncWidth&, ncHeight&`

Remarks — The desktop client size is the part of the screen that is not obscured by the system tray.

This can be used in combination with DESKTOP GET LOC or DESKTOP GET SIZE for exact positioning of windows on the desktop.

See also — Dynamic Dialog Tools, DESKTOP GET LOC, DESKTOP GET SIZE

DESKTOP GET LOC statement

DESKTOP GET LOC statement

Purpose — Retrieve the location of the top, left corner of the client area of the desktop, in pixels.

Syntax — `DESKTOP GET LOC TO x&, y&`

Remarks — The desktop client area is the part of the screen that is not obscured by the system tray. The system tray's position on the screen determines the upper, left position of the client area. If the tray is located at the bottom of the screen (default), left and top coordinates are 0,0. If the tray is located on the right side of the screen, left and top coordinates are 0,0. If the tray is located on the left side of the screen, left and top coordinates are TrayWidth,0. If the tray is located at the top of the screen, left and top coordinates are 0,TrayHeight.

This can be used in combination with DESKTOP GET CLIENT or DESKTOP GET SIZE for exact positioning of windows on the desktop.

See also DESKTOP GET CLIENT, DESKTOP GET SIZE

DESKTOP GET SIZE statement

DESKTOP GET SIZE statement

Purpose Retrieve the size of the entire desktop, in pixels.

Syntax **DESKTOP GET SIZE TO *ncWidth&, ncHeight&***

Remarks The desktop size includes the space taken up by the system tray and is same as the screen size. This can be used in combination with DESKTOP GET CLIENT or DESKTOP GET LOC for exact positioning of windows on the desktop.

See also DESKTOP GET CLIENT, DESKTOP GET LOC

DIALOG DEFAULT FONT statement

DIALOG DEFAULT FONT statement IMPROVED

Purpose Specify the default DDT font information.

Syntax **DIALOG DEFAULT FONT *fontname$* [,*points&, style&, charset&*]**

Legacy syntax:
DIALOG FONT [DEFAULT] *fontname$* [,*points&, style&, charset&*]

fontname$ Name of the font.

points& Size of the font, in points.

style& Font style attribute.

0	Normal
2	Italic

charset& CharSet identifier.

0	ANSI CharSet	162	Turkish CharSet
1	Default CharSet	177	Hebrew CharSet
2	Symbol CharSet	178	Arabic CharSet
77	Mac CharSet	186	Baltic CharSet
128	Shiftjis CharSet	204	Russian CharSet
129	Hangeul CharSet	222	Thai CharSet
130	Johab CharSet	238	East Europe CharSet
136	Chinese CharSet	255	OEM CharSet
161	Greek CharSet		

Remarks The DIALOG DEFAULT FONT statement specifies the font which will be used for all subsequent dialogs created with DIALOG NEW, until another DIALOG DEFAULT FONT statement is executed. When a DIALOG NEW statement is executed, the selected default font is associated with it, and its

, for the lifetime of the dialog.

The default font is particularly important when creating new dialogs which use dialog units (rather than pixels) as the unit of measurement. When sizing in dialog units, Windows calculates the physical size of the window based upon the font size, among other factors. Changing the font size later will not update the window size.

You may use the value zero (0) for any of the numeric parameters to designate that the compiler should use the default for that item. If parameter(s) are missing, the compiler substitutes the default value for all remaining parameters. If no DIALOG DEFAULT FONT statement is executed, PowerBASIC will select MS Sans Serif, 8 point, with no style attributes.

When specifying a font, care should be exercised to use a standard font that is available in all versions of Windows, such as "Times New Roman", "Arial", "Courier", "MS Sans Serif", etc. Specifying a font name that is not available forces Windows to substitute a font that may not be visually appealing, and may also alter the relative size of the dialog.

DIALOG DEFAULT FONT is module-specific. That is, it only affects subsequent dialogs created by code in the same EXE or DLL. For example, a DIALOG DEFAULT FONT statement in a DLL, will not affect dialogs created in the calling EXE or other DLLs loaded by the EXE.

See also CONTROL SET FONT, Dynamic Dialog Tools, DIALOG NEW, DIALOG SET COLOR, FONT END, FONT NEW, GRAPHIC SET FONT, XPRINT SET FONT

DIALOG DISABLE statement

DIALOG DISABLE statement

Purpose Disable a dialog so that it no longer receives any mouse or keyboard messages.

Syntax `DIALOG DISABLE hDlg`

Remarks *hDlg* refers to the dialog you want to disable. A disabled dialog will not receive any messages when it is clicked with the mouse or selected with the keyboard. Disabling a dialog that is already disabled has no effect.

If the dialog has a Callback Function, a %WM_ENABLE message is sent to the Callback Function before DIALOG DISABLE finishes.

See also Dynamic Dialog Tools, DIALOG ENABLE, DIALOG HIDE, DIALOG NORMALIZE, DIALOG SHOW MODAL, DIALOG SHOW MODELESS, DIALOG SHOW STATE

DIALOG DOEVENTS statement

DIALOG DOEVENTS statement

Purpose Process pending window or dialog messages for MODELESS dialogs. If there are no pending messages, DIALOG DOEVENTS pauses execution of the current thread for a length of time specified by the programmer.

Syntax **DIALOG DOEVENTS [*sleep&*] [TO *count&*]**

Remarks DIALOG DOEVENTS is usually used to create a "message pump" for modeless dialog boxes.

If a window message is pending, it is processed appropriately. If no messages are pending, execution of the current

is paused for the time specified by the *sleep&* parameter. If *sleep&* is zero (0), the remainder of the current time slice is relinquished to other threads or processes. If *sleep&* is greater than zero, the current thread is paused for that number of milliseconds to allow other threads or processes to continue. If *sleep&* is not specified, it defaults to a value of one (1). During the sleep period, all time-slices for the current thread are given to other threads and processes. If there are no other threads of equal priority, execution continues immediately. The time-slice duration (also known as the Quantum) can vary from version to version of Windows, ranging from 20 mSec to 120 mSec. If the optional TO clause is included, the number of active dialogs is returned in the *count&* variable, once all of the pending messages have been processed.

Restrictions The DIALOG DOEVENTS loop must run for the duration of the modeless dialog(s), or they will not respond or be redrawn correctly.

See also Dynamic Dialog Tools, DIALOG NEW, DIALOG SHOW MODELESS, SLEEP

Example

```
' Single modeless dialog message pump example.
' (Assume dialog already created with DIALOG NEW)
DIALOG SHOW MODELESS hDlg CALL DlgCallback
DO
  DIALOG DOEVENTS 0 TO Count&
LOOP WHILE Count&
' Application code continues here...

' Multiple modeless dialog message pump example.
' In some applications, the number of modeless dialogs can vary at any
given moment,
' we want to break the message loop when the 'main' dialog is closed.
' (Assume dialogs already created with DIALOG NEW)
DIALOG SHOW MODELESS hMainDlg& CALL DlgCallback
DIALOG SHOW MODELESS hChildDlg1&
DIALOG SHOW MODELESS hChildDlg2&
[statements]
DO
  DIALOG DOEVENTS
LOOP WHILE ISWIN(hMainDlg&)
' Application code continues here...
```

DIALOG ENABLE statement

DIALOG ENABLE statement

Purpose Enable a dialog so that it can receive messages when the user interacts with it via the mouse or keyboard.

Syntax **DIALOG ENABLE *hDlg***

Remarks *hDlg* refers to the dialog you want to enable. An enabled dialog will receive messages when it is clicked with the mouse or selected with the keyboard. Enabling a dialog has no effect if the dialog is already enabled.

If the dialog has a Callback Function, a %WM_ENABLE message is sent to the Callback Function before DIALOG ENABLE finishes.

See also Dynamic Dialog Tools, DIALOG DISABLE, DIALOG HIDE, DIALOG NORMALIZE, DIALOG SHOW MODAL, DIALOG SHOW MODELESS, DIALOG SHOW STATE

DIALOG END statement

DIALOG END statement

Purpose Close and destroy the specified dialog.

Syntax **DIALOG END *hDlg* [, *lResult&*]**

Remarks The dialog specified by the *hDlg* variable is destroyed.

lResult& optionally specifies a value to return to the DIALOG SHOW MODAL or DIALOG SHOW MODELESS statement that activated the dialog initially.

Restrictions DIALOG END cannot close or destroy a dialog in a separate thread. In this case, send or post a message to the dialog to signal it to close, and respond to the message in the callback for the specified dialog. For example:

```
' Trigger a DIALOG END in a separate thread
DIALOG SEND hDlg, %WM_SYSCOMMAND, %SC_CLOSE, 0
```

DIALOG END cannot be used during processing of the %WM_INITDIALOG message. If this effect is necessary, the solution is to post a user-defined message to the dialog and use DIALOG END at that point. For example:

```
CALLBACK FUNCTION MyDialogCallback
  SELECT CASE CB.MSG
    CASE %WM_INITDIALOG
      IF gMustEnd& THEN _ ' We have to stop!
        DIALOG POST CB.HNDL, %WM_USER+999&, 0, 0

    CASE %WM_USER + 999&
      DIALOG END CB.HNDL
      FUNCTION = 1
  END SELECT
END FUNCTION
```

See also Dynamic Dialog Tools, DIALOG NEW, DIALOG SHOW MODELESS, THREAD CREATE

DIALOG GET CLIENT statement

DIALOG GET CLIENT statement

Purpose Return the client size of the specified dialog.

Syntax **DIALOG GET CLIENT *hDlg* TO *nWide&*, *nHigh&***

Remarks *hDlg* refers to the dialog to examine. The size of the dialog client area is placed in the *nWide&* (width) and *nHigh&* (height) variables. The size is specified in the same terms (pixels or dialog units) as the parent dialog.

See also Dynamic Dialog Tools, CONTROL GET CLIENT, DIALOG GET LOC, DIALOG GET SIZE, DIALOG PIXELS, DIALOG SET CLIENT, DIALOG SET LOC, DIALOG SET SIZE, DIALOG UNITS

DIALOG GET LOC statement

DIALOG GET LOC statement

Purpose Return the location of the specified dialog.

Syntax **DIALOG GET LOC *hDlg* TO *x&*, *y&***

Remarks *hDlg* refers to the dialog to examine. The location of the dialog is placed in the *x&* (horizontal position) and *y&* (vertical position) variables as a relative location. If the dialog was created with the PIXELS option in the DIALOG NEW statement, the values are returned in pixel units. If the UNITS option was used (or no scaling option was specified), the values are returned in dialog units.

If the parent of the dialog is zero (or %HWND_DESKTOP), the location is relative to the upper-left corner of the display. Otherwise, it is relative to the upper-left corner of client area of the parent window.

See also Dynamic Dialog Tools, DIALOG GET CLIENT, DIALOG GET SIZE, DIALOG PIXELS, DIALOG SET LOC, DIALOG SET SIZE, DIALOG UNITS

DIALOG GET SIZE statement

DIALOG GET SIZE statement

Purpose Return the size of the specified dialog.

Syntax `DIALOG GET SIZE hDlg TO x&, y&`

Remarks *hDlg* refers to the dialog to examine. The total size of the dialog is placed in the *x&* (width) and *y&* (height) variables. If the dialog was created with the PIXELS option in the DIALOG NEW statement, the values are returned in pixel units. If the UNITS option was used (or no scaling option was specified), the values are returned in dialog units.

See also Dynamic Dialog Tools, DIALOG GET CLIENT, DIALOG GET LOC, DIALOG PIXELS, DIALOG SET LOC, DIALOG SET SIZE, DIALOG UNITS

DIALOG GET TEXT statement

DIALOG GET TEXT statement

Purpose Retrieve the text in a dialog or window caption.

Syntax `DIALOG GET TEXT hDlg TO titletext$`

Remarks The text of the dialog or window caption specified by *hDlg*. For DDT dialogs, *hDlg* is the dialog handle returned by the DIALOG NEW statement. In a dialog Callback Function, the CB.HNDL function will return the parent dialog handle and this can also be used with DIALOG GET TEXT.

titletext$ The text is returned and placed into the variable *titletext$*. If the window or dialog is invalid, *titletext$* will be set to an empty string.

Restrictions *hDlg* is a dialog or window handle, so DIALOG GET TEXT works with both DDT dialogs and conventional windows and dialogs.

See also CB Callback functions, CONTROL GET TEXT, CONTROL SET TEXT, DIALOG NEW, DIALOG SET TEXT

Example

```
DIALOG GET TEXT hDlg1& TO a$
```

Result Variable *a$* contains the caption text of the dialog referenced by *hDlg*

DIALOG GET USER statement

DIALOG GET USER statement

Purpose Retrieve a value from the user data area of a DDT dialog.

Syntax `DIALOG GET USER hDlg, index& TO retvar&`

Remarks Each DDT dialog has a user data area consisting of eight Long-integer values which may be used at the programmer's discretion to save relevant data. DIALOG GET USER allows one of the values to be retrieved, based upon the index parameter value (1 through 8).

hDlg refers to the dialog that contains the user data.

index& is the index number of the user data value to retrieve, in the range 1 to 8 inclusive.

retvar& receives the Long-integer data value stored in the nominated user data index.

Restrictions Data in the user data area is lost when the dialog is destroyed. The data area is completely separate from the %GWL_USERDATA area maintained by Windows.

See also Dynamic Dialog Tools, COMBOBOX SET USER, CONTROL GET USER, CONTROL SET USER, DIALOG SET USER, LISTBOX GET USER, LISTBOX SET USER, LISTVIEW GET USER, LISTVIEW SET USER, TREEVIEW GET USER, TREEVIEW SET USER

DIALOG HIDE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DIALOG HIDE statement New!

Purpose Make a Dialog invisible.

Syntax `DIALOG HIDE hDlg`

Remarks The Dialog identified by the handle *hDlg* is made invisible.

See also CONTROL HIDE, CONTROL NORMALIZE, DIALOG MAXIMIZE, DIALOG MINIMIZE, DIALOG NORMALIZE

DIALOG MAXIMIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DIALOG MAXIMIZE statement

Purpose Maximize a Dialog.

Syntax `DIALOG MAXIMIZE hDlg`

Remarks The Dialog identified by the handle *hDlg* is maximized. You can restore the Dialog to its normal state with DIALOG NORMALIZE.

See also CONTROL HIDE, CONTROL NORMALIZE, CONTROL SET SIZE, DIALOG MINIMIZE, DIALOG NORMALIZE, DIALOG SET SIZE

DIALOG MINIMIZE statement

DIALOG MINIMIZE statement

Purpose Minimize a Dialog.

Syntax `DIALOG MINIMIZE hDlg`

Remarks The Dialog identified by the handle *hDlg* is minimized. You can restore the Dialog to its normal state with DIALOG NORMALIZE.

See also CONTROL HIDE, CONTROL NORMALIZE, CONTROL SET SIZE, DIALOG MAXIMIZE, DIALOG NORMALIZE, DIALOG SET SIZE

DIALOG NEW statement

DIALOG NEW statement

Purpose Create a new dialog in memory, ready for display.

Syntax `DIALOG NEW [PIXELS, | UNITS,] hParent, title$, [x&], [y&], xx&, yy& [, [style&] [, [exstyle&]]] [,] TO hDlg`

Remarks A new empty dialog is created, but not yet displayed. Once the dialog has been created and all of the desired controls have been added with

statements, the dialog can be displayed with the DIALOG SHOW MODELESS, or DIALOG SHOW MODAL statements.

If a modeless dialog is created, the application must create a DIALOG DOEVENTS message pump for the duration of the dialog. Failure to provide a message pump can result in disruptions to the display of the dialog, or the inability of the dialog to respond to messages such as button clicks, etc. Modal dialogs do not require a message pump.

To change the displayed state of a dialog (i.e., hidden, minimized, etc) after the dialog has been created, use the DIALOG SHOW STATE statement.

If a dialog does not have either %WS_CHILD or %WS_POPUP styles, Windows may enforce a minimum dialog width of some 60-70 dialog units.

PIXELS If the PIXELS keyword is specified, all size and position parameters are specified in pixels. In this case, related statements such as DIALOG GET LOC will also return values in Pixels.

UNITS If UNITS is specified (or no scaling option is specified), all size and position parameters are specified in Dialog Units. (default)

DIALOG NEW takes the following parameters.

hParent Handle of the parent window or dialog. If there is no parent, use zero (0) or % HWND_DESKTOP. If the dialog is MODAL, the parent window/dialog will be disabled while this "child" dialog is running.

title$ The text displayed in the title or caption bar of the dialog.

x&, y& Optional location of the top-left corner for the dialog. The location is specified in the same terms (pixels or dialog units) as specified in the DIALOG NEW statement. If neither *x&* and *y&* are specified, the dialog is centered on the screen.

If %CW_USEDEFAULT (&H080000000) is specified, the default Windows position is used (cascading from the upper-left corner).

xx&, yy& The width and height of the dialog. The size is specified in the same terms (pixels or dialog units) as specified in the DIALOG NEW statement.

If the default dialog style (or any other dialog style that **includes** the %WS_CAPTION style) is used, the width and height parameters specify the client size only, and this does not include any caption and border dimensions.

If the style does **not** include %WS_CAPTION, the width and height specify the overall dialog size, including the caption and border, if any.

Note that %WS_CAPTION is a combination of the %WS_BORDER and %

WS_DLGFRAME styles. The default dialog style includes %WS_BORDER and %WS_DLGFRAME styles, so it implicitly includes the %WS_CAPTION style.

style& An optional bitmask describing how the dialog should be displayed. default style of &H084C000D4& is made up %DS_3DLOOK, %DS_SETFONT, %DS_MODALFRAME, %DS_NOFAILCREATE, %WS_BORDER, %WS_CLIPSIBLINGS, %WS_DLGFRAME and %WS_POPUP. used if parameter omitted from statement completely. For example:

```
DIALOG NEW 0, "Dialog Title",,, 100, 200,, TO hDlg
```

Custom style values replace the default values. That is, they are not additional to the default style values - your code must specify all necessary style parameters (with the exception of %DS_NOFAILCREATE, %DS_SETFONT and %DS_3DLOOK, which are automatically added into the *style&* parameter by PowerBASIC).

This also applies to the extended styles parameter - if your code specifies a custom primary style, the default extended style will no longer be in effect either. In this case, an explicit extended style may also need to be added to the DIALOG NEW statement if an explicit primary style is specified.

The primary *style&* value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%DS_3DLOOK Give the dialog box a non-bold font, and draw three-dimensional borders around controls in the dialog box. The %DS_3DLOOK style is not required by applications marked with #OPTION VERSION4 or #OPTION VERSION5; as Windows automatically applies the 3D appearance. DDT dialogs are always created with this style. (default)

%DS_3DLOOK	Give the dialog box a non-bold font, and draw three-dimensional borders around controls in the dialog box. The %DS_3DLOOK style is not required by applications marked with #OPTION VERSION4 or #OPTION VERSION5; as Windows automatically applies the 3D appearance. DDT dialogs are always created with this style. (default)
%DS_ABSALIGN	Indicate that the coordinates of the dialog box are screen coordinates; otherwise, Windows assumes they are client coordinates.
%DS_CENTER	Center the dialog box in the working area (the area not obscured by the task bar and system tray). This is the default if *x&* and *y&* are not specified.
%DS_CENTERMOUSE	Center the mouse cursor in the dialog box when the dialog is initially created.
%DS_CONTEXTHELP	Include a question mark in the title bar of the dialog box. When the user clicks the question mark, the cursor changes to a question mark with a pointer. If the user then clicks a control in the dialog box, the dialog callback receives a %WM_HELP message. This style cannot be used with the %WS_MAXIMIZEBOX and %WS_MINIMIZEBOX styles. Also see %WS_EX_CONTEXTHELP.
%DS_CONTROL	Create a dialog that works as a child control of another dialog, smoothing the keyboard focus interface across the two dialogs when the TAB key or control accelerators are used. Typically used for dialogs that form the "pages" for tab controls and property-sheets.
%DS_MODALFRAME	Create a dialog box with a modal dialog-box frame that can be combined with a title bar and System menu by specifying the %WS_CAPTION and %WS_SYSMENU styles. (default)

%DS_NOFAILCREATE	The dialog is created regardless of any errors that may occur during the creation phase. DDT dialogs are always created with this style. (default)
%DS_SETFONT	The font to be used by a DDT dialog and its controls can be predetermined with the DIALOG DEFAULT FONT statement. If the DIALOG DEFAULT FONT statement is not used, the default font (MS Sans Serif, 8 point) is used. The size of the dialog font proportionately affects the conversion of dialog units values into pixels, so an increase in default font size will automatically create a larger dialog, even through the dialog dimensions have remained constant. As child controls are added to a %DS_SETFONT dialog, they will be sent a %WM_SETFONT message to ensure they also make use of the specified dialog font. DDT dialogs are always created with this style. (default)
%DS_SETFOREGROUND	Bring the dialog box to the foreground. Internally, Windows calls the SetForegroundWindow API function for the dialog box.
%DS_SYSMODAL	Create a system-modal dialog box. This style causes the dialog box to have the %WS_EX_TOPMOST style, but otherwise has no effect on the dialog box or the behavior of other applications and windows when the dialog box is displayed.
%WS_BORDER	Create a dialog that has a thin-line border.
%WS_CAPTION	Create a dialog that has a title bar. Includes the %WS_BORDER and %WS_DLGFRAME styles. When this style is used, the *xx&* and *yy&* parameters specify the size of the client area of the dialog; otherwise, they specify the outer dimensions of the dialog. (default)
%WS_CHILD	Create a child dialog. Cannot be used with the %WS_POPUP style. Typically used with %DS_CONTROL for tab control and property sheet "pages".
%WS_CLIPCHILDREN	Exclude the area occupied by child controls when drawing occurs on the dialog background. FRAME and LINE controls on a dialog with this style usually use the extended style %WS_EX_TRANSPARENT so the background of those controls is drawn by the dialog before the controls are drawn. %WS_CLIPCHILDREN is commonly used to reduce redraw flicker when a %WS_THICKFRAME style dialog is being resized.
%WS_CLIPSIBLINGS	Child controls are clipped (not overdrawn) by one another when the dialog window is repainted. (default)
%WS_DISABLED	Create a dialog that is initially disabled. A disabled dialog cannot receive input from the user.
%WS_DLGFRAME	Create a window that has a border of the style typically used with dialog boxes. (default)
%WS_HSCROLL	Dialog contains a horizontal scroll bar.
%WS_ICONIC	Create a dialog that is initially minimized, the same as the %WS_MINIMIZE style.

%WS_MAXIMIZE	Create a dialog that is initially maximized.
%WS_MAXIMIZEBOX	Create a dialog that has a Maximize button. Use with the %WS_SYSMENU style.
%WS_MINIMIZE	Create a dialog that is initially minimized, the same as the %WS_ICONIC style.
%WS_MINIMIZEBOX	Create a dialog that has a Minimize button. Use with the %WS_SYSMENU style.
%WS_OVERLAPPED	Create an overlapped window. An overlapped window has a title bar (caption) and a border. Synonym of the obsolete style %WS_TILED.
%WS_OVERLAPPEDWINDOW	Combination style producing an overlapping dialog. Comprises %WS_CAPTION, %WS_SYSMENU, %WS_THICKFRAME, %WS_MINIMIZEBOX, %WS_MAXIMIZEBOX, and %WS_OVERLAPPED styles.
%WS_POPUP	Create a popup dialog. When used by itself, a flat dialog is created with no caption or borders. Combine with %DS_MODALFRAME to create a 3D border. A popup dialog can overlap another window or dialog. (default)
%WS_POPUPWINDOW	Create a popup dialog but with a border and system menu. Comprises %WS_BORDER, %WS_POPUP and %WS_SYSMENU. Combine %WS_POPUPWINDOW with %WS_CAPTION to make the Window menu visible.
%WS_SYSMENU	Create a dialog that has a System-menu box in its title bar. Must be used with the %WS_CAPTION style.
%WS_THICKFRAME	Create a dialog that has a sizing border. That is, the dialog will be resizable.
%WS_VSCROLL	Dialog contains a vertical scroll bar. Also see %WS_EX_LEFTSCROLLBAR.

exstyle& An optional extended style bitmask describing how the dialog should be displayed. The default extended dialog style comprises %WS_EX_LEFT with %WS_EX_LTRREADING and %WS_EX_RIGHTSCROLLBAR. The default extended style is used only if there are no explicit primary or extended styles parameters in the DIALOG NEW statement.

An explicit extended style value can be a combination of any values below, combined together with the OR operator to form a bitmask:

%WS_EX_ACCEPTFILES	The dialog accepts drag+drop files. The dialog Callback Function receives a %WM_DROPFILES message when files have been dropped onto the dialog.
%WS_EX_APPWINDOW	Force a top-level dialog onto the application taskbar when the window is minimized.
%WS_EX_CLIENTEDGE	Dialog has a border with a sunken edge.
%WS_EX_CONTEXTHELP	Include a question mark in the title bar of the dialog. When the user clicks the question mark, the cursor changes to a question mark with a pointer. If the user then clicks a child window, the child receives a %WM_HELP message. Also see %DS_CONTEXTHELP.
%WS_EX_CONTROLPARENT	The user may navigate among the child dialogs of the window by using the TAB key. See %DS_CONTROL.
%WS_EX_LEFT	Dialog has generic "left-aligned" properties. (default)

%WS_EX_LEFTSCROLLBAR	If present, the vertical scroll bar is positioned to the left of the client area. Also see %WS_VSCROLL.
%WS_EX_LTRREADING	Display the dialog text using Left to Right reading-order properties. (default)
%WS_EX_NOPARENTNOTIFY	Suppress %WM_PARENTNOTIFY messages when dialog is created or destroyed.
%WS_EX_OVERLAPPEDWINDOW	Comprised of the %WS_EX_CLIENTEDGE and %WS_EX_WINDOWEDGE styles.
%WS_EX_PALETTEWINDOW	Comprised of the %WS_EX_WINDOWEDGE, %WS_EX_TOOLWINDOW and %WS_EX_TOPMOST styles.
%WS_EX_RIGHT	Dialog has generic "right-aligned" properties that depend on the window class. This style has an effect only if the shell language is Hebrew, Arabic, or another language that supports reading order alignment. Otherwise, the style is ignored.
%WS_EX_RIGHTSCROLLBAR	If present, the vertical scroll bar is positioned to the right of the client area. See %WS_VSCROLL. (default)
%WS_EX_RTLREADING	If the shell language is Hebrew, Arabic, or another language that supports reading order alignment, the dialog text is displayed using Right to Left reading-order properties. For other languages, the style is ignored.
%WS_EX_STATICEDGE	Dialog has a 3D border. Primarily used for dialogs that do not require user-input.
%WS_EX_TOOLWINDOW	Create a tool window (a window intended to be used as a floating toolbar). A tool window has a shorter than normal caption area and the dialog caption is drawn using a smaller font. A tool window does not appear in the task bar, or in the window that appears when the user presses ALT+TAB. The hybrid versions of Windows (95/98/ME) may require this extended style to be added after creation, using the SetWindowLong API function.
%WS_EX_TOPMOST	Place dialog above all non-topmost windows and keep it above them, even while the dialog is deactivated.
%WS_EX_TRANSPARENT	Controls/windows beneath the dialog are drawn before the dialog is drawn. The dialog is deemed transparent because elements behind the dialog have already been painted - the dialog itself is not drawn differently. True transparency is achieved by using Regions - see MSDN for more information.
%WS_EX_WINDOWEDGE	Dialog has a border with a raised edge.

hDlg Long-integer Variable where the Windows window handle of the dialog is stored after it has been created and assigned by Windows. This handle should be used with subsequent

and statements, and may be directly used with Windows API calls.

If the dialog could not be created (i.e., due to low Windows resources), zero is returned.

See also Dynamic Dialog Tools, CONTROL ADD, DIALOG DOEVENTS, DIALOG END, DIALOG HIDE, DIALOG MAXIMIZE, DIALOG MINIMIZE, DIALOG NONSTABLE, DIALOG NORMALIZE, DIALOG SET COLOR, DIALOG SHOW MODAL, DIALOG SHOW MODELESS, DIALOG STABILIZE, DIALOG SHOW STATE, TXT pseudo-object

DIALOG NONSTABLE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DIALOG NONSTABLE statement New!

Purpose	Make a Dialog non-stable (closeable).
Syntax	**DIALOG NONSTABLE *hDlg***
Remarks	The Dialog identified by the handle *hDlg* is made non-stable, meaning that it can be closed by the user. If there is a system menu, the close option and the close box are enabled. The ALT-F4 close key is also enabled. This is the default mode of operation.
See also	DIALOG STABILIZE

DIALOG NORMALIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DIALOG NORMALIZE statement New!

Purpose	Make a Dialog visible.
Syntax	**DIALOG NORMALIZE *hDlg***
Remarks	The Dialog identified by the handle *hDlg* is made visible at its normal size and position.
See also	DIALOG HIDE, DIALOG MAXIMIZE, DIALOG MINIMIZE, DIALOG SHOW STATE

DIALOG PIXELS statement

DIALOG PIXELS statement

Purpose	Convert pixels (device units) into dialog units.
Syntax	**DIALOG PIXELS *hDlg*, *x&*, *y&* TO UNITS *xx&*, *yy&***
Remarks	The pixel values specified in the *x&* and *y&* variables are converted into dialog units,

based on the default font of the dialog specified by *hDlg*. The resulting value in dialog units is stored in the *xx&* and *yy&* variables.

See also Dynamic Dialog Tools, CONTROL GET CLIENT, DIALOG GET CLIENT, DIALOG GET LOC, DIALOG GET SIZE, DIALOG SET LOC, DIALOG SET SIZE, DIALOG UNITS

DIALOG POST statement

DIALOG POST statement

Purpose Place a message in the message queue to be processed at the leisure of the target dialog.

Syntax **DIALOG POST *hDlg*, *Msg&*, *wParam&*, *lParam&***

Remarks DIALOG POST places the message in the message queue and returns immediately. The message is processed by the dialog at a later time, when it reads the message from the queue.

This behavior is quite different to the DIALOG SEND statement, which forces the control to process the message immediately before returning. Since DIALOG POST is an asynchronous operation, it is not possible to retrieve a return code from the message.

hDlg refers to the target dialog.

Msg& is the message you want to post to the dialog.

wParam& is the first message parameter. *lParam&* is the second message parameter. The values of *wParam&* and *lParam&* are message-dependent. By Default, PowerBASIC passes these parameters BYVAL. If the target dialog is expected to alter the values held by variables passed in the *wParam&* and *lParam&* parameters, pass them using VARPTR() or the changes will likely be discarded.

Note that the address of the data must remain valid until after the dialog has processed the message and accessed the data. In this case, using STATIC or GLOBAL variables can be very important or a General Protection Fault (GPF) may occur (that is, if the variables have gone out of scope by the time the message is processed).

An example of posting the addresses of variables to a dialog:

```
' Sel1& and Sel2& must be STATIC or GLOBAL
DIALOG POST CB.HNDL, %WM_USER + 999&, VARPTR(Sel1&), VARPTR(Sel2&)
```

DIALOG POST returns immediately after the placing the message in the queue.

To post a custom message to a dialog, use a message value in the range of (%WM_USER + 500) to (%WM_USER + &H07FFF), or use the RegisterWindowMessage API to obtain a unique message value from the operating system. Using messages with a numeric value of less then %WM_USER + 500 may conflict with Windows Common Control messages.

See also Dynamic Dialog Tools, CB Callback functions, CONTROL POST, CONTROL SEND, DIALOG SEND

Example

```
' Programmatically post a message to a dialog:
DIALOG POST hDlg, %WM_CLOSE, 0, 0
```

DIALOG REDRAW statement

DIALOG REDRAW statement

Purpose Signal a designated dialog and all child to be redrawn immediately.

Syntax **DIALOG REDRAW *hDlg***

Remarks DIALOG REDRAW invalidates the target dialog area, and signals a redraw/repaint to occur immediately, even if there are pending messages in the message queue.

hDlg refers to the dialog that is to be redrawn.

Restrictions It is not advisable to use DIALOG REDRAW or CONTROL REDRAW statements within the %WM_PAINT and associated message handling code, or an infinite redraw loop could occur.

See also Dynamic Dialog Tools, CONTROL REDRAW, CONTROL SET COLOR, DIALOG SET COLOR

Example
```
DIALOG REDRAW hDlg
```

DIALOG SEND statement

DIALOG SEND statement

Purpose Send a message to a dialog, then wait until the message has been processed before continuing.

Syntax
```
DIALOG SEND hDlg, msg&, wParam&, lParam& [TO lResult&]
```

Remarks *hDlg* identifies the dialog which should receive the message specified by *msg&*. *wParam&* is the first message parameter, and *lParam&* is the second message parameter.

By default, PowerBASIC passes these parameters BYVAL. If the target dialog is expected to return or alter the values passed in the *wParam&* and *lParam&* parameters, pass them using VARPTR() or the return values will be discarded. For example:

```
DIALOG SEND CB.HNDL, %WM_USER, VARPTR(Param1&), VARPTR(Param2&)
```

TO The return value may be returned and stored in the variable *lResult&* after the message was processed by the dialog.

Restrictions If the target dialog was not created by the same thread, the DIALOG SEND statement becomes blocked until the thread processes the message. The InSendMessage API function will return TRUE (non-zero) if the callback code is currently processing a message from a separate thread.

To send a custom message to a dialog, use a message value in the range of (%WM_USER + 500) to (%WM_USER + &H07FFF), or use the RegisterWindowMessage API to obtain a unique message value from the operating system.

A dialog callback can send a message to its own dialog, but care should be taken not to create an infinite loop. Also, if DIALOG SEND sends a message that arrives back in the same callback as the message originated, care should be exercised to ensure that critical STATIC and GLOBAL variables are not unexpectedly altered by the second message processing code in the callback. This is known as re-entrant code design.

See also Dynamic Dialog Tools, CONTROL SEND

DIALOG SET CLIENT Statement

DIALOG SET CLIENT statement

Purpose Change the size of a dialog to a specific client area size.

Syntax
```
DIALOG SET CLIENT hDlg, x&, y&
```

Remarks *hDlg* refers to the handle of the dialog to change. *x&* and *y&* specify the new width and height of the dialog client area. *x&* and *y&* are specified in dialog units or pixels, depending upon the system used when the dialog was created.

The dialog client size may be smaller than total size, depending on the type of borders used. The client area is the part below the dialog caption, and an eventual menu, where controls can be placed.

See also Dynamic Dialog Tools, DIALOG NEW, DIALOG PIXELS, DIALOG UNITS, DIALOG GET CLIENT, DIALOG GET LOC, DIALOG GET SIZE, DIALOG SET LOC, DIALOG SET SIZE

Example

```
LOCAL hDlg, hMnu, hSubMenu AS DWORD, h, w AS LONG

DIALOG NEW 0, "My Dialog",,, 400, 300, %WS_CAPTION OR %WS_SYSMENU, 0 TO
hDlg
' Retrieve dialog client area
DIALOG GET CLIENT hDlg TO w, h
MENU NEW BAR TO hMnu
MENU NEW POPUP TO hSubMenu
MENU ADD POPUP, hMnu, "&File", hSubMenu, %MF_ENABLED
MENU ADD STRING, hSubMenu, "E&Xit", %IDCANCEL, %MF_ENABLED
MENU ATTACH hMnu, hDlg

' Restore client area to desired size
DIALOG SET CLIENT hDlg, w, h
```

DIALOG SET COLOR statement

DIALOG SET COLOR statement

Purpose Set the background color of a dialog to a specific RGB color.

Syntax **DIALOG SET COLOR *hDlg*, *foreclr&*, *backclr&***

Remarks *hDlg* identifies the dialog to colorize.

Color values *foreclr&* and *backclr&* must be in the range of &H0 to &H00FFFFFF, while the value -1& is used to specify the system default color. RGB can be a useful function to derive a 32-bit color value from discrete Red, Green and Blue values.

foreclr& In the current implementation of PowerBASIC, the dialog foreground color parameter *foreclr&* is not used, but the syntax is retained for future implementation. It is recommended that the foreground color parameter be set to -1&.

backclr& In 16-bit or greater color-depth mode, the RGB color specified is used when the background of the dialog is drawn. If *backclr&* = -1&, the default dialog background color is used. If *backclr&* = -2&, the dialog background is not painted, allowing the content behind the dialog to become visible through the dialog.

In 16-bit or greater color-depth mode, the specified RGB color is used when the background of the dialog is drawn. However, in 8-bit (256-color) mode, the color system works quite differently. Behind the scenes in Windows, the base system palette usually contains 20 solid colors that are not dithered when drawn on a dialog background. These solid-colors are ideal for background colors with DDT dialogs in 256-color mode.

Conversely, when using a non-solid RGB color value, Windows will dither (approximate) the color to draw the dialog, using combinations of two or more colors. This usually produces an undesirable pattern effect.

To avoid these problems when in 256-color mode, dialogs should either be colored with one of the 20 standard (solid) system colors, or the default color should be used instead. PowerBASIC includes the following 10 built-in equates for help with the selection of a standard solid color:

```
%RGB_BLACK %RGB_BLUE %RGB_GREEN %RGB_CYAN %RGB_RED
%RGB_MAGENTA %RGB_YELLOW %RGB_WHITE %RGB_GRAY %RGB_LIGHTGRAY
```

Many non standard colors are also built into the compiler, see the Built In RGB Color Equates topic for a complete list.

If you prefer to disable color in 256-color mode, the number of colors can be easily tested with the following code:

```
' Determine number of colors
LOCAL hDC AS DWORD, iColors AS LONG

hDC = GetWindowDC(GetDeskTopWindow())
iColors = 2& ^ (GetDeviceCaps(hDC, %BITSPIXEL) * GetDeviceCaps(hDC, %
PLANES))
ReleaseDC GetDeskTopWindow(), hDC
IF iColors > 256 THEN _
DIALOG SET COLOR hDlg, -1, RGB(0,100,192)
```

In 256-color mode on most computers, the values of the standard 20 system colors can be found by requesting the first and last 10 (0 to 9, and 246 to 255 inclusive) entries from the GetSystemPaletteEntries API function, as follows:

```
' Fill array with solid colors
DIM hDC AS DWORD, Cols AS LONG, x AS LONG

hDC = GetWindowDC(GetDesktopWindow)
Cols = GetDeviceCaps(hDC, %NUMRESERVED)
REDIM lp(1 TO Cols) AS LONG
x& = GetSystemPaletteEntries(hDC, 0, Cols \ 2, BYVAL VARPTR(lp(1)))
x& = GetSystemPaletteEntries(hDC, 256 - x&, Cols - x&, BYVAL
VARPTR(lp(x& + 1)))
ReleaseDc GetDesktopWindow, hDC
' Array lp() now contains the solid color table
```

For more information on working with palettes in 256-color mode, please consult WIN32.HLP or visit http://msdn.microsoft.com.

When dynamically changing colors of a dialog from within a callback (i.e., after the statement), a DIALOG SET COLOR statement should be immediately followed by an explicit DIALOG REDRAW statement.

Without a forced dialog redraw, the dialog background color change may not become evident to the user until the dialog is **eventually** repainted in the normal course of user interaction. For example, a normal repaint may only occur if the dialog becomes obscured and then uncovered by another window. Ensuring a timely repaint of the dialog will guarantee the dialog maintains an up-to-date appearance at all times.

See also Built In RGB Color Equates, Dynamic Dialog Tools, CONTROL REDRAW, DIALOG REDRAW, CONTROL SET COLOR, DIALOG SET ICON

Example

```
DIALOG NEW 0, "Dialog",,, 160, 120, TO hDlg

' Set the color with an RGB value
DIALOG SET COLOR hDlg, -1, RGB(0,0,255)

' Or we could use the built-in %BLUE equate:
DIALOG SET COLOR hDlg, -1, %BLUE
```

DIALOG SET ICON statement

DIALOG SET ICON statement

Purpose Change both the dialog icon in the caption, and the icon shown in the ALT+TAB task list.

Syntax **DIALOG SET ICON *hDlg*, *newicon$***

Remarks DIALOG SET ICON changes both the small icon (as used in the dialog caption bar), and the large icon (visible in the icon task list presented during ALT+TAB task switching).

hDlg	[Handle](#) of the dialog that is to have its icon changed.
newicon$	A string expression which specifies the name of the icon in the resource file. If the icon resource uses an integral identifier, *newicon$* should begin with a Number symbol (#), followed by the integral identifier in ASCII format. For example, "#998". Otherwise, the text identifier name should be used.

Restrictions DIALOG SET ICON cannot use bitmap files. 32x32 pixel icons produce the most visually pleasing results.

See also Dynamic Dialog Tools, CONTROL ADD IMAGE, CONTROL ADD IMAGEX, CONTROL ADD IMGBUTTON, CONTROL ADD IMGBUTTONX, CONTROL SET IMAGEX, CONTROL SET IMGBUTTON, CONTROL SET IMGBUTTONX, DIALOG SET TEXT

DIALOG SET LOC statement

DIALOG SET LOC statement

Purpose Change the position of a dialog.

Syntax `DIALOG SET LOC hDlg, x&, y&`

Remarks *hDlg* identifies the dialog to reposition. *x&* and *y&* specify the new coordinates of the upper-left corner of the target dialog. *x&* and *y&* are the horizontal and vertical coordinates respectively. If the dialog was created with the PIXELS option in the DIALOG NEW statement, the values are returned in pixel units. If the UNITS option was used (or no scaling option was specified), the values are returned in dialog units.

If the dialog has a parent, the coordinates are relative to the upper-left corner of the parent dialog client area. Otherwise, the coordinates are relative to the upper-left corner of the desktop workspace.

See also Dynamic Dialog Tools, DIALOG GET CLIENT, DIALOG GET LOC, DIALOG GET SIZE, DIALOG PIXELS, DIALOG SET SIZE, DIALOG UNITS

DIALOG SET SIZE statement

DIALOG SET SIZE statement

Purpose Change the size of a dialog.

Syntax `DIALOG SET SIZE hDlg, nWide&, nHigh&`

Remarks *hDlg* identifies the dialog to resize. *nwide&* and *nhigh&* specify the new width and height, in dialog units, for the dialog. If the dialog was created with the PIXELS option in the DIALOG NEW statement, the values are set in pixel units. If the UNITS option was used (or no scaling option was specified), the values are set in dialog units.

See also Dynamic Dialog Tools, DIALOG GET CLIENT, DIALOG GET LOC, DIALOG GET SIZE, DIALOG PIXELS, DIALOG SET CLIENT, DIALOG SET LOC, DIALOG UNITS

DIALOG SET TEXT statement

DIALOG SET TEXT statement

Purpose Set the text in a dialog or window caption.

Syntax `DIALOG SET TEXT hDlg, titletext$`

Remarks The caption of the dialog or window specified by *hDlg* is set with the DIALOG SET TEXT

	statement. For DDT dialogs, *hDlg* is the dialog handle returned by the DIALOG NEW statement. In a dialog Callback Function, the CB.HNDL function will return the parent dialog handle and this can also be used with DIALOG SET TEXT.
titletext$	The caption text is specified in *titletext$*. If the window or dialog is invalid, the operation is ignored.
Restrictions	*hDlg* is a dialog or window handle, so DIALOG SET TEXT works with both DDT dialogs and conventional windows and dialogs.
See also	Dynamic Dialog Tools, CB Callback functions, CONTROL GET TEXT, CONTROL SET TEXT, DIALOG GET TEXT, DIALOG NEW, DIALOG SET ICON
Example	`DIALOG SET TEXT hDlgMine, "This is my dialog!"`

DIALOG SET USER statement

DIALOG SET USER statement

Purpose	Set a value in the user data area of a DDT dialog.
Syntax	**DIALOG SET USER *hDlg, index&, usrval&***
Remarks	Each DDT dialog has a user data area consisting of eight Long-integer values which may be used at the programmer's discretion to save relevant data. DIALOG SET USER allows one of the values to be set, based upon the index parameter value (1 through 8). *hDlg* refers to the dialog that owns the user data area. *index&* is the index number of the user data value to set, in the range 1 to 8 inclusive. *usrval&* is the Long-integer data value to store in the user data area.
Restrictions	Data in the user data area is lost when the dialog is destroyed. The data area is completely separate from the %GWL_USERDATA area maintained by Windows.
See also	Dynamic Dialog Tools, COMBOBOX SET USER, CONTROL GET USER, CONTROL SET USER, DIALOG GET USER, LISTBOX GET USER, LISTBOX SET USER, LISTVIEW GET USER, LISTVIEW SET USER, TREEVIEW GET USER, TREEVIEW SET USER

DIALOG SHOW MODAL statement

DIALOG SHOW MODAL statement

Purpose	Display and activate a dialog, allowing it to receive user input and messages. The DIALOG SHOW MODAL statement blocks (halts) until the dialog is destroyed with DIALOG END.
Syntax	**DIALOG SHOW MODAL *hDlg* [[,] CALL *callback*] [TO *lResult&*]**
Remarks	*hDlg* identifies a dialog created using DIALOG NEW. You can specify a Callback Function for all dialog messages using the CALL keyword, followed by the name of the Callback Function. When a modal dialog is displayed, the DIALOG SHOW MODAL statement is blocked until the dialog is destroyed with DIALOG END. During the duration of the dialog, the Callback Function code is executed in response to messages for the dialog. If a parent was specified in the DIALOG NEW statement, the parent window is disabled until the modal dialog is destroyed.
callback	If specified, dialog messages are routed to the nominated Callback Function. Just before a dialog is initially displayed, the dialog Callback Function is sent a %

	WM_INITDIALOG message. By processing this message within the dialog callback, an application can take the opportunity to load controls with data before the controls become visible to the user. For example, a list box control could be loaded with a list of items so that the control appears populated with data when initially displayed.
	The nominated callback function name must be a CALLBACK FUNCTION or a compile-time Error 547 ("Callback function required") will occur.
lResult&	When the modal dialog is destroyed using the DIALOG END statement, the resulting value is assigned to the *lResult&* variable, if specified. *lResult&* is excluded from becoming a Register variable by the compiler, since this value can be assigned from outside of the function containing the DIALOG SHOW MODAL statement, and this may only be performed with a memory variable. However, if the target variable is explicitly declared as a register variable, PowerBASIC raises a compile-time Error 491 ("Invalid register variable").
See also	Dynamic Dialog Tools, DIALOG END, DIALOG NEW, DIALOG SHOW MODELESS

DIALOG SHOW MODELESS statement

DIALOG SHOW MODELESS statement

Purpose	Display and activate a dialog, allowing it to receive user input and messages. Execution of the code continues at the same time as the dialog is displayed. Modeless dialogs require a message pump to be running for the duration of the dialog.
Syntax	`DIALOG SHOW MODELESS hDlg [[,] CALL callback] [TO lResult&]`
Remarks	*hDlg* identifies a dialog created using DIALOG NEW. You can specify a Callback Function for all dialog messages, using the CALL keyword followed by the name of the Callback Function.
	Once a modeless dialog is displayed, the DIALOG SHOW MODELESS statement completes, and execution of the code continues. At the same time, the dialog can receive messages and process them via the Callback Function. A DIALOG SHOW MODELESS statement is usually followed by a message pump loop. For more information, please refer to the examples under DIALOG DOEVENTS.
callback	If specified, dialog messages are routed to the nominated Callback Function.
	The nominated callback function name must be a CALLBACK FUNCTION or a compile-time Error 547 ("Callback function required") will occur.
lResult&	When the modeless dialog is destroyed using the DIALOG END statement, the resulting value is assigned to the *lResult&* variable, if specified. *lResult&* is excluded from becoming a Register variable by the compiler, since this value can be assigned from outside of the function containing the DIALOG SHOW MODELESS statement, and this may only be performed with a memory variable. However, if the target variable is explicitly declared as a register variable, PowerBASIC raises a compile-time Error 491 ("Invalid register variable").
See also	Dynamic Dialog Tools, DIALOG DOEVENTS, DIALOG END, DIALOG NEW, DIALOG SHOW MODAL

DIALOG SHOW STATE statement

DIALOG SHOW STATE statement

Purpose	Change the visible state of a dialog.
Syntax	`DIALOG SHOW STATE hDlg, showstate& [TO lResult&]`

Remarks DIALOG SHOW STATE changes the visible state of the dialog identified by *hDlg*.

showstate& can be one of the following values:

%SW_HIDE	Hide the dialog.
%SW_MAXIMIZE	Maximize the specified dialog.
%SW_MINIMIZE	Minimize the specified dialog.
%SW_RESTORE	Activate and display the dialog. If the dialog is minimized or maximized, Windows restores it to its original size and position. An application should specify this flag when restoring a minimized dialog.
%SW_SHOW	Activate the dialog and displays it in its current size and position.
%SW_SHOWMAXIMIZED	Synonym of %SW_MAXIMIZE.
%SW_SHOWMINIMIZED	Activate the dialog and minimize it.
%SW_SHOWNA	Display the dialog in its current state without activating it. The currently active window remains active.
% SW_SHOWNOACTIVATE	Display the dialog in its most recent size and position without activating it. The currently active window remains active.
%SW_SHOWNORMAL	Activate and display the dialog. If the dialog is minimized or maximized, Windows restores it to its original size and position.

If the optional *lResult&* parameter is used, it will contain the previous visibility state. If *lResult&* is set to TRUE (non-zero), the dialog was visible. If the dialog was previously hidden, *lResult&* is set to FALSE (zero).

Restrictions In previous versions of PowerBASIC, the DIALOG SHOW STATE was not permitted to be executed before a DIALOG SHOW MODAL or DIALOG SHOW MODELESS statement had been executed for that specific dialog. Starting with this version of PowerBASIC, DIALOG SHOW STATE may be executed before or after the dialog is activated with DIALOG SHOW MODAL or DIALOG SHOW MODELESS statement.

When utilized prior to dialog activation, the attributes %SW_HIDE, %SW_MAXIMIZE, and %SW_MINIMIZE are remembered for use when activated. All other possible attributes are translated to the standard %SW_SHOW. Generally speaking, it is unwise to use % SW_HIDE with a modal dialog.

DIALOG SHOW STATE can be used to show a dialog before the message pump for a modeless dialog begins operating (i.e., after the DIALOG SHOW MODELESS statement, etc). However, until the message pump begins its operation, the dialog may not be drawn or displayed completely.

For more information on message pumps, see DIALOG DOEVENTS and DIALOG SHOW MODELESS.

See also Dynamic Dialog Tools, CONTROL SHOW STATE, DIALOG DOEVENTS, DIALOG HIDE, DIALOG MAXIMIZE, DIALOG MINIMIZE, DIALOG NONSTABLE, DIALOG NORMALIZE, DIALOG SHOW MODAL, DIALOG SHOW MODELESS, DIALOG STABILIZE

DIALOG STABILIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DIALOG STABILIZE statement New!

Purpose Make a Dialog stabilized (non-closeable).

Syntax `DIALOG STABILIZE hDlg`

Remarks The Dialog identified by the handle *hDlg* is stabilized, meaning that it cannot be closed by the user. If there is a system menu, the close option and the close box are grayed. The ALT-F4 close key is disabled. This allows you to be certain that your operations on the dialog can be completed. When a dialog is stabilized, only DIALOG END or program termination will close it.

See also DIALOG END, DIALOG NONSTABLE

DIALOG UNITS statement

DIALOG UNITS statement

Purpose Convert dialog units into pixels.

Syntax `DIALOG UNITS hDlg, x&, y& TO PIXELS xx&, yy&`

Remarks The dialog units specified in the *x&* and *y&* variables are converted into pixels, based on the default font of the dialog specified by *hDlg*. The resultant pixel values are stored in the *xx&* and *yy&* variables.

See also Dynamic Dialog Tools, CONTROL GET CLIENT, DIALOG GET CLIENT, DIALOG GET LOC, DIALOG GET SIZE, DIALOG PIXELS, DIALOG SET LOC, DIALOG SET SIZE

DIM statement

DIM statement

Purpose Declare and dimension arrays, scalar variables, and pointers.

Syntax *Arrays:*

```
DIM var[(subscripts)] [AS [GLOBAL | INSTANCE | LOCAL | STATIC |
THREADED]type] [PTR | POINTER] [AT address] [, ...]
DIM var[(subscripts)] ' var may include a type-specifier
```

Scalar variables:

```
DIM var AS [GLOBAL | INSTANCE | LOCAL | STATIC | THREADED] type
[PTR |POINTER] [, ...]
DIM var  ' var must include a type-specifier
```

Remarks DIM declares var to be a variable or array whose type is specified by appending a type-specifier to the name or by using the AS type keyword. If the AS clause is used, the variable name cannot end with a type-specifier character.

DIM can only be used inside a SUB, FUNCTION, METHOD, or PROPERTY. Outside of Subs, Functions, Methods, or Properties, use GLOBAL or INSTANCE to declare variables and arrays.

DIM can also be used to dimension an "absolute array" - one that occupies a specific location in memory. This can be useful to dynamically "superimpose" one type of array directly over the top of an existing block of memory (which could be another type of array, or data structure). This would form a Union-like overlay structure. See below.

In addition, it is possible to create an array of pointers with the DIM statement, and it is also possible to do so at a specific location in memory. This is termed an "*absolute pointer array*".

Dimensioning arrays

subscripts may take one of the following forms for each array dimensioned:

(a) A comma-delimited list of one or more Long-integer expressions, each defining a dimension of the array. This form is used to declare arrays whose subscript (index) range starts at 0. For example, the following lines are equivalent ways of dimensioning the same array:

```
DIM lArray(20) AS LONG  ' With an AS type clause
```

or

```
DIM lArray&(20)         ' With a type-specifier
```

Both lines above define a one dimension Long-integer array that has 21 elements, from lArray(0) to lArray(20) inclusive. The second line uses a type-specifier symbol to specify the

, and this uses a simplified syntax (trailing clauses/keywords are not permitted). The simplified syntax is only valid for data types that have a type-specifier symbol ($, !, @, @@, #, ##, %, &, &&, ?, ??, ???), or the specifier can be omitted if there is a DEF*type* statement in effect. The specifier *must* be omitted if #DIM ALL is in effect.

Declarations of multiple-dimension arrays take the following forms:

```
DIM sArray(20,40,2) AS STRING
```

or

```
DIM sArray$(20,40,2)
```

These two lines of code define a dynamic string array with three dimensions, 21 elements by 41 elements by 3 elements, totaling 2583 string elements. As before, the second line uses the simplified syntax form.

(b) A comma-delimited list where both the upper and lower subscript bounds are explicitly declared for each dimension of the array. For each dimension, the lower bound is listed first, followed by the TO keyword, followed by the upper bound. For example:

```
DIM MyArray(1 TO 20) AS LONG
```

…defines an array of one dimension that has 20 elements, from MyArray(1) to MyArray(20). The lower bound does not have to be zero or one; for example:

```
DIM SalesByYear(1980 TO 2000) AS INTEGER
```

or

```
DIM SalesByYear%(1980 TO 2000)
```

Each array can access elements in the range of -2,147,483,648 to 2,147,483,647. It is recommended that an explicit variable scope clause (GLOBAL/LOCAL/STATIC) be added to each DIM statement that uses an explicit *type* clause. See Restrictions below.

Array Initialization and Absolute Arrays

PowerBASIC generates an error message when it encounters an array that hasn't been dimensioned. If the array has already been dimensioned, the DIM statement is ignored. A new array is not created and a run-time error is not generated.

When a program is first executed, PowerBASIC sets each element of a numeric array to zero, and sets each element of regular string arrays to a null string (length zero). However, when an absolute array is Dimensioned (at a specific location in memory using the AT *address* syntax), PowerBASIC does not initialize the memory occupied by the array. Further, when an absolute array is erased, the memory is not released either. This provides a powerful mechanism to create Union-like overlay structures in memory.

The most common use of an absolute array is when manipulating Visual Basic arrays directly from a DLL. This involves obtaining a pointer to the array, the element size, and the number of elements. With this information, an absolute array can be dimensioned in PowerBASIC and the array memory manipulated directly. Another common use involves using a large dynamic or fixed-length string memory block, overlaid with an absolute numeric array.

Care must be exercised when using absolute arrays, since the contents of an absolute array can only be valid for the scope of the memory the array references. If an absolute array references memory that is LOCAL to the procedure, the array contents become invalidated if the target memory block is released. For example, by either explicitly deallocating the memory block, or exiting the procedure itself. Attempting to access absolute array memory that has been deallocated will likely trigger a General Protection Fault (GPF). On this basis, absolute arrays should be LOCAL to the procedure in which they are to be used.

While PowerBASIC supports LBOUND values that are non-zero, PowerBASIC generates the most efficient code if the LBOUND parameter is omitted (i.e., the array uses the default LBOUND of zero). You should also avoid specifying an explicit LBOUND of zero, since this imposes a small efficiency penalty with no meaningful benefits

Declaring scalar (non-array) variables

If you have specified #DIM ALL or OPTION EXPLICIT, you have to declare all variables used in your programs. PowerBASIC provides a variation of the DIM statement for this job, because of the reduced level of syntax required for scalar variables. The following is a simplified syntax for DIM that just applies to scalar variables:

```
DIM var AS [GLOBAL | INSTANCE | LOCAL | STATIC | THREADED] type
[PTR | POINTER] [, ...]
DIM var   ' var must include a type-specifier
```

Here are some sample variable declarations:

```
DIM a AS LOCAL INTEGER
DIM b AS STATIC WORD
DIM c AS GLOBAL DOUBLE POINTER
DIM d AS STRINGZ * 255
DIM e AS THREADED STRING
DIM f AS INSTANCE SINGLE
```

AS type	**Type**
BYTE	Byte
WORD	Word
INTEGER	Integer
DWORD	Double-word
LONG	Long-integer
QUAD	Quad-integer
SINGLE	Single-precision floating-point
DOUBLE	Double-precision floating-point
EXT	Extended-precision floating-point
EXTENDED	Extended-precision floating-point
CUR	Currency
CURRENCY	Currency
CUX	Extended-currency

CURRENCYX	Extended-currency
STRING	Dynamic (variable-length) string
WSTRING	Unicode Dynamic string
STRING * *x*	Fixed-length string
ASCIIZ * *x*	Nul-terminated string
ASCIZ * *x*	Nul-terminated string
STRINGZ * x	Nul-terminated string
WSTRINGZ * x	Unicode Nul-Terminated string
Pointer	Pointer
Ptr	Pointer
VARIANT	Variant
IAUTOMATION	Automation Interface
IDISPATCH	Dispatch Interface
IUNKNOWN	Direct Interface
GUID	16-byte GUID string
FIELD	Field string

Restrictions

LOCAL ASCIIZ, LOCAL fixed-length strings, and LOCAL UDTs are created on the stack frame of the Sub/Function/Method/Property in which they are declared. You must therefore use caution so that the combined local variable size does not exceed the allocated stack size. Unless you declare otherwise, PowerBASIC sets a default stack size of 1MB. If more stack space is required, you can allocate it with the #STACK metastament. There are no such limitations with GLOBAL, INSTANCE, THREADED, or STATIC variables.

When a DIM statement is used (*without an explicit scope clause*), to declare a variable in a procedure, *and* an identical variable has already been declared as GLOBAL, the variable in the procedure will be given GLOBAL scope. For example:

```
GLOBAL xyz AS LONG
...
SUB MySub
  DIM xyz AS LONG
  ' Here, xyz is a GLOBAL variable
END SUB
```

To ensure that the variable scope is LOCAL to the Sub/Function/Method/Property, use a LOCAL statement rather than a DIM statement. Alternatively, add an explicit scope clause to the DIM statement. For example:

```
GLOBAL xyz AS LONG
[statements]
SUB MySub
  DIM xyz AS LOCAL LONG
  ' Here, xyz is a LOCAL variable
END SUB
```

Declaring pointer variables

A pointer *must* be declared before it can be used. You use the DIM statement to declare pointers, and describe the type of data to which they point. When a pointer is declared, it is automatically initialized to a value of zero. This is known as a null-pointer. You *must* remember to initialize it to a valid address, or you will get a General Protection Fault (GPF). The syntax for declaring pointer variables is similar to that of regular variables:

```
DIM var[(subscripts)] AS [GLOBAL | INSTANCE | LOCAL | STATIC |
THREADED] type [PTR | POINTER] [, ...]
```

Here are some examples of pointer variable declarations:

```
DIM a         AS BYTE PTR
DIM b         AS INTEGER POINTER
DIM c         AS STRING PTR * 25
```

```
DIM d        AS MyType POINTER
DIM e(500)   AS INTEGER PTR
```

Pointers themselves are stored as DWORD values.

Options The scope of a variable or array is set using the GLOBAL, INSTANCE, LOCAL, STATIC, or THREADED keywords.

Restrictions When returning a pointer to a calling Sub, Function, Method, or Property, make sure the pointer target remains valid when the current routine terminates. For example, returning a pointer to a LOCAL variable is certain to trigger a GPF, since local storage is released when the routine ends. In this case, the pointers target should be STATIC, GLOBAL, or INSTANCE, or be valid within the scope of the calling code.

IAUTOMATION, IDISPATCH, IUNKNOWN, VARIANT and GUID variables have special uses with COM.

See also #DIM, ARRAYATTR, ERASE, GLOBAL, INSTANCE, Just what is COM?, LOCAL, REDIM, RESET, STATIC, THREADED, Variables, Variable Scope, What is an object, anyway?

DIR$ function

DIR$ function IMPROVED

Purpose Return a filename and/or directory entry that matches a file name mask and an optional attribute.

Syntax

```
file$ = DIR$(mask$ [, [ONLY] attribute&, TO DirDataVar])
file$ = DIR$([NEXT] [TO DirDataVar])
```

Remarks There are two forms to the DIR$() function. The first form, which includes a mask and optional attribute, is used to find the first filename which matches. The second form, without those parameters, returns subsequent matching filenames. When the returned string is null (zero-length), there are no further matching filenames.

The second form may optionally specify the key-word NEXT to aid in self-documentation of the source code.

*mask$* specifies a filename or path which can include a drive name and system wildcard characters (* and ?). If the numeric attribute parameter is zero (or not specified), DIR$ returns only "Normal" files. If *mask$* is a null (zero-length) string, the function call is equivalent to the second form of the function to find subsequent matching filenames. In that case, an optional attribute is ignored.

If an *attribute&* is specified, it must use a standard operating system numeric attribute code. This causes DIR$ to include filenames with specific attributes in the search, in addition to normal files. "Normal" files are those which are not hidden or system files, nor are they a directory or a volume label.

Attribute	Description	Equate
0	Normal	%NORMAL
2	Hidden	%HIDDEN
4	System	%SYSTEM
8	Volume Label	%VLABEL
16	Directory	%SUBDIR

You can search for filenames with multiple attributes set by adding the attribute codes together.

For example, to search for hidden and system files, you'd add those codes together (2 and 4) to get 6. All other attribute codes (except for volume label) are normally inclusive. For example, specifying both hidden and system results in DIR$ returning all hidden files, system files, normal files, and files that are both hidden and system.

If the ONLY option is included, normal files are excluded from the file search. For example: DIR$(*mask$*, ONLY 16) just the directory entries which match *mask$* are returned. Another useful search attribute is 6, which returns normal, hidden, and system file, but no directories.

An attribute of 8 will return the volume label, if one exists. In this case, *mask$* must reference the drive letter of the target drive, and additional path information is ignored. Additionally, you may specify a UNC name for a shared drive (subject to operating system restrictions), and retrieve the volume label, if one exists, and you have suitable access rights. You can also obtain the volume label for a 'hidden' share with NT/2000/XP by appending a trailing dollar symbol to the share name.

```
' Retrieve volume for share \\server\drive0
A$ = DIR$("\\server\drive0", 8)

' Retrieve volume for hidden share D: (\d$)
A$ = DIR$("\\server\d$", %VLABEL)
```

The DIR$ function may optionally assign the complete directory entry to an appropriate UDT variable if you include the TO clause as a parameter. The complete directory entry contains 592 bytes of data, corresponding to the following TYPE definition. This definition (DIRDATA) is built into PowerBASIC, and need not necessarily be included in your source code. The DirData UDT is identical to the Unicode version of the Win32_Find_Data structure used by the Windows API for this purpose.

```
TYPE DirData
  FileAttributes        AS DWORD
  CreationTime          AS QUAD
  LastAccessTime        AS QUAD
  LastWriteTime         AS QUAD
  FileSizeHigh          AS DWORD
  FileSizeLow           AS DWORD
  Reserved0             AS DWORD
  Reserved1             AS DWORD
  FileName              AS WSTRINGZ * 260
  ShortName             AS WSTRINGZ * 14
END TYPE
```

You can declare a variable as DIRDATA for this purpose, or use any other user-defined type of at least 592 data bytes. The additional data may be used for any other purpose in your program.

CreationTime, LastAccessTime, and LastWriteTime members of the DIRDATA can be assigned to a PowerTime object to convert the QUAD integer (FILETIME) values for easy calculations and conversions.

```
LOCAL f AS STRING
LOCAL d AS DIRDATA
LOCAL t AS IPOWERTIME

t = CLASS "PowerTime"
...
f = DIR$("c:\*.*" TO d)
t.FileTime = d.CreationTime   ' t contains the file creation time in a
localized format.
```

Previous versions of PowerBASIC used an ANSI version of DirData which was only 318 bytes in size. However, if you utilized the built-in form of DirData, your program should execute correctly under this version with no changes needed.

Restrictions PowerBASIC performs file matching with both the long (LFN) and short (SFN) filename versions of filenames. This means that DIR$ will also return filenames that start with the specified extension (as per standard Windows operating system behavior).

For example, A$ = DIR$("*.htm") will match filenames such as "Index.htm", "Default.html", "Homepages.htmb", "cgilib.htmlpages", etc. Similarly, A$ = DIR$("*.h??") and DIR$("*.ht*") will match the same filenames.

DIR$ is thread-safe, so DIR$ operations in one thread do not interfere with DIR$ operations in another thread. However, you should be aware that specifying a new mask$ parameter always starts an entirely new DIR$ search loop.

See also CURDIR$, DIR$ CLOSE, DISPLAY BROWSE, DISPLAY OPENFILE, FILEATTR, GETATTR, ISFILE, PATHNAME$, PATHSCAN$, SETATTR

Example The following code shows a typical method of retrieving filenames from a directory:

```
DIM Listing(1000) AS DirData
DIM x&, temp$
temp$ = DIR$("*.*", TO Listing(x&))
WHILE LEN(temp$) AND x& < 1000 ' max = 1000
  INCR x&
  temp$ = DIR$(NEXT, TO Listing(x&) )
WEND
```

DIR$ CLOSE statement

DIR$ CLOSE statement

Purpose Force the release of the operating system FindNext handle.

Syntax `DIR$ CLOSE`

Remarks DIR$ CLOSE will cause the operating system FindNext handle to be closed. Each time a new DIR$() sequence is initiated within a thread, or DIR$() returns an empty

, PowerBASIC automatically closes the FindNext handle to avoid overuse of system resources.

However, in unusual circumstances (such as a recursive directory scan with delete or rename), it may be necessary to close the FindNext handle sooner, through the use of this explicit statement, so that a directory can be removed or renamed.

Restrictions It is never necessary to execute DIR$ CLOSE to simply avoid a "System Handle Leak".

See also DIR$

DISKFREE function

DISKFREE function

Purpose Return the amount of available space on a disk, in bytes.

Syntax `bytes&& = DISKFREE(drive$)`

Remarks *drive$* specifies the drive letter or UNC share name (subject to operating system restrictions) of the disk to examine. If *drive$* is an empty

, information on the default drive is returned.

Restrictions With Windows 95 versions before OSR2, and Windows NT versions before 4.0, DISKFREE may return a negative or inaccurate value for drives larger than 2 GB.

See also DISKSIZE

Example `DisplayText "Free bytes on C: " + FORMAT$(DISKFREE("C"), "#,###")`

DISKSIZE function

DISKSIZE function

Purpose Return the total amount of space on a disk, in bytes.

Syntax `bytes&& = DISKSIZE(drive$)`

Remarks *drive$* specifies the drive letter or UNC share name (subject to operating system restrictions) of the disk to examine. If *drive$* is an empty

, information on the default drive is returned.

Restrictions With Windows 95 versions before OSR2, and Windows NT versions before 4.0, DISKSIZE may return a negative or inaccurate value for drives larger than 2 GB.

See also DISKFREE

Example `DisplayText "Total bytes on C: " + FORMAT$(DISKSIZE("C"), "#,###")`

DISPLAY BROWSE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DISPLAY BROWSE statement

Purpose Display a folder selection dialog to return the user's choice.

Syntax `DISPLAY BROWSE [hParent], [xpos&], [ypos&], title$, start$, flags& TO folder$`

hParent Handle of the parent window or dialog. If there is no parent, use zero (0) or %HWND_DESKTOP.

xpos& Horizontal position, in pixels, relative to the parent window. If omitted, PowerBASIC selects the position (offset from the parent, or centered if no parent).

ypos& Vertical position, in pixels, relative to the parent window. If missing, PowerBASIC selects the position (offset from the parent, or centered if no parent).

title$ The caption to be displayed below the caption bar of the dialog box. If this parameter is a null string, the title "Open" is displayed.

start$ A

which specifies the starting path to be used as the initial default folder. This may be disabled by passing a nul, zero-length string ("").

flags& The style attributes of the BROWSE Dialog. The following values may be used alone or combined, and are predefined in the PowerBASIC compiler:

%BIF_BROWSEINCLUDEFILES (4.71)	The dialog box will display both files and folders.
%BIF_BROWSEINCLUDEURLS	The dialog box can display URL's if %BIF_USENEWUI and %BIF_BROWSEINCLUDEFILES are also set.

%BIF_DONTGOBELOWDOMAIN	Does not include network folders below the domain level in the treeview control.
%BIF_EDITBOX	Includes an edit control in the dialog box that allows the user to type the name of an item.
%BIF_NEWDIALOGSTYLE (5.0)	Provides the new user interface, a larger dialog box that can be resized. It also offers drag-and-drop capability within the dialog box, reordering, shortcut menus, new folders, delete, and other shortcut menu commands. This is the default style implemented by PowerBASIC.
%BIF_NONEWFOLDERBUTTON (6.0)	Do not include the "New Folder" button in the dialog box.
%BIF_NOTRANSLATETARGETS (6.0)	When the selected item is a shortcut, return the PIDL of the shortcut itself rather than its target.
%BIF_RETURNFSANCESTORS	Only returns file system ancestors. With any other selection, the OK button is grayed.
%BIF_RETURNONLYFSDIRS	Only returns file system directories. With any other selection, the OK button is grayed.
%BIF_SHAREABLE (5.0)	The dialog box can display shareable resources on remote systems. It is intended for applications that want to expose remote shares on a local system. The %BIF_NEWDIALOGSTYLE flag must also be set.
%BIF_UAHINT (6.0)	When this flag is combined with %BIF_NEWDIALOGSTYLE, adds a usage hint to the dialog box in place of the edit box.
%BIF_USENEWUI (5.0)	Use the new user interface, plus an edit box.

folder$ Contains the drive letter and path to the folder the user selected. If an error occurs or the user clicks the cancel button, this variable is set to a nul, zero-length string.

See also DISPLAY COLOR, DISPLAY FONT, DISPLAY OPENFILE, DISPLAY SAVEFILE

DISPLAY COLOR statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DISPLAY COLOR statement

Purpose Display a color selection dialog to return the user's choice.

Syntax **`DISPLAY COLOR`** ***`[hParent], [xpos&], [ypos&], firstcolor&, custcolors, flags&`*** **`TO`** ***`colorval&`***

hParent Handle of the parent window or dialog. If there is no parent, use zero (0) or %HWND_DESKTOP.

xpos&	Horizontal position, in pixels, relative to the parent window. If omitted, PowerBASIC selects the position (offset from the parent, or centered if no parent).
ypos&	Vertical position, in pixels, relative to the parent window. If missing, PowerBASIC selects the position (offset from the parent, or centered if no parent).
firstcolor&	Specifies the RGB color which is initially selected when the dialog box is created.
custcolors	User-Defined Type variable which is used to initialize and return 16 custom colors on the dialog. The UDT must have 16 members, each of which is a long integer or dword. They may be scalar members, or a member array.
flags&	The style attributes of the COLOR Dialog. The following values may be used alone or combined, and are predefined in the PowerBASIC compiler:

%CC_FULLOPEN	Causes the entire dialog box to appear when created, including the section which allows the user to create custom colors.
% CC_PREVENTFULLOPEN	Disables the "Define Custom Colors" button, preventing the creation of custom colors.
%CC_SHOWHELP	Causes the Help Button to be displayed. The *hParent* parameter must not be zero or %HWND_DESKTOP.

colorval&	The RGB value of the selected color. If the user fails to make a color selection, or chooses CANCEL, the value -1 is assigned to the *colorval&* variable.
Remarks	If you offer the user the ability to create custom colors, it is suggested you retain the *custcolors&* UDT variable without change. It may then be used again on a later invocation of DISPLAY COLOR with the user's custom colors intact.
See also	Built In RGB Color Equates, DISPLAY BROWSE, DISPLAY FONT, DISPLAY OPENFILE, DISPLAY SAVEFILE, RGB

DISPLAY FONT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DISPLAY FONT statement

Purpose Display a

selection dialog to return user choices.

Syntax

```
DISPLAY FONT [hParent], [xpos&], [ypos&], defname$, defpoints&, defstyle&,
flags& _
TO fontname$, points&, style& [,colorval&, charset&]
```

hParent	Handle of the parent window or dialog. If there is no parent, use zero (0) or % HWND_DESKTOP.
xpos	Horizontal position, in pixels, relative to the parent window. If omitted, PowerBASIC selects the position (offset from the parent, or centered if no parent).
ypos	Vertical position, in pixels, relative to the parent window. If missing, PowerBASIC selects the position (offset from the parent, or centered if no parent).
defname$	The name of the default, pre-selected font which will be initially highlighted when the font

	dialog is displayed. A default font may be disabled by passing a nul, zero-length ("").
defpoints&	The point size of the default, pre-selected font.
defstyle&	The style attribute of the default, pre-selected font. See the specific definition of *style&* below.
flags&	The style attributes of the FONT Dialog. The following values may be used alone or combined, and are predefined in the PowerBASIC compiler:

%CF_BOTH	Causes the dialog box to list both screen and [printer](#) fonts.
%CF_TTONLY	Specifies that Font selection dialog should only enumerate and allow the selection of TrueType fonts.
%CF_EFFECTS	Specifies that Font selection dialog should enable strikeout, underline, and color effect choices.
%CF_FIXEDPITCHONLY	Specifies that Font selection dialog should select only fixed-pitch fonts.
%CF_FORCEFONTEXIST	Specifies that Font selection dialog should indicate an error condition if the user attempts to select a font or style that does not exist.
%CF_NOSTYLESEL	Specifies that Font selection dialog should not make an initial style selection.
%CF_NOSIZESEL	Specifies that Font selection dialog should not make an initial size selection.
%CF_NOSIMULATIONS	Specifies that Font selection dialog should not allow graphics device interface (GDI) font simulations.
%CF_NOVECTORFONTS	Specifies that Font selection dialog should not allow vector font selections.
%CF_PRINTERFONTS	Causes the Font selection dialog box to list only the fonts supported by the printer.
%CF_SCALABLEONLY	Specifies that Font selection dialog should allow only the selection of scalable fonts. (Scalable fonts include vector fonts, scalable printer fonts, TrueType fonts, and fonts scaled by other technologies.)
%CF_SCREENFONTS	Causes the Font selection dialog box to list only the screen fonts supported by the system.
%CF_WYSIWYG	Specifies that the Font selection dialog should allow only the selection of fonts available on both the printer and the display. If this flag is specified, the %CF_BOTH and %CF_SCALABLEONLY flags should also be specified.

fontname$	The name of the font selected by the user
points&	The point size of the font selected by the user.
style&	The style attribute of the selected font. Any of the following values can be combined or used alone:

0	Normal
1	Bold
2	Italic
4	Underline
8	Strikeout

For example, if a style& value of 3 is returned, it specifies that a combination of both bold and italic attributes was selected by the user.

colorval&	The [RGB](#) value of the selected color.
charset&	The chosen character set - 0 if a standard U.S. charset.
See also	[CONTROL SET FONT](#), [DIALOG DEFAULT FONT](#), [DISPLAY BROWSE](#), [DISPLAY](#)

COLOR, DISPLAY OPENFILE, DISPLAY SAVEFILE, FONT END, FONT NEW, GRAPHIC SET FONT, XPRINT SET FONT

DISPLAY OPENFILE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DISPLAY OPENFILE statement

Purpose Display an OpenFile selection dialog to return user choices.

Syntax

```
DISPLAY OPENFILE [hParent], [xpos&], [ypos&], title$, folder$, filter$, _
  start$, defextn$, flags& TO filevar$ [,countvar&]
```

hParent Handle of the parent window or dialog. If there is no parent, use zero (0) or %HWND_DESKTOP.

xpos& Horizontal position, in pixels, relative to the parent window. If omitted, PowerBASIC selects the position (offset from the parent, or centered if no parent).

ypos& Vertical position, in pixels, relative to the parent window. If missing, PowerBASIC selects the position (offset from the parent, or centered if no parent).

title$ The title to be displayed in the title bar of the dialog box. If this parameter is a null
, the title "Open" is displayed.

folder$ The name of the initial file directory to be displayed. If this parameter is a null string, the current directory is used. Future invocations remember and use the ending directory, rather than honoring a null string for the current directory.

filter$ A string expression containing pairs of null-terminated filter strings. The first string in each pair describes the filter, and the second the filter pattern. For example, if you wish to display BASIC source files, you might use an expression like:

```
"BASIC" + CHR$(0) + "*.BAS" + CHR$(0)
```

A simpler method using the unique characteristics of the CHR$() function in PowerBASIC to achieve the same result:

```
CHR$("BASIC", 0, "*.BAS", 0)
```

Multiple filters can be designated for a single item by separating filter pattern strings with a semicolon:

```
CHR$("BASIC", 0, "*.BAS;*.INC;*.BAK", 0)
```

start$ A string which specifies the starting file name to be used as the initial file selection. This may be disabled by passing a null, zero-length string ("").

defextn$ A default extension to be appended to the selected file name if the user does not enter it. This may be disabled by passing a null, zero-length string ("").

flags& The style attributes of the OPENFILE Dialog. The following values may be used alone or combined, and are predefined in the PowerBASIC compiler:

%OFN_ALLOWMULTISELECT	Multiple selections are allowed. If the user chooses multiple items, the return value consists of multiple file names which are null-terminated.
%OFN_CREATEPROMPT	The user may specify a file which does not exist.

%OFN_ENABLESIZING	The dialog may be resized by the user, but future invocations remember and use the ending size and screen location, rather than honoring *xpos* and *ypos* parameter values. The position parameters are ignored.
%OFN_EXPLORER	The dialog uses the Explorer style interface. This is the default condition, even if the flag is not set.
%OFN_FILEMUSTEXIST	The user may not specify a file which does not exist.
%OFN_NODEREFERENCELINKS	The dialog returns the name of the selected shortcut (.LNK) file. If this value is not given, the name of the file referenced by the shortcut is returned.
%OFN_NONETWORKBUTTON	Hides and disables the network button.
%OFN_NOTESTFILECREATE	The file is not created before the dialog is closed.
%OFN_NOVALIDATE	The file name is not validated for invalid characters.
%OFN_PATHMUSTEXIST	The user may type only valid paths and filenames.
%OFN_SHAREAWARE	If the dialog fails because of a network sharing violation, the error is ignored and the selected filename is returned.
%OFN_SHOWHELP	The help button is displayed.

Return Values

filevar$ If the user selects one file, this variable receives the drive, path, and name of that file, followed by a $NUL terminator. If the user selects no files, an error occurs, or cancel/close is chosen, this variable is set to a null, zero-length string.

If the user selects multiple files, and specified the flag %OFN_ALLOWMULTISELECT, the returned string consists of the path name (which applies to all selected files), followed by each of the file names of the selected files. Each of these text items are delimited in the returned string by a nul - CHR$(0). You can extract each of the multiple names with the PARSE$() function or the PARSE statement.

Windows imposes a text limit of 32K (32,768 bytes) for the returned string value. If it is exceeded, a nul, zero-length string is returned.

countvar& If this optional long integer variable is included, it receives a count of the number of file names which were selected by the user.

Remarks The current default directory is never altered by this statement, even if the user changes the directory while searching for files.

See also DISPLAY BROWSE, DISPLAY COLOR, DISPLAY FONT, DISPLAY SAVEFILE

DISPLAY SAVEFILE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

DISPLAY SAVEFILE statement

Purpose Display a SaveFile selection dialog to return user choices.

Syntax **DISPLAY SAVEFILE** ***[hParent], [xpos&], [ypos&], title$, folder$, filter$, _ start$, defext$, flags&*** **TO** ***filevar$*** **[*,countvar&*]**

hParent Handle of the parent window or dialog. If there is no parent, use zero (0) or %HWND_DESKTOP.

xpos& Horizontal position, in pixels, relative to the parent window. If omitted, PowerBASIC selects the position (offset from the parent, or centered if no parent).

ypos& Vertical position, in pixels, relative to the parent window. If missing, PowerBASIC selects the position (offset from the parent, or centered if no parent).

title$ The title to be displayed in the title bar of the dialog box. If this parameter is a null
, the title "Save As" is displayed.

folder$ The name of the initial file directory to be displayed. If this parameter is a null string, the current directory is used.

filter$ A string expression containing pairs of null-terminated filter strings. The first string in each pair describes the filter, and the second the filter pattern. For example, if you wish to display BASIC source files, you might use an expression like:

```
"BASIC" + CHR$(0) + "*.BAS" + CHR$(0)
```

A simpler method using the unique characteristics of the CHR$() function in PowerBASIC to achieve the same result:

```
CHR$("BASIC", 0, "*.BAS", 0)
```

Multiple filters can be designated for a single item by separating filter pattern strings with a semicolon:

```
CHR$("BASIC", 0, "*.BAS;*.INC;*.BAK", 0)
```

start$ A string which specifies the starting file name to be used as the initial file selection. This may be disabled by passing a nul, zero-length string ("").

defext$ A default extension to be appended to the selected file name if the user does not enter it. This may be disabled by passing a nul, zero-length string ("").

flags& The style attributes of the SAVEFILE Dialog. The following values may be used alone or combined, and are predefined in the PowerBASIC compiler:

%OFN_ALLOWMULTISELECT	Multiple selections are allowed. If the user chooses multiple items, the return value consists of multiple file names which are null-terminated.
%OFN_CREATEPROMPT	The user may specify a file which does not exist.
%OFN_ENABLESIZING	The dialog may be resized by the user, but future invocations remember and use the ending size and screen location, rather than honoring *xpos* and *ypos* parameter values. The position parameters are ignored.
%OFN_EXPLORER	The dialog uses the Explorer style interface. This is the default condition, even if the flag is not set.
%OFN_FILEMUSTEXIST	The user may not specify a file which does not exist.
%OFN_NODEREFERENCELINKS	The dialog returns the name of the selected shortcut (.LNK) file. If this value is not given, the name of the file referenced by the shortcut is returned.
%OFN_NONETWORKBUTTON	Hides and disables the network button.
%OFN_NOTESTFILECREATE	The file is not created before the dialog is closed.
%OFN_NOVALIDATE	The file name is not validated for invalid characters.
%OFN_PATHMUSTEXIST	The user may type only valid paths and filenames.
%OFN_OVERWRITEPROMPT	The user may select a filename that already exists.
%OFN_SHAREAWARE	If the dialog fails because of a network sharing violation, the error is ignored and the selected

	filename is returned.
%OFN_SHOWHELP	The help button is displayed.

Return Values

filevar$ If the user selects one file, this variable receives the drive, path, and name of that file. If the user selects no files, an error occurs, or cancel/close is chosen, this variable is set to a nul, zero-length string.

If the user selects multiple files, and specified the flag %OFN_ALLOWMULTISELECT, the returned string consists of the path name (which applies all selected files), followed by each of the file names of the selected files. Each of these text items are delimited in the returned string by a nul - CHR$(0). You can extract each of the multiple names with the PARSE$() function or the PARSE statement.

Windows imposes a text limit of 32K (32,768 bytes) for the returned string value. If it is exceeded, a nul, zero-length string is returned.

countvar& If this optional long integer variable is included, it receives a count of the number of file names which were selected by the user.

Remarks The current default directory is never altered by this statement, even if the user changes the directory while searching for files.

See also DISPLAY BROWSE, DISPLAY COLOR, DISPLAY FONT, DISPLAY OPENFILE

DLLMAIN function

LIBMAIN function

Purpose LIBMAIN (or its synonym DLLMAIN) is an optional user-defined function called by Windows each time a DLL is loaded into, and unloaded from, memory. The PBLIBMAIN function performs a similar task to LIBMAIN, but takes no parameters.

Syntax

```
FUNCTION { LIBMAIN | DLLMAIN } ( _
  BYVAL hInstance AS DWORD, _
  BYVAL lReason AS LONG, _
  BYVAL lReserved AS LONG ) AS LONG
```

In 32-bit Windows, LIBMAIN is called by Windows each time a DLL is loaded or unloaded by an application or process, and (usually) when a thread is started and stopped. Your code should never call LIBMAIN.

Remarks The LIBMAIN / DLLMAIN function provides the following parameters:

hInstance The unique instance handle of the DLL. This handle is used by the calling application to identify the DLL. The instance handle value is commonly used to load resources embedded within the DLL, and to obtain the actual file name of the DLL (via the GetModuleFilename API function). In these cases, it is common to copy the *hInstance* value to a global variable, allowing the instance handle value to be utilized elsewhere in the DLL.

lReason This flag indicates why the DLL entry-point is being called. It can be one of the following values (as defined in WIN32API.INC):

% DLL_PROCESS_ATTACH	Indicates that the DLL is being loaded by a process (another DLL or EXE is loading the DLL). DLLs can use this opportunity to initialize any instance or global data, such as arrays. *lReserved* is zero if the DLL is being loaded explicitly (run-time linking) using LoadLibrary(), or non-zero if the DLL is being loaded implicitly (load-time linking) during process initialization.
% DLL_PROCESS_DETACH	Indicates that the DLL is being cleanly unloaded or detached from the calling application. DLLs can take this opportunity to clean up all resources for all threads

		attached and known to the DLL. This is functionally equivalent to the WEP function in 16-bit DLLs. *lReserved* is zero if LIBMAIN was executed via the FreeLibrary API and the DLLs reference count reached zero (no further instances of the DLL are loaded), or non-zero if LIBMAIN is executed during process termination. A %DLL_PROCESS_DETACH does not generate %DLL_THREAD_DETACH for active threads.
	%DLL_THREAD_ATTACH	Indicates that the DLL is being loaded by a new thread in the calling application. DLLs can use this opportunity to initialize any Thread Local Storage (TLS). This execution occurs in the context of the new thread.
	%DLL_THREAD_DETACH	Indicates that the thread is exiting cleanly. If the DLL has allocated any thread-specific storage (Thread Local Storage or TLS), it should be released. This may occur even if there was no matching %DLL_THREAD_ATTACH call. A %DLL_PROCESS_DETACH does not generate %DLL_THREAD_DETACH for active threads.

lReserved — The *lReserved* parameter specifies further aspects of the DLL initialization and cleanup. If *lReason* is %DLL_PROCESS_ATTACH, *lReserved* is zero (0) for explicit (dynamic) loads and non-zero for implicit loads. If *lReason* is %DLL_PROCESS_DETACH, *lReserved* is zero if LIBMAIN has been called by using the FreeLibrary API call, and non-zero if LIBMAIN has been called during process termination.

Return value — If LIBMAIN is called with %DLL_PROCESS_ATTACH, your LIBMAIN function should return a zero (0) if any part of your initialization process fails, or a one (1) if no errors were encountered. If a zero is returned, Windows will abort and unload the DLL from memory. When LIBMAIN is called with any other value than %DLL_PROCESS_ATTACH, the return value is ignored.

Restrictions — Note that Windows does not guarantee that LIBMAIN will be called in a "balanced" manner. For example, a %DLL_PROCESS_ATTACH is not followed by a %DLL_THREAD_ATTACH for the primary thread. In some conditions, %DLL_THREAD_DETACH may not occur at all. Further discussion on these Windows traits are beyond the scope of this documentation; however, an excellent source of information can be found in "Win32 Programming", Rector/Newcomer, ISBN 0-201-63492-9.

At the point where a DLL is loaded into memory during process startup, Windows only guarantees that the KERNEL32.DLL system library will be loaded in memory. On this basis, API calls made from within LIBMAIN must be restricted to the range of API functions present in KERNEL32.DLL, with the exception of the LoadLibrary, LoadLibraryEx, and FreeLibrary API functions.

In addition, code within LIBMAIN must not call API functions in any other DLL (for example, USER32.DLL, SHELL32.DLL, ADVAPU32.DLL, GDI32.DLL, etc), because some API functions in those DLLs may attempt to load other libraries via LoadLibrary, etc. For example, never call the MessageBox API function from within LIBMAIN, nor use the related MSGBOX function or MSGBOX statement.

Failure to observe these restrictions will result in Access Violation or General Protection Faults (GPFs), typically caused by the execution of code in DLLs that has yet to be initialized.

See also — DLLMAIN, PBLIBMAIN, PBMAIN, THREAD CREATE, WINMAIN

Example

```
#DIM ALL
#COMPILE DLL "LIBTEST.DLL"
#INCLUDE "WIN32API.INC"

GLOBAL gNumOfTimes AS DWORD

FUNCTION LIBMAIN(BYVAL hInstance AS DWORD, _
  BYVAL lReason AS LONG, _
```

```
  BYVAL lReserved AS LONG) AS LONG

  INCR gNumOfTimes

  SELECT CASE AS LONG lReason

    CASE %DLL_PROCESS_ATTACH
      ' This DLL has been mapped into the memory context of
      ' the calling program, and can be initialized as required.
      ' Here we return a non-zero LIBMAIN result to indicate success.
      LIBMAIN = 1
      EXIT FUNCTION

    CASE %DLL_PROCESS_DETACH
      ' This DLL is about to be unloaded
      EXIT FUNCTION

    CASE %DLL_THREAD_ATTACH
      ' A [New] thread is starting (see THREADID)
      EXIT FUNCTION

    CASE %DLL_THREAD_DETACH
      ' This thread is closing (see THREADID)
      EXIT FUNCTION

  END SELECT

  ' Theoretically execution should never get to this point.
  ' However, if the DLL is being implicitly linked then return
  ' Zero (0) and the process (program) will fail to start
  ' running. For Explicit linking, returning Zero (0) will
  ' simply cause the LoadLibrary/LoadLibraryEx API call to fail.
  LIBMAIN = 0 ' Indicate failure to initialize the DLL!
END FUNCTION

SUB TestIt ALIAS "TestIt" () EXPORT
  MSGBOX "TestIt" + $CRLF + _"gNumOfTimes =" + STR$(gNumOfTimes)
END SUB
```

DO/LOOP statements

DO/LOOP statements

Purpose Define a group of program statements that are executed repetitively as long as a certain condition is met.

Syntax

```
DO [{WHILE | UNTIL} expression]
  [statements]
  [EXIT LOOP]
  [statements]
  [ITERATE LOOP]
  [statements]
LOOP [{WHILE | UNTIL} expression]
```

Remarks *expression* is a numeric expression, in which non-zero values represent logical TRUE, and zero values represent logical FALSE. If a string expression is used (i.e., A$ <> ""), PowerBASIC returns TRUE if the length of result of the string expression is greater than zero.

DO/LOOP statements are extremely flexible. They can be used to create loops for almost any imaginable programming situation. They allow you to create loops with the test for the terminating condition at the top of the loop, the bottom of the loop, both places, or none of the above.

A DO statement must always be paired with a matching LOOP statement at the bottom of the loop. Failure to match each DO with a LOOP results in either a compile-time Error 448 ("DO loop expected") or an Error 456 ("LOOP/WEND expected").

The WHILE and UNTIL keywords are used to add tests to a DO/LOOP. Use the WHILE if the loop should be repeated if *expression* is TRUE, and terminated if *expression* is FALSE. UNTIL has the opposite effect; that is, the loop will be terminated if *expression* is TRUE, and repeated if FALSE.

For example:

```
DO WHILE a = 13
  [statements]
LOOP
```

executes the statements between DO and LOOP as long as *a* is 13. If *a* is not 13 initially, the statements in the loop are never executed. Conversely:

```
DO UNTIL a = 13
  [statements]
LOOP
```

executes the statements between DO and LOOP as long as *a* is not 13. If *a* equals 13 initially, the loop is never executed.

At any point in a DO/LOOP, you can include an EXIT LOOP or ITERATE LOOP statement. EXIT LOOP causes the loop to terminate, so that execution continues *after* the terminating loop statement. ITERATE LOOP causes the loop to continue *at* the terminating loop statement.

The WHILE/WEND statements can be used in many cases to perform the same functions as DO/LOOP. For example, this DO/LOOP:

```
DO WHILE a < b
  [statements]
LOOP
```

has the same effect as this WHILE/WEND loop:

```
WHILE a < b
  [statements]
WEND
```

When using nested loops, be careful that inner loops do not modify variables that are used by the outer loop's terminating condition test. For example, the following code was intended to get all 20 elements of a 10x2 array (dimensioned *arry*(9,1)):

```
Count1 = 0
DO WHILE Count1 < 10
  FOR Count2 = 0 TO 1
    x = arry(Count1,Count2)
    Count1 = Count1 + 1
  NEXT Count2
LOOP
```

Because *Count1* is incremented within the inner loop, which executes twice for each pass through the outer loop, this code would not get all the array values, but would only get the values for *arry*(0,0), *arry*(1,1), *arry*(2,0), *arry*(3,1) and so on. By moving the Count1 = Count1 + 1 statement to just below the NEXT Count2 statement, the code functions as intended.

If an EXIT LOOP statement is used within nested loops, it exits only the current loop, not the entire nest. Similarly, an ITERATE within nested loops iterates the current loop. For advice on exiting nested block structures, please refer to the EXIT statement. The PowerBASIC can be used to construct multiple test conditions for loop control. For example:

```
DO WHILE x < 10 AND y < 10
  [statements]
LOOP
```

is executed only as long as both *x* and *y* are less than 10. Similarly, the loop:

```
DO UNTIL X > 10 OR Y > 10
  [statements]
LOOP
```

is executed until either *x* or *y* (or both) is (are) greater than 10. See the

and Arithmetic Operators topics for more information about using logical operators.

Although the compiler doesn't care about such things, it is a good idea when writing your source code to indent the statements between DO and LOOP. The same is true of FOR/NEXT loops, WHILE/WEND loops, and multi-line IF statements. Such indenting makes the appearance of your source code reflect the logical structure of your program, resulting in greater readability. Indenting is particularly valuable when nesting multiple loops of the same type, since it makes it easier to see which LOOP goes with which DO.

Also see the discussion on the IF statement for notes on PowerBASIC's Short-circuit evaluation and its possible side effects.

See also #OPTIMIZE, EXIT, FOR EACH/NEXT, FOR/NEXT,
, ITERATE, WHILE/WEND

ENUM/END ENUM statements

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ENUM/END ENUM statements New!

Purpose Creates a group of logically related numeric equates.

Syntax

```
ENUM Name [SINGULAR] [BITS] [AS COM]
  EquateName [= value]
  EquateName [= value]
  ...
END ENUM
```

Remarks PowerBASIC allows you to refer to integral numeric constants by name. These names are called equates, and are visible throughout your program. If you need a set of equates which are logically related, you can define them as a group in an enumeration. This provides meaningful names for the enumeration, its members, and therefore the name by which it is referenced.

When an equate is created in an enumeration, its name is composed of a leading percent sign (%), the enumeration name, a period (.), and then the member name. For example:

```
ENUM abc
  count = 7
END ENUM
```

In the above example, the equate is referenced as *%abc.count*, and returns the value seven (7).

Each member of an enumeration may be assigned a specific integral value (in the range of a 64-bit quad integer) by using the optional [=*value*] syntax. In this case, only a constant value (or a simple constant/literal expression) may be assigned to it. If an expression is used, all of the terms in the expression must be constants; numeric equates; bitwise operators like AND, OR, NOT; arithmetic operators +, -, *, /, \; the relational operators >, <, >=, <=, <>, =; and the CVQ function.

If the [=*value*] option is omitted, each member of the enumeration is assigned an integral value in sequence beginning with the value 0. If one or more equates are assigned an explicit value, equates which follow are assigned the next value in the sequence. For example:

```
ENUM abc
  direction
  count = 8
  scope
END ENUM
```

In the above example, *%abc.direction* = 0, *%abc.count* = 8, and *%abc.scope* = 9.

BITS

If the BITS option is included, the members are auto-assigned values suitable for use as a bit mask, increasing as integral powers of two. The first member is auto-assigned the value 0, the next is 1, then 2, 4, 8, 16, etc. If one or more are assigned an explicit value, equates which follow are assigned the next value in the sequence. For example:

```
ENUM abc BITS
  direction = 1
  count = 8
  scope
END ENUM
```

In the above example, *%abc.direction* = 1, *%abc.count* = 8, and *%abc.scope* = 16.

SINGULAR

If the SINGULAR option is included, the member name is the complete name, without the ENUM name or the period. The equate is referenced by just the member name with a percent (%) prepended. For example:

```
ENUM abc SINGULAR
  count = 7
END ENUM
```

In the above example, the equate would normally be referenced by the compound name %abc.count. However, since it includes the SINGULAR option, it is referenced by the simplified name *%count*.

AS COM

If you are using a version of PowerBASIC which creates COM servers, you can easily include these equates in your type library; just append the words AS COM to the ENUM definition.

END statement

END statement New!

Purpose

Terminate program immediately.

Syntax

END [*nErrorLevel&*]

Remarks

Normally, PowerBASIC programs are terminated when you exit the PBMAIN or WINMAIN() function. It should always be your goal to end programs in this fashion, so that the compiler and the operating system can do everything possible to leave things in an orderly state.

The END statement is an alternative termination method which should only be used in limited circumstances. It may be helpful in emergency situations, such as a fatal error like "out of memory". It's also useful (temporarily) in the conversion of DOS programs, just for the sake of compatibility. However, once conversion is complete, you should eliminate it as soon as possible.

The optional *nErrorLevel&* value has an effective range of 0 to 255. Batch files may act on the result through the IF [NOT] ERRORLEVEL batch command.

Restrictions END may not be used in a DLL. END is intended only for temporary use in converting DOS programs to Windows. You should convert it to the standard EXIT FUNCTION method as soon as possible. It should be avoided while any COM objects are active.

See also EXIT, PBMAIN, WINMAIN

ENVIRON statement

ENVIRON statement

Purpose Modify the current program's environment table.

Syntax **ENVIRON *envstring$***

Remarks Modify the environment table for the current program and any subsequent child programs that are launched. A single string expression parameter sets both the name of the environment variable and its value, delimited by an equal ("=") sign. If a value is not specified, the variable is removed from the environment table.

See also ENVIRON$

Example

```
ENVIRON "SETMODE=YES"     ' SETMODE = "YES"
ENVIRON "SETMODE="        ' Removes SETMODE
```

ENVIRON$ function

ENVIRON$ function

Purpose Retrieve information from the current program's environment table.

Syntax ***s$* = ENVIRON$({*parameter_string* | *n*})**

Remarks *parameter_string* is a string expression denoting which environment parameter is to be retrieved. *n* is an

expression, starting at 1.

If a

argument is used, ENVIRON$ returns the text that follows *parameter_string* (after the equal sign) in the environment table. If *parameter_string* is not found, or no text follows the equal sign in the environment string table, an empty string is returned.

If the numeric argument is used, it acts as an index into the environment table. ENVIRON$ returns a string containing the *n*th parameter from the start of the table. If there is no *n*th parameter, an empty string is returned. If the index is negative, private Windows variables are returned.

When launching a program from within the IDE, PowerBASIC sets the "PBIDE" environment variable with the IDE name and version number. For example, "CCEDIT 5.00" or "PBEDIT 9.00". Similarly, when running in the debugger, the "PBDEBUG" environment string will return the IDE name and version.

Programs can use these environment strings to detect their "mode" of operation, for example, to signal a program to save internal data to a disk file, and when to display helpful debugging information. DLLs created with PB/Win can also examine these environment strings and adapt behavior accordingly. This will be of particular interest to

3rd-party DLL programmers who create libraries and add-ons for other PowerBASIC programmers.

Restrictions When a program (process) starts, it is given its own local environment table, which is typically a copy of the parent program's environment table. ENVIRON$ works with this local table, not the parent's table.

See also ENVIRON

Example

```
' Retrieve the PATH environment variable
Path$ = ENVIRON$("PATH")

IF LEN(ENVIRON$("PBDEBUG")) THEN _
  CALL DisplayMyDebugData()

' Enumerate all Environment strings
RESET x&
DO
  INCR x&
  a$ = ENVIRON$(x&)
  ' process a$ here
LOOP WHILE LEN(a$)
```

EOF function

EOF function

Purpose Return the end-of-file status of an opened file or TCP/UDP transmission.

Syntax `y = EOF([#] filenum&)`

Remarks Use EOF to determine when the end of a file has been reached while reading its data. *filenum&* is the file number specified when the file was Opened. EOF returns -1 (TRUE) if the end of the specified file has been reached, or if an error occurs trying to check for the end of the file. Otherwise, EOF returns 0 (FALSE).

If *filenum&* is not a valid, open file, a run-time Error 53 will occur ("File not found"). If *filenum&* is for a binary file, EOF returns TRUE only if the most recent file operation was a read operation, and that operation could not read the requested number of bytes.

The EOF function may also be used with the COMM LINE and TCP LINE statements to detect that an incomplete line was received. Normally, these statements read data until a $CRLF character pair is found, and in that case, EOF will return 0 (FALSE). However, even if no $CRLF has been found, the statements will end when no additional data is available. In that case, they will return whatever data has already been accumulated, and set EOF to -1 (TRUE).

In many cases, it would be prudent to test EOF after every COMM LINE and TCP LINE to verify that a full line has been received. In some cases, you may wish to execute the statement one or more additional times, combining the data, in order to obtain a full line of text.

See also COMM LINE, LOC, LOF, OPEN, TCP LINE

Example

```
' Open an ASCII text file and read it
hFile = FREEFILE
OPEN "TEXTFILE.TXT" FOR INPUT AS hFile
WHILE ISFALSE EOF(hFile)
  LINE INPUT# hFile, x$
WEND
CLOSE hFile
```

EQV operator

EQV operator

Purpose The EQV operator works as both a logical and a bitwise arithmetic operator.

Syntax ***p*** **EQV** ***q***

Remarks

Using EQV as a logical operator

EQV returns TRUE (non-zero) if *at least* one bit in one operand contains the same value as the identical bit position in the other operand. Further, EQV will return zero if and only if there are no matching bit values between the two operands. This can occur when one operand is equal to the bitwise NOT value of the other operand. For example:

```
IF x EQV y = 0 THEN statement
```

…is equivalent to:

```
IF x = NOT y THEN statement
```

The EQV operator can be used for comparing signed and unsigned values of the same bit size, such as Long-integer and Double-word. This use of EQV is similar to using the BITS functions; however, care must be exercised to test the return value of EQV correctly, since EQV will return an unsigned value with all bits set *only* if the bit patterns of the two operands are an *exact match*.

The EQV truth table looks like this:

Truth table

x	y	x EQV y
T	T	T
T	F	F
F	T	F
F	F	T

Using EQV as a bitwise arithmetic operator

The EQV operator is seldom used as a bitwise arithmetic operator, but here is an example:

```
        1001 0111 0000 0000 = &H09700
EQV     0011 1111 1111 1111 = &H03FFF (the mask)
        0101 0111 0000 0000 = &H05700 (result)
MSB                           LSB (bit 0)
```

See also Arithmetic Operators, AND, IMP, ISFALSE, ISTRUE, LET, NOT, OR, XOR

Example

```
IF (Var1& EQV Var2???)  = BITS???(-1&) THEN ...
IF (Val1% EQV Var2??)   = &H0FFFF??    THEN ...
IF -1& EQV BITS???(-1&) = &H0FFFFFFFF  THEN ...
IF -1% EQV BITS??(-1%)  = &H0FFFF      THEN ...
```

ERASE statement

ERASE statement

Purpose Deallocate array memory and release it from memory.

Syntax **ERASE** ***array*****[()] [,** ***array*****[()]] ...**

Remarks Any memory assigned to the individual elements (if they are dynamic strings, Objects, Variants, etc.) is also released. ERASE deallocates all the memory for LOCAL, STATIC, and GLOBAL arrays. After an array is erased, attempting to access the array may produce a General Protection Fault (GPF). Local arrays are implicitly erased upon exit from the Sub/Function/Method/Property that created them.

array The name of the array to deallocate. Parentheses are optional, but are recommended for clarity of the source code.

One method to check if an array has been dimensioned without triggering a GPF is to use the LBOUND and UBOUND functions, as follows:

```
IF UBOUND(array) - LBOUND(array) = -1 THEN
  ' array() is not allocated
END IF
```

ERASE can deallocate an array that was passed as a parameter to a procedure, but only if the array was passed by reference (BYREF). To clear the contents of an array back to its initialized state, use REDIM or RESET.

Restrictions Absolute arrays (those created by DIM...AT) are handled differently by ERASE. An explicit ERASE will release the individual elements of an absolute array, if needed, but the full data block is left as-is because no assumptions can be made as to its origin. It is the programmer's responsibility to ensure that the memory block overlaid by the absolute array is handled correctly. In an implied ERASE (Sub/Function/Method/Property exit) of a LOCAL absolute array, the internal array descriptor is deactivated, but no changes of any kind are made to the individual data elements or the full block. RESET may be used to set arrays to zeroes or empty strings without releasing the data block.

See also ARRAYATTR, DIM, REDIM, RESET

Example

```
ERASE Array1$(), MyArray%()
```

ERL system variable

ERL system variable

Purpose Return the last line number encountered before the most recent error.

Syntax ***nline*** **= ERL**

Remarks Return the last (most recent) line number that was encountered before the most recent run-time error, within the current Sub, Function, Method, or Property. With ERL, line numbers are of the traditional-basic line numbering variety, not the physical source code line.

See also ERL$, ERR, ERRCLEAR, ERROR, ERROR$, Error Overview, Error Trapping, ON ERROR

Example

```
10 ERRCLEAR
20 NAME "a nonexisting filename.txt" AS "abc.txt"
30 IF ERR THEN lErrLine = ERL    ' lErrLine = 20
```

ERL$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ERL$ function

Purpose Return the last label, line number, or

name executed prior to the most recent error.

Syntax ***position$*** **= ERL$**

Remarks Return a

containing the name of the last (most recent) label, line number, or procedure that was executed prior to the most recent run-time error, within the current Sub, Function, Method, or Property. In order to maintain high efficiency levels, the returned name is limited to the first 8 characters of the actual name.

See also ERL, ERR, ERRCLEAR, ERROR, ERROR$, Error Overview, Error Trapping, ON ERROR

Example

```
MyLabel:
ERRCLEAR
NAME "a nonexisting filename.txt" AS "abc.txt"
IF ERR THEN Position$ = ERL$
```

ERR system variable

ERR and ERRCLEAR system variables

Purpose Return the error code of the most recent PowerBASIC run-time error.

Syntax

```
y = ERR
ERR = ErrNum
y = ERRCLEAR
ERRCLEAR
```

Remarks ERR and ERRCLEAR return the error code of the most recent run-time error in the current Sub, Function, Method, or Property. This number can be tested after any critical operation, so that appropriate error-handling code can be executed.

You can also assign a value to ERR. This is similar to executing an ERROR statement, except that no branch to an error trap routine is generated. Instead, subsequent tests of ERR and ERRCLEAR reflect *ErrNum*.

ERRCLEAR returns the error code of the most recent run-time error. In addition, it resets PowerBASIC's internal error code variable ERR to zero after you reference it. Finally, it emulates RESUME FLUSH so that no RESUME execution is needed or allowed. This ensures that the next time you test ERR or ERRCLEAR, you are guaranteed to get a zero, unless a new error has actually occurred in the interim.

ERRCLEAR can also be used as a statement to reset ERR to zero.

IMPORTANT: Be sure to study the Errors and Error Trapping.

Restrictions Valid run-time error values are in the range 0 through 255. A value of 0 indicates no error. Attempting to set an error value (with the ERROR statement) outside of that range will convert the value to a run-time Error 5 ("Illegal function call").

See also ERROR, ERROR$, Error Overview, Error Trapping, ON ERROR

Example

```
y = ERR         ' sets y = ERR
ERR = 6         ' sets ERR to 6
y = ERRCLEAR    ' sets y = ERR and ERR = 0
ERRCLEAR        ' sets ERR = 0
```

ERRCLEAR system variable

ERR and ERRCLEAR system variables

Purpose Return the error code of the most recent PowerBASIC run-time error.

Syntax

```
y = ERR
ERR = ErrNum
y = ERRCLEAR
ERRCLEAR
```

Remarks

ERR and ERRCLEAR return the error code of the most recent run-time error in the current Sub, Function, Method, or Property. This number can be tested after any critical operation, so that appropriate error-handling code can be executed.

You can also assign a value to ERR. This is similar to executing an ERROR statement, except that no branch to an error trap routine is generated. Instead, subsequent tests of ERR and ERRCLEAR reflect *ErrNum*.

ERRCLEAR returns the error code of the most recent run-time error. In addition, it resets PowerBASIC's internal error code variable ERR to zero after you reference it. Finally, it emulates RESUME FLUSH so that no RESUME execution is needed or allowed. This ensures that the next time you test ERR or ERRCLEAR, you are guaranteed to get a zero, unless a new error has actually occurred in the interim.

ERRCLEAR can also be used as a statement to reset ERR to zero.

IMPORTANT: Be sure to study the Errors and Error Trapping.

Restrictions

Valid run-time error values are in the range 0 through 255. A value of 0 indicates no error. Attempting to set an error value (with the ERROR statement) outside of that range will convert the value to a run-time Error 5 ("Illegal function call").

See also

ERROR, ERROR$, Error Overview, Error Trapping, ON ERROR

Example

```
y = ERR         ' sets y = ERR
ERR = 6         ' sets ERR to 6
y = ERRCLEAR    ' sets y = ERR and ERR = 0
ERRCLEAR        ' sets ERR = 0
```

ERROR statement

ERROR statement

Purpose

Cause a run-time error to be generated and sets ERR to the specified error number.

Syntax

```
ERROR ErrNum
```

Remarks

ERROR *ErrNum* causes a run-time error to be generated and sets ERR to the specified number. Run-time errors are only caught (through the branch to your error trap routine) if you have an active ON ERROR GOTO or a TRY/END TRY block in your code.

Valid errors are in the range 1 through 255. Attempting to set an error value outside of that range will convert the value to a run-time Error 5 ("Illegal function call").

The compiler reserves codes 0 through 150, and 241 through 255 for run-time errors. You may freely use error codes 151 through 240 for your own purposes.

See also

#DEBUG DISPLAY, ERL, ERR, ERRCLEAR, ERROR$, Error Overview, Error Trapping, ON ERROR

Example

```
ERROR 5   ' generates error 5 "Illegal Function Call"
```

ERROR$ function

ERROR$ function

Purpose

Return a

containing the descriptive name of a specified PowerBASIC run-time error code.

Syntax `msg$ = ERROR$[(ErrNum)]`

Remarks ERROR$ returns the verbose text title of a PowerBASIC run-time error identified by *ErrNum*.

ErrNum must be in the range 1 to 255 inclusive. Values outside of this range return "No error". If *ErrNum* is not specified, ERROR$ returns the description of the current value of ERR.

See also #DEBUG DISPLAY, ERL, ERR, ERRCLEAR, ERROR, Error Overview, Error Trapping, ON ERROR

Example

```
a$ = ERROR$(5)  ' Returns "Illegal function call"
```

EVENT SOURCE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

EVENT SOURCE statement

Purpose Declare an event interface within a Class definition

Syntax `EVENT SOURCE InterfaceName`

Remarks With objects, normally a client module calls a server module to perform specific operations as they are needed. However, in many situations, it's convenient and efficient for a server to notify its client of a condition or event immediately, without forcing the client to inquire about the status. At the appropriate time, the server calls back to a client method, passing information via the method parameters. This is the exact opposite of normal communication, because the server module is now calling the client module. In effect, the client is acting as a server for the purpose of handling these events. In the world of objects, a server which can call such "Event Methods" is said to offer a "Connection Point". A Connection Point can be used with COM objects or internal objects. Further, it may use either a direct interface or the DISPATCH interface. Event methods may take parameters, but may not return a result.

Each server class created by PowerBASIC may offer up to four event interfaces. A client module may subscribe to any or all of these event interfaces. When it's time for the server object to notify the client of an event, the RAISEEVENT statement is used. For the Dispatch interface, OBJECT RAISEEVENT is used instead. RAISEEVENT may only appear within a class which declares the Event Source interface.

The client must initiate a connection to the server with EVENTS FROM statement, and disconnect when done with EVENTS END statement.

A Connection Point may be attached to one Event Method, multiple Event Methods, or no Event Method at all. Whenever a RAISEEVENT statement or OBJECT RAISEEVENT statement is executed, all Event Methods attached to the source object are called, one after another. There is no guarantee of the sequence of the calls, and you must consider the possibility that RAISEEVENT with a ByRef parameter could change the value of a parameter variable before any particular Event Method is executed.

InterfaceName Specifies the "Event Source" Interface name. If *InterfaceName* is DISPATCH, you can reference it with the OBJECT RAISEEVENT statement -- otherwise, regular Method references are used.

See also EVENTS, INTERFACE (Direct), INTERFACE (IDBind), Just what is COM?, METHOD, OBJECT RAISEEVENT, RAISEEVENT, What are Connection Points?

Example

```
' Direct Interface Example
#COMPILE EXE
#DIM ALL
CLASS EvClass AS EVENT
  INTERFACE IStatus AS EVENT
    INHERIT IUNKNOWN
    METHOD Done
      ? "Done!"
    END METHOD
  END INTERFACE
END CLASS

CLASS MyClass
  INTERFACE IMath
    INHERIT IUNKNOWN
    METHOD DoMath
      ? "Calculating..."   ' Do some math calculations here
      RAISEEVENT IStatus.Done()
    END METHOD
  END INTERFACE
  EVENT SOURCE IStatus
END CLASS

FUNCTION PBMAIN()
  LOCAL oMath   AS IMath
  LOCAL oStatus AS IStatus

  oMath   = CLASS "MyClass"
  oStatus = CLASS "EvClass"

  EVENTS FROM oMath CALL oStatus

  oMath.DoMath

  EVENTS END oStatus
END FUNCTION

' Dispatch Interface Example
#COMPILE EXE
#DIM ALL
CLASS EvClass AS EVENT
  INTERFACE IStatus AS EVENT
    INHERIT IDISPATCH
    METHOD Done
      ? "Done!"
    END METHOD
  END INTERFACE
END CLASS

CLASS MyClass
  INTERFACE IMath
    INHERIT IDISPATCH
    METHOD DoMath
      ? "Calculating..."   ' Do some math calculations here
      OBJECT RAISEEVENT IStatus.Done()
    END METHOD
  END INTERFACE
```

```
  EVENT SOURCE DISPATCH
END CLASS

FUNCTION PBMAIN()
  LOCAL oMath   AS IMath
  LOCAL oStatus AS DISPATCH

  oMath   = CLASS "MyClass"
  oStatus = CLASS "EvClass"

  EVENTS FROM oMath CALL oStatus

  oMath.DoMath

  EVENTS END oStatus
END FUNCTION
```

EVENTS statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

EVENTS statement

Purpose Attach or detach an event handler to/from an event source.

Syntax

```
DIM oSource AS InterfaceName
DIM oEvent  AS EventInterface
LET oSource = NEWCOM CLSID $ClassId
LET oEvent  = CLASS "EventClass"
EVENTS FROM oSource CALL oEvent
[statements]
EVENTS END oEvent
```

Remarks In the above source code sample, *oEvent* is an object variable which references an event handler object, and *oSource* is an object variable which references an event source object which generates events.

The EVENTS FROM statement attaches event handler code to an event source object variable. The object variable *oEvent* must be declared as a supported event interface, while *"EventClass"* specifies the class which implements the event handler code. The object variable *oSource* specifies the event source. EVENTS END detaches the event handler from the event source.

Generally speaking, a server object "sources" events, and a client object "handles" events by supplying a METHOD which is called by the server to perform a user-defined notification. This event handler is code in the client object, which is sometimes referred to as an "event sink" (analogous to the electrical engineering terms source/sink).

One or more clients may choose to "subscribe" to events from a server object by executing the EVENTS FROM statement. The subscription is terminated by execution of the EVENTS END statement. When the server executes RAISEEVENT or OBJECT RAISEEVENT, all clients which have unsubscribed to these events are called.

PowerBASIC servers support up to 32 concurrent client subscribers per server object.

Event sources and event handlers may be used within a single module, or through COM services supplied by the Windows operating system.

See also CLASS, EVENT SOURCE, INTERFACE (Direct), INTERFACE (IDBind), Just what is COM?, OBJECT RAISEEVENT, RAISEEVENT, What is an object, anyway?, What are Connection Points?

Example

```
#COMPILE EXE

CLASS EvClass AS EVENT
  INTERFACE EvStatus AS EVENT
    INHERIT IUNKNOWN

    METHOD Done
      MSGBOX "Done!"
    END METHOD
  END INTERFACE
END CLASS

CLASS MyClass
  INTERFACE MyMath
    INHERIT IUNKNOWN

    METHOD DoMath
      MSGBOX "Calculating..."    ' Do some math calculations here
      RAISEEVENT EvStatus.Done()
    END METHOD
  END INTERFACE

  EVENT SOURCE EvStatus
END CLASS

FUNCTION PBMAIN()
  DIM oMath   AS MyMath
  DIM oStatus AS EvStatus

  LET oMath   = CLASS "MyClass"
  LET oStatus = CLASS "EvClass"

  EVENTS FROM oMath CALL oStatus

  oMath.DoMath

  EVENTS END oStatus
END FUNCTION
```

EXE.Inst member

Keyword Template

Purpose

Syntax

Remarks

See also

Example

EXE read-only user defined type IMPROVED

Purpose Return information about the executing program.

Syntax

```
h& = EXE.Inst
f$ = EXE.Extn$
f$ = EXE.Full$
f$ = EXE.Name$
f$ = EXE.Namex$
f$ = EXE.Path$
```

Remarks You can use EXE to retrieve information about the executing program, including the complete path and file name, or just a selected part of it. If the reference is physically located within a DLL, the returned data describes the executable program which loaded it.

EXE.Inst	This returns the instance handle (a DWord) of the program which is currently executing.
EXE.Extn$	This returns the extension (with a leading period) of the program which is currently executing.
EXE.Full$	This returns the complete drive, path, file name, and extension of the program which is currently executing.
EXE.Name$	This returns just the file name of the program which is currently executing.
EXE.Namex$	This returns the file name and the extension of the program which is currently executing.
EXE.Path$	This returns the complete drive and path of the program which is currently executing.

See also COMMAND$, PATHNAME$, PATHSCAN$

EXE.Extn$ member

Keyword Template

Purpose

Syntax

Remarks

See also

Example

EXE read-only user defined type IMPROVED

Purpose Return information about the executing program.

Syntax

```
h& = EXE.Inst
f$ = EXE.Extn$
f$ = EXE.Full$
f$ = EXE.Name$
f$ = EXE.Namex$
f$ = EXE.Path$
```

Remarks You can use EXE to retrieve information about the executing program, including the complete path and file name, or just a selected part of it. If the reference is physically located within a DLL, the returned data describes the executable program which loaded it.

EXE.Inst	This returns the instance handle (a DWord) of the program which is currently executing.

EXE.Extn$	This returns the extension (with a leading period) of the program which is currently executing.
EXE.Full$	This returns the complete drive, path, file name, and extension of the program which is currently executing.
EXE.Name$	This returns just the file name of the program which is currently executing.
EXE.Namex$	This returns the file name and the extension of the program which is currently executing.
EXE.Path$	This returns the complete drive and path of the program which is currently executing.

See also COMMAND$, PATHNAME$, PATHSCAN$

EXE.Full$ member

Keyword Template

Purpose

Syntax

Remarks

See also

Example

EXE read-only user defined type IMPROVED

Purpose Return information about the executing program.

Syntax

```
h& = EXE.Inst
f$ = EXE.Extn$
f$ = EXE.Full$
f$ = EXE.Name$
f$ = EXE.Namex$
f$ = EXE.Path$
```

Remarks You can use EXE to retrieve information about the executing program, including the complete path and file name, or just a selected part of it. If the reference is physically located within a DLL, the returned data describes the executable program which loaded it.

EXE.Inst	This returns the instance handle (a DWord) of the program which is currently executing.
EXE.Extn$	This returns the extension (with a leading period) of the program which is currently executing.
EXE.Full$	This returns the complete drive, path, file name, and extension of the program which is currently executing.
EXE.Name$	This returns just the file name of the program which is currently executing.
EXE.Namex$	This returns the file name and the extension of the program which is currently executing.
EXE.Path$	This returns the complete drive and path of the program which is currently executing.

See also COMMAND$, PATHNAME$, PATHSCAN$

EXE.Name$ member

Keyword Template

Purpose

Syntax

Remarks

See also

Example

EXE read-only user defined type IMPROVED

Purpose Return information about the executing program.

Syntax

```
h& = EXE.Inst
f$ = EXE.Extn$
f$ = EXE.Full$
f$ = EXE.Name$
f$ = EXE.Namex$
f$ = EXE.Path$
```

Remarks You can use EXE to retrieve information about the executing program, including the complete path and file name, or just a selected part of it. If the reference is physically located within a DLL, the returned data describes the executable program which loaded it.

EXE.Inst	This returns the instance handle (a DWord) of the program which is currently executing.
EXE.Extn$	This returns the extension (with a leading period) of the program which is currently executing.
EXE.Full$	This returns the complete drive, path, file name, and extension of the program which is currently executing.
EXE.Name$	This returns just the file name of the program which is currently executing.
EXE.Namex$	This returns the file name and the extension of the program which is currently executing.
EXE.Path$	This returns the complete drive and path of the program which is currently executing.

See also COMMAND$, PATHNAME$, PATHSCAN$

EXE.Namex$ member

Keyword Template

Purpose

Syntax

Remarks

See also

Example

EXE read-only user defined type IMPROVED

Purpose Return information about the executing program.

Syntax

```
h& = EXE.Inst
f$ = EXE.Extn$
```

```
f$ = EXE.Full$
f$ = EXE.Name$
f$ = EXE.Namex$
f$ = EXE.Path$
```

Remarks You can use EXE to retrieve information about the executing program, including the complete path and file name, or just a selected part of it. If the reference is physically located within a DLL, the returned data describes the executable program which loaded it.

EXE.Inst	This returns the instance handle (a DWord) of the program which is currently executing.
EXE.Extn$	This returns the extension (with a leading period) of the program which is currently executing.
EXE.Full$	This returns the complete drive, path, file name, and extension of the program which is currently executing.
EXE.Name$	This returns just the file name of the program which is currently executing.
EXE.Namex$	This returns the file name and the extension of the program which is currently executing.
EXE.Path$	This returns the complete drive and path of the program which is currently executing.

See also COMMAND$, PATHNAME$, PATHSCAN$

EXE.Path$ member

Keyword Template

Purpose

Syntax

Remarks

See also

Example

EXE read-only user defined type IMPROVED

Purpose Return information about the executing program.

Syntax

```
h& = EXE.Inst
f$ = EXE.Extn$
f$ = EXE.Full$
f$ = EXE.Name$
f$ = EXE.Namex$
f$ = EXE.Path$
```

Remarks You can use EXE to retrieve information about the executing program, including the complete path and file name, or just a selected part of it. If the reference is physically located within a DLL, the returned data describes the executable program which loaded it.

EXE.Inst	This returns the instance handle (a DWord) of the program which is currently executing.
EXE.Extn$	This returns the extension (with a leading period) of the program which is currently executing.
EXE.Full$	This returns the complete drive, path, file name, and extension of the program which is currently executing.
EXE.Name$	This returns just the file name of the program which is currently executing.

EXE.Name x$	This returns the file name and the extension of the program which is currently executing.
EXE.Path$	This returns the complete drive and path of the program which is currently executing.

See also COMMAND$, PATHNAME$, PATHSCAN$

EXIT statement

EXIT statement IMPROVED

Purpose Transfer program execution out of a block structure.

Syntax

```
EXIT FASTPROC         ' FastProc / End FastProc
EXIT FOR              ' For / Next Loop
EXIT FUNCTION         ' Function / End Function
EXIT IF               ' If / End If
EXIT DO               ' Do / Loop or While / Wend
EXIT LOOP             ' Do / Loop or While / Wend
EXIT MACRO            ' Macro / End Macro
EXIT METHOD           ' Method / End Method
EXIT PROPERTY         ' Property / End Property
EXIT SELECT           ' Select / End Select
EXIT SUB              ' Sub / End Sub
EXIT TRY              ' Try / End Try
EXIT [,ITERATE]       ' Exit one loop and immediately iterate another
EXIT [,EXIT...]       ' The nearest enclosing block structure
```

Remarks The EXIT statement allows you to leave a code section block immediately. Using EXIT by itself will leave the most recently executed structure, but not an outer block. EXIT, EXIT will leave two block structures, and EXIT, EXIT, EXIT will leave three levels. For example:

```
FOR ix = 1 TO 10
  DO UNTIL x > 10
    EXIT FOR' will exit from the DO LOOP
  LOOP
NEXT
```

EXIT is preferred over GOTO for this purpose. If you want to exit a structure other than the one most recently executed, you may include the type of structure, or you can use multiple EXITs. The following two examples are functionally identical:

```
FOR ix = 1 TO 10
  DO UNTIL x > 10
    EXIT FOR  ' will exit DO and FOR NEXT loop
  LOOP
NEXT

FOR ix = 1 TO 10
  DO UNTIL x > 10
    EXIT, EXIT  ' will exit DO and FOR NEXT loop
  LOOP
NEXT
```

You can also exit one loop and immediately iterate another:

```
FOR x = 1 TO 10
  DO
    EXIT, ITERATE
  LOOP
NEXT
```

See also DO/LOOP, FASTPROC, FOR EACH/NEXT, FOR/NEXT, FUNCTION/END FUNCTION, IF/END IF block, ITERATE, MACRO/END MACRO, METHOD, PROPERTY, SELECT,

SUB/END SUB, TRY/END TRY, WHILE/WEND

EXP function

EXP, EXP2 and EXP10 functions

Purpose Return a base number raised to a power. The base is *e* for EXP, 2 for EXP2, and 10 for EXP10.

Syntax

```
y = EXP(n)
y = EXP2(n)
y = EXP10(n)
```

Remarks EXP returns *e* to the *n*th power, where *n* is a numeric variable or expression and *e* is the base for natural logarithms, approximately 2.718282. Among other uses, this provides a simple way to obtain the value of *e* itself:

```
e = EXP(1)
```

EXP2(*n*) returns 2 to the *n*th power, where *n* is a numeric variable or expression.

EXP10(*n*) returns 10 to the *n*th power, where *n* is a numeric variable or expression.

The EXP functions provide a convenient alternative to the ^ operator, which works with any base. The EXP functions return results in Extended-precision.

See also LOG, LOG2, LOG10, SQR, Arithmetic Operators

EXP2 function

EXP, EXP2 and EXP10 functions

Purpose Return a base number raised to a power. The base is *e* for EXP, 2 for EXP2, and 10 for EXP10.

Syntax

```
y = EXP(n)
y = EXP2(n)
y = EXP10(n)
```

Remarks EXP returns *e* to the *n*th power, where *n* is a numeric variable or expression and *e* is the base for natural logarithms, approximately 2.718282. Among other uses, this provides a simple way to obtain the value of *e* itself:

```
e = EXP(1)
```

EXP2(*n*) returns 2 to the *n*th power, where *n* is a numeric variable or expression.

EXP10(*n*) returns 10 to the *n*th power, where *n* is a numeric variable or expression.

The EXP functions provide a convenient alternative to the ^ operator, which works with any base. The EXP functions return results in Extended-precision.

See also LOG, LOG2, LOG10, SQR, Arithmetic Operators

EXP10 function

EXP, EXP2 and EXP10 functions

Purpose Return a base number raised to a power. The base is *e* for EXP, 2 for EXP2, and 10 for EXP10.

Syntax

```
y = EXP(n)
y = EXP2(n)
y = EXP10(n)
```

Remarks EXP returns *e* to the *n*th power, where *n* is a numeric variable or expression and *e* is the base for natural logarithms, approximately 2.718282. Among other uses, this provides a simple way to obtain the value of *e* itself:

```
e = EXP(1)
```

EXP2(*n*) returns 2 to the *n*th power, where *n* is a numeric variable or expression.

EXP10(*n*) returns 10 to the *n*th power, where *n* is a numeric variable or expression.

The EXP functions provide a convenient alternative to the ^ operator, which works with any base. The EXP functions return results in Extended-precision.

See also LOG, LOG2, LOG10, SQR, Arithmetic Operators

EXTRACT$ function

EXTRACT$ function

Purpose Extract characters from a

up to a character or group of characters.

Syntax `x$ = EXTRACT$([start,] MainStr, [ANY] MatchStr)`

Remarks EXTRACT$ returns a sub-string of *MainStr*, starting with its first character (or the character specified by *start*) and up to (but not including) the first occurrence of *MatchStr*. If *MatchStr* is not present in *MainStr*, or either string parameter is nul, all of *MainStr* is returned.

start is the optional starting position to begin extracting. If *start* is not specified, it will start at position 1. If *start* is zero, or beyond the length of *MainStr*, a nul string is returned. If *start* is negative, the starting position is counted from right to left: if -1, the search begins at the last character; if -2, the second to last, and so forth.

MainStr is the string expression from which to extract. *MatchStr* is the string expression to extract up to. EXTRACT$ is case-sensitive.

If the ANY keyword is included, *MatchStr* specifies a list of single characters to be searched for individually, a match on any one of which will cause the extract operation to be performed up to that character.

EXTRACT$ is especially useful when parsing a string containing arguments to a program, or when manipulating nul-terminated or delimited strings received from a routine written in another language.

The complementary function to EXTRACT$ is REMAIN$, which returns the part of the string that EXTRACT$ leaves behind. A similar function to EXTRACT$ is PARSE$, which extracts delimited substrings from a string.

See also CLIP$, INSTR, JOIN$, LEFT$, LTRIM$, MID$, PARSE, PARSE$, PARSECOUNT, REMAIN$, REMOVE$, RETAIN$, RIGHT$, RTRIM$, TALLY, TRIM$, UNWRAP$, VERIFY

Example

```
' x$ = first command-line argument, assuming spaces,
' commas, periods, and tabs are valid delimiters
x$ = EXTRACT$(COMMAND$, ANY " ,."+CHR$(9))

' the following line returns "aba" (match on "cad")
x$ = EXTRACT$("abacadabra","cad")

' the following line returns nothing (match on first character "a")
x$ = EXTRACT$("abacadabra", ANY "cad")
```

FASTPROC/END FASTPROC statements

Keyword Template

Purpose

Syntax

Remarks

See also

Example

FASTPROC/END FASTPROC statements New!

Purpose Define a FastProc code section.

Syntax

```
FASTPROC ProcName [([arguments])] [THREADSAFE] [AS LONG]
  [statements...]
END FASTPROC [= ReturnValue]
```

Remarks A Fast Procedure (FASTPROC) is a highly simplified form of SUB or FUNCTION which executes much faster than its fully-featured counterparts. It allows a maximum of two LONG arguments, and may optionally return a LONG result. The arguments are always processed as register variables for maximum execution speed. No stack frame is ever created, so there are other limitations detailed below. The programmer may then decide when it is appropriate to accept these trade-offs in exchange for maximum efficiency.

All executable code must reside in a Sub, Function, Method, FastProc, or Property block. You cannot define a procedure inside another procedure. A FASTPROC is a subroutine-like block of statements which is invoked with the CALL statement. A FASTPROC may also be invoked without the word CALL, which is then implied. If the CALL word is omitted, the parentheses around the argument list must also be omitted.

ProcName must be unique: no variable, Function, Sub, Method, FastProc, Property or label can share the same name.

THREADSAFE If you include the option THREADSAFE, PowerBASIC automatically establishes a semaphore which allows only one thread to execute it at a time. Others must wait until the first thread exits the THREADSAFE procedure before they are allowed to begin.

Restrictions Most of the restrictions of a FASTPROC stem from the fact that no stack frame is created.

- A maximum of two parameters are allowed, and they must be defined as BYVAL LONG integers. An optional return value, if used, must be defined as LONG integer.
- LOCAL variables are not available because there is no stack frame. This includes Register variables, which are by definition, Local variables. Instead, one or two parameters are automatically given status as Register Variables. By default, all new variables are assigned STATIC scope.
- ON ERROR GOTO, RESUME, and TRY blocks are not available. You should explicitly test for errors with IF ERR THEN...
- DATA and READ$ are not available.
- FUNCNAME$ is not available.
- COMMON, IMPORT, and EXPORT options are not available.

See also DECLARE, EXIT, FUNCNAME$, GLOBAL, INSTANCE, ISMISSING, LOCAL, METHOD, PROPERTY, STATIC, SUB, THREAD CREATE, THREADID, THREASAFE

FIELD statement

FIELD statement

Purpose Bind a field string variable to a random file buffer or a dynamic string variable.

Syntax

```
FIELD # filenum, nSize AS fieldvar, [FROM] nStart TO nEnd AS fieldvar
[, ...]
FIELD DynamicStr, nSize AS fieldvar, [FROM] nStart TO nEnd AS fieldvar
[, ...]
FIELD RESET fieldvar [, ...]
FIELD STRING fieldvar [, ...]
```

Remarks A field variable is a special form of

variable which may be used just like a standard dynamic string variable, or it may be declared to reference a particular sub-section of a random file buffer or a dynamic string variable. Because of the added capabilities, it requires 12 bytes more storage space (16 vs 4) than a standard string variable. A field variable may not be used as a member of a User-Defined TYPE or UNION.

By default, a field variable mimics a dynamic string variable, and may be considered a virtual replacement. Then, at any time, the FIELD statement can be used to declare that the field variable now refers to a specific portion of a random file buffer or a dynamic string. FIELD RESET is used to change it back to a nul (zero-length) dynamic string. FIELD STRING also changes it back to a dynamic string, but first assigns the current sub-section data to it. This last action is particularly useful in the case where the sub-section data might be lost when the bound random file is closed.

In the first form, FIELD binds a field string variable to a specific sub-section of a random-access file buffer. In the second form, FIELD binds a field string variable to a specific sub-section of a dynamic string variable .If the sub-section extends beyond the actual size of the file buffer or string, that portion of the FIELD is empty. Otherwise, it represents a fixed size string, and may be referenced as any other string variable.

When used with a file:

A random-access file buffer is automatically created for use when GET or PUT are used without a target variable. In this case, the file data is read or written using this buffer, which is accessed with one or many field variables.

If a field is defined by a single field (size) parameter, it represents the length of the field in characters, with the start position implied by the preceding field within the statement. If two parameters are used, they represent the start (*nStart*) and end (*nEnd*) positions in characters, indexed to one.

If a string value shorter than the declared size is assigned to a field string, it is padded with blank spaces as it is placed into the file buffer. There is no requirement to use LSET for assignment.

Finally, it should be noted that FIELD statements are tied to an open file, i.e. they are valid only as long as the file is open. Once the file is closed, any field strings that had been defined for the file will return nul (empty), not a string of the previously specified length.

```
LOCAL sFirst AS FIELD, sSecond AS FIELD
OPEN "ABC.TXT" FOR RANDOM AS #1 LEN=20
FIELD #1, 10 AS sFirst, 10 AS sSecond
sFirst  = "0123456789"
sSecond = "9876543210"
Put #1  ' creates a record of: 01234567899876543210
```

When used with a dynamic string:

A field variable bound to a dynamic string works very much like a pointer, so the programmer must use care in field variable selection. For example, if you bind a GLOBAL FIELD variable to a LOCAL string variable, then attempt to reference the global string after the local is destroyed (i.e., released when the owning Sub/Function/Method/Property exits), a fatal exception error (GPF) is likely to occur. The same could happen after an array has been erased, or a REDIM is used to change the memory allocation.

To avoid problems with scope, it is suggested that field variables be bound only with strings within the same scope (LOCAL, GLOBAL, etc.).

```
LOCAL x$, sFirst AS FIELD, sSecond AS FIELD
FIELD x$, 3 AS sFirst, 3 AS sSecond
x$ = SPACE$(6)  ' Allocate the space for the field
SFirst = "111"
sSecond = "222"
? x$            ' Displays 111222
x$ = "abcd"
? sFirst        ' Displays abc
? sSecond       ' Displays d
```

Restrictions Field string variables must be explicitly declared using DIM, INSTANCE, LOCAL, STATIC, GLOBAL, or THREADED. Attempting to bind a variable other than a declared field variable results in a compile-time Error 544 ("Field variable expected"). Field strings cannot be used in UDT or UNION structures. Attempting to do so results in a compile-time Error 485 ("Dynamic/Field strings not allowed").

See also Field Strings, GET, PUT, TYPE/END TYPE, User-Defined Types, Unions, UNION/END UNION

FILEATTR function

FILEATTR function

Purpose Return information about an open file.

Syntax ***lResult&*** **= FILEATTR([#]** ***filenum&, fattr*****)**

Remarks *filenum&* is the handle of a currently open file. *fattr* is an integer between -3 and 3 that specifies the type of information required, according to the following table:

fattr	Definition
-3	The device type. Returns 1 for a file, 2 for a device. COMM, TCP and UDP are classified as devices.
-2	Logical first byte (base) position of a disk file. By default, PowerBASIC opens files with a default first location of 1, but this can be overridden via the BASE= clause of the OPEN statement. This function can be useful when the base is not known or when performing SEEK operations.
-1	The minimum amount of data that can be read or written at one time. For RANDOM files, it is the record length. For INPUT files, it is the input buffer length (set with LEN= in the OPEN statement). For BINARY, OUTPUT and APPEND, there is no buffering, so it always returns 1 (1 byte).
0	The open state. TRUE (non-zero) if open, FALSE (zero) if closed.
1	The file mode (which may be a combination of the following):

result&	File mode
1	Input
2	Output
4	Random
8	Append
16	Serial Communications (COMM)
32	Binary
64	TCP Winsock

128 UDP Winsock

(for example, an APPEND file will return 8 + 2 = 10).

2 The operating system file handle for the file. This handle can be used with particular Windows API calls files to manipulate files opened with PowerBASIC, and with the OPEN HANDLE statement.

3 Enumerates existing file numbers. This mode enumerates existing file numbers, in the range of 1 to 32767. FILEATTR(1,3) returns the first located file number, FILEATTR(2,3) the second, and so on until -1 is returned to indicate that there are no more file numbers active. The file numbers returned are not guaranteed to be returned in any particular sequence, nor be open. You can use FILEATTR(#filenum,0) to determine whether a given file number is open or closed.

The number symbol [#] is optional, but recommended for clarity.

See also COMM OPEN, EOF, FILENAME$, GETATTR, LOF, OPEN, SEEK function, SEEK statement, SETATTR, TCP OPEN, UDP OPEN

Example

```
OPEN "TEST.DOC" FOR OUTPUT AS #1 LEN = 28
x& = FILEATTR(#1,1)
Result  x& = 2
```

FILECOPY statement

FILECOPY statement

Purpose Copy a file.

Syntax **FILECOPY *sourcefile, destfile***

Remarks Copy the file *sourcefile* to the file *destfile*. Both *sourcefile* and *destfile* must be filenames, not merely drives or directories (although it's OK to include drive and directory specifications along with the filenames). Wildcards are not supported. If you attempt to copy a file that is read locked (preventing read access), a run-time Error 70 will occur ("Permission denied").

If the destination file already exists, it will be overwritten. If it is not possible to overwrite the existing destination file (for example, it is marked as read-only or in use by another program), the result will be a run-time Error 70 ("Permission denied").

The attributes of the source file are inherited by the destination file, with the exception of the Archive attribute, which is always set ON for the destination file. File attributes may be examined or modified with the GETATTR and SETATTR statements.

See also FILEATTR, GETATTR, SETATTR

Example

```
FILECOPY "C:\AUTOEXEC.BAT", "C:\AUTOEXEC.BAK"
```

FILENAME$ function

FILENAME$ function

Purpose Return the file-system name of an open file.

Syntax ***a$* = FILENAME$(*filenum&*)**

Remarks *a$* receives the name of the open file identified by the file number *filenum&*. This function is not valid with a file opened using OPEN HANDLE, COMM OPEN, TCP OPEN, or UDP OPEN.

See also CLOSE, FILEATTR, FREEFILE, GETATTR, OPEN, SETATTR

Example

```
OPEN "MYFILE.TXT" FOR INPUT AS #1
a$ = FILENAME$(1)
CLOSE #1
```

FILESCAN statement

FILESCAN statement

Purpose Rapidly scan a file opened for INPUT or BINARY mode, in order to obtain size information about variable length string data.

Syntax **FILESCAN [#]** ***fnum&*****, RECORDS TO** ***y&*** **[, WIDTH TO** ***x&*****]**

Remarks FILESCAN assigns a count of the lines/records/strings to *y&*, and if the WIDTH clause is specified, the length of the longest string to *x&*.

In INPUT mode, it is assumed the data is standard text, with lines delimited by a CR/LF ($CRLF) pair. FILESCAN stops reading the file if it encounters an "end of file" (EOF) marker byte (CHR$(26) or $EOF). Text that occurs after the last CR/LF but before the EOF is considered the last record of the file. Use the LINE INPUT# statement to read a complete text file into an array.

In BINARY mode, it is assumed the file was written in the PowerBASIC and/or VB packed string format using PUT of an entire string array. If a string is shorter than 65535 bytes, a 2-byte length WORD is followed by the string data. If a string is equal to or longer than 65535 bytes, a 2-byte value of 65535 is followed by a length DWORD value, then finally the string data.

Use the GET statement to read a complete binary file into an array.

Restrictions If FILESCAN is applied to other file formats, the results are undefined.

See also GET, GET$, GET$$, LINE INPUT#, PUT, PUT$, PUT$$

Example

```
OPEN "datafile.dat" FOR INPUT AS #1
FILESCAN #1, RECORDS TO count&
DIM TheData(1 TO count&) AS STRING
LINE INPUT #1, TheData() TO count&
CLOSE #1
```

Result The entire text file comprising *y&* lines is read into the string array.

FIX function

FIX function

Purpose Truncate a

number to an .

Syntax ***y*** **= FIX(*****numeric_expression*****)**

Remarks FIX strips off the fractional part of its argument, and returns the integer part. Unlike CINT and INT, FIX does not perform any form of rounding or scaling.

See also CEIL, CINT, INT, FRAC, ROUND

Example

```
x$ = "The integer part of 50.67 is" + STR$(FIX(50.67))
y$ = STR$(FIX(-1.1)) & ", " & STR$(INT(-1.1)) & ", " & STR$(CINT(-1.1))
Output  The integer part of 50.67 is 50
-1, -2, -1
```

FLUSH statement

FLUSH statement

Purpose Flush file buffers to disk, to ensure that the disk information is up-to-date.

Syntax `FLUSH [[#] filenum& [, [#] filenum&] ...]`

Remarks FLUSH ensures that all data you have written to disk files has actually been written to disk. The CLOSE statement also flushes the buffers, but FLUSH has the advantage of leaving the files open.

filenum& The file number of an OPEN file. If *filenum&* is specified, only the data for that file is flushed. Otherwise, data for all open files is flushed. The Number (#) symbol is optional, but recommended for the purposes of clarity.

See also CLOSE, OPEN

FONT END statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

FONT END statement

Purpose Destroy a font when it is no longer needed.

Syntax `FONT END fonthndl&`

fonthndl& Handle of the font to be destroyed.

Remarks When you have no further need for a font originally created with FONT NEW, you can destroy it and reclaim the memory space which was originally allocated for it.

If the specified font is still in use by a

, a Graphic Control, a Graphic Window, or an XPrint page, an error 5 (Illegal Function Call) will be generated. To avoid this error, you may restore the original default font with CONTROL/GRAPHIC/XPRINT SET FONT using a handle number of zero (0).

When your program ends, any existing fonts are automatically destroyed by PowerBASIC.

See also CONTROL SET FONT, FONT NEW, GRAPHIC PRINT, GRAPHIC SET FONT, XPRINT, XPRINT SET FONT

FONT NEW statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

FONT NEW statement IMPROVED

Purpose

Create a new font for use with
, GRAPHIC PRINT, XPRINT, etc.

Syntax

`FONT NEW fontname$ [,points!, style&, charset&, pitch&, escapement&] TO fhndl`

fontname$

Name of the font.

points!

Size of the font, in points. This may be specified as a
value for fractional point sizes.

style&

Font style attribute. Any of the following values can be combined or used alone:

0	Normal	4	Underline
1	Bold	8	Strikeout
2	Italic	16	Leading

Some fonts specify "external leading" in their definition. In some cases, it only applies to certain point sizes of a font. External Leading specifies that one or more blank pixels are added to the bottom of each character when displayed. This has an impact on character position and should be considered when creating a font. Normally, the font is created without regard to external leading. That is, it's created so that the visible character face fills the requested point size. However, if the Leading Option is used, the font will be created so that the visible character face plus the external leading (if any) fills the point size. In these cases, the character may appear slightly smaller.

charset&

CharSet identifier.

0	ANSI CharSet	162	Turkish CharSet
1	Default CharSet	177	Hebrew CharSet
2	Symbol CharSet	178	Arabic CharSet
77	Mac CharSet	186	Baltic CharSet
128	Shiftjis CharSet	204	Russian CharSet
129	Hangeul CharSet	222	Thai CharSet
130	Johab CharSet	238	East Europe CharSet
136	Chinese CharSet	255	OEM CharSet
161	Greek CharSet		

pitch&

Pitch and Font Family attribute. One of each group of values can be combined or used alone:

0	Default	32	Swiss font (Helvetica, Swiss...)
1	Fixed width font	48	Modern font (Pica, Courier...)
2	Variable width font	64	Script font (Cursive...)
16	Roman font (Times Roman...)	80	Decorative (OldEnglish...)

escapement&

Specifies the angle, in tenths of degrees, between the character base line and the x axis. Allows printing of text on an angle.

fhndl

Upon successful creation of a new font, a unique PowerBASIC handle is assigned to this

Long Integer or DWord variable. This handle is used with other statements and functions to specify the created font. If the font creation fails, the value zero (0) is assigned to *fhndl*.

Remarks This is the preferred method of creating and specifying fonts in PowerBASIC. Using FONT NEW, you can create a group of fonts, in advance, and switch between them easily using CONTROL SET FONT, GRAPHIC SET FONT, and XPRINT SET FONT.

If the requested font is not available on the computer, Windows will search for a substitute font, which is similar to the attributes specified (CharSet, Font Family, etc.).

You may use the value zero (0) for any of the numeric parameters to designate that the compiler should use the default for that item. If parameters are missing, the compiler substitutes the default value for all remaining parameters.

See also CONTROL SET FONT, FONT END, GRAPHIC PRINT, GRAPHIC SET FONT, XPRINT, XPRINT SET FONT

FOR EACH/NEXT statements

Keyword Template

Purpose

Syntax

Remarks

See also

Example

FOR EACH/NEXT statements New!

Purpose Define a loop of program statements which can sequentially examine and act upon each member of a PowerCollection or LinkListCollection.

Syntax

```
FOR EACH VariantVar IN CollectionObjectVar
  [statements]
NEXT
```

VariantVar A simple scalar variant variable (Local, Static, Global) which receives successive collection items at the beginning of each loop iteration.

CollectionObjectVar A simple scalar object variable which contains a PowerCollection or a LinkListCollection.

Remarks The FOR EACH loop allows you to examine each member of a collection in sequence, to perform needed operations with that data. If there are no member items in the collection, the loop is skipped.

When the loop begins, the first member variant in the collection is assigned to the *VariantVar*. Statements in the loop can act upon or with that data to perform whatever functions are needed. When the NEXT statement is reached, the next member item is assigned to the *VariantVar*, and the loop is repeated. This repetition continues until there are no more member items.

VariantVar contains a copy of the variant in the collection. You can alter the value of *VariantVar*, but these changes do not affect the member variant in the collection.

See also EXIT FOR, FOR/NEXT, ITERATE FOR, LINKLISTCOLLECTION, POWERCOLLECTION

FOR/NEXT statements

FOR/NEXT statements

Purpose Define a loop of program statements whose execution is controlled by an automatically incrementing or decrementing counter.

Syntax

```
FOR Counter = start TO stop [STEP increment]
  [statements]
  [EXIT FOR]
  [statements]
  [ITERATE FOR]
  [statements]
NEXT [Counter]
```

Remarks *Counter* is a numeric variable serving as the loop counter.

start is a numeric expression specifying the value initially assigned to *Counter*.

stop is a numeric expression giving the value that *Counter* must reach for the loop to be terminated.

increment is an optional numeric expression defining the amount by which *Counter* is incremented with each loop execution. If not specified, *increment* defaults to 1.

Note that *increment* must be the same data type or in the same range as *Counter*. For example:

```
FOR x?? = 50 TO 1 STEP -1
```

will fail because -1 is not within the range of an unsigned Word variable.

When a FOR statement is encountered, *start* is assigned to *Counter,* and *Counter* is tested to see if it is greater than (or, for negative *increment*, less than) *stop*. If not, the statements within the FOR/NEXT loop are executed, *increment* is added to *Counter*, and *Counter* again tested against *stop*. The statements in the loop are executed repeatedly until the test fails, at which time control passes to the statement immediately following the NEXT.

If *increment* is equal to the maximum value of a variable class (255 for a byte, 32767 for an Integer, 65535 for a Word, etc), the compiler will generate an error. If *step* is zero, an infinite loop can be created.

When using

values with FOR/NEXT, be sure to allow for round-off errors when mixing numbers of different precision. Using constants or variables of the same type throughout will help solve this problem:

```
FOR n# = 1.0 TO 1.5 STEP 0.1
  x$ = STR$(n#)
NEXT n#
```

executes 5 times and returns:

```
1
1.10000000149012
1.20000000298023
1.30000000447035
1.40000000596046
```

while:

```
FOR n@ = 1.0@ TO 1.5@ STEP 0.1@
  x$ = STR$(n@)
NEXT n@
```

executes 6 times and returns:

```
1
1.1
1.2
1.3
```

```
1.4
1.5
```

FOR/NEXT loops run fastest when *Counter* is a Long-integer variable, and *start* and *increment* are Long-integer constants. The value of *Counter* is available like any other variable within the loop. It is wise to avoid explicitly modifying the value of *Counter* within the loop. If you need to exit the loop prematurely, use an EXIT FOR statement. Keep range considerations in mind. For example, if *Counter* is an Integer variable, you may not use the maximum value for an Integer for *stop*, as *Counter* would be incremented outside the Integer range at the end of the loop.

The body of the loop is skipped altogether if the initial value of *Counter* is greater than *stop* (or, for a negative *increment*, if *Counter* is less than *stop*).

FOR/NEXT loops can be nested within other FOR/NEXT loops. Be sure to use unique counter variables. Note that PowerBASIC allows the *Counter* in the NEXT keyword simply as a comment, which is ignored. For example, the following will compile, even though the counter variables are "crossed":

```
FOR n = 1 TO 10
  FOR m = 1 TO 20
    .
    .
    .
  NEXT n
NEXT m
```

You can omit the counter variable in the NEXT statement altogether. For example:

```
FOR n = 1 TO 10
  .
  .
  .
NEXT
```

If a NEXT is encountered without a corresponding FOR (or vice versa), a compile-time error is generated.

> **Previous version of PowerBASIC supported a single NEXT statement used with multiple nested FOR/NEXT loops, such as NEXT c, b, a. This is no longer supported and you will need to update your code to use multiple NEXT statements.**

In certain situations, previous versions of PowerBASIC optimized FOR/NEXT loops to count down instead of up for improved execution speed. This optimization could cause the counter variable to contain a value which was not expected when execution of the loop was complete. This optimization has been improved so that the counter variable value is always correct upon loop completion, even if EXIT FOR was used to force an early termination.

Although the compiler does not care about such things, it is considered good programming practice to indent the statements between FOR and NEXT by two or three spaces to set off the structure of the loop.

For additional performance, use a REGISTER variable for the loop counter variable.

Restrictions The counter variable must be a simple numeric scalar variable, such as LOCAL, STATIC, GLOBAL, or REGISTER. This aids in maintaining high performance levels for a simple loop structure. Variables which require multiple operations to access are specifically disallowed: THREADED, INSTANCE,

Parameters, POINTER Targets, and ARRAY.

See also #OPTIMIZE, #REGISTER, DO/LOOP, EXIT, FOR EACH/NEXT, ITERATE, WHILE/WEND, REGISTER

FORMAT$ function

FORMAT$ function

Purpose Format data according to instructions contained in a format expression.

Syntax `x$ = FORMAT$(num_expression [, [digits& | fmt$]])`

Remarks FORMAT$ has the following parts:

num_expression The numeric expression, variable, or literal value to be formatted. This argument is converted to full (Extended) precision before formatting commences.

digits& The maximum number of significant digits, in the range of 1 to 18. If not included, PowerBASIC supplies a default value of 7 for single precision values, or 16 for more precise values. This form of the function is very similar to the STR$() function, except that it never supplies any leading or trailing spaces. Use care that *digits&* is large enough to contain the whole part of a number, or scientific notation must be used to estimate it. For example, FORMAT$(123.456, 2) returns the "1.2E+2", while FORMAT$(123.456, 5) returns the string "123.45".

fmt$ Format characters that will determine how the numeric expression should be formatted. This expression is termed the *mask*. There may be up to 18 digit-formatting digits on either side of the decimal point. The mask may not contain literal characters unless each character is preceded with a backslash (\) escape character, or the literal characters are enclosed in quotes.

fmt$ may contain one, two or three formatting masks, separated by semicolon (;) characters:

One mask If *fmt$* contains just one format mask, the mask is used to format all possible values of *num_expression*. For example:

```
x$ = FORMAT$(z!, "000.00")
```

Two masks If *fmt$* contains two format masks, the first mask is used for positive values (=> 0), and the second mask is used for negative values (< 0). For example:

```
x$ = FORMAT$(-100, "+00000.00;-000")
```

Three masks If *fmt$* contains three masks, the first mask is used for positive values (> 0), the second mask for negative values (< 0), and the third mask is used if *num_expression* is zero (0). For example:

```
FOR y! = -0.5! TO 0.5! STEP 0.5!
  x$ = FORMAT$(y!, "+.0;-.0; .0")
NEXT y!
```

Digit placeholders in a mask do not have to be contiguous. This allows you to format a single number into multiple displayed parts. For example:

```
A$ = FORMAT$(123456, "00\:00\:00")    ' 12:34:56
```

The following table shows the characters you can use to create the user-defined format strings (masks) and the definition of each formatting character:

Character	Definition

Empty string	[null string] No formatting takes place. The number is converted to Extended-precision and formatted similarly to STR$, but without the leading space that STR$ applies to non-negative numbers.
	`A$=FORMAT$(0.2)                ' .200000002980232`
	`A$=FORMAT$(0.2!, "")           ' .200000002980232`
	`A$=FORMAT$(0.2#)               ' .2`
	`A$=FORMAT$(0.2#, "")           ' .2`

0	**[zero]** Digit placeholder. PowerBASIC will insert a digit or 0 in that position. If there is a digit in *num_expression* in the position where the 0 appears in

the format string, return that digit. Otherwise, return "0". If the number being formatted has fewer digits than there are zeros (on either side of the decimal point) in the format expression, leading or trailing zeros are added. If the number has more digits to the right of the decimal point than there are zeros to the right of the decimal point in the format expression, the number is rounded to as many decimal places as there are zeros in the mask.

If the number has more digits to the left of the decimal point than there are zeros to the left of the decimal point in the format expression, the extra digits are displayed without truncation. If the numeric value is negative, the negation symbol will be treated as a decimal digit. Therefore, care should be exercised when displaying negative values with this placeholder style. In such cases, it is recommended that multiple masks be used.

```
' Numeric padded with leading zero characters
A$ = FORMAT$(999%, "00000000")    ' 00000999
```

\# [Number symbol] Digit placeholder. If there is a digit for this position, PowerBASIC replaces this placeholder with a digit, nothing, or a user-specified character.

Unlike the 0 digit placeholder, if the numeric value has the fewer digits than there are # characters on either side of the decimal placeholder, PowerBASIC will either:

a) Omit this character position from the final formatted string; or

Substitute a user-specified replacement character if one has been defined (see the asterisk (*) character for more information). To specify leading spaces, prefix the mask with "* " (asterisk and a space character).

For example:

```
' No leading spaces and trailing spaces
A$ = FORMAT$(0.75!, "####.###")   ' 0.75
' Up to 3 Leading spaces before decimal
A$ = FORMAT$(0.75!, "* ##.###")   '    0.75
' Using asterisks for padding characters
A$ = FORMAT$(0.75!, "*=##.###")   ' ===0.75=
```

FORMAT$ may also return a string that is larger than the number of characters in the mask:

```
A$ = FORMAT$(999999.9, "#.#")     ' 999999.9
```

. **[period]** Decimal placeholder. Determines the position of the decimal point in the resultant formatted string.

If any numeric field is specified to the left of the decimal point, at least one digit will always result, even if only a zero. The zero is not considered to be a "leading" zero if it is the only digit to the left of the decimal. Placing more than one period character in the *fmt$* string will produce undefined results.

% [percent] Percentage placeholder. PowerBASIC multiplies *num_expression* by 100, and adds a trailing percent symbol. For example:

```
x$ = FORMAT$(1 / 5!, "0.0%")    ' 20.0%
```

, [comma] Thousand separator. Used to separate thousands from hundreds within a number that has four or more digits to the left of the decimal point. In order to be recognized as a format character, the comma must be placed immediately after a digit placeholder character (also see Restrictions below).

```
A$ = FORMAT$(1234567@, "#,")         ' 1,234,567
A$ = FORMAT$(12345@, "#,.00")        ' 12,345.00
A$ = FORMAT$(12345@, "#.00,")        ' 12,345.00
A$ = FORMAT$(1212.46, "$00,000.00") ' $01,212.46
A$ = FORMAT$(1000%, """#""#,")       ' #1,000
```

```
A$ = FORMAT$(1234567@, "0,")          ' 1,234,567
```

**x* [asterisk] Digit placeholder and fill-character. Instructs PowerBASIC to insert a digit or character "*x*" in that position. If there is a digit in *num_expression* at the position where the * appears in the format string, that digit is used; otherwise, the "*x*" character is used (where "*x*" represents your own choice of character). The **x* specifier acts as two digit (#) fields.

```
A$ = FORMAT$(9999.9@,"$**####,.00")' $**9,999.90
A$ = FORMAT$(0@,"$*=###0,.00#")    ' $=====0.00=
A$ = FORMAT$(0@,"$* ####0,.00")    ' $      0.00
```

E- e- E+ e+ [e] Scientific format. PowerBASIC will use scientific notation in the formatted output. Use E- or e- to place a minus sign in front of negative exponents. Use E+ or e+ to place a minus sign in front of negative exponents and a plus sign in front of non-negative exponents.

In order to be recognized as a format sequence, the E-, e-, E+, or e+ must be placed between two digit placeholder characters. For example:

```
A$ = FORMAT$( 99.999, "0.0E-##")      ' 1.0E2
A$ = FORMAT$(-99.999, "0.0E-##")      ' -1.0E2
A$ = FORMAT$( 99.999, "0.0E+##")      ' 1.0E+2
A$ = FORMAT$(-99.999, "0.0E+##")      ' -1.0E+2
A$ = FORMAT$(0.1!, "0.0e+##")         ' 1.0e-1
```

" [double-quote] Quoted string. PowerBASIC treats all characters up to the next quotation mark as-is, without interpreting them as digit placeholders or format characters. Also see backslash. For example:

```
A$ = FORMAT$(12, $DQ+"##"+$DQ+"##")  ' ##12
A$ = FORMAT$(5.55, """XYZ=""#.##\#") ' XYZ=5.55#
A$ = FORMAT$(25, """x=""#")          ' x=25
A$ = FORMAT$(999, """Total ""#")     ' Total 999
A$ = FORMAT$(5, $DQ+"x="+$DQ+"#")    ' x=5
```

\x [backslash] Escaped character prefix. PowerBASIC treats the character "*x*" immediately following the backslash (\) as a literal character rather than a digit placeholder or a formatting character. Many characters in a mask have a special meaning and cannot be used as literal characters unless they are preceded by a backslash.

The backslash itself is not copied. To display a backslash, use two backslashes (\\). To display a literal double-quote, use two double-quote characters.

To simplify the mask string for common numeric formats, FORMAT$ permits the dollar symbol, the left and right parenthesis symbols, the plus and minus symbols, and the space character ("$()+- ") to pass through from the mask string into the formatted output string, without requiring an escape (\) prefix character.

```
A$ = FORMAT$(23, "(* 0\%)")         ' ( 23%)
A$ = FORMAT$(99999, "#\#")          ' 99999#
A$ = FORMAT$(5, "\"+$DQ+$DQ+"x="+$DQ+ _
                "#\"+$DQ)           ' "x=5"
A$ = FORMAT$(5, "\""""x=""#\""")    ' "x=5"
A$ = FORMAT$(1000%, """#####,""")   ' "#####,"
```

Restrictions You cannot pass a string expression or string variable in *num_expression*. Do not place more than one decimal point in the mask.

FORMAT$ can return the maximum possible number of digits (up to 4932 for Extended-precision); however, the resulting digits will be meaningless beyond the actual precision of *num_expression*. Consequently, the value of *num_expression* may produce formatted strings that are wider than the length of *fmt$,* for example:

```
A$ = FORMAT$(3e30!, "#,###") ' returns 41 characters
```

Rounding, if necessary, is implemented by the "banker's rounding" principle: if the fractional digit being rounded off is exactly five, with no trailing digits, the number is rounded to the nearest even number. This provides better results, on average, and follows the IEEE standard. For example:

```
A$ = FORMAT$(0.5##, "0")              ' 0
A$ = FORMAT$(1.5##, "0")              ' 2
A$ = FORMAT$(2.5##, "0")              ' 2
A$ = FORMAT$(2.51##, "0")             ' 3
```

Semicolon characters, being mask delimiters, should not be used for other purposes in mask strings unless prefixed with an escaped character symbol (\).

FORMAT$, when used with some formatting characters such as the thousands separator (comma), may not produce a "right-justified" formatted string. The simple solution is to apply separate justification with the RSET statement or the RSET$ function. For example:

```
A$ = SPACE$(12)
RSET A$ = FORMAT$(1,"#,###.00")       '         1.00
RSET A$ = FORMAT$(1000, "#,.00")      '     1,000.00
RSET A$ = FORMAT$(1000000,"#,###.00")' 1,000,000.00
B$ = RSET$(FORMAT$(1e6, "#,"),10)     ' " 1,000,000"
```

One further enhancement would be to combine this into a MACRO function, for example:

```
MACRO mMoney1(d,l) = "$"+RSET$(FORMAT$(d,"#,"),l-1)
MACRO mMoney2(d,l) = RSET$(FORMAT$(d,"$#,"),l)
' code here
A$ = mMoney1(1000,10)                 ' "$    1,000"
B$ = mMoney2(1000,10)                 ' "    $1,000"
```

See also BIN$, GRAPHIC PRINT, GUID$, HEX$, OCT$, REPEAT$, SPACE$, STR$, STRING$, USING$, VAL, XPRINT

FRAC function

FRAC function

Purpose Return the fractional part of a number.

Syntax `h = FRAC(float_expression)`

Remarks FRAC returns the number *after* the decimal point of a floating-point number or expression. FRAC rounds the result of fit the precision of the target *h*, as per IEEE specifications.

See also CEIL, CINT, FIX, INT, ROUND

Example `h# = FRAC(10.25#)  ' = 0.25# (Double-precision)`

FREEFILE function

FREEFILE function

Purpose Return the next available PowerBASIC file number.

Syntax `x% = FREEFILE`

Remarks FREEFILE returns an Integer value in the range 1 to 32767, which dictates the next available file number that may be used to OPEN a file or device. Using FREEFILE, your program can open files and devices without the need to keep track of which file numbers are already in use.

FREEFILE is thread-safe, returning a new file number with each invocation. This means that two or more consecutive calls to FREEFILE will return different file numbers regardless of whether they were used to open a file or not. This behavior differs from previous versions of PowerBASIC, where FREEFILE returned the same file number consistently until the file number was actually used to open a file or device.

FREEFILE is vastly superior to using hard-coded file numbers because it eliminates the possibility of a file number being used more than once in a module at any given moment.

A file number returned by FREEFILE can be used with the COMM OPEN, TCP OPEN and UDP OPEN statements, as well as standard file I/O OPEN and OPEN HANDLE statements.

Use FILENAME$ to return the name of the open file that corresponds to a given file number.

Restrictions FREEFILE returns file numbers within a predictable and convenient range of values. PowerBASIC file numbers are also specific (private) to the PowerBASIC module in which they are used to OPEN a file or device. This means that a file number in use in one module will have no definition or meaning if passed to another module or API function.

However, it can sometimes be necessary for a different module or even an API function to access a file that is already open. In this case, it is necessary to use the FILEATTR function to obtain the operating system file handle, and this value can be passed to other modules or API functions. These modules would use the OPEN HANDLE statement to gain access into the already-open file.

See also COMM OPEN, FILEATTR, FILENAME$, OPEN, TCP OPEN, UDP OPEN

Example

```
x%= FREEFILE
OPEN MyFileName$ FOR OUTPUT AS #x%
```

FUNCNAME$ function

FUNCNAME$ function

Purpose Return the name of the current Sub/Function/Method/Property.

Syntax `f$ = FUNCNAME$`

Remarks FUNCNAME$ returns the name of the procedure in which it is located. If an is specified, FUNCNAME$ returns the ALIAS name; otherwise, it returns the primary name capitalized. Returning the ALIAS name provides a mechanism to disguise sensitive internal procedure names even when reporting error conditions to a user.

FUNCNAME$ can be useful as a debugging tool, or in situations where an error handler in a procedure passes error information on to a "central" procedure for logging and handling. FUNCNAME$ does not require #TOOLS ON.

See also #TOOLS, CALLSTK, CALLSTK$, CALLSTKCOUNT, FILENAME$, FUNCTION, METHOD, PROFILE, PROPERTY, SUB, TRACE

Example

```
SUB SecretEncryptionSub ALIAS "MySub" (sData$)
  x$ = FUNCNAME$  ' Returns "MySub"
END SUB
[statements]
SUB SecretDecryptionSub (sData$)
  x$ = FUNCNAME$  ' Returns "SECRETDECRYPTIONSUB"
END SUB
```

FUNCTION/END FUNCTION statements

FUNCTION/END FUNCTION statements IMPROVED

Purpose Define a Function block.

Syntax

```
FUNCTION ProcName [ALIAS "AliasName"] [(arguments)] <Descriptors> AS Type
  [statements]
  [{FuncName | FUNCTION} = ReturnValue]
END FUNCTION
CALLBACK FUNCTION ProcName [AS LONG]...
THREAD FUNCTION ProcName (BYVAL var AS LONG) AS LONG...
```

Remarks All executable code must reside in a Sub, Function, Method, Property, or FastProc block. Functions may not be nested. That is, you cannot define a code block (Sub, Function, Method, Property) inside another code block.

> **Previous versions of PowerBASIC required that you create an explicit DECLARE statement if you wished to execute a SUB or FUNCTION which did not physically precede the reference to it. This extra work is no longer required, as PowerBASIC resolves all forward references to internal procedures automatically.**
>
> **DECLARE statements for a Sub/Function imported from a DLL must still precede any reference to the procedure.**

FuncName The name of the Function. A type-specifier may be appended (just like an ordinary variable name) to specify the data type of the Function's return value, in place of the [AS *type*] clause. *FuncName* must be unique: no other variable, Function, Sub, Method, Property, or label can share it. Also see ALIAS below.

> **Future versions of PowerBASIC will not support type-specifier symbols for the Function return type, so specify the return data type with an explicit AS *type* clause in all DECLARE and FUNCTION definitions, to ensure future compatibility.**

ALIAS String literal that identifies an case-sensitive alternative name for the function. This lets you export a Function by a different unique name. This can be useful if you want to abbreviate a long name, provide a more descriptive name, or if the exported name needs to contain characters that are illegal in PowerBASIC. *AliasName* is the routine's actual name as it appears in the export table, and *FuncName* is the title that you can use in PowerBASIC. For example:

```
FUNCTION ShortName ALIAS "LongFuncName"() EXPORT STATIC AS LONG
```

The ALIAS clause is very important when exporting procedures. Omitting the ALIAS clause or incorrectly capitalizing the alias name are common causes of "Missing Export" errors. Please refer to the DECLARE topic for more information.

Descriptors

EXPORT This descriptor identifies a Sub or Function which may be accessed between Dynamic Link Libraries (DLLs), and/or the main executable which links them. If a procedure is not marked EXPORT, it is hidden from these other modules. The EXPORT attribute may be added to a Sub/Function defined elsewhere, by specifying EXPORT in a DECLARE statement. EXPORT can even be added to a Sub/Function in an SLL with a DECLARE in the host module.

COMMON A COMMON Sub/Function is one which may be referenced by and between linked unit modules (Host or SLL). If you DECLARE a Common Sub or Function which is not present in this module, it is presumed to be found in a separate linked module (Host or SLL).

PRIVATE A PRIVATE Sub/Function is one which may only be accessed from within the current PowerBASIC program or library. Even if not specified, this is the default mode of operation.

THREADSAFE With the THREADSAFE option, PowerBASIC automatically establishes a semaphore which allows only one thread to execute the Sub/Function at a time. Other callers must wait until the first thread exits the THREADSAFE procedure before they are allowed to begin.

LOCAL This descriptor specifies that all undeclared variables in a function are LOCAL. This is the default condition if neither LOCAL nor STATIC is specified.

Local variables and arrays variables are automatically deallocated when the procedure terminates. LOCAL scalar variables (except dynamic strings) are stored on the stack, and visible only within the function.

STATIC This descriptor specifies that all undeclared variables in a function are STATIC. Static variables retain their values as long as the program is running. They are visible only within the function.

BDECL Specifies that the declared procedure uses the legacy BASIC/Pascal calling convention. Parameters are pushed on the stack from left to right, and the called procedure is responsible for removing them. BDECL should only be used when necessary to match outside modules.

CDECL Specifies that the declared procedure uses the C calling convention. Parameters are pushed on the stack from right to left, and the calling code is responsible for removing them. CDECL should only be used when necessary to match outside modules.

SDECL This is the default convention, and should be used whenever possible. SDECL (and its synonym STDCALL), specifies the "Standard Calling Convention" for Windows. Parameters are pushed on the stack from right to left, and the called procedure is responsible for removing them.

CALLBACK Specifies that this is a callback function, which is used only to receive messages from the operating system. It may never be called directly from your code. Details about the message sent to the callback are retrieved using the CB group of PowerBASIC functions. Callback functions may not include parameters, and always return a long integer result. For example:

```
CALLBACK FUNCTION DlgProc AS LONG
  ' Callback code goes here
END FUNCTION
```

Callback functions have the unique ability to optionally return two distinct values when necessary for certain Windows messages. This allows them to return the value zero (0) as a function result, while still specifying that the message has been processed. See the section CALLBACK RETURN VALUE (below) and the CALLBACKS page for more details.

THREAD Specifies that this is a thread function, which is the point where execution of a new thread begins. It may never be called directly from your code. Thread functions must take exactly one long-integer or double-word parameter by value (BYVAL), and must return either a long-integer or double-word result. For example:

```
THREAD FUNCTION MyThreadFunction(BYVAL x AS LONG) AS LONG
  ' Thread code goes here
END FUNCTION
```

The THREAD CREATE statement creates and begins execution of a new thread Function.

Passing parameters

arguments An optional, comma-delimited sequence of formal parameters. The parameters used in the *arguments* list serve only to define the Function; they have no relationship to other variables in the calling code with the same name.

Normally, PowerBASIC passes parameters to a Function either by reference (BYREF) or by value (BYVAL). If you do not need to modify the parameters (true in many cases), you can speed up your calls by passing the parameters by value using the BYVAL keyword. You can clarify that a parameter is passed by reference by using the optional BYREF keyword.

The type of the parameter is specified either by appending a type-specifier character to the name or by using an AS clause. For example:

```
FUNCTION Test&(A AS INTEGER) 'integer passed by ref
```

```
FUNCTION Test&(A%)          'integer passed by ref
FUNCTION Test&(BYREF A%)    'integer passed by ref
FUNCTION Test&(BYVAL A%)    'integer passed by val
```

Parameter restrictions

PowerBASIC compilers have a limit of 32 parameters per FUNCTION. To pass more than 32 parameters to a FUNCTION, construct a User-Defined Type (UDT) and pass the UDT by reference (BYREF) instead.

Fixed-length strings, Nul-Terminated Strings, and User-Defined Types/Unions may also be passed as BYVAL or OPTIONAL parameters. Try to avoid passing large items BYVAL, as it's terribly inefficient, and there is a maximum size limit of 64 Kb for a given parameter list.

PowerBASIC Functions cannot return an array or Variant variable as a Function return value. Pass these variable types as BYREF parameters instead. For example:

```
lResult& = ProcessData(TheArray&(), iSize%)
[statements]
FUNCTION ProcessData(lArr() AS LONG, iSize%) AS LONG
  REDIM lArr(iSize%) AS LONG
  lArr(iSize%) = 1&
  FUNCTION = -1&
END FUNCTION
```

Pointer parameters

When a Function definition specifies either a BYREF parameter or a pointer variable parameter, the calling code may freely pass a BYVAL DWORD or a Pointer instead. Pointer variable parameters must always be declared as BYVAL parameters.

```
' Integer Pointer (passed by value)
FUNCTION Test(BYVAL A AS INTEGER PTR) AS LONG
  @A = 56
END FUNCTION
```

Additional information on BYVAL/BYREF/BYCOPY parameter passing can be found in the CALL statement topic.

Optional parameters

PowerBASIC supports two syntax formats for optional parameters: the classic optional parameter syntax using brackets "[..]", and the new syntax using the OPTIONAL (or OPT) keyword. We'll discuss each one in turn.

Using OPTIONAL/OPT

FUNCTION statements may specify one or more parameters as optional by preceding the parameter with either the keyword OPTIONAL or OPT. Optional parameters are only allowed with CDECL or SDECL calling conventions, not BDECL.

When a parameter is declared optional, all subsequent parameters in the declaration are optional as well, whether or not they specify an explicit OPTIONAL or OPT directive. The following two lines are equivalent, with both second and third parameters being optional:

```
FUNCTION sABC(a&, OPTIONAL BYVAL b&, OPTIONAL BYVAL c&) AS LONG
FUNCTION sABC(a&, OPT BYVAL b&, BYVAL c&) AS LONG
```

VARIANT variables are particularly well suited for use as an optional parameter. If the calling code omits an optional VARIANT parameter, (BYVAL or BYREF), PowerBASIC (and most other compilers) substitute a variant of type VT_ERROR which contains an error value of %DISP_E_PARAMNOTFOUND (&H80020004). In this case, you can check for this value directly, or use the ISMISSING() function to determine whether the parameter was physically passed or not.

When optional parameters (other than a VARIANT) are omitted in the calling code, the stack area normally reserved for those parameters is zero-filled. This allows you to test if an optional parameter was passed or not:

If the parameter is defined as a BYVAL parameter, it will have the value zero. For TYPE or UNION variables passed BYVAL, the compiler will pass a string of binary zeroes of length SIZEOF(Type_or_union_var).

If the parameter is defined as a BYREF parameter, VARPTR (*varname*) will equal zero; when this is true, any attempt to use *Var_name* in your code will result in Error #9 (null pointer); failure to detect this error using error-trapping may result in a General Protection Fault or memory corruption. You should use the ISMISSING() function first to determine whether it is safe to access the parameter.

Because the FUNCTION, SUB, FASTPROC, METHOD, or PROPERTY being called does not know how many parameters are being passed at the time it is called, you should pass the number of parameters as one of the required parameters in the list.

AS *type*

Function blocks are constructed very much like Subs (see SUB/END SUB statement). However, Functions differ from Subs in that they always return a result, so they can be used in assignments and expressions. Therefore, there are two ways to specify the return type of a Function:

You may specify the type of data returned by a Function to the calling code. If you do not specify a type, PowerBASIC assumes that the Function returns the data type specified by a DEFtype statement. However, if no DEFtype or AS type has been specified, a compile-time error is generated.

Therefore, there are two ways to specify the return type of a Function:

- Include a type-specifier character at the end of *FuncName*
- Include the AS type clause as the last part of the FUNCTION statement (this is the recommended syntax to ensure future compatibility).

For example, the following statements are equivalent:

```
FUNCTION aFunction?()
FUNCTION aFunction() AS BYTE
```

While most FUNCTION calling conventions are fairly well defined throughout the industry, there are a few exceptions. In the case of functions which return a Quad Integer value, some programming languages (including PowerBASIC) return the quad value in the FPU, while others return it in EDX:EAX. PowerBASIC automatically detects the method used by imported functions and adjusts accordingly for you, but that's not a feature found in other compilers. Therefore, we recommend that you do not EXPORT QUAD FUNCTIONS unless they will only be accessed by PowerBASIC programs. A simple equivalent functionality would be to return the quad-integer value to the caller in a BYREF QUAD parameter.

Assigning a return value

You can specify the return value of the Function by explicitly setting the value, either by assigning a value to the FUNCTION keyword, or by assigning a value to the function name. For example, the two lines within the following Function block are equivalent:

```
FUNCTION AddData() AS LONG
  [statements]
  AddData  = 123& ' Assign value to function name
  FUNCTION = 123& ' Assign value to the function
END FUNCTION
```

Default return value

If the code within the Function does not explicitly set a return value, the default return value will be zero if the function returns a numeric data type, or an empty string if the function returns a string. For example:

```
FUNCTION AddData() AS LONG
  [statements]
  IF condition THEN
```

```
    EXIT FUNCTION  ' No assignment, will return 0&
  ELSE
    FUNCTION = -1& ' An explicit return value
  END IF
END FUNCTION
```

PowerBASIC Functions cannot return an array as a Function return value. Pass the array as a parameter instead. For example:

```
lResult& = CheckTheData(InTheArray&())
[statements]
FUNCTION CheckTheData(lArr() AS LONG) AS LONG
  [statements]
END FUNCTION
```

CALLBACK Return Value

Callback functions always return a long integer result. The primary purpose of this return value is to tell the PowerBASIC DDT engine and the Windows operating system whether your Callback Function has processed this particular message. If you return the value TRUE (any non-zero value), you are asserting that the message was processed and no further handling is needed. If you return the value FALSE (zero), the PowerBASIC DDT engine will manage the message for you, using the default message procedures in Windows. If you do not specify a return value in the function, PowerBASIC chooses the value FALSE (zero) for you.

The term "process a message" may have many meanings. If it's a simple notification of a change in focus or style, which has no impact on your program, you may decide to consider it processed, yet do nothing. In other cases, your reaction could be quite complex and involved. As the programmer, that's your decision to make. But, regardless of your reaction, you should consider a message "processed" (returning a true value) whenever no further handling of the message (by DDT or Windows) is needed.

In some cases, especially when dealing with Common Controls and custom controls, you may be required to return a second result value through a special Windows data area named DWL_MSGRESULT. When you complete a Callback Function, PowerBASIC automatically copies any non-zero return value to DWL_MSGRESULT, if you haven't done so already. Therefore, it's generally safe to ignore this requirement in your code.

In most cases, when you process a message, you'll return a generic value for TRUE, such as: FUNCTION = 1. However, some messages require that you return a special value for TRUE, such as a graphical brush handle. As long as the value is non-zero, you can return it in the normal manner (with FUNCTION = *n*), since any non-zero value automatically implies that the message was processed.

That said, there are a few unique messages which may require special handling. Luckily, they're rare, but some just "break all the rules" listed above. For example, you might find one which requires a zero result, even when you have processed the message. You may find another which requires the return value be different from DWL_MSGRESULT. For these very special cases, you can simply specify two return values:

```
FUNCTION = 1, BrushHandle&
```

In this form, the first numeric expression specifies the value to be returned from the Callback Function. The second numeric expression tells the value to be assigned to DWL_MSGRESULT. When you use this double parameter assignment, the results are absolute. PowerBASIC assumes you have processed the message, regardless of the values given. PowerBASIC makes no other assumptions of any kind about these values. A double parameter function assignment is only allowed in a Callback Function.

Previous versions of PowerBASIC did not offer a double parameter form of function return. This caused some difficulty with a few Windows messages which required a special return value of zero. If you return a value of zero (0) with the single parameter form, it implies the message was not processed at all by the Callback. This issue is totally circumvented by the double parameter form.

Variables within functions

LOCAL variables are created within the procedures stack frame. If a LOCAL variable exceeds the amount of stack space available, it may become necessary to use a STATIC or GLOBAL variable instead. For example, creating a LOCAL Nul-Terminated string or LOCAL fixed-length string that is very large (say, approaching 1 MB) can trigger a General Protection Fault (GPF) because it may overrun the stack frame.

See also DECLARE, EXIT, FASTPROC, FUNCNAME$, GLOBAL, INSTANCE, ISMISSING, LOCAL, METHOD, PROPERTY, STATIC, SUB, THREAD CREATE, THREADID

Example

```
FUNCTION HalfOf ALIAS "HalfOf" (X!) EXPORT AS SINGLE
  FUNCTION = X! / 2
END FUNCTION
```

GET statement

GET statement

Purpose Read a record from a random-access file, or a variable or an array from a binary file.

Syntax

```
Random-Access files:
GET [#] filenum&, [Rec], [ABS] Var
GET [#] filenum& [, Rec]
Binary files:
GET [#] filenum&, [RecPos], Var
GET [#] filenum&, [RecPos], Arr() [RECORDS rcds] [TO count]
```

Remarks A

variable used to receive data may be either ANSI or WIDE, but it must match the CHR mode of the data read from the file. That is, if the data was written as an ANSI string, it should be read into an ANSI string variable. If it was written as a WIDE string, it should be read into a WIDE string variable. Failure to match this CHR mode can cause unpredictable interpretation of the data. GET never performs conversions of ANSI/WIDE characters, regardless of the CHR mode specified in the OPEN statement. It reads data from the file based upon the type of string variable you use. It is the responsibility of the programmer to choose the correct type.

filenum& The file number under which the file was opened.

Random Access files

Rec For random-access files, *Rec* is the record number to be read, from 1 to 2^63-1 (the maximum positive value for a Quad-integer). If *Rec* is omitted, the next record in sequence (following the one specified by the most recent GET or PUT) is read. If the file was just opened, the first record is read.

Var If *Var* is smaller than the defined record length, GET will read enough data to fill *Var. The* remainder of the record is discarded and the file pointer is placed at the next record position. If *Var* is larger than the defined record length, GET will read one record into *Var,* and the file pointer will be moved to the next record.

When GET is used to retrieve data from a random access file into a dynamic (variable-length) string, PowerBASIC looks for a 2-byte (WORD) size field at the beginning of each record which indicates the number of data bytes which follow. If the data is in WIDE format, the size is double the number of characters because each character occupies two bytes. This 2-byte size field is placed in the file automatically by the PUT statement when used with dynamic (variable-length) strings.

When the second form of GET is used (without a *Var* target string), GET reads the file data from the current file pointer into an internal buffer. This data can then be accessed using FIELD string variables.

ABS

When GET is used to read a random file into a dynamic string, it normally expects the first two bytes of the record to contain the length of the valid data contained in the record. The ABS keyword specifies that no length word exists in the data, and the number of bytes to read is defined by the current length of the dynamic string variable. If the variable length is greater than the file record length, the remainder of the string variable is filled with nul's (CHR$(0) or $NUL). This offers greater compatibility with the actual operation of other versions of BASIC, such as PowerBASIC for DOS.

A random access file record is limited to 32768 bytes to ensure consistent behavior across all supported Win32 platforms. GET$ and other related functions are not constrained in this manner.

Binary files

RecPos

For binary files, *RecPos* is the starting byte or

from where the GET should begin. The optional BASE = clause of the OPEN statement defines whether the first position is 0 or 1. The base position is 1 by default. If *RecPos* is greater than the number of records or bytes in the file, no error occurs but unpredictable data may be read. Use the EOF function to avoid reading past the end of the file.

Var

When used with a binary file, GET retrieves enough data from the file to fill *Var*. The *Var* parameter can be a simple (scalar) variable like an Integer or a dynamic (variable-length) string, an element in an array, or a variable of User-Defined Type.

When GET is used to read a binary file into a dynamic string, the number of bytes to read is defined by the current size of the dynamic string variable. If the variable length is greater than the file record length, the remainder of the string variable is filled with nuls (CHR$(0) or $NUL). This offers greater compatibility with the actual operation of other versions of BASIC, such as PowerBASIC for DOS.

Arr()

When reading an array from the disk file, GET assigns data from the file into each element in the array, starting at the arrays LBOUND subscript. GET attempts to read the number of elements specified by *rcds* in the RECORDS option, or the number of elements in the array, whichever is smaller. The actual number of elements read is assigned to the variable *count* specified in the optional TO clause.

With a dynamic string array, it is assumed the file was written in the PowerBASIC and/or VB packed string format using PUT of an entire string array. If a string is shorter than 65535 bytes, a 2-byte length WORD is followed by the string data. Otherwise, a 2-byte value of 65535 is followed by a length Double-word (DWORD), then finally the string data.

With other array arrays types, the entire data area is read as a single block. In either case, it is presumed the file was created with the complementary PUT Array statement.

EOF is set just as with other GET statements.

You can use the FILESCAN statement to determine the number of records contained in the file, allowing an array of the appropriate type to be dimensioned before using the GET statement to read the file.

See also

CSET, CSET$, EOF, FIELD, FILESCAN, GET$, GET$$, LINE INPUT#, LSET, OPEN, PRINT#, PUT, PUT$, PUT$$, RSET, TYPE, SEEK, WRITE#

Example

```
' Random-access GET example
DIM uName AS STRING * 20
DIM I AS QUAD
DIM F AS LONG

F = FREEFILE
OPEN "TESTFILE.DTA" FOR RANDOM AS #F LEN = LEN(uName)
WHILE uName <> SPACE$(20)
  PUT #F,, uName
  uName = GetInput()
WEND
```

```
IF SEEK(F) > 0 THEN
  ShowText "The file contains these names:"
  FOR ix = 1 TO SEEK(F)
    GET #F, ix, uName
    ShowText uName + NL
  NEXT
ELSE
  ShowText "The file is empty"
END IF
CLOSE #F

' Binary GET Array example
OPEN "Data file to read.dat" FOR BINARY AS #1
FILESCAN #1, RECORDS TO count&
DIM TheData$(1 TO count&)
GET #1, 1, TheData$() TO y&
CLOSE #1
```

GET$ statement

GET$ statement IMPROVED

Purpose Read an ANSI

from a file opened in binary mode.

Syntax `GET$ [#] filenum&, Count&, StrgVar`

filenum& The file number under which the file was opened.

Count& Specifies how many bytes to read.

StrgVar The string variable which receives the data. It can be a dynamic string, fixed-length string, nul-terminated string, or field string. *StrgVar* may be either ANSI or WIDE. If it is a WIDE variable, the data is automatically converted to WIDE Unicode before it is assigned.

Remarks GET$ reads *Count&* characters from file number *filenum&*, and assigns them to *StrgVar*. GET$ and PUT$ provide a low-level alternative to sequential and random-access file-processing techniques, allowing you to deal with files on a byte-by-byte basis.

File *filenum&* must have been opened in binary mode. Characters are read starting at the current file pointer position, which can be set with the SEEK statement. When the file is first opened, the pointer is at the beginning of the file (position 1, by default, unless BASE=0 was specified in the OPEN statement). After GET$, the file pointer position is automatically advanced to the position immediately following the data read.

See also EOF, GET, GET$$, INPUT#, LINE INPUT#, LOF, OPEN, PRINT#, PUT, PUT$, PUT$$, SEEK, WRITE#

Example

```
' Open binary file, write the alphabet A-Z to it
OPEN "SEEK.DTA" FOR BINARY AS #1 LEN = 1 BASE = 0
FOR I& = 65 TO 90
  PUT$ #1, CHR$(I&)
NEXT I&

' Now read five characters at a time from the file,
' starting at different pointer positions
FOR I& = 0 TO 20 STEP 5
  SEEK #1, I&
  GET$ #1, 5, TempString$
  x$ = "Starting at position" + STR$(I&) + $SPC + $DQ + TempString$ + $DQ
NEXT I&
```

```
CLOSE #1
```

Result

```
Starting at position  0 "ABCDE"
Starting at position  5 "FGHIJ"
Starting at position 10 "KLMNO"
Starting at position 15 "PQRST"
Starting at position 20 "UVWXY"
```

GET$$ statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GET$$ statement New!

Purpose Reads WIDE

data from a file opened in binary mode.

Syntax `GET$$ [#] Filenum&, Count&, StrgVar`

Filenum& The file number under which the file was opened.

Count& Specifies how many WIDE characters to read from the file.

StrgVar The string variable which receives the data. It can be a dynamic string, fixed-length string, nul-terminated string, or field string. *StrgVar* may be either ANSI or WIDE. If it is an ANSI variable, the data is automatically converted to ANSI bytes before it is assigned.

Remarks GET$$ reads *Count&* WIDE characters from file number *filenum&*, and assigns them to *StrgVar*. GET$$ and PUT$$ provide a low-level alternative to sequential and random-access file-processing techniques, allowing you to deal with files on a character-by-character basis.

File *filenum&* must have been opened in binary mode. Characters are read starting at the current file pointer position, which can be set with the SEEK statement. When the file is first opened, the pointer is at the beginning of the file (position 1, by default, unless BASE=0 was specified in the OPEN statement). After GET$$, the file pointer position is automatically advanced to the position immediately following the data read.

See also EOF, GET, GET$, INPUT#, LINE INPUT#, LOF, OPEN, PRINT#, PUT, PUT$, PUT$$, SEEK, WRITE#

GETATTR function

GETATTR function

Purpose Return the file-system attribute(s) of a disk file or directory.

Syntax `x& = GETATTR(filespec$)`

Remarks *filespec$* specifies a filename or directory (optionally, including a drive letter and directory path). The attribute code returned in *x&* is a standard operating system attribute code, or a combination of several codes ORed together:

Attribute	Description	Equate

0	Normal*	%NORMAL
1	Read-only	%READONLY
2	Hidden	%HIDDEN
4	System	%SYSTEM
8	Volume Label	%VLABEL
16	Directory	%SUBDIR
32	Archived	%ARCHIVE
128	Normal*	(synonym of %NORMAL)

*** Some operating systems may return either 0 or 128 for normal files.**

If GETATTR returns an attribute of 0 (or 128), *filespec$* is a regular file: not read-only, not hidden, not system, and not archived.

Additional file attributes may be supported on some file systems. See the % FILE_ATTRIBUTE equates in your WinNT.inc file for a full list.

If you want to test for a single attribute, use the bitwise AND operator to strip out any other attributes that might be set. See the example below.

GETATTR can also be used to verify the existence of a file or directory, taking advantage of the fact that ERR will be set if the file/directory does not exist. See the example below.

Restrictions

If *filespec$* cannot be found, a run-time Error 53 ("File not found") occurs. You cannot obtain the attributes of the root directory (i.e., "C:\"). Windows prevents this particular operation, triggering an Error 53.

See also

DIR$, FILEATTR, ISFILE, PATHSCAN$, SETATTR

Example

```
' General GETATTR example
attr& = GETATTR("C:\CONFIG.SYS")
IF (attr& AND 32&) = 32& THEN
  x$ = "CONFIG.SYS has been modified"
ELSE
  x$ = "CONFIG.SYS hasn't been modified"
END IF
```

GLOBAL statement

GLOBAL statement

Purpose

Declare global (shared) variables between Subs, Functions. Methods, and Properties.

Syntax

```
GLOBAL variable[()] [ AS type] [, variable[()]] [, ...]
GLOBAL variable[()] [, variable[()]] [, ...] AS type
```

Remarks

GLOBAL declares the specified variable(s) as global to the entire program. This gives a procedure access to variable(s), without having to pass them as parameters. To declare an array as a global variable, use an empty set of parentheses in the variable list:

```
GLOBAL MyArray%()
GLOBAL StringArray() AS STRING
```

You must then use the DIM or REDIM statements to dimension the array inside a procedure. A good place to do this is inside your WINMAIN or PBMAIN function.

If an array is defined as GLOBAL outside a procedure, you should include the GLOBAL keyword in the DIM statement for clarity, and compatibility with future versions of PowerBASIC:

```
GLOBAL a() AS STRING
FUNCTION PBMAIN
  DIM a(1 TO 500) AS GLOBAL STRING
  [statements]
END FUNCTION
```

The GLOBAL statement may accept a list of variables, all of which are defined by the type descriptor keywords which follow them. For example:

```
GLOBAL aaa, bbb, ccc AS INTEGER
GLOBAL vptr, aptr() AS LONG PTR
```

Restrictions GLOBAL variables are not shared between programs and DLLs or between multiple instances of the same DLL. That is, a GLOBAL variable is only global within its own module. The simplest way to expose a variable to a DLL is to pass the variable (by reference) to the target DLL. DEF*type* has no effect on variables defined by a GLOBAL statement.

See also DIM, INSTANCE, LOCAL, STATIC, THREADED

Example

```
#COMPILE EXE
GLOBAL Caption AS ASCIIZ * 255

FUNCTION PBMAIN() AS LONG
  DIM Msg AS ASCIIZ * 255
  CALL SetVars
  IF Caption = "GLOBAL test" then Msg = "Success!"
END FUNCTION

SUB SetVars()
  Caption = "GLOBAL test"
END SUB
```

GLOBALMEM ALLOC statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GLOBALMEM statement

Purpose Allocate or release a block of global memory

Syntax

```
GLOBALMEM ALLOC  count TO vHndl
GLOBALMEM FREE   mHndl TO vHndl
GLOBALMEM LOCK   mHndl TO vPtr
GLOBALMEM SIZE   mHndl TO vSize
GLOBALMEM UNLOCK mHndl TO vLocked
```

Remarks GLOBALMEM allocates a block of global system memory of the requested size. This is always allocated as "moveable" memory, so it can be used with any facilities of Windows. It is the programmer's responsibility to release the allocated memory block when it's no longer needed.

There are five general forms of the GLOBALMEM statement:

GLOBALMEM ALLOC	A moveable memory block of the size in bytes specified by *count* is allocated. A unique handle is assigned to this memory object (for later identification). This handle is assigned to the LONG or DWORD variable specified by *vHndl*. If the requested allocation fails for any reason, the value zero (0) is assigned to *vHndl* instead.

GLOBALMEM FREE	A memory block is de-allocated and released for re-use. The *mHndl* parameter is a variable or expression which evaluates to the handle returned by GLOBALMEM ALLOC when the memory block was created. If the de-allocation operation was successful, the result variable *vHndl* is set to zero (0) to indicate that the original handle is no longer valid. If the operation fails for any reason, the value of the *mHndl* parameter is assigned to *vHndl*. It may be convenient to use the same variable for both the parameter and the result, as it will then be automatically cleared to zero when the memory block is released.
GLOBALMEM LOCK	The moveable memory block referenced by *mHndl* is locked at a specific memory location. A pointer to this location is assigned to the variable specified by *vPtr*. You may only read or write the memory block while it is locked, and you use the current pointer to its location.
GLOBALMEM SIZE	The size of the memory block referenced by *mHndl* is retrieved and assigned to the LONG or DWORD variable specified by *vSize*. The *mHndl* parameter is the handle originally returned by GLOBALMEM ALLOC.
GLOBALMEM UNLOCK	The moveable memory block referenced by *mHndl* is unlocked, and the previous memory pointer is invalidated. If the memory block remains locked (perhaps because it had been locked more than once), the value TRUE (non-zero) is assigned to the result variable *vLocked*. If the memory block is now unlocked, or the parameter *mHndl* was invalid, the value FALSE (0) is assigned to *vLocked* instead.

See also MEMORY

GLOBALMEM FREE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GLOBALMEM statement

Purpose Allocate or release a block of global memory

Syntax

```
GLOBALMEM ALLOC  count TO vHndl
GLOBALMEM FREE   mHndl TO vHndl
GLOBALMEM LOCK   mHndl TO vPtr
GLOBALMEM SIZE   mHndl TO vSize
GLOBALMEM UNLOCK mHndl TO vLocked
```

Remarks GLOBALMEM allocates a block of global system memory of the requested size. This is always allocated as "moveable" memory, so it can be used with any facilities of Windows. It is the programmer's responsibility to release the allocated memory block when it's no longer needed.

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GLOBALMEM LOCK	The moveable memory block referenced by *mHndl* is locked at a specific memory location. A pointer to this location is assigned to the variable specified by *vPtr*. You may only read or write the memory block while it is locked, and you use the current pointer to its location.
GLOBALMEM SIZE	The size of the memory block referenced by *mHndl* is retrieved and assigned to the LONG or DWORD variable specified by *vSize*. The *mHndl* parameter is the handle originally returned by GLOBALMEM ALLOC.
GLOBALMEM UNLOCK	The moveable memory block referenced by *mHndl* is unlocked, and the previous memory pointer is invalidated. If the memory block remains locked (perhaps because it had been locked more than once), the value TRUE (non-zero) is assigned to the result variable *vLocked*. If the memory block is now unlocked, or the parameter *mHndl* was invalid, the value FALSE (0) is assigned to *vLocked* instead.

See also MEMORY

GLOBALMEM LOCK statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GLOBALMEM statement

Purpose Allocate or release a block of global memory

Syntax

```
GLOBALMEM ALLOC  count TO vHndl
GLOBALMEM FREE   mHndl TO vHndl
```

```
GLOBALMEM LOCK   mHndl TO vPtr
GLOBALMEM SIZE   mHndl TO vSize
GLOBALMEM UNLOCK mHndl TO vLocked
```

Remarks

GLOBALMEM allocates a block of global system memory of the requested size. This is always allocated as "moveable" memory, so it can be used with any facilities of Windows. It is the programmer's responsibility to release the allocated memory block when it's no longer needed.

There are five general forms of the GLOBALMEM statement:

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GLOBALMEM LOCK	The moveable memory block referenced by *mHndl* is locked at a specific memory location. A pointer to this location is assigned to the variable specified by *vPtr*. You may only read or write the memory block while it is locked, and you use the current pointer to its location.
GLOBALMEM SIZE	The size of the memory block referenced by *mHndl* is retrieved and assigned to the LONG or DWORD variable specified by *vSize*. The *mHndl* parameter is the handle originally returned by GLOBALMEM ALLOC.
GLOBALMEM UNLOCK	The moveable memory block referenced by *mHndl* is unlocked, and the previous memory pointer is invalidated. If the memory block remains locked (perhaps because it had been locked more than once), the value TRUE (non-zero) is assigned to the result variable *vLocked*. If the memory block is now unlocked, or the parameter *mHndl* was invalid, the value FALSE (0) is assigned to *vLocked* instead.

See also MEMORY

GLOBALMEM SIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GLOBALMEM statement

Purpose Allocate or release a block of global memory

Syntax

```
GLOBALMEM ALLOC  count TO vHndl
GLOBALMEM FREE   mHndl TO vHndl
GLOBALMEM LOCK   mHndl TO vPtr
GLOBALMEM SIZE   mHndl TO vSize
GLOBALMEM UNLOCK mHndl TO vLocked
```

Remarks GLOBALMEM allocates a block of global system memory of the requested size. This is always allocated as "moveable" memory, so it can be used with any facilities of Windows. It is the programmer's responsibility to release the allocated memory block when it's no longer needed.

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GLOBALMEM LOCK	The moveable memory block referenced by *mHndl* is locked at a specific memory location. A pointer to this location is assigned to the variable specified by *vPtr*. You may only read or write the memory block while it is locked, and you use the current pointer to its location.
GLOBALMEM SIZE	The size of the memory block referenced by *mHndl* is retrieved and assigned to the LONG or DWORD variable specified by *vSize*. The *mHndl* parameter is the handle originally returned by GLOBALMEM ALLOC.
GLOBALMEM UNLOCK	The moveable memory block referenced by *mHndl* is unlocked, and the previous memory pointer is invalidated. If the memory block remains locked (perhaps because it had been locked more than once), the value TRUE (non-zero) is assigned to the result variable *vLocked*. If the memory block is now unlocked, or the parameter *mHndl* was invalid, the value FALSE (0) is assigned to *vLocked* instead.

See also MEMORY

GLOBALMEM UNLOCK statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GLOBALMEM statement

Purpose

Allocate or release a block of global memory

Syntax

```
GLOBALMEM ALLOC  count TO vHndl
GLOBALMEM FREE   mHndl TO vHndl
GLOBALMEM LOCK   mHndl TO vPtr
GLOBALMEM SIZE   mHndl TO vSize
GLOBALMEM UNLOCK mHndl TO vLocked
```

Remarks

GLOBALMEM allocates a block of global system memory of the requested size. This is always allocated as "moveable" memory, so it can be used with any facilities of Windows. It is the programmer's responsibility to release the allocated memory block when it's no longer needed.

There are five general forms of the GLOBALMEM statement:

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GLOBALMEM FREE	A memory block is de-allocated and released for re-use. The *mHndl* parameter is a variable or expression which evaluates to the handle returned by GLOBALMEM ALLOC when the memory block was created. If the de-allocation operation was successful, the result variable *vHndl* is set to zero (0) to indicate that the original handle is no longer valid. If the operation fails for any reason, the value of the *mHndl* parameter is assigned to *vHndl*. It may be convenient to use the same variable for both the parameter and the result, as it will then be automatically cleared to zero when the memory block is released.
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or the parameter *mHndl* was invalid, the value FALSE (0) is assigned to *vLocked* instead.

See also MEMORY

GOSUB statement

GOSUB/GOSUB DWORD statements

Purpose Invoke a subroutine.

Syntax

```
GOSUB {label | linenumber}
GOSUB DWORD dwpointer
```

Remarks GOSUB causes execution to branch to the statement prefaced by *label* or *linenumber*, after first saving its current location on the stack. The *label* or *linenumber* must be local to the Sub, Function, Method, or Property where the GOSUB statement is located. Executing a RETURN statement returns control to the instruction immediately following the GOSUB.

When using GOSUB, be sure that each subroutine returns to its caller gracefully through a RETURN statement. Run-away (recursive) GOSUBs that loop upon themselves will eat up large chunks of stack space, reducing available memory.

All labels and line numbers are private. You cannot GOSUB to a label outside of the current procedure.

For time critical or high-performance code, using a GOSUB to perform a repetitive task is almost always faster then performing a call to a procedure, since there is no overhead in setting up a stack frame for a GOSUB.

DWORD GOSUB DWORD causes execution to branch to address stored in dw*pointer*, after first saving its current location on the stack. *dwpointer* must be a Double word, Long integer, or pointer variable that contains the address of a label that is in the same procedure as the GOSUB DWORD statement. Executing a RETURN statement returns control to the instruction immediately following the GOSUB DWORD statement.

See also #STACK, FUNCTION, METHOD, ON GOSUB, PROPERTY, SUB, RETURN

Example

```
FUNCTION DoCalc!(Radius!)
  pi# = ATN(1) * 4      ' calculate value of PI
  GOSUB CalcArea        ' jump to subroutine Radius!
  EXIT FUNCTION

CalcArea:
  FUNCTION = pi# * Radius! ^2  ' calculate area
  RETURN                ' return from subroutine
END FUNCTION
```

GOSUB DWORD statement

GOSUB/GOSUB DWORD statements

Purpose Invoke a subroutine.

Syntax

```
GOSUB {label | linenumber}
GOSUB DWORD dwpointer
```

Remarks GOSUB causes execution to branch to the statement prefaced by *label* or *linenumber*, after first saving its current location on the stack. The *label* or *linenumber* must be local to the Sub, Function, Method, or Property where the GOSUB statement is located. Executing a RETURN statement returns control to the instruction immediately following the GOSUB.

When using GOSUB, be sure that each subroutine returns to its caller gracefully through a RETURN statement. Run-away (recursive) GOSUBs that loop upon themselves will eat up large chunks of stack space, reducing available memory.

All labels and line numbers are private. You cannot GOSUB to a label outside of the current procedure.

For time critical or high-performance code, using a GOSUB to perform a repetitive task is almost always faster then performing a call to a procedure, since there is no overhead in setting up a stack frame for a GOSUB.

DWORD — GOSUB DWORD causes execution to branch to address stored in dw*pointer*, after first saving its current location on the stack. *dwpointer* must be a Double word, Long integer, or pointer variable that contains the address of a label that is in the same procedure as the GOSUB DWORD statement. Executing a RETURN statement returns control to the instruction immediately following the GOSUB DWORD statement.

See also — #STACK, FUNCTION, METHOD, ON GOSUB, PROPERTY, SUB, RETURN

Example

```
FUNCTION DoCalc!(Radius!)
  pi# = ATN(1) * 4     ' calculate value of PI
  GOSUB CalcArea       ' jump to subroutine Radius!
  EXIT FUNCTION

CalcArea:
  FUNCTION = pi# * Radius! ^2  ' calculate area
  RETURN              ' return from subroutine
END FUNCTION
```

GOTO statement

GOTO/GOTO DWORD statements

Purpose — Transfer program execution to the statement identified by a label or line number.

Syntax

GOTO {*label* | *linenumber*}
GOTO DWORD *dwpointer*

Remarks — GOTO causes program flow to jump unconditionally to the code identified by *label* or *linenumber*. The *label* or *linenumber* must be local to the Sub, Function, Method, or Property where the GOTO statement is located. GOTO differs from GOSUB and other similar control statements, in that after execution of a GOTO, the program retains no memory of where it was before it executed the jump.

Labels and line numbers are private. You cannot GOTO a label outside of the current procedure.

DWORD — GOTO DWORD causes execution to jump unconditionally to address stored in *dwpointer*. *dwpointer* must be a Double word, Long integer, or

variable that contains the address of a label which is local to the procedure where the GOTO DWORD statement is located.

See also — CALL, CALL DWORD, DO/LOOP, EXIT, FOR/NEXT, FUNCTION, GOSUB, IF block, METHOD, PROPERTY, RETURN, SELECT, SUB, WHILE/WEND

Example

```
FUNCTION test() AS LONG
  RESET X
Start:            ' define a label
  INCR X          ' increment X
  IF X < 10 THEN DoBeep
  EXIT FUNCTION
  .[statements]
DoBeep:
  BEEP
```

```
  GOTO Start     ' jump back to Start
END FUNCTION
One method of obtaining the same results without use of GOTO is:

FUNCTION test() AS LONG
  FOR X = 1 TO 9
    GOSUB DoBeep
  NEXT X
  EXIT FUNCTION
  [statements]
DoBeep:
  BEEP
  RETURN
END FUNCTION
```

GOTO DWORD statement

GOTO/GOTO DWORD statements

Purpose

Transfer program execution to the statement identified by a label or line number.

Syntax

GOTO {*label* | *linenumber*}
GOTO DWORD *dwpointer*

Remarks

GOTO causes program flow to jump unconditionally to the code identified by *label* or *linenumber*. The *label* or *linenumber* must be local to the Sub, Function, Method, or Property where the GOTO statement is located. GOTO differs from GOSUB and other similar control statements, in that after execution of a GOTO, the program retains no memory of where it was before it executed the jump.

Labels and line numbers are private. You cannot GOTO a label outside of the current procedure.

DWORD

GOTO DWORD causes execution to jump unconditionally to address stored in *dwpointer*. *dwpointer* must be a Double word, Long integer, or

variable that contains the address of a label which is local to the procedure where the GOTO DWORD statement is located.

See also

CALL, CALL DWORD, DO/LOOP, EXIT, FOR/NEXT, FUNCTION, GOSUB, IF block, METHOD, PROPERTY, RETURN, SELECT, SUB, WHILE/WEND

Example

```
FUNCTION test() AS LONG
  RESET X
Start:           ' define a label
  INCR X         ' increment X
  IF X < 10 THEN DoBeep
  EXIT FUNCTION
  .[statements]
DoBeep:
  BEEP
  GOTO Start     ' jump back to Start
END FUNCTION
One method of obtaining the same results without use of GOTO is:

FUNCTION test() AS LONG
  FOR X = 1 TO 9
    GOSUB DoBeep
  NEXT X
  EXIT FUNCTION
  [statements]
DoBeep:
  BEEP
```

```
  RETURN
END FUNCTION
```

GRAPHIC Code Group

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC Code Group

Purpose

The

Code Group offers statements and functions which display text and graphics on a GRAPHIC TARGET (this could be a Graphic Window, a Graphic Control, or a). In addition, it provides a wide variety of support to manage and interact with these items.

Syntax

```
GRAPHIC DirectorWord [params]
GRAPHIC DirectorWord [params] TO ReturnVariable(s)
```

Function Form:

```
ReturnVariable  = GRAPHIC (DirectorWord [,params])
ReturnVariable$ = GRAPHIC$ (DirectorWord [,params])
```

Remarks

Some of the functionality of the GRAPHIC group was available in prior versions of PowerBASIC, but it has now been expanded. Some Graphic Procedures (namely those which return a single value) may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
GRAPHIC GET LINES TO LineCountVar&
LineCountVar& = GRAPHIC(LINES)
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a function which returns a value), it can be a term in any expression of any complexity. When a function form is available, it is labeled with the prefix "Function Form".

Some Graphic procedures return two or more values. As it is not possible to simultaneously inject multiple terms into a valid expression, the function option is not available for them.

GRAPHIC TARGET

The term GRAPHIC TARGET refers to a Graphic Bitmap, a Graphic Control, or a Graphic Window. You may want to think of a graphic target as your painter's canvas, where you display any amount of text and graphics. Many graphic targets may exist simultaneously, but only one is attached to the graphic stream at a time. The attached graphic target is the one acted upon by graphic code.

Graphic Bitmap	This is a non-visible target typically used as a work area to construct an image prior to displaying it. You can create a new, blank bitmap with GRAPHIC BITMAP NEW, or load one from a resource or disk file with GRAPHIC BITMAP LOAD. At that point, other graphic code can be used to act on it.
Graphic Control	This is a static control/window which is placed on a DDT Dialog with CONTROL ADD GRAPHIC. Once you attach this control, you can

	display all forms of text and graphics on it.
Graphic Window	This is a standalone window which can be placed at any location on the desktop. It's created with GRAPHIC WINDOW and can even be used as a graphical console window. Once you attach this window, you can display all forms of text and graphics on it.

GRAPHIC STREAM

The Graphic Stream is the connection between graphic code and a graphic target. The Graphic Stream is created when you attach a particular target with GRAPHIC ATTACH. From that moment forward, all graphic code acts on that selected target. This continues until such time as you select a new graphic target. When this occurs, the graphic stream to the first target is disabled, and a new graphic stream to the new target is created.

You can redirect the graphic stream to different graphic targets as often as necessary for the logic of your program.

PAGE UNITS

PAGE UNITS are used to measure the size of a graphical item, or to define a particular position on a graphic target. You can define page units to be pixels, dialog units, or scaled units of your choice.

Initially, each graphic target inherits the page unit size from its parent: pixels or dialog units. You can change this to scaled world coordinates of your choice with GRAPHIC SCALE. You can revert from dialog units or scaled units back to pixels (the most accurate form) by executing GRAPHIC SCALE PIXELS.

By default, the upper left corner of a graphic target is considered to be the X,Y position 0,0 and grows larger to the right or downward. The X axis is horizontal, while the Y axis is vertical. Whenever an X,Y position is given, the X value is stated first. Both the limits and the axis direction can be altered with GRAPHIC SCALE.

GRAPHIC POSITION (POS)

Each time you draw text or graphics, it is displayed at the current graphic position (POS) for that target. Upon completion, the POS is updated to the last point referenced. You can draw a relative distance from the POS (using a STEP option), or set an entirely new position with GRAPHIC SET POS.

Most PowerBASIC functions specify graphic and pixel positions in Page Units as X,Y (horizontal term first, then the vertical term). This is true for both graphics and text. When you draw text with GRAPHIC PRINT, POS defines the position of the upper-left corner of the first character.

TEXT CELL (ROW/COLUMN POSITION)

For ease of programming, a few procedures specify text position by row and column. In this case, the position is measured in text cells, which is the space occupied by one character. This works well with fixed width fonts, which is recommended. If a variable width font is chosen, PowerBASIC must use the average character size for these calculations, which can give imprecise results.

For compatibility with most current and prior versions of BASIC (PowerBASIC included), code which references text rows and columns names the vertical term first (ROWS, COLUMNS). Rows and columns are always numbered from one upward.

See also Graphic Commands, Graphics

GRAPHIC(CANVAS.X) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET CANVAS statement New!

Purpose Retrieves the writable size of the attached graphic target.

Syntax **`GRAPHIC GET CANVAS TO`** ***`WidthVar!, HeightVar!`***

Function Form:

```
WidthVar!  = GRAPHIC(CANVAS.X)
HeightVar! = GRAPHIC(CANVAS.Y)
```

Remarks GRAPHIC GET CANVAS retrieves the size of the drawing buffer for the attached graphic window, control, or bitmap. The size is specified in Page Units, so it could return scaled values if they were applied with GRAPHIC SCALE. If the graphic window or control is FIXED (the default), the size returned is equivalent to the CLIENT size (other than the scaling factor). The CANVAS size does not include a caption, frame, scrollbars, etc. If no graphic target has been attached with GRAPHIC ATTACH, the values 0,0 are returned.

See also GRAPHIC GET CLIENT, GRAPHIC GET CLIP, GRAPHIC GET SIZE, GRAPHIC GET SCALE, GRAPHIC SCALE

GRAPHIC(CANVAS.Y) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET CANVAS statement New!

Purpose Retrieves the writable size of the attached graphic target.

Syntax **`GRAPHIC GET CANVAS TO`** ***`WidthVar!, HeightVar!`***

Function Form:

```
WidthVar!  = GRAPHIC(CANVAS.X)
HeightVar! = GRAPHIC(CANVAS.Y)
```

Remarks GRAPHIC GET CANVAS retrieves the size of the drawing buffer for the attached graphic window, control, or bitmap. The size is specified in Page Units, so it could return scaled values if they were applied with GRAPHIC SCALE. If the graphic window or control is FIXED (the default), the size returned is equivalent to the CLIENT size (other than the scaling factor). The CANVAS size does not include a caption, frame, scrollbars, etc. If no graphic target has been attached with GRAPHIC ATTACH, the values 0,0 are returned.

See also GRAPHIC GET CLIENT, GRAPHIC GET CLIP, GRAPHIC GET SIZE, GRAPHIC GET SCALE, GRAPHIC SCALE

GRAPHIC(Cell.Size.X) function

GRAPHIC CELL SIZE statement New!

Purpose Retrieve the character cell size including external leading.

Syntax

```
GRAPHIC CELL SIZE TO WidthVar!, HeightVar!
```

Function Form:

```
WidthVar!  = GRAPHIC(Cell.Size.X)
HeightVar! = GRAPHIC(Cell.Size.Y)
```

Remarks GRAPHIC CELL SIZE retrieves the size of one character cell, for the current font, on the attached graphic target. The returned character size is specified in PAGE UNITS, and allows you to calculate the number of text lines which will fit in a particular space. The height value is the size of the displayed character, including external leading (if any) for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console,the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some scaled units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the exact height of characters without external leading, use GRAPHIC CHR SIZE.

See also GRAPHIC CELL, GRAPHIC CHR SIZE, GRAPHIC SET FONT, GRAPHIC TEXT SIZE

GRAPHIC(Cell.Size.Y) function

GRAPHIC CELL SIZE statement New!

Purpose Retrieve the character cell size including external leading.

Syntax

```
GRAPHIC CELL SIZE TO WidthVar!, HeightVar!
```

Function Form:

```
WidthVar!  = GRAPHIC(Cell.Size.X)
HeightVar! = GRAPHIC(Cell.Size.Y)
```

Remarks GRAPHIC CELL SIZE retrieves the size of one character cell, for the current font, on the attached graphic target. The returned character size is specified in PAGE UNITS, and allows you to calculate the number of text lines which will fit in a particular space. The height value is the size of the displayed character, including external leading (if any) for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console,the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some scaled units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the exact height of characters without external leading, use GRAPHIC CHR SIZE.

See also GRAPHIC CELL, GRAPHIC CHR SIZE, GRAPHIC SET FONT, GRAPHIC TEXT SIZE

GRAPHIC(Chr.Size.X) function

GRAPHIC CHR SIZE statement IMPROVED

Purpose Retrieve the character size on the Graphic Target.

Syntax ***GRAPHIC CHR SIZE To WidthVar!, HeightVar!***

Function Form:
```
WidthVar!  = GRAPHIC(Chr.Size.X)
HeightVar! = GRAPHIC(Chr.Size.Y)
```

Remarks GRAPHIC CHR SIZE retrieves the size of one character, for the current font, on the attached graphic target. The returned character size is specified in Page Units. The height value is the actual size of the displayed character, without including external leading (if any) for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console,the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some scaled units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the total row height including external leading, use GRAPHIC CELL SIZE instead.

See also GRAPHIC ATTACH, GRAPHIC CELL, GRAPHIC CELL SIZE, GRAPHIC SET FONT, GRAPHIC PRINT, GRAPHIC TEXT SIZE

GRAPHIC(Chr.Size.Y) function

GRAPHIC CHR SIZE statement IMPROVED

Purpose Retrieve the character size on the Graphic Target.

Syntax ***GRAPHIC CHR SIZE To WidthVar!, HeightVar!***

Function Form:
```
WidthVar!  = GRAPHIC(Chr.Size.X)
HeightVar! = GRAPHIC(Chr.Size.Y)
```

Remarks GRAPHIC CHR SIZE retrieves the size of one character, for the current font, on the attached graphic target. The returned character size is specified in Page Units. The height value is the actual size of the displayed character, without including external leading (if any) for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console,the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some scaled units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the total row height including external leading, use GRAPHIC CELL SIZE instead.

See also GRAPHIC ATTACH, GRAPHIC CELL, GRAPHIC CELL SIZE, GRAPHIC SET FONT, GRAPHIC PRINT, GRAPHIC TEXT SIZE

GRAPHIC(Client.X) function

GRAPHIC GET CLIENT statement IMPROVED

Purpose Retrieve the client size of the selected graphic target.

Syntax

```
GRAPHIC GET CLIENT To WidthVar!, HeightVar!
```

Function form:

```
WidthVar!  = GRAPHIC(Client.X)
HeightVar! = GRAPHIC(Client.Y)
```

Remarks GRAPHIC GET CLIENT retrieves the physical size of the client area (visible part) of the attached graphic window or control. The size is specified in Pixels or Dialog Units, depending upon how it was created. The sizes returned are not altered or affected by GRAPHIC SCALE, VIRTUAL, or AUTOSIZE operations, as it returns the physical size of the viewable area in the terms used to create it. The client area does not include a caption, frame, scrollbars, etc. When GRAPHIC GET CLIENT is used with a

, it returns 0,0. You would normally use GRAPHIC GET CANVAS with a Bitmap, or to obtain the size of the area which can be drawn. If no graphic target has been attached with GRAPHIC ATTACH, the values 0,0 are returned.

See also GRAPHIC ATTACH, GRAPHIC GET CANVAS, GRAPHIC GET CLIP, GRAPHIC GET SIZE, GRAPHIC SET CLIENT

GRAPHIC(Client.Y) function

GRAPHIC GET CLIENT statement IMPROVED

Purpose Retrieve the client size of the selected graphic target.

Syntax

```
GRAPHIC GET CLIENT To WidthVar!, HeightVar!
```

Function form:

```
WidthVar!  = GRAPHIC(Client.X)
HeightVar! = GRAPHIC(Client.Y)
```

Remarks GRAPHIC GET CLIENT retrieves the physical size of the client area (visible part) of the attached graphic window or control. The size is specified in Pixels or Dialog Units, depending upon how it was created. The sizes returned are not altered or affected by GRAPHIC SCALE, VIRTUAL, or AUTOSIZE operations, as it returns the physical size of the viewable area in the terms used to create it. The client area does not include a caption, frame, scrollbars, etc. When GRAPHIC GET CLIENT is used with a

, it returns 0,0. You would normally use GRAPHIC GET CANVAS with a Bitmap, or to obtain the size of the area which can be drawn. If no graphic target has been attached with GRAPHIC ATTACH, the values 0,0 are returned.

See also GRAPHIC ATTACH, GRAPHIC GET CANVAS, GRAPHIC GET CLIP, GRAPHIC GET SIZE, GRAPHIC SET CLIENT

GRAPHIC(Clip.X) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET CLIP statement New!

Purpose Retrieves the size of the clip area.

Syntax

```
GRAPHIC GET CLIP TO WidthVar!, HeightVar!
```

Function Form:

```
WidthVar!  = GRAPHIC(Clip.X)
HeightVar! = GRAPHIC(Clip.Y)
```

Remarks The clip area of a graphic target is that space where operations can be displayed. That is, the clip area is that portion of the client area which is not protected (clipped) by GRAPHIC SET CLIP.

GRAPHIC GET CLIP retrieves the size of the clip area, and assigns these values to the variables specified by *WidthVar!* and *HeightVar!*. The size is specified in PAGE UNITS. If no graphic target is selected, the values 0,0 are returned.

See also GRAPHIC GET CANVAS, GRAPHIC GET CLIENT, GRAPHIC SET CLIP

GRAPHIC(Clip.Y) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET CLIP statement New!

Purpose Retrieves the size of the clip area.

Syntax

```
GRAPHIC GET CLIP TO WidthVar!, HeightVar!
```

Function Form:

```
WidthVar!  = GRAPHIC(Clip.X)
HeightVar! = GRAPHIC(Clip.Y)
```

Remarks The clip area of a graphic target is that space where operations can be displayed. That is, the clip area is that portion of the client area which is not protected (clipped) by GRAPHIC SET CLIP.

GRAPHIC GET CLIP retrieves the size of the clip area, and assigns these values to the variables specified by *WidthVar!* and *HeightVar!*. The size is specified in PAGE UNITS. If no graphic target is selected, the values 0,0 are returned.

See also GRAPHIC GET CANVAS, GRAPHIC GET CLIENT, GRAPHIC SET CLIP

GRAPHIC(COL) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC CELL statement New!

Purpose

Sets or retrieves the next print position, based upon the row and column position of a text cell.

Syntax

```
GRAPHIC CELL = RowValue&, ColValue&
GRAPHIC CELL TO RowVar&, ColVar&
GRAPHIC COL TO ColVar&
GRAPHIC ROW TO RowVar&
```

Function Form:

```
ColVar& = GRAPHIC(COL)
RowVar& = GRAPHIC(ROW)
```

Remarks

GRAPHIC CELL is used to set or retrieve the print position, based upon the row and column position of a Text Cell. That is the row column position where the next printed text will be displayed. These operations are very similar to GRAPHIC GET POS and GRAPHIC SET POS, except that the position is reported in text rows and columns, rather than Page Units. The current graphic position is translated to a row and column number, based upon the standard character size in a fixed width font, or the average character size for a variable width font.

RowValue& specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the window is considered to be cell 1,1.

The first form of GRAPHIC CELL moves the print position to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed.

The second form of GRAPHIC CELL retrieves the current print position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*. Every point which falls within a text character cell is reported as that Row/Column position. If the graphic position is not at the upper left corner of the text character, you may get imprecise or unexpected results. This can occur if you perform a graphic operation other than GRAPHIC PRINT which leaves the "Last Point Referenced" at a mid-cell position.

The remaining forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

See also

GRAPHIC CELL SIZE, GRAPHIC GET POS, GRAPHIC SET FONT, GRAPHIC SET POS, GRAPHIC SET SCROLLTEXT, GRAPHIC SET WORDWRAP, GRAPHIC SET WRAP, GRAPHIC SPLIT

GRAPHIC(DC) function

GRAPHIC GET DC statement

Purpose

Retrieve the handle of the DC (device context) for the selected graphic target.

Syntax

```
GRAPHIC GET DC TO hDC???
Function Form:
DCVar??? = GRAPHIC(DC)
```

Remarks

The DC handle may be used with various Windows API functions to perform specialized graphic operations in the graphic target. If no graphic window is currently selected, zero is returned.

See also [GRAPHIC ATTACH]

GRAPHIC(INSTAT) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC INSTAT statement IMPROVED

Purpose Determines whether a keyboard character is ready.

Syntax **GRAPHIC INSTAT TO *NumericVar***

Function Form:
***InstatVar&* = GRAPHIC(INSTAT)**

Remarks The

variable receives the keyboard buffer status for the selected graphic target. The value assigned is TRUE (non-zero) if a keyboard character is ready to be retrieved, or FALSE (zero) if not.

GRAPHIC INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with GRAPHIC INKEY$, GRAPHIC INPUT, etc.

See also GRAPHIC INKEY$, GRAPHIC INPUT, GRAPHIC INPUT FLUSH, GRAPHIC LINE INPUT, GRAPHIC WAITKEY$

GRAPHIC(LINES) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET LINES statement IMPROVED

Purpose Retrieves the number of text lines which will fit on the graphic target.

Syntax **GRAPHIC GET LINES TO *linecount&***

Function Form:
***linecount&* = GRAPHIC(LINES)**

Remarks GRAPHIC GET LINES retrieves the number of lines of text which will fit on the graphic target, given the current selected font. This value is assigned to *linecount&*.

See also GRAPHIC ATTACH, GRAPHIC CELL, GRAPHIC CHR SIZE, GRAPHIC PRINT, GRAPHIC SET FONT, GRAPHIC TEXT SIZE

GRAPHIC(LOC.X) function

GRAPHIC GET LOC statement IMPROVED

Purpose Retrieves the location of the Graphic Window on the screen.

Syntax **GRAPHIC GET LOC TO *x&*, *y&***

***F*unction Form:**
***x&* = GRAPHIC(LOC.X)**
***y&* = GRAPHIC(LOC.Y)**

Remarks This statement retrieves the location of the selected Graphic Window. If no graphic object is selected, or it is not a Graphic Window, 0,0 is returned. The location is specified in pixels, relative to the upper left corner of the screen.

See also GRAPHIC ATTACH, GRAPHIC GET PPI, GRAPHIC SET LOC

GRAPHIC(LOC.Y) function

GRAPHIC GET LOC statement IMPROVED

Purpose Retrieves the location of the Graphic Window on the screen.

Syntax **GRAPHIC GET LOC TO *x&*, *y&***

***F*unction Form:**
***x&* = GRAPHIC(LOC.X)**
***y&* = GRAPHIC(LOC.Y)**

Remarks This statement retrieves the location of the selected Graphic Window. If no graphic object is selected, or it is not a Graphic Window, 0,0 is returned. The location is specified in pixels, relative to the upper left corner of the screen.

See also GRAPHIC ATTACH, GRAPHIC GET PPI, GRAPHIC SET LOC

GRAPHIC(MIX) function

GRAPHIC GET MIX statement IMPROVED

Purpose Retrieve the color mix mode for the selected graphic target.

Syntax **GRAPHIC GET MIX TO *mixmode&***

Function Form:
***mixmode&* = GRAPHIC(MIX)**

Remarks There are 16 mix modes available to use for mixing the drawing color with the color that already exists at the drawing location.

%mix_Blackness	Pixel is always 0 (black).
%mix_NotMergeSrc	Pixel is the inverse of the MergeSrc color.
%mix_MaskNotSrc	Pixel is a combination of the colors common to both the pixel and the inverse of the source.
%mix_NotCopySrc	Pixel is the inverse of the pen color.
%mix_MaskSrcNot	Pixel is a combination of the colors common to both the source and the inverse of the pixel.
%mix_Not	Pixel is the inverse of the pixel color.
%mix_XorSrc	Pixel is a combination of the colors in the source and in the pixel,

		but not in both.
	%mix_NotMaskSrc	Pixel is the inverse of the MaskSrc color.
	%mix_MaskSrc	Pixel is a combination of the colors common to both the source and the pixel.
	%mix_NotXorSrc	Pixel is the inverse of the XorSrc color.
	%mix_Nop	Pixel remains unchanged.
	%mix_MergeNotSrc	Pixel is a combination of the source color and the inverse of the pixel color.
	%mix_CopySrc	Pixel is the source color (default).
	%mix_MergeSrcNot	Pixel is a combination of the source color and the inverse of the pixel color.
	%mix_MergeSrc	Pixel is a combination of the source color and the pixel color.
	%mix_Whiteness	Pixel is always 1 (white).

See also GRAPHIC SET MIX

GRAPHIC(OVERLAP) function

GRAPHIC GET OVERLAP statement New!

Purpose Retrieves the status of Graphic Overlap Mode.

Syntax **GRAPHIC GET OVERLAP To *OverlapVar&***

*F*unction Form:
***OverlapVar&* = GRAPHIC(OVERLAP)**

Remarks GRAPHIC GET OVERLAP retrieves the status of overlap mode and assigns it to the variable specified by *OverlapVar&*. If Overlap Mode is enabled, the value true (non-zero) is assigned. If it's disabled, the value false (zero) is assigned instead. The value returned reflects the status of the graphic target which is currently attached to the graphic stream.

With Overlap Mode, you control how PowerBASIC treats graphic operations which involve a RECT structure in their definition. Windows graphic conventions consider the bottom and right coordinates of a RECT to be exclusive. In other words, the pixels at the bottom and right edges lie immediately outside the rectangle. They are not drawn, but are ignored. For example:

```
GRAPHIC BOX (0,0) - (50,50)
```

In this case, a box is drawn from 0,0 to 49,49. The final pixels at the bottom and right edge are simply not drawn. However, if Overlap Mode is enabled with GRAPHIC SET OVERLAP, the box is drawn from 0,0 to 50,50.

The Overlap Mode affects drawing operations involving GRAPHIC SCALE, GRAPHIC BOX, GRAPHIC ELLIPSE, GRAPHIC LINE, GRAPHIC POLYLINE, etc.

See also GRAPHIC SET OVERLAP

GRAPHIC(PIXEL...) function

GRAPHIC GET PIXEL statement IMPROVED

Purpose Retrieve the color of the pixel at the specified point in the selected graphic target.

Syntax **GRAPHIC GET PIXEL [STEP] (*x!*, *y!*) To *PixelVar&***

Function Form:
***PixelVar&* = GRAPHIC(PIXEL [STEP], *x!*, *y!*)**

Remarks The coordinate points *x!*, *y!* are specified in Page Units.

See also GRAPHIC ATTACH, GRAPHIC COLOR, GRAPHIC SCALE, GRAPHIC SET PIXEL

GRAPHIC(POS.X) function

GRAPHIC GET POS statement IMPROVED

Purpose Retrieve the POS (last point referenced) by a statement.

Syntax `GRAPHIC GET POS To XVar!, YVar!`

Function Form:

```
XVar! = GRAPHIC(POS.X)
YVar! = GRAPHIC(POS.Y)
```

Remarks The coordinate points *XVar!*, *YVar!* are specified in the same terms (pixels or dialog units) as the parent dialog (or world coordinates, if those were chosen with GRAPHIC SCALE).

See also GRAPHIC ATTACH, GRAPHIC CELL, GRAPHIC SCALE, GRAPHIC SET POS

GRAPHIC(POS.Y) function

GRAPHIC GET POS statement IMPROVED

Purpose Retrieve the POS (last point referenced) by a statement.

Syntax `GRAPHIC GET POS To XVar!, YVar!`

Function Form:

```
XVar! = GRAPHIC(POS.X)
YVar! = GRAPHIC(POS.Y)
```

Remarks The coordinate points *XVar!*, *YVar!* are specified in the same terms (pixels or dialog units) as the parent dialog (or world coordinates, if those were chosen with GRAPHIC SCALE).

See also GRAPHIC ATTACH, GRAPHIC CELL, GRAPHIC SCALE, GRAPHIC SET POS

GRAPHIC(PPI.X) function

GRAPHIC GET PPI statement IMPROVED

Purpose Retrieve the resolution of the display device, in points per inch.

Syntax `GRAPHIC GET PPI TO XVar&, YVar&`

Function Form:

```
XVar& = GRAPHIC(PPI.X)
YVar& = GRAPHIC(PPI.Y)
```

Remarks The resolution is always specified in pixels. This statement is particularly useful in drawing items such as rulers and graphs to a representative physical size". There are 25.4 millimeters per inch, so just divide by 25.4 to convert from pixels per inch to pixels per millimeter.

"Representative physical size" means that the actual image may be close to a particular physical size, but is subject to factors including Windows default PPI setting, the driver's DPI to PPI ratio and even how the monitor has been adjusted. By using the GRAPHIC GET PPI, results, you can construct a representative graphic image that can be saved and later output at the intended scale by more precise means, for example a higher resolution Windows printer.

See also GRAPHIC ATTACH, GRAPHIC SCALE

GRAPHIC(PPI.Y) function

GRAPHIC GET PPI statement IMPROVED

Purpose Retrieve the resolution of the display device, in points per inch.

Syntax `GRAPHIC GET PPI TO XVar&, YVar&`

Function Form:
`XVar& = GRAPHIC(PPI.X)`
`YVar& = GRAPHIC(PPI.Y)`

Remarks The resolution is always specified in pixels. This statement is particularly useful in drawing items such as rulers and graphs to a representative physical size". There are 25.4 millimeters per inch, so just divide by 25.4 to convert from pixels per inch to pixels per millimeter.

"Representative physical size" means that the actual image may be close to a particular physical size, but is subject to factors including Windows default PPI setting, the driver's DPI to PPI ratio and even how the monitor has been adjusted. By using the GRAPHIC GET PPI, results, you can construct a representative graphic image that can be saved and later output at the intended scale by more precise means, for example a higher resolution Windows printer.

See also GRAPHIC ATTACH, GRAPHIC SCALE

GRAPHIC(ROW) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC CELL statement New!

Purpose Sets or retrieves the next print position, based upon the row and column position of a text cell.

Syntax
```
GRAPHIC CELL = RowValue&, ColValue&
GRAPHIC CELL TO RowVar&, ColVar&
GRAPHIC COL TO ColVar&
GRAPHIC ROW TO RowVar&
```

Function Form:
`ColVar& = GRAPHIC(COL)`
`RowVar& = GRAPHIC(ROW)`

Remarks GRAPHIC CELL is used to set or retrieve the print position, based upon the row and column position of a Text Cell. That is the row column position where the next printed text will be displayed. These operations are very similar to GRAPHIC GET POS and GRAPHIC SET POS, except that the position is reported in text rows and columns, rather than Page Units. The current graphic position is translated to a row and column number, based upon the standard character size in a fixed width font, or the average character size for a variable width font.

RowValue& specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the window is considered to be cell 1,1.

The first form of GRAPHIC CELL moves the print position to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed.

The second form of GRAPHIC CELL retrieves the current print position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*. Every point which falls within a text character cell is reported as that Row/Column position. If the graphic position is not at the upper left corner of the text character, you may get imprecise or unexpected results. This can occur if you perform a graphic operation other than GRAPHIC PRINT which leaves the "Last Point Referenced" at a mid-cell position.

The remaining forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

See also GRAPHIC CELL SIZE, GRAPHIC GET POS, GRAPHIC SET FONT, GRAPHIC SET POS, GRAPHIC SET SCROLLTEXT, GRAPHIC SET WORDWRAP, GRAPHIC SET WRAP, GRAPHIC SPLIT

GRAPHIC(SCROLLTEXT) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET SCROLLTEXT statement New!

Purpose Retrieves the status of Graphic ScrollText Mode.

Syntax `GRAPHIC GET SCROLLTEXT To ScrollVar&`

Function Form:
`ScrollVar& = GRAPHIC(SCROLLTEXT)`

Remarks GRAPHIC GET SCROLLTEXT retrieves the status of ScrollText mode and assigns it to the variable specified by *ScrollVar&*. If ScrollText Mode is enabled, the value true (non-zero) is assigned. If it's disabled, the value false (zero) is assigned instead. The value returned reflects the status of the graphic target which is currently attached to the graphic stream.

With ScrollText Mode, you can control how PowerBASIC prints text on a graphic target when it reaches the end of a page. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the page. This can be modified under program control by using GRAPHIC SET SCROLLTEXT.

When ScrollText Mode is enabled, scrolling of a page is triggered only by GRAPHIC PRINT. If the POS (last point referenced) is located on the bottom row of the graphic target, and a GRAPHIC PRINT statement moves the POS off of the page, the entire contents of the graphic target is scrolled one row, and a new blank row is opened at the bottom.

See also GRAPHIC CELL, GRAPHIC SET SCROLLTEXT

GRAPHIC(SIZE.X) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET SIZE statement New!

Purpose Retrieves the overall size of the selected graphic target.

Syntax

```
GRAPHIC GET SIZE To WidthVar&, HeightVar&
```

Function Form:

```
WidthVar&  = GRAPHIC(SIZE.X)
HeightVar& = GRAPHIC(SIZE.Y)
```

Remarks GRAPHIC GET SIZE retrieves overall physical size of the selected graphic window or control. The size is specified in Pixels or Dialog Units, depending upon how it was created. The size always includes any caption, frame, scrollbars, etc. If no graphic target is attached, the values 0,0 are returned.

See also GRAPHIC GET CANVAS, GRAPHIC GET CLIENT, GRAPHIC GET CLIP, GRAPHIC GET LINES, GRAPHIC SET SIZE

GRAPHIC(SIZE.Y) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET SIZE statement New!

Purpose Retrieves the overall size of the selected graphic target.

Syntax

```
GRAPHIC GET SIZE To WidthVar&, HeightVar&
```

Function Form:

```
WidthVar&  = GRAPHIC(SIZE.X)
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See also GRAPHIC GET CANVAS, GRAPHIC GET CLIENT, GRAPHIC GET CLIP, GRAPHIC GET LINES, GRAPHIC SET SIZE

GRAPHIC(STRETCHMODE) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET STRETCHMODE statement New!

Purpose

Retrieves the default bitmap stretching mode for the attached DC.

Syntax

```
GRAPHIC GET STRETCHMODE TO ModeVar&
```

Function Form:

```
ModeVar& = GRAPHIC(STRETCHMODE)
```

Remarks

There are several operations in PowerBASIC which involve stretching or condensing images on bitmaps, most notably GRAPHIC STRETCH. As individual pixels must be added or removed, there is a good chance that the quality of the image will be degraded. However, if you describe the nature of the image by defining a StretchMode, you can substantially enhance the appearance.

The default StretchMode is maintained individually for each DC. You can retrieve the default mode with this statement, or set it with GRAPHIC GET STRETCHMODE. Of course, you can also override the default StretchMode when you execute one of the affected statements.

The 4 stretch mode equates are predefined in PowerBASIC.

Equate	Value	Description
%BLACKONWHITE	1	This is the default Windows stretch mode, and is most appropriate for monochrome bitmaps, or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels.
%WHITEONBLACK	2	Performs a boolean OR of eliminated and existing pixels. It preserves white pixels at the expense of black pixels.
%COLORONCOLOR	3	Deletes eliminated lines of pixels without trying to preserve their information.
%HALFTONE	4	This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source pixel block.

See also

GRAPHIC BITMAP LOAD, GRAPHIC COPY, GRAPHIC RENDER, GRAPHIC SET STRETCHMODE, GRAPHIC STRETCH

GRAPHIC(TEXT.SIZE.X...) function

GRAPHIC TEXT SIZE statement IMPROVED

Purpose Calculate the size of text to be printed.

Syntax

```
GRAPHIC TEXT SIZE txt$ TO WidthVar!, HeightVar!

Function Form:
WidthVar!  = GRAPHIC(TEXT.SIZE.X, txt$)
HeightVar! = GRAPHIC(TEXT.SIZE.Y, txt$)
```

Remarks This statement calculates the total size of the printed text, based upon the current font for the graphic target. The sizes returned are specified in Page Units.

This allows you to easily calculate the appropriate print position, particularly when using a proportional font.

See also FONT NEW, GRAPHIC CELL, GRAPHIC CELL SIZE, GRAPHIC CHR SIZE, GRAPHIC PRINT, GRAPHIC SET FONT, GRAPHIC SCALE, GRAPHIC SET WORDWRAP, GRAPHIC SET WRAP, GRAPHIC SPLIT

GRAPHIC(TEXT.SIZE.Y...) function

GRAPHIC TEXT SIZE statement IMPROVED

Purpose Calculate the size of text to be printed.

Syntax

```
GRAPHIC TEXT SIZE txt$ TO WidthVar!, HeightVar!

Function Form:
WidthVar!  = GRAPHIC(TEXT.SIZE.X, txt$)
HeightVar! = GRAPHIC(TEXT.SIZE.Y, txt$)
```

Remarks This statement calculates the total size of the printed text, based upon the current font for the graphic target. The sizes returned are specified in Page Units.

This allows you to easily calculate the appropriate print position, particularly when using a proportional font.

See also FONT NEW, GRAPHIC CELL, GRAPHIC CELL SIZE, GRAPHIC CHR SIZE, GRAPHIC PRINT, GRAPHIC SET FONT, GRAPHIC SCALE, GRAPHIC SET WORDWRAP, GRAPHIC SET WRAP, GRAPHIC SPLIT

GRAPHIC(View.X) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET VIEW statement New!

Purpose Retrieves the position of the virtual graphic viewport.

Syntax

```
GRAPHIC GET VIEW To WidthVar!, HeightVar!
```

Function Form:

```
WidthVar!  = GRAPHIC(View.X)
```

HeightVar! **= GRAPHIC(View.Y)**

Remarks Retrieves the position of the viewport on a virtual graphic target. The size is specified in Page Units. If no graphic target has been selected, or no virtual window has been created, the values 0,0 are returned.

See also GRAPHIC SET VIEW, GRAPHIC SET VIRTUAL

GRAPHIC(View.Y) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET VIEW statement New!

Purpose Retrieves the position of the virtual graphic viewport.

Syntax **GRAPHIC GET VIEW To *WidthVar!*, *HeightVar!***

Function Form:
WidthVar! **= GRAPHIC(View.X)**
HeightVar! **= GRAPHIC(View.Y)**

Remarks Retrieves the position of the viewport on a virtual graphic target. The size is specified in Page Units. If no graphic target has been selected, or no virtual window has been created, the values 0,0 are returned.

See also GRAPHIC SET VIEW, GRAPHIC SET VIRTUAL

GRAPHIC(WORDWRAP) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET WORDWRAP statement New!

Purpose Retrieves the status of Graphic WordWrap Mode.

Syntax **GRAPHIC GET WORDWRAP TO *WrapVar&***

Function Form:
WrapVar& **= GRAPHIC(WORDWRAP)**

Remarks GRAPHIC GET WORDWRAP retrieves the status of wordwrap mode and assigns it to the variable specified by *WrapVar&*. If WordWrap Mode is enabled, the value true (non-zero) is assigned. If it's disabled, the value false (zero) is assigned instead. The value returned reflects the status of the graphic target which is currently attached to the graphic stream.

With WordWrap Mode, you can control how PowerBASIC prints text on a graphic target when it reaches the end of a line. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the line. This can be modified under program control by using GRAPHIC SET WORDWRAP.

When WordWrap mode is enabled, it affects only GRAPHIC PRINT operations. If GRAPHIC PRINT attempts to display a word beyond the end of a row, the entire word is automatically wrapped to the first column of the next row.

See also GRAPHIC CELL, GRAPHIC GET WRAP, GRAPHIC SET WORDWRAP, GRAPHIC SET WRAP, GRAPHIC SPLIT

GRAPHIC(WRAP) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET WRAP statement New!

Purpose Retrieves the status of Graphic Wrap Mode.

Syntax `GRAPHIC GET WRAP TO WrapVar&`

Function Form:
`WrapVar& = GRAPHIC(WRAP)`

Remarks GRAPHIC GET WRAP retrieves the status of wrap mode and assigns it to the variable specified by *WrapVar&*. If Wrap Mode is enabled, the value true (non-zero) is assigned. If it's disabled, the value false (zero) is assigned instead. The value returned reflects the status of the graphic target which is currently attached to the graphic stream.

With Wrap Mode, you can control how PowerBASIC prints text on a graphic target when it reaches the end of a line. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the line. This can be modified under program control by using GRAPHIC SET WRAP.

When Wrap Mode is enabled, it affects only GRAPHIC PRINT operations. If GRAPHIC PRINT attempts to display a character beyond the end of a row, it is automatically wrapped to the first column of the next row.

See also GRAPHIC CELL, GRAPHIC GET WORDWRAP, GRAPHIC SET WORDWRAP, GRAPHIC SET WRAP, GRAPHIC SPLIT

GRAPHIC$(CAPTION) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET CAPTION statement New!

Purpose Retrieves the caption from a Graphic Window.

Syntax **GRAPHIC GET CAPTION To *CaptionVar$***

Function form:
***CaptionVar$* = GRAPHIC$(CAPTION)**

Remarks GRAPHIC GET CAPTION retrieves the text (if any) which is currently displayed as the caption of the selected Graphic Target. This area is also called the "title bar". A Graphic Window is the only form of Graphic Target which may have a caption, so other forms will return a null (zero-length) string.

See also GRAPHIC SET CAPTION, GRAPHIC WINDOW

GRAPHIC$(INKEY$) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC INKEY$ statement IMPROVED

Purpose Reads a keyboard character if one is ready.

Syntax **GRAPHIC INKEY$ TO *InkeyVar$***

Function Form:
***InkeyVar$* = GRAPHIC$(INKEY$)**

Remarks GRAPHIC INKEY$ returns a

of 0, 1, or 2 characters that reflects the status of the keyboard buffer for the selected graphic target. A null string (LEN=0) means that the buffer is empty - no key pressed.

A string length of one means that an ASCII key was pressed and the string contains the ASCII character. An ASCII value between 1 and 31 indicate a control code.

A string length of two means that an extended key was pressed. In this case, the first character in the string has an ASCII value of zero, and the second is the extended keyboard code.

See also GRAPHIC INPUT, GRAPHIC INPUT FLUSH, GRAPHIC INSTAT, GRAPHIC LINE INPUT, GRAPHIC WAITKEY$

GRAPHIC$(WAITKEY$) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC WAITKEY$ statement IMPROVED

Purpose Reads a keyboard character or extended key, waiting until one is ready.

Syntax

```
GRAPHIC WAITKEY$ [To WaitVar$]
GRAPHIC WAITKEY$ ([KeyMask$] [,TimeOut&]) [TO WaitVar$]
```

```
Function Form:
WaitVar$ = GRAPHIC$(WAITKEY$)
WaitVar$ = GRAPHIC$(WAITKEY$, [KeyMask$] [,TimeOutVal&])
```

Remarks Reads a character or extended key from the keyboard without echoing anything to the screen. If no data is available, GRAPHIC WAITKEY$ will wait for an event to occur. It is very similar to GRAPHIC INKEY$, except that it waits for input to be available. While waiting, time slices are released to the operating system to reduce CPU load.

It returns a

of one or two characters if a key was pressed. If the TO clause is omitted, the keyboard character is discarded.

If the optional *KeyMask$* expression is included, only a limited set of keys are recognized. *KeyMask$* may include any number of Sub-Masks, one for each key to observe. For example, GRAPHIC WAITKEY$("YyNn") will recognize upper-case or lower-case Y or N (for yes/no answers), while any other key will be ignored. If *KeyMask$* is omitted, or evaluates to a zero-length string, any key event will be recognized.

If the optional *TimeOutVal&* expression is included, it tells the maximum number of milliseconds to wait for a key. GRAPHIC WAITKEY$(5000) will wait a maximum of 5 seconds. The specified TimeOut period will only be approximate, so you should not rely upon precision accuracy. If the TimeOut period is exceeded, a zero-length string is returned. If the *TimeOutVal&* parameter is omitted, or evaluates to zero (0), it will wait an infinite length of time. The maximum *TimeOut&* permitted is one hour.

A string length of one (LEN(i$) = 1) means that a standard character key was pressed. The result string contains the character. An ASC()value between 1 and 31 indicates a control code.

A string length of two (LEN(i$) = 2) means that an extended key was pressed. In this case, the first character in the result string has an ASC() value of zero (0), and the second is the extended keyboard scan code. For example, pressing the F1 key will return CHR$(0, 59).

See also GRAPHIC INKEY$, GRAPHIC INPUT, GRAPHIC INPUT FLUSH, GRAPHIC INSTAT, GRAPHIC LINE INPUT

GRAPHIC$(WAITKEY$...) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC WAITKEY$ statement IMPROVED

Purpose Reads a keyboard character or extended key, waiting until one is ready.

Syntax
```
GRAPHIC WAITKEY$ [To WaitVar$]
GRAPHIC WAITKEY$ ([KeyMask$] [,TimeOut&]) [TO WaitVar$]
```

Function Form:
```
WaitVar$ = GRAPHIC$(WAITKEY$)
WaitVar$ = GRAPHIC$(WAITKEY$, [KeyMask$] [,TimeOutVal&])
```

Remarks Reads a character or extended key from the keyboard without echoing anything to the screen. If no data is available, GRAPHIC WAITKEY$ will wait for an event to occur. It is very similar to GRAPHIC INKEY$, except that it waits for input to be available. While waiting, time slices are released to the operating system to reduce CPU load.

It returns a

of one or two characters if a key was pressed. If the TO clause is omitted, the keyboard character is discarded.

If the optional *KeyMask$* expression is included, only a limited set of keys are recognized. *KeyMask$* may include any number of Sub-Masks, one for each key to observe. For example, GRAPHIC WAITKEY$("YyNn") will recognize upper-case or lower-case Y or N (for yes/no answers), while any other key will be ignored. If *KeyMask$* is omitted, or evaluates to a zero-length string, any key event will be recognized.

If the optional *TimeOutVal&* expression is included, it tells the maximum number of milliseconds to wait for a key. GRAPHIC WAITKEY$(5000) will wait a maximum of 5 seconds. The specified TimeOut period will only be approximate, so you should not rely upon precision accuracy. If the TimeOut period is exceeded, a zero-length string is returned. If the *TimeOutVal&* parameter is omitted, or evaluates to zero (0), it will wait an infinite length of time. The maximum *TimeOut&* permitted is one hour.

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See also GRAPHIC INKEY$, GRAPHIC INPUT, GRAPHIC INPUT FLUSH, GRAPHIC INSTAT, GRAPHIC LINE INPUT

GRAPHIC ARC statement

GRAPHIC ARC statement

Purpose Draw an arc in the selected graphic target.

Syntax
```
GRAPHIC ARC (x1!, y1!) - (x2!, y2!), arcStart!, arcEnd! [, rgbColor&]
```

Remarks An arc is a section of a circle or an ellipse. To specify a particular arc, you would first define the full circle or ellipse of which it is a part, and then specify the points on the ellipse where the arc starts and stops.

The full circle or ellipse is defined by its bounding rectangle, which is defined as the smallest rectangle which can be drawn around the circle or ellipse. For example, if the circle is centered at position (400,400), with a radius of 100 pixels, the upper left corner (*x1!*, *y1!*) of the bounding rectangle is (300,300), and the lower right corner (*x2!*, *y2!*) is

(500,500). The start point and end point of the arc are specified by their angle, which must be given in radians. A complete circle or ellipse is 2*pi radians. On a 12-hour clock-face, the values 0 and 2*pi both refer to the position of 3 o'clock, while the value 1*pi refers to the position of 9 o'clock. Other positions are specified by a radian value relative to these. In PowerBASIC, arcs are always drawn counter-clockwise from the starting point to the ending point.

Prior to any graphical operations, the graphic target must first be selected with GRAPHIC ATTACH. The Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog (or world coordinates, if those were chosen with GRAPHIC SCALE). Line width can be set using GRAPHIC WIDTH. If line width is set to 1 (the default), the line style can be set with GRAPHIC STYLE. Because of the nature of an arc, GRAPHIC ARC neither uses, nor updates, GRAPHIC POS (last point referenced).

x1!, *y1!* The upper left corner of the bounding rectangle of the full circle or ellipse.

x2!, *y2!* The lower right corner of the bounding rectangle of the full circle or ellipse.

ArcStart! The starting angle of the arc, in radians, from 0 to 2*pi.

ArcEnd! The ending angle of the arc, in radians, from 0 to 2*pi radians. Note that arcs are always drawn counter-clockwise from *arcStart!* to *arcEnd!*. Compared with a 12-hour clock-face, 0 or 2*pi radians is at 3 o'clock, and 1*pi radians is at 9 o'clock.

rgbColor& Optional RGB color for the arc. If omitted (or -1), the current foreground color for the graphic window is used.

See also Built In RGB Color Equates, GRAPHIC ATTACH, GRAPHIC COLOR, GRAPHIC ELLIPSE, GRAPHIC PIE, GRAPHIC SET OVERLAP, GRAPHIC STYLE, GRAPHIC WIDTH

Example

```
' Draw two arcs that combine into a circle.
' The upper half uses the default foreground color.
' The lower half is drawn in red.
LOCAL Pi AS DOUBLE
Pi = 4 * ATN(1)                           ' Calculate Pi
GRAPHIC ARC (5, 5) - (105, 105), 0,  Pi      ' Upper half
GRAPHIC ARC (5, 5) - (105, 105), Pi, 0, %RED ' Lower half
```

GRAPHIC ATTACH statement

GRAPHIC ATTACH statement

Purpose Select the graphic target (window, control, or

) on which future drawing operations will take place.

Syntax `GRAPHIC ATTACH hWin, id [, REDRAW]`

Remarks This statement chooses a graphic target. All further graphic operations will be directed to this target until another GRAPHIC ATTACH or GRAPHIC DETACH statement is executed, or the graphic target is deleted. All PowerBASIC graphical displays are persistent -- they will be automatically redrawn even if minimized or temporarily covered by another window.

By default, all graphic operations are displayed immediately upon execution of a graphic statement. In many cases, this is a good choice, because the display is always up-to-date. However, as the complexity of graphic operations increases, this continuous update process does not afford the best performance. It is usually better to use the REDRAW option described below, as it will generally provide a dramatic improvement in overall performance.

Only one thread may be attached to a particular Graphic Target at a time. An attempt to attach more than one will generate an Illegal Function Call Error 5.

hWin Handle of the GRAPHIC WINDOW, DIALOG, or BITMAP to be used with

statements.

id The control id, if the target is a GRAPHIC CONTROL, or zero if the target is a GRAPHIC WINDOW or GRAPHIC BITMAP.

REDRAW This option can provide a dramatic improvement in the execution speed of graphic statements, as it eliminates repetitive updates to the display. If this option is included, all drawing statements are buffered until a GRAPHIC REDRAW statement is executed, or the operating system chooses to update the target window. Without REDRAW, all graphical statements (Line, Box, Print, etc.) are performed immediately. However, in most cases, it's better to defer the display until a number of statements have been performed.

While the REDRAW option defers update of the display, it does not guarantee that no interim updates will be performed. There are times when the operating system, or other factors, may intervene. If update must be suppressed until complete, you should create your graphic invisibly using a GRAPHIC BITMAP, then display it by using GRAPHIC COPY.

Example

```
' Draw a blue gradient fill.
' Each line is displayed as it's drawn.
GRAPHIC ATTACH hDlg, %IDC_GRAPHIC1
FOR y& = 0 TO 255
  GRAPHIC LINE (0, y&) - (255, y&), RGB(0, 0, y&)
NEXT

' Draw a buffered, blue gradient fill.
' Nothing is displayed before GRAPHIC REDRAW,
' this enhancing performance dramatically.
GRAPHIC ATTACH hDlg, %IDC_GRAPHIC2, REDRAW
FOR y& = 0 TO 255
  GRAPHIC LINE (0, y&) - (255, y&), RGB(0, 0, y&)
NEXT
GRAPHIC REDRAW
```

See also CONTROL ADD GRAPHIC, GRAPHIC BITMAP LOAD, GRAPHIC BITMAP NEW, GRAPHIC DETACH, GRAPHIC WINDOW

GRAPHIC BITMAP END statement

GRAPHIC BITMAP END statement

Purpose Close the selected graphic bitmap.

Syntax `GRAPHIC BITMAP END`

Remarks You must close every memory bitmap (that was created with GRAPHIC BITMAP LOAD or GRAPHIC BITMAP NEW) when you are finished using them for graphical operations. To close a bitmap, select it with the GRAPHIC ATTACH statement, then execute GRAPHIC BITMAP END.

See also GRAPHIC ATTACH, GRAPHIC BITMAP LOAD, GRAPHIC BITMAP NEW

GRAPHIC BITMAP LOAD statement

GRAPHIC BITMAP LOAD statement

Purpose Create a memory bitmap and load an image into it.

Syntax **GRAPHIC BITMAP LOAD *BmpName$, nWidth&, nHeight&* [,*stretch&*] TO *hBmp???***

BmpName$ The name of the bitmap image to load.

nWidth& The width of the bitmap, in pixels.

nHeight& The height of the bitmap, in pixels.

stretch& Stretch mode if the bitmap is to be resized.

hBmp??? The bitmap handle.

Remarks GRAPHIC BITMAP LOAD creates a new memory bitmap, loading a bitmap image from a resource or a disk file. This bitmap works just like a GRAPHIC WINDOW, except that it is not visible. The parameter *BmpName$* specifies the name of the image to be loaded. If *BmpName$* contains a period, it is presumed to be the name of a disk file. Otherwise, an attempt is made to load it from a resource -- if not found, it is then presumed to be a disk file.

The parameters *nWidth&* and *nHeight&* specify the width and height of the bitmap, in pixels. If either of the size parameters are zero (0), the bitmap is loaded at its natural size. If either of the size parameters is different from the natural size, the bitmap is stretched or condensed to the requested size.

If the bitmap creation is successful, the bitmap handle is assigned to the variable *hbmp???*. If not successful, *hbmp???* is set to zero. When you are finished using this memory bitmap, you must delete it with GRAPHIC BITMAP END.

If the *stretch&* parameter is included, it is one of the values in the following table. If not included, or it is the value zero (0), the stretch mode is unchanged. An appropriate choice of stretch mode can substantially enhance the quality of bitmaps which are changed in size. The stretch mode equates are predefined in PowerBASIC.

The 4 stretch modes are:

%BLACKONWHITE	This is the default Windows stretch mode, and is most appropriate for monochrome bitmaps, or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels.
%WHITEONBLACK	Performs a boolean OR of eliminated and existing pixels. It preserves white pixels at the expense of black pixels.
% COLORONCOLOR	Deletes eliminated lines of pixels without trying to preserve their information.
%HALFTONE	This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source pixel block.

The following code will retrieve the natural size of an image in a bitmap file, in pixels:

```
nFile& = FREEFILE
OPEN "myimage.bmp" FOR BINARY AS nFile&
GET #nFile&, 19, nWidth&
GET #nFile&, 23, nHeight&
CLOSE nFile&
```

See also GRAPHIC BITMAP END, GRAPHIC BITMAP NEW, GRAPHIC GET STRETCHMODE, GRAPHIC IMAGELIST, GRAPHIC RENDER, GRAPHIC SET STRETCHMODE, GRAPHIC STRETCH

GRAPHIC BITMAP NEW statement

GRAPHIC BITMAP NEW statement

Purpose Create a new memory bitmap.

Syntax `GRAPHIC BITMAP NEW nWidth&, nHeight& TO hBmp???`

Remarks GRAPHIC BITMAP NEW creates a new memory bitmap, which may be manipulated and drawn just as if it were a GRAPHIC WINDOW, except that it is not visible. The parameters *nWidth&* and *nHeight&* specify the width and height of the bitmap, in pixels. If the bitmap creation is successful, the bitmap handle is assigned to the variable *hBmp???*

. If not successful, *hBmp???* is set to zero. When you are finished using this memory bitmap, you must delete it with GRAPHIC BITMAP END.

See also GRAPHIC ATTACH, GRAPHIC BITMAP END, GRAPHIC BITMAP LOAD, GRAPHIC IMAGELIST

GRAPHIC BOX statement

GRAPHIC BOX statement

Purpose Draw a box with square or rounded corners in the selected graphic target.

Syntax
```
GRAPHIC BOX (x1!, y1!) - (x2!, y2!) [, [corner&] [, [rgbColor&] [,
    [fillcolor&] [, [fillstyle&]]]]]
```

Remarks The coordinates are specified in Page Units. Line width can be set using GRAPHIC WIDTH. If line width is set to 1 (the default), the line style can be set with GRAPHIC STYLE. Because of the nature of a box, GRAPHIC BOX neither uses, nor updates, the last point referenced (POS). Windows graphic conventions consider the bottom and right coordinates of a BOX to be exclusive. The pixels at the bottom and right edges are not drawn unless Overlap Mode is enabled. See GRAPHIC SET OVERLAP for details.

x1!, *y1!* The upper left corner of the box.

x2!, *y2!* The lower right corner of the box.

corner& The percentage of roundness of the corners, in the range of 0 to 100. A value of zero creates square corners, while 100 creates a circle/oval. A value of 20 being most common for a pleasant, rounded appearance. If *corner&* is omitted, the default is 0, which creates a rectangle with square corners.

rgbColor& Optional RGB color of the box edge. If omitted (or -1), the edge color defaults to the current foreground color for the selected graphic target.

fillcolor& Optional RGB color of the box interior. If *fillcolor&* is omitted (or -2), the interior of the box is not filled, allowing the background to show through. If *fillcolor&* is -1, the interior is painted with the same color as the edge. Otherwise, *fillcolor&* specifies the RGB color to be used.

fillstyle& Optional fill style (pattern) to be used. If *fillstyle&* is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the *fillcolor&*, while the background is specified by the default background color. The optional *fillstyle&* may be:

0	Solid (default)
1	Horizontal Lines
2	Vertical Lines
3	Upward Diagonal Lines
4	Downward Diagonal Lines
5	Crossed Lines
6	Diagonal Crossed Lines

See also Built In RGB Color Equates, GRAPHIC ATTACH, GRAPHIC COLOR, GRAPHIC LINE, GRAPHIC SET OVERLAP, GRAPHIC STYLE, GRAPHIC WIDTH

Example
```
' Draw rectangle with square corners and default colors.
GRAPHIC BOX (10, 10) - (100, 80)

' Draw a blue rectangle with 20% rounded corners,
' filled with a light-gray, diagonal cross pattern
GRAPHIC BOX (15, 15) - (95, 75), 20, %BLUE, RGB(191,191,191), 6
```

GRAPHIC CELL SIZE statement

GRAPHIC CELL SIZE statement New!

Purpose Retrieve the character cell size including external leading.

Syntax `GRAPHIC CELL SIZE TO WidthVar!, HeightVar!`

Function Form:

```
WidthVar!  = GRAPHIC(Cell.Size.X)
HeightVar! = GRAPHIC(Cell.Size.Y)
```

Remarks GRAPHIC CELL SIZE retrieves the size of one character cell, for the current font, on the attached graphic target. The returned character size is specified in PAGE UNITS, and allows you to calculate the number of text lines which will fit in a particular space. The height value is the size of the displayed character, including external leading (if any) for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console,the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some scaled units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the exact height of characters without external leading, use GRAPHIC CHR SIZE.

See also GRAPHIC CELL, GRAPHIC CHR SIZE, GRAPHIC SET FONT, GRAPHIC TEXT SIZE

GRAPHIC CELL statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC CELL statement New!

Purpose Sets or retrieves the next print position, based upon the row and column position of a text cell.

Syntax

```
GRAPHIC CELL = RowValue&, ColValue&
GRAPHIC CELL TO RowVar&, ColVar&
GRAPHIC COL TO ColVar&
GRAPHIC ROW TO RowVar&
```

Function Form:

```
ColVar& = GRAPHIC(COL)
RowVar& = GRAPHIC(ROW)
```

Remarks GRAPHIC CELL is used to set or retrieve the print position, based upon the row and column position of a Text Cell. That is the row column position where the next printed text will be displayed. These operations are very similar to GRAPHIC GET POS and GRAPHIC SET POS, except that the position is reported in text rows and columns, rather than Page Units. The current graphic position is translated to a row and column number, based upon the standard character size in a fixed width font, or the average character size for a variable width font.

RowValue& specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the window is considered to be cell 1,1.

The first form of GRAPHIC CELL moves the print position to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed.

The second form of GRAPHIC CELL retrieves the current print position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*. Every point which falls within a text character cell is reported as that Row/Column position. If the graphic position is not at the upper left corner of the text character, you may get imprecise or unexpected results. This can occur if you perform a graphic operation other than GRAPHIC PRINT which leaves the "Last Point Referenced" at a mid-cell position.

The remaining forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

See also GRAPHIC CELL SIZE, GRAPHIC GET POS, GRAPHIC SET FONT, GRAPHIC SET POS, GRAPHIC SET SCROLLTEXT, GRAPHIC SET WORDWRAP, GRAPHIC SET WRAP, GRAPHIC SPLIT

GRAPHIC CHR SIZE statement

GRAPHIC CHR SIZE statement IMPROVED

Purpose Retrieve the character size on the Graphic Target.

Syntax ***GRAPHIC CHR SIZE To WidthVar!, HeightVar!***

Function Form:

```
WidthVar!  = GRAPHIC(Chr.Size.X)
HeightVar! = GRAPHIC(Chr.Size.Y)
```

Remarks GRAPHIC CHR SIZE retrieves the size of one character, for the current font, on the attached graphic target. The returned character size is specified in Page Units. The height value is the actual size of the displayed character, without including external leading (if any) for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console,the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some scaled units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the total row height including external leading, use GRAPHIC CELL SIZE instead.

See also GRAPHIC ATTACH, GRAPHIC CELL, GRAPHIC CELL SIZE, GRAPHIC SET FONT, GRAPHIC PRINT, GRAPHIC TEXT SIZE

GRAPHIC CLEAR statement

GRAPHIC CLEAR statement

Purpose Clear the entire selected graphic target, optionally using a specified color and fill style.

Syntax **GRAPHIC CLEAR [*rgbColor&* [, *fillstyle&*]]**

Remarks The graphic target must first be selected with GRAPHIC ATTACH. The last point referenced (POS) is set to the upper left corner of the graphic window (0,0).

rgbColor&	Optional RGB value representing the fill color. If *rgbColor&* is omitted (or -1), the graphic target is cleared to the default background color for the selected graphic target.
fillstyle&	Optional fill style (pattern) to be used. If *fillstyle&* is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the *rgbColor&*, while the background is specified by the default background color for the selected graphic window. The optional *fillstyle&* may be: 0 Solid (default) 1 Horizontal Lines 2 Vertical Lines 3 Upward Diagonal Lines 4 Downward Diagonal Lines 5 Crossed Lines 6 Diagonal Crossed Lines
See also	Built In RGB Color Equates, GRAPHIC ATTACH, GRAPHIC COLOR

GRAPHIC COLOR statement

GRAPHIC COLOR statement IMPROVED

Purpose Sets the foreground and background color.

Syntax **GRAPHIC COLOR *foreground&* [, *background&*]**

Remarks If either parameter is -1, the default foreground/background color is used. If the background parameter is -2, the background is not painted, allowing the content behind to become visible. If either parameter is -3, the existing color is not changed. Otherwise, the specified RGB color is used.

See also Built In RGB Color Equates, GRAPHIC ATTACH, GRAPHIC PRINT, GRAPHIC SET FONT

Example

```
' Set red foreground and blue background color.
GRAPHIC COLOR %RED, RGB(0,0,191)
```

GRAPHIC COPY statement

GRAPHIC COPY statement

Purpose Copy a

to the selected graphic target.

Syntax

```
GRAPHIC COPY hbmpSource???, id& [, style&]
GRAPHIC COPY hbmpSource???, id& TO (x!, y!) [, style&]
GRAPHIC COPY hbmpSource???, id&, (x1!, y1!)-(x2!, y2!) TO (x!, y!) [,
style%]
```

Remarks You can copy a complete bitmap, or a portion of it, to the selected graphic target. The expression *hbmpSource???* specifies the handle of the source GRAPHIC BITMAP, GRAPHIC WINDOW, or dialog containing a GRAPHIC CONTROL. The expression *id&* is the unique control identifier in the range 1 to 65535, as assigned with the CONTROL ADD GRAPHIC statement. *id&* must be 0 for a GRAPHIC WINDOW or a GRAPHIC BITMAP. The destination of the copy operation is the window selected by GRAPHIC ATTACH. You must take care that your parameters are valid for the specified bitmap, or the results of the operation are undefined.

The first form of the GRAPHIC COPY statement copies the complete bitmap, positioning it at (0,0), which is the upper left corner of the destination.

The second form of GRAPHIC COPY also copies the complete bitmap, but positions it at the point specified by the parameter (*x!*, *y!*).

The third form copies a portion of the bitmap, specified by x1,y1 as the upper left corner and x2,y2 as the lower right corner. It is positioned at the point specified by the parameter (x,y). You must use care that your parameters are valid for the specified bitmaps, or results of the operation are undefined.

If the style parameter is included, it is one of the values in the following table. If not included, a default of %mix_CopySrc is presumed. There are 8 mix modes available to use for mixing drawing colors with the colors which already exist at the at the drawing location The mix mode

are predefined in PowerBASIC.

%mix_Blackness	Pixel is always 0 (black).
%mix_NotMergeSrc	Pixel is the inverse of the MergeSrc color.
%mix_MaskNotSrc	Pixel is a combination of the colors common to both the pixel and the inverse of the source.
%mix_NotCopySrc	Pixel is the inverse of the pen color.
%mix_MaskSrcNot	Pixel is a combination of the colors common to both the source and the inverse of the pixel.
%mix_Not	Pixel is the inverse of the pixel color.
%mix_XorSrc	Pixel is a combination of the colors in the source and in the pixel, but not in both.
%mix_NotMaskSrc	Pixel is the inverse of the MaskSrc color.
%mix_MaskSrc	Pixel is a combination of the colors common to both the source and the pixel.
%mix_NotXorSrc	Pixel is the inverse of the XorSrc color.
%mix_Nop	Pixel remains unchanged.
%mix_MergeNotSrc	Pixel is a combination of the source color and the inverse of the pixel color.
%mix_CopySrc	Pixel is the source color (default).
%mix_MergeSrcNot	Pixel is a combination of the source color and the inverse of the pixel color.
%mix_MergeSrc	Pixel is a combination of the source color and the pixel color.
%mix_Whiteness	Pixel is always 1 (white).

See also GRAPHIC GET STRETCHMODE, GRAPHIC RENDER, GRAPHIC SET STRETCHMODE, GRAPHIC STRETCH

GRAPHIC DETACH statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC DETACH statement

Purpose Detaches a graphic target attached to the graphic stream.

Syntax `GRAPHIC DETACH`

Remarks Though detached from the graphic stream, the graphic target is not deleted, nor is it altered in any way. Until another graphic target is attached, any

statements executed are ignored. If no graphic is attached, this statement performs no operation.

See also GRAPHIC ATTACH, GRAPHIC BITMAP LOAD, GRAPHIC BITMAP NEW, GRAPHIC WINDOW

GRAPHIC ELLIPSE statement

GRAPHIC ELLIPSE statement

Purpose Draw an ellipse or a circle in the selected graphic target.

Syntax **GRAPHIC ELLIPSE (*x1!*, *y1!*) - (*x2!*, *y2!*) [, [*rgbColor&*] [,[*fillcolor&*] [, [*fillstyle&*]]]]**

Remarks Coordinates are specified in Page Units. Line width can be set using GRAPHIC WIDTH. If line width is set to 1 (the default), the line style can be set with GRAPHIC STYLE. Because of the nature of an ellipse, which has no obvious beginning or end, GRAPHIC ELLIPSE neither uses, nor updates, the last point referenced (POS).

The coordinate pair define an invisible bounding rectangle which would enclose the ellipse to be drawn. It tells both the size and the proportions of the ellipse. Windows graphic conventions consider the bottom and right coordinates of it to be exclusive. The pixels at the bottom and right edges are ignored, unless Overlap Mode is enabled. See GRAPHIC SET OVERLAP for details.

x1!, *y1!* The upper left corner of the bounding rectangle.

x2!, *y2!* The lower right corner of the bounding rectangle.

rgbColor& Optional RGB color of the ellipse edge. If omitted (or -1), the edge color defaults to the current foreground color for the selected graphic window.

fillcolor& Optional RGB color of the ellipse interior. If *fillcolor&* is omitted (or -2), the interior of the ellipse is not filled, allowing the background to show through. If *fillcolor&* is -1, the interior is painted with the same color as the edge. Otherwise, *fillcolor&* specifies the RGB color to be used.

fillstyle& Optional fill style (pattern) to be used. If *fillstyle&* is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the *fillcolor&*, while the background is specified by the default background color for the selected graphic window. The optional *fillstyle&* may be:

0	Solid (default)
1	Horizontal Lines
2	Vertical Lines
3	Upward Diagonal Lines
4	Downward Diagonal Lines
5	Crossed Lines
6	Diagonal Crossed Lines

See also Built In RGB Color Equates, GRAPHIC ARC, GRAPHIC ATTACH, GRAPHIC COLOR, GRAPHIC LINE, GRAPHIC PIE, GRAPHIC SET OVERLAP, GRAPHIC STYLE, GRAPHIC WIDTH

Example

```
' Draw a circle, using default colors.
GRAPHIC ELLIPSE (10, 10) - (100, 100)

' Draw a blue ellipse filled with a light-gray,
' diagonal cross pattern.
GRAPHIC ELLIPSE (15, 25) - (95, 50), %BLUE, RGB(191,191,191), 6
```

GRAPHIC GET BITS statement

GRAPHIC GET BITS statement

Purpose Retrieve a copy of a bitmap , storing it as a device-independent bitmap in a dynamic string variable.

Syntax `GRAPHIC GET BITS TO bitvar$`

Remarks This statement retrieves a copy of the entire bitmap for the selected graphic target, assigning it to the dynamic string variable specified by *bitvar$*. This allows you to make many modifications to the bitmap very quickly, particularly operations which may not be directly supported by GRAPHIC code. For example, you might change all red pixels in a bitmap to blue. Once your operations are complete, the bitmap is replaced using GRAPHIC SET BITS.

The *bitvar$* string will contain a series of four-byte values, each of which represents a long integer. You can convert the four-byte string sections to numeric values with the CVL function, and convert a numeric value to a four-byte string with MKL$. The first four-byte value specifies the width of the bitmap, in pixels, and the second specifies the height. Following that will be one four-byte value for each pixel in the bitmap, which represents the color of that pixel. So, a 20 by 20 bitmap would have 400 pixels and require 1600 bytes (400 * 4), plus 4 bytes for the width and 4 bytes for the height, or a total of 1608 bytes.

The first four-byte pixel value in the string represents the top-left corner of the image, the second represents the second pixel of the first row, and so on. After the last pixel of the first row will be the first pixel of the second row, etc.

If execution speed is most important, it's likely that the string can be manipulated most efficiently with pointer variables.

Some Windows API functions, namely those which reference Device-Independent Bitmaps (DIB), require that colors be specified in the reverse of normal RGB sequence (Blue-Green-Red instead of Red-Green-Blue). To maximize performance, GRAPHIC GET BITS uses BGR format as well. You can use the BGR() function to translate an RGB value to its BGR equivalent.

See also Built In RGB Color Equates, BGR, CVL, GRAPHIC SET BITS, MKL$, RGB

Example

```
' Change all red pixels to blue
LOCAL PixelPtr AS LONG PTR
GRAPHIC GET BITS TO bmp$
xsize& = CVL(bmp$,1)
ysize& = CVL(bmp$,5)
PixelPtr = STRPTR(bmp$) + 8
FOR i& = 1 TO xsize& * ysize&
  IF @PixelPtr = BGR(%red) THEN @PixelPtr = BGR(%blue)
  INCR PixelPtr
NEXT
GRAPHIC SET BITS bmp$
```

GRAPHIC GET CANVAS statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET CANVAS statement New!

Purpose Retrieves the writable size of the attached graphic target.

Syntax
```
GRAPHIC GET CANVAS TO WidthVar!, HeightVar!
```
Function Form:
```
WidthVar!  = GRAPHIC(CANVAS.X)
HeightVar! = GRAPHIC(CANVAS.Y)
```

Remarks GRAPHIC GET CANVAS retrieves the size of the drawing buffer for the attached graphic window, control, or bitmap. The size is specified in Page Units, so it could return scaled values if they were applied with GRAPHIC SCALE. If the graphic window or control is FIXED (the default), the size returned is equivalent to the CLIENT size (other than the scaling factor). The CANVAS size does not include a caption, frame, scrollbars, etc. If no graphic target has been attached with GRAPHIC ATTACH, the values 0,0 are returned.

See also GRAPHIC GET CLIENT, GRAPHIC GET CLIP, GRAPHIC GET SIZE, GRAPHIC GET SCALE, GRAPHIC SCALE

GRAPHIC GET CAPTION statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET CAPTION statement New!

Purpose Retrieves the caption from a Graphic Window.

Syntax
```
GRAPHIC GET CAPTION To CaptionVar$
```
Function form:
```
CaptionVar$ = GRAPHIC$(CAPTION)
```

Remarks GRAPHIC GET CAPTION retrieves the text (if any) which is currently displayed as the caption of the selected Graphic Target. This area is also called the "title bar". A Graphic Window is the only form of Graphic Target which may have a caption, so other forms will return a null (zero-length) string.

See also GRAPHIC SET CAPTION, GRAPHIC WINDOW

GRAPHIC GET CLIENT statement

GRAPHIC GET CLIENT statement IMPROVED

Purpose Retrieve the client size of the selected graphic target.

Syntax
```
GRAPHIC GET CLIENT To WidthVar!, HeightVar!
```
Function form:
```
WidthVar!  = GRAPHIC(Client.X)
HeightVar! = GRAPHIC(Client.Y)
```

Remarks GRAPHIC GET CLIENT retrieves the physical size of the client area (visible part) of the attached graphic window or control. The size is specified in Pixels or Dialog Units, depending upon how it was created. The sizes returned are not altered or affected by GRAPHIC SCALE, VIRTUAL, or AUTOSIZE operations, as it returns the physical size of the viewable area in the terms used to create it. The client area does not include a caption, frame, scrollbars, etc. When GRAPHIC GET CLIENT is used with a

, it returns 0,0. You would normally use GRAPHIC GET CANVAS with a Bitmap, or to obtain the size of the area which can be drawn. If no graphic target has been attached with GRAPHIC ATTACH, the values 0,0 are returned.

See also GRAPHIC ATTACH, GRAPHIC GET CANVAS, GRAPHIC GET CLIP, GRAPHIC GET SIZE, GRAPHIC SET CLIENT

GRAPHIC GET CLIP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET CLIP statement New!

Purpose Retrieves the size of the clip area.

Syntax

```
GRAPHIC GET CLIP TO WidthVar!, HeightVar!
```

Function Form:

```
WidthVar!  = GRAPHIC(Clip.X)
HeightVar! = GRAPHIC(Clip.Y)
```

Remarks The clip area of a graphic target is that space where

operations can be displayed. That is, the clip area is that portion of the client area which is not protected (clipped) by GRAPHIC SET CLIP.

GRAPHIC GET CLIP retrieves the size of the clip area, and assigns these values to the variables specified by *WidthVar!* and *HeightVar!*. The size is specified in PAGE UNITS. If no graphic target is selected, the values 0,0 are returned.

See also GRAPHIC GET CANVAS, GRAPHIC GET CLIENT, GRAPHIC SET CLIP

GRAPHIC GET DC statement

GRAPHIC GET DC statement

Purpose Retrieve the handle of the DC (device context) for the selected graphic target.

Syntax

```
GRAPHIC GET DC TO hDC???
Function Form:
DCVar??? = GRAPHIC(DC)
```

Remarks The DC handle may be used with various Windows API functions to perform specialized graphic operations in the graphic target. If no graphic window is currently selected, zero is returned.

See also GRAPHIC ATTACH

GRAPHIC GET LINES statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET LINES statement IMPROVED

Purpose Retrieves the number of text lines which will fit on the graphic target.

Syntax

```
GRAPHIC GET LINES TO linecount&
```

Function Form:

```
linecount& = GRAPHIC(LINES)
```

Remarks GRAPHIC GET LINES retrieves the number of lines of text which will fit on the graphic target, given the current selected font. This value is assigned to *linecount&*.

See also GRAPHIC ATTACH, GRAPHIC CELL, GRAPHIC CHR SIZE, GRAPHIC PRINT, GRAPHIC SET FONT, GRAPHIC TEXT SIZE

GRAPHIC GET LOC statement

GRAPHIC GET LOC statement IMPROVED

Purpose Retrieves the location of the Graphic Window on the screen.

Syntax

```
GRAPHIC GET LOC TO x&, y&
```

Function Form:

```
x& = GRAPHIC(LOC.X)
y& = GRAPHIC(LOC.Y)
```

Remarks This statement retrieves the location of the selected Graphic Window. If no graphic object is selected, or it is not a Graphic Window, 0,0 is returned. The location is specified in pixels, relative to the upper left corner of the screen.

See also GRAPHIC ATTACH, GRAPHIC GET PPI, GRAPHIC SET LOC

GRAPHIC GET MIX statement

GRAPHIC GET MIX statement IMPROVED

Purpose Retrieve the color mix mode for the selected graphic target.

Syntax

```
GRAPHIC GET MIX TO mixmode&
```

Function Form:

```
mixmode& = GRAPHIC(MIX)
```

Remarks There are 16 mix modes available to use for mixing the drawing color with the color that already exists at the drawing location.

%mix_Blackness	Pixel is always 0 (black).
%mix_NotMergeSrc	Pixel is the inverse of the MergeSrc color.
%mix_MaskNotSrc	Pixel is a combination of the colors common to both the pixel and

	the inverse of the source.
%mix_NotCopySrc	Pixel is the inverse of the pen color.
%mix_MaskSrcNot	Pixel is a combination of the colors common to both the source and the inverse of the pixel.
%mix_Not	Pixel is the inverse of the pixel color.
%mix_XorSrc	Pixel is a combination of the colors in the source and in the pixel, but not in both.
%mix_NotMaskSrc	Pixel is the inverse of the MaskSrc color.
%mix_MaskSrc	Pixel is a combination of the colors common to both the source and the pixel.
%mix_NotXorSrc	Pixel is the inverse of the XorSrc color.
%mix_Nop	Pixel remains unchanged.
%mix_MergeNotSrc	Pixel is a combination of the source color and the inverse of the pixel color.
%mix_CopySrc	Pixel is the source color (default).
%mix_MergeSrcNot	Pixel is a combination of the source color and the inverse of the pixel color.
%mix_MergeSrc	Pixel is a combination of the source color and the pixel color.
%mix_Whiteness	Pixel is always 1 (white).

See also GRAPHIC SET MIX

GRAPHIC GET OVERLAP statement

GRAPHIC GET OVERLAP statement New!

Purpose Retrieves the status of Graphic Overlap Mode.

Syntax **GRAPHIC GET OVERLAP To *OverlapVar&***

Function Form:
***OverlapVar&* = GRAPHIC(OVERLAP)**

Remarks GRAPHIC GET OVERLAP retrieves the status of overlap mode and assigns it to the variable specified by *OverlapVar&*. If Overlap Mode is enabled, the value true (non-zero) is assigned. If it's disabled, the value false (zero) is assigned instead. The value returned reflects the status of the graphic target which is currently attached to the graphic stream.

With Overlap Mode, you control how PowerBASIC treats graphic operations which involve a RECT structure in their definition. Windows graphic conventions consider the bottom and right coordinates of a RECT to be exclusive. In other words, the pixels at the bottom and right edges lie immediately outside the rectangle. They are not drawn, but are ignored. For example:

```
GRAPHIC BOX (0,0) - (50,50)
```

In this case, a box is drawn from 0,0 to 49,49. The final pixels at the bottom and right edge are simply not drawn. However, if Overlap Mode is enabled with GRAPHIC SET OVERLAP, the box is drawn from 0,0 to 50,50.

The Overlap Mode affects drawing operations involving GRAPHIC SCALE, GRAPHIC BOX, GRAPHIC ELLIPSE, GRAPHIC LINE, GRAPHIC POLYLINE, etc.

See also GRAPHIC SET OVERLAP

GRAPHIC GET PIXEL statement

GRAPHIC GET PIXEL statement IMPROVED

Purpose Retrieve the color of the pixel at the specified point in the selected graphic target.

Syntax **GRAPHIC GET PIXEL [STEP] (*x!*, *y!*) To *PixelVar&***

	Function Form: ***PixelVar&*** **= GRAPHIC(PIXEL [STEP],** ***x!*****,** ***y!*****)**
Remarks	The coordinate points *x!*, *y!* are specified in Page Units.
See also	GRAPHIC ATTACH, GRAPHIC COLOR, GRAPHIC SCALE, GRAPHIC SET PIXEL

GRAPHIC GET POS statement

GRAPHIC GET POS statement IMPROVED

Purpose	Retrieve the POS (last point referenced) by a statement.
Syntax	**GRAPHIC GET POS To** ***XVar!*****,** ***YVar!*** *Function Form:* ***XVar!*** **= GRAPHIC(POS.X)** ***YVar!*** **= GRAPHIC(POS.Y)**
Remarks	The coordinate points *XVar!*, *YVar!* are specified in the same terms (pixels or dialog units) as the parent dialog (or world coordinates, if those were chosen with GRAPHIC SCALE).
See also	GRAPHIC ATTACH, GRAPHIC CELL, GRAPHIC SCALE, GRAPHIC SET POS

GRAPHIC GET PPI statement

GRAPHIC GET PPI statement IMPROVED

Purpose	Retrieve the resolution of the display device, in points per inch.
Syntax	**GRAPHIC GET PPI TO** ***XVar&*****,** ***YVar&*** *Function Form:* ***XVar&*** **= GRAPHIC(PPI.X)** ***YVar&*** **= GRAPHIC(PPI.Y)**
Remarks	The resolution is always specified in pixels. This statement is particularly useful in drawing items such as rulers and graphs to a representative physical size". There are 25.4 millimeters per inch, so just divide by 25.4 to convert from pixels per inch to pixels per millimeter. "Representative physical size" means that the actual image may be close to a particular physical size, but is subject to factors including Windows default PPI setting, the driver's DPI to PPI ratio and even how the monitor has been adjusted. By using the GRAPHIC GET PPI, results, you can construct a representative graphic image that can be saved and later output at the intended scale by more precise means, for example a higher resolution Windows printer.
See also	GRAPHIC ATTACH, GRAPHIC SCALE

GRAPHIC GET SCALE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET SCALE statement

Purpose Retrieve the current coordinate limits for the graphic target.

Syntax **GRAPHIC GET SCALE TO *x1!, y1!, x2!, y2!***

Remarks GRAPHIC SCALE allows you to define your own world coordinate system for subsequent statements. World coordinates may be values, with the only requirement that *x1!* not equal *x2!*, and *y1!* not equal *y2!*.

GRAPHIC GET SCALE retrieves the coordinate limits, which may be either custom world coordinates (if a GRAPHIC SCALE has been executed), or else default pixel coordinates. This allows you to save and restore a previous set of coordinates. This statement will automatically adjust to allow Dialog Unit scale factors to be retrieved.

See also GRAPHIC SCALE, GRAPHIC SCALE PIXELS

GRAPHIC GET SCROLLTEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET SCROLLTEXT statement New!

Purpose Retrieves the status of Graphic ScrollText Mode.

Syntax **GRAPHIC GET SCROLLTEXT To *ScrollVar&***

Function Form:
***ScrollVar&* = GRAPHIC(SCROLLTEXT)**

Remarks GRAPHIC GET SCROLLTEXT retrieves the status of ScrollText mode and assigns it to the variable specified by *ScrollVar&*. If ScrollText Mode is enabled, the value true (non-zero) is assigned. If it's disabled, the value false (zero) is assigned instead. The value returned reflects the status of the graphic target which is currently attached to the graphic stream.

With ScrollText Mode, you can control how PowerBASIC prints text on a graphic target when it reaches the end of a page. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the page. This can be modified under program control by using GRAPHIC SET SCROLLTEXT.

When ScrollText Mode is enabled, scrolling of a page is triggered only by GRAPHIC PRINT. If the POS (last point referenced) is located on the bottom row of the graphic target, and a GRAPHIC PRINT statement moves the POS off of the page, the entire contents of the graphic target is scrolled one row, and a new blank row is opened at the bottom.

See also GRAPHIC CELL, GRAPHIC SET SCROLLTEXT

GRAPHIC GET SIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET SIZE statement New!

Purpose Retrieves the overall size of the selected graphic target.

Syntax **GRAPHIC GET SIZE To *WidthVar&, HeightVar&***

Function Form:

```
WidthVar&  = GRAPHIC(SIZE.X)
HeightVar& = GRAPHIC(SIZE.Y)
```

Remarks GRAPHIC GET SIZE retrieves overall physical size of the selected graphic window or control. The size is specified in Pixels or Dialog Units, depending upon how it was created. The size always includes any caption, frame, scrollbars, etc. If no graphic target is attached, the values 0,0 are returned.

See also GRAPHIC GET CANVAS, GRAPHIC GET CLIENT, GRAPHIC GET CLIP, GRAPHIC GET LINES, GRAPHIC SET SIZE

GRAPHIC GET STRETCHMODE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET STRETCHMODE statement New!

Purpose Retrieves the default bitmap stretching mode for the attached DC.

Syntax **GRAPHIC GET STRETCHMODE TO *ModeVar&***

Function Form:

```
ModeVar& = GRAPHIC(STRETCHMODE)
```

Remarks There are several operations in PowerBASIC which involve stretching or condensing images on bitmaps, most notably GRAPHIC STRETCH. As individual pixels must be added or removed, there is a good chance that the quality of the image will be degraded. However, if you describe the nature of the image by defining a StretchMode, you can substantially enhance the appearance.

The default StretchMode is maintained individually for each DC. You can retrieve the default mode with this statement, or set it with GRAPHIC GET STRETCHMODE. Of course, you can also override the default StretchMode when you execute one of the affected statements.

The 4 stretch mode equates are predefined in PowerBASIC.

Equate	Value	Description
%BLACKONWHITE	1	This is the default Windows stretch mode, and is most appropriate for monochrome bitmaps, or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels.
%WHITEONBLACK	2	Performs a boolean OR of eliminated and existing pixels. It preserves white pixels at the expense of black pixels.
%COLORONCOLOR	3	Deletes eliminated lines of pixels without trying to preserve their information.
%HALFTONE	4	This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source pixel block.

See also GRAPHIC BITMAP LOAD, GRAPHIC COPY, GRAPHIC RENDER, GRAPHIC SET STRETCHMODE, GRAPHIC STRETCH

GRAPHIC GET VIEW statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET VIEW statement New!

Purpose Retrieves the position of the virtual graphic viewport.

Syntax **GRAPHIC GET VIEW To *WidthVar!, HeightVar!***

Function Form:

```
WidthVar!  = GRAPHIC(View.X)
HeightVar! = GRAPHIC(View.Y)
```

Remarks Retrieves the position of the viewport on a virtual graphic target. The size is specified in Page Units. If no graphic target has been selected, or no virtual window has been created, the values 0,0 are returned.

See also GRAPHIC SET VIEW, GRAPHIC SET VIRTUAL

GRAPHIC GET WORDWRAP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET WORDWRAP statement New!

Purpose Retrieves the status of Graphic WordWrap Mode.

Syntax **GRAPHIC GET WORDWRAP TO *WrapVar&***

Function Form:
***WrapVar&* = GRAPHIC(WORDWRAP)**

Remarks GRAPHIC GET WORDWRAP retrieves the status of wordwrap mode and assigns it to the variable specified by *WrapVar&*. If WordWrap Mode is enabled, the value true (non-zero) is assigned. If it's disabled, the value false (zero) is assigned instead. The value returned reflects the status of the graphic target which is currently attached to the graphic stream.

With WordWrap Mode, you can control how PowerBASIC prints text on a graphic target when it reaches the end of a line. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the line. This can be modified under program control by using GRAPHIC SET WORDWRAP.

When WordWrap mode is enabled, it affects only GRAPHIC PRINT operations. If GRAPHIC PRINT attempts to display a word beyond the end of a row, the entire word is automatically wrapped to the first column of the next row.

See also GRAPHIC CELL, GRAPHIC GET WRAP, GRAPHIC SET WORDWRAP, GRAPHIC SET WRAP, GRAPHIC SPLIT

GRAPHIC GET WRAP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC GET WRAP statement New!

Purpose Retrieves the status of Graphic Wrap Mode.

Syntax **GRAPHIC GET WRAP TO *WrapVar&***

Function Form:
***WrapVar&* = GRAPHIC(WRAP)**

Remarks GRAPHIC GET WRAP retrieves the status of wrap mode and assigns it to the variable specified by *WrapVar&*. If Wrap Mode is enabled, the value true (non-zero) is assigned. If it's disabled, the value false (zero) is assigned instead. The value returned reflects the status of the graphic target which is currently attached to the graphic stream.

With Wrap Mode, you can control how PowerBASIC prints text on a graphic target when it reaches the end of a line. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the line. This can be modified under program control by using GRAPHIC SET WRAP.

When Wrap Mode is enabled, it affects only GRAPHIC PRINT operations. If GRAPHIC PRINT attempts to display a character beyond the end of a row, it is automatically wrapped to the first column of the next row.

See also GRAPHIC CELL, GRAPHIC GET WORDWRAP, GRAPHIC SET WORDWRAP, GRAPHIC SET WRAP, GRAPHIC SPLIT

GRAPHIC IMAGELIST statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC IMAGELIST statement

Purpose Displays an image from an IMAGELIST

Syntax `GRAPHIC IMAGELIST (x!,y!), hLst, index&, overlay&, style&`

Remarks One of the images stored in an IMAGELIST is displayed on the selected graphic control, , or window. The parameters *x!,y!* define the upper left corner of the position of the image. *hLst* is the handle of the IMAGELIST and *index&* is the selector of the image to be displayed (1=first, 2=second, etc.). If *overlay&* is non-zero, it specifies an overlay image to be added to the displayed image from the image list. The parameter *style&* may be one of the following style bits:

%ILD_NORMAL	Draws the image using the background color of the image list. If the background color is the default value %CLR_NONE (defined in the Commctrl.inc file), the image is drawn transparently.
%ILD_TRANSPARENT	Draws the image transparently if there is a mask.
%ILD_MASK	Draws the mask.
%ILD_BLEND25	If there is a mask, the image is drawn blending 25% with the system highlight color.
%ILD_BLEND50	If there is a mask, the image is drawn blending 50% with the system highlight color.

See also GRAPHIC ATTACH, GRAPHIC COPY, GRAPHIC RENDER, GRAPHIC STRETCH, IMAGELIST

GRAPHIC INKEY$ statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC INKEY$ statement IMPROVED

Purpose Reads a keyboard character if one is ready.

Syntax **GRAPHIC INKEY$ TO *InkeyVar$***

Function Form:
***InkeyVar$* = GRAPHIC$(INKEY$)**

Remarks GRAPHIC INKEY$ returns a

of 0, 1, or 2 characters that reflects the status of the keyboard buffer for the selected graphic target. A null string (LEN=0) means that the buffer is empty - no key pressed.

A string length of one means that an ASCII key was pressed and the string contains the ASCII character. An ASCII value between 1 and 31 indicate a control code.

A string length of two means that an extended key was pressed. In this case, the first character in the string has an ASCII value of zero, and the second is the extended keyboard code.

See also GRAPHIC INPUT, GRAPHIC INPUT FLUSH, GRAPHIC INSTAT, GRAPHIC LINE INPUT, GRAPHIC WAITKEY$

GRAPHIC INPUT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC INPUT statement

Purpose Reads data from the keyboard from within a graphic window or graphic control.

Syntax **GRAPHIC INPUT [*prompt*,] *varlist***

prompt An optional quoted string literal or string equate which is displayed to the user as a prompt.

varlist A comma delimited sequence of one or more or variables.

Remarks GRAPHIC INPUT displays the prompt on the graphic window or graphic control, waits for the user to enter data from the keyboard, and assigns the data to the variables in *varlist*. Data entered from the keyboard must match the type of the variables -- that is, non-numeric characters are unacceptable for numeric variables.

If a single GRAPHIC INPUT statement prompts for more than one variable, the user must enter the proper number of values on a single line, separated by commas. If not enough comma-delimited values are entered, remaining variables are set to zero or nul.

See also GRAPHIC INKEY$, GRAPHIC INPUT FLUSH, GRAPHIC INSTAT, GRAPHIC LINE INPUT, GRAPHIC WAITKEY$

GRAPHIC INPUT FLUSH statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC INPUT FLUSH statement

Purpose Remove all buffered keyboard data.

Syntax `GRAPHIC INPUT FLUSH`

See also GRAPHIC INKEY$, GRAPHIC INPUT, GRAPHIC INSTAT, GRAPHIC LINE INPUT, GRAPHIC WAITKEY$

GRAPHIC INSTAT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC INSTAT statement IMPROVED

Purpose Determines whether a keyboard character is ready.

Syntax **GRAPHIC INSTAT TO** ***NumericVar***

Function Form:
InstatVar& **= GRAPHIC(INSTAT)**

Remarks The

variable receives the keyboard buffer status for the selected graphic target. The value assigned is TRUE (non-zero) if a keyboard character is ready to be retrieved, or FALSE (zero) if not.

GRAPHIC INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with GRAPHIC INKEY$, GRAPHIC INPUT, etc.

See also GRAPHIC INKEY$, GRAPHIC INPUT, GRAPHIC INPUT FLUSH, GRAPHIC LINE INPUT, GRAPHIC WAITKEY$

GRAPHIC LINE INPUT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC LINE INPUT statement

Purpose Read an entire line from the keyboard from within a Graphic Window or a Graphic Control.

Syntax **GRAPHIC LINE INPUT ["*prompt*"] *string_variable***

Remarks GRAPHIC LINE INPUT displays the optional prompt on the Graphic Window or Control and waits for user input. Keystrokes are accepted until you press ENTER, at which time the entire typed string is assigned to the *string_variable*. Input is limited to 255 characters.

See also GRAPHIC INKEY$, GRAPHIC INPUT, GRAPHIC INPUT FLUSH, GRAPHIC INSTAT, GRAPHIC WAITKEY$

GRAPHIC LINE statement

GRAPHIC LINE statement

Purpose Draw a line on the selected graphic target

Syntax **GRAPHIC LINE [STEP] [(*x1!*, *y1!*)] - [STEP] (*x2!*, *y2!*)[, *rgbColor&*]**

Remarks The line is drawn from the first point, up to, but not including the second point. Coordinate points are specified in Page Units. Line width can be set using GRAPHIC WIDTH. If line width is set to 1 (the default), the line style can be set with GRAPHIC STYLE.

Windows graphic conventions consider the final x2 and y2 coordinates to be exclusive. Therefore, by default, the final pixel is not drawn unless Overlap Mode is enabled. See GRAPHIC SET OVERLAP for details.

x1!, *y1!* Optional values which define the starting point of the line. If this optional first point is omitted, the line begins at the last point referenced (POS) in a preceding statement. If the first STEP option is included, the *x1!* and *y1!* starting coordinates are relative to the last point referenced (POS).

x2!, *y2!* The ending point of the line. If the second STEP option is included, the *x2!* and *y2!* ending coordinates are relative to the starting coordinates.

rgbColor& Optional RGB color value for the line. If *rgbColor&* is omitted (or -1), the line color defaults to the current foreground color.

See also GRAPHIC ARC, GRAPHIC ATTACH, GRAPHIC BOX, GRAPHIC COLOR, GRAPHIC ELLIPSE, GRAPHIC PIE, GRAPHIC SET OVERLAP, GRAPHIC STYLE, GRAPHIC WIDTH

Example

```
' Draw a triangle. Note that, since LINE draws up to,
' but not including the second point, one extra point
' must be added when STEP is used.
GRAPHIC LINE (10, 10) - (10, 100)   ' left side
GRAPHIC LINE STEP - (101, 100)      ' base line
GRAPHIC LINE STEP - (10, 10)        ' back to top
```

GRAPHIC PAINT statement

GRAPHIC PAINT statement

Purpose Fill an area with a solid color or a hatch pattern.

Syntax `GRAPHIC PAINT [BORDER | REPLACE] [STEP] (x!, y!) [, [rgbFill&] [, [rgbBorder&] [, [fillstyle&]]]]`

Remarks The coordinate points are specified in Page Units.

x!, *y!* The point where filling begins. If the STEP option is included, the x and y coordinates are relative to the last point referenced (POS) in the selected graphic target.

rgbFill& Optional RGB color value for the fill area. If *rgbFill&* is omitted (or -1), the default foreground color is used.

rgbBorder& Optional RGB base color of the fill area. If the REPLACE option is chosen, filling continues outward in all directions until a color other than *rgbBorder&* is found. If the BORDER option (or no option) is included, filling continues outward until the *rgbBorder&* color is found. If *rgbBorder&* is not specified, it is assumed to be the same as the *rgbFill&* parameter.

fillstyle& Optional fill style (pattern) to use. If *fillstyle&* is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the *rgbFill&*, while the background is specified by the default background color for the selected graphic target. The optional *fillstyle&* may be:

0	Solid (default)
1	Horizontal Lines
2	Vertical Lines
3	Upward Diagonal Lines
4	Downward Diagonal Lines
5	Crossed Lines
6	Diagonal Crossed Lines

See also Built In RGB Color Equates, GRAPHIC ARC, GRAPHIC ATTACH, GRAPHIC BOX, GRAPHIC COLOR, GRAPHIC ELLIPSE, GRAPHIC LINE, GRAPHIC PIE

Example

```
FUNCTION PBMAIN
  LOCAL hWin AS DWORD

  GRAPHIC WINDOW "Paint", 0, 0, 200, 200 TO hWin
  GRAPHIC ATTACH hWin, 0

  ' Draw a circle with blue foreground color
  ' and a box below it with red foreground color.
  GRAPHIC ELLIPSE (10, 10) - (70, 70), %BLUE
  GRAPHIC BOX (10, 80) - (70, 120), 0, %RED

  ' Fill the area inside the circle's blue borders
  ' with a green diagonal pattern.
  GRAPHIC PAINT BORDER (40, 40), %GREEN, %BLUE, 6

  'Retrieve the color at point 5,5 (outside the circle).
  GRAPHIC GET PIXEL (5, 5) TO lRes&

  ' Fill the area outside the circle by replacing the color
  ' at point 5,5 and outwards with a solid yellow color.
  GRAPHIC PAINT REPLACE (5, 5), RGB(255, 255, 223), lRes&, 0

  SLEEP 10000
END FUNCTION
```

GRAPHIC PIE statement

GRAPHIC PIE statement

Purpose Draw a pie section on the selected graphic target.

Syntax **GRAPHIC PIE (*x1!*, *y1!*) - (*x2!*, *y2!*), *arcStart!*, *arcEnd!* [, [*rgbColor&*] *[, [fillcolor&*] *[, [fillstyle&*]]]]**

Remarks A pie section is an arc, with a line drawn from each end point to the center of the circle or ellipse. To specify a pie section, you would first define the full circle or ellipse of which it is a part, and then specify the points on the ellipse where the arc starts and stops.

The full circle or ellipse is defined by its bounding rectangle, which is the smallest rectangle which can be drawn around the circle or ellipse. For example, if the circle is centered at position (400,400), with a radius of 100 pixels, the upper left corner (x1,y1) of the bounding rectangle is (300,300), and the lower right corner (x2,y2) is (500,500).

The start point and end point of the arc are specified by their angle, which must be given in radians. A complete circle or ellipse is 2*pi radians. On a 12-hour clock-face, the values 0 and 2*pi both refer to the position of 3 o'clock, while the value 1*pi refers to the position of 9 o'clock. Other positions are specified by a radian value relative to these. In PowerBASIC, arcs are always drawn counter-clockwise from the starting point to the ending point.

Prior to any graphical operations, the graphic target must first be selected with GRAPHIC ATTACH. The Coordinates are specified in the same terms (pixels or dialog units) as the parent dialog (or world coordinates, if those were chosen with GRAPHIC SCALE). Line width can be set using GRAPHIC WIDTH. If line width is set to 1 (the default), the line style can be set with GRAPHIC STYLE. Because of the nature of a pie section, GRAPHIC PIE neither uses, nor updates, graphic POS (last point referenced).

x1!, *y1!* The upper left corner of the bounding rectangle of the full circle or ellipse.

x2!, *y2!* The lower right corner of the bounding rectangle of the full circle or ellipse.

ArcStart! The starting angle of the arc, in radians, from 0 to 2*pi.

ArcEnd! The ending angle of the arc, in radians, from 0 to 2*pi radians. Note that arcs are always drawn counter-clockwise from *arcStart!* to *arcEnd!*. Compared with a 12-hour clock-face, 0 or 2*pi radians is at 3 o'clock, and 1*pi radians is at 9 o'clock.

rgbColor& Optional RGB color of the pie section edge. If omitted (or -1), the edge color defaults to the current foreground color.

fillcolor& Optional RGB color of the pie section interior. If *fillcolor&* is omitted (or -2), the interior of the pie section is not filled, allowing the background to show through. If *fillcolor&* is -1, the interior is painted with the same color as the edge. Otherwise, *fillcolor&* specifies the RGB color to be used.

fillstyle& Optional fill style (pattern) to be used. If *fillstyle&* is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the *fillcolor&*, while the background is specified by the default background color. The optional *fillstyle&* may be:

0 Solid (default)
1 Horizontal Lines
2 Vertical Lines
3 Upward Diagonal Lines
4 Downward Diagonal Lines
5 Crossed Lines
6 Diagonal Crossed Lines

See also Built In RGB Color Equates, GRAPHIC ARC, GRAPHIC ATTACH, GRAPHIC BOX, GRAPHIC COLOR, GRAPHIC ELLIPSE, GRAPHIC LINE, GRAPHIC SET OVERLAP, GRAPHIC STYLE, GRAPHIC WIDTH

Example

```
FUNCTION PBMAIN
```

```
  LOCAL hWin AS DWORD

  GRAPHIC WINDOW "Pie", 0, 0, 200, 200 TO hWin
  GRAPHIC ATTACH hWin, 0

  ' A full circle is 2Pi radians (100%).
  ' To show a 25% Pie, use the formula 0.25 * 2Pi.
  ' The following divides a full circle into four 25% parts, each
  ' with its own colors, each slightly separated from the others.
  ' Note: 0 is at 3 O'clock, then it builds counter-clockwise.

  LOCAL Pi2 AS DOUBLE
  Pi2 = 8 * ATN(1)  ' 2 * Pi can be useful here

  GRAPHIC PIE (10,  9)-(110, 109), 0,          Pi2 * 0.25, %BLUE,  %
LTGRAY, 3
  GRAPHIC PIE (9,   9)-(109, 109), Pi2 * 0.25, Pi2 * 0.50, %RED,   %
LTGRAY, 4
  GRAPHIC PIE (9,  10)-(109, 110), Pi2 * 0.5,  Pi2 * 0.75, RGB(0,127,0), %
LTGRAY, 3
  GRAPHIC PIE (10, 10)-(110, 110), Pi2 * 0.75, 0,          %GRAY, %LTGRAY,
4

  SLEEP 10000
END FUNCTION
```

GRAPHIC POLYGON statement

GRAPHIC POLYGON statement

Purpose Draw a polygon in the selected graphic target.

Syntax **GRAPHIC POLYGON *points* [,[*rgbColor&*] [, [*fillcolor&*] [,[*fillstyle&*] [, *fillmode&*]]]]**

Remarks The Coordinates are specified in Page Units. Line width can be set using GRAPHIC WIDTH. If line width is set to 1 (the default), the line style can be set with GRAPHIC STYLE. GRAPHIC POLYGON neither uses, nor updates, the last point referenced (POS).

points User-defined type that defines the number of vertices and the location of each. There must be at least two, and no more than 1024 vertices. The first member is a long integer point count, followed directly by the appropriate number of single precision floats to specify the actual coordinates. Floating point coordinates are required, because of the possibility of their use as world coordinates with SCALE. You can use a type with a scalar list, like this:

```
TYPE PolyPoints
  count as long
  x1 as single
  y1 as single
  x2 as single
  y2 as single
  x3 as single
  y3 as single
END TYPE
```

Or, you can create an array using point types, like this:

```
TYPE PolyPoint
  x as single
  y as single
END TYPE
```

```
TYPE PolyArray
  count as long
  xy(1 TO 3) as PolyPoint
END TYPE
```

rgbColor& — Optional RGB color of the polygon edge. If omitted (or -1), the edge color defaults to the current foreground color.

fillcolor& — Optional RGB color of the polygon interior. If *fillcolor&* is omitted (or -2), the interior of the ellipse is not filled, allowing the background to show through. If *fillcolor&* is -1, the interior is painted with the same color as the edge. Otherwise, *fillcolor&* specifies the RGB color to be used.

fillstyle& — Optional fill style (pattern) to be used. If *fillstyle&* is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the *fillcolor&*, while the background is specified by the default background color. The optional *fillstyle&* may be:

0 Solid (default)
1 Horizontal Lines
2 Vertical Lines
3 Upward Diagonal Lines
4 Downward Diagonal Lines
5 Crossed Lines
6 Diagonal Crossed Lines

fillmode& — If *fillmode&* is missing (or zero), the winding mode is selected. This fills any region with a non-zero winding value. If *fillmode&* is non-zero, the alternate mode is selected. This fills the area between odd-numbered and even-numbered polygon sides on each scan line. That is, it fills the area between the first side and the second side, between the third side and fourth side, etc.

See also — Built In RGB Color Equates, GRAPHIC ARC, GRAPHIC ATTACH, GRAPHIC BOX, GRAPHIC COLOR, GRAPHIC ELLIPSE, GRAPHIC LINE, GRAPHIC POLYLINE, GRAPHIC SET OVERLAP, GRAPHIC STYLE, GRAPHIC WIDTH

GRAPHIC POLYLINE statement

GRAPHIC POLYLINE statement

Purpose — Draw a series of connected line segments.

Syntax — **GRAPHIC POLYLINE *points* [, *rgbColor&*]**

Remarks — The Coordinates are specified in Page Units. Line width can be set using GRAPHIC WIDTH. If line width is set to 1 (the default), the line style can be set with GRAPHIC STYLE. GRAPHIC POLYLINE neither uses, nor updates, the last point referenced (POS).

Windows graphic conventions consider the final *x* and *y* coordinates to be exclusive. Therefore, by default, the final pixel is not drawn unless Overlap Mode is enabled. See GRAPHIC SET OVERLAP for details.

points — User-defined type that defines the number of vertices and the location of each. There must be at least two, and no more than 1024 vertices. The first member is a long integer point count, followed directly by the appropriate number of single precision floats to specify the actual coordinates. Floating point coordinates are required, because of the possibility of their use as world coordinates with SCALE. You can use a type with a scalar list, like this:

```
TYPE PolyPoints
  count as long
  x1 as single
  y1 as single
  x2 as single
```

```
  y2 as single
  x3 as single
  y3 as single
END TYPE
```

Or, you can create an array using point types, like this:

```
TYPE PolyPoint
  x as single
  y as single
END TYPE

TYPE PolyArray
  count as long
  xy(1 TO 3) as PolyPoint
END TYPE
```

rgbColor& Optional RGB color of the polyline. If omitted (or -1), the color defaults to the current foreground color.

See also Built In RGB Color Equates, GRAPHIC ARC, GRAPHIC ATTACH, GRAPHIC BOX, GRAPHIC COLOR, GRAPHIC ELLIPSE, GRAPHIC LINE, GRAPHIC POLYGON, GRAPHIC SET OVERLAP, GRAPHIC STYLE, GRAPHIC WIDTH

GRAPHIC PRINT statement

GRAPHIC PRINT statement IMPROVED

Purpose Output text to the selected graphic target.

Syntax **GRAPHIC PRINT [EXPRLIST] [POS(*n*)] [SPC(*n*)] [TAB(*n*)] [,] [;]...**

Remarks Prior to any graphical operations are executed, you should be certain that a graphic target has been selected, either by default, or with GRAPHIC ATTACH. The text color and the text background color are set with GRAPHIC COLOR. Text which extends beyond the bounds of the graphic target is clipped. The size of the text to be printed can be determined in advance with GRAPHIC TEXT SIZE, and formatted to fit a particular field with GRAPHIC SPLIT. Drawing begins at the last point referenced by another

procedure, or the point specified by GRAPHIC SET POS. The upper left corner of the text is positioned at the POS.

GRAPHIC PRINT has the following parts, which may occur in any order and quantity, within a single statement:

EXPRLIST and/or expression(s) to be written to the graphic target. A semicolon can be used as separator between multiple expressions in the same statement. Upon completion, the POS is moved to the left margin of the next line.

POS(*n*) An optional function used to set the POS to the horizontal page unit (pixel, dialog unit, scaled unit, etc.) specified by the numeric argument, Multiple uses of the POS function is permitted in a single statement. The vertical position of the POS is never changed.

SPC(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of SPC is permitted in a single statement. Values of n less than 1 are ignored.

TAB(*n*) An optional function used to tab to the nth column before printing the next expression. Multiple use of TAB is permitted in a single statement. Since TAB references columns, rather than pixels, it can give unpredictable results when used with a variable width font. It is best used with a fixed width font.

; , Special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument is a semicolon or comma, the POS is maintained at the current location, rather than the default action of moving to the start of the next line. For example:

```
GRAPHIC PRINT "Hello";
GRAPHIC PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, GRAPHIC PRINT just moves the POS to the left margin of the next line. Any control codes, such as Carriage Return, Line-Feed, and Backspace are not interpreted. They will display as symbols in the currently selected font.

USING$ is a separate function, which may be included in the ExprList. See the USING$() function for more information.

It is not possible to print a User-Defined Type (UDT), a Variant, an object variable, or an entire array. Individual member values must be extracted with the appropriate function before they can be displayed.

See also GRAPHIC ATTACH, GRAPHIC CELL, GRAPHIC CHR SIZE, GRAPHIC SET FONT, GRAPHIC GET POS, GRAPHIC SET POS, GRAPHIC SET SCROLLTEXT, GRAPHIC SET WORDWRAP, GRAPHIC SET WRAP, GRAPHIC SPLIT, GRAPHIC TEXT SIZE, USING$

GRAPHIC REDRAW statement

GRAPHIC REDRAW statement

Purpose Update buffered graphical statements, drawing them to the selected graphic target.

Syntax `GRAPHIC REDRAW`

Remarks This statement is only needed when GRAPHIC ATTACH with the REDRAW option have been chosen for faster, buffered draw operations. Otherwise, it performs no operation.

All PowerBASIC graphical displays are *persistent* -- they are automatically redrawn for you after resuming from being minimized or temporarily covered by other windows.

In intensive drawing operations, it is preferable to delay the display until a number of statements have been performed by using the REDRAW option with the GRAPHIC ATTACH statement and the GRAPHIC REDRAW statement. This can improve the overall performance dramatically.

See also GRAPHIC ATTACH

Example

```
FUNCTION PBMAIN
  LOCAL hWin AS DWORD

  ' Draw a buffered, blue gradient fill
  GRAPHIC WINDOW "Gradient", 0, 0, 255, 255 TO hWin
  GRAPHIC ATTACH hWin, 0, REDRAW
  FOR y& = 0 TO 255
    GRAPHIC LINE (0, y&) - (255, y&), RGB(0, 0, y&)
  NEXT
  GRAPHIC REDRAW

  SLEEP 10000
```

```
END FUNCTION
```

GRAPHIC RENDER statement

GRAPHIC RENDER statement IMPROVED

Purpose Render an image on the selected graphic target.

Syntax **GRAPHIC RENDER [BITMAP | ICON]** ***ImgName*****, (*****x1!*****,** ***y1!*****)-(*****x2!*****,** ***y2!*****)**

Remarks Renders an image (bitmap or icon), loaded from a resource or a disk file, on the selected graphic target. The optional director word identifies whether the source is a

or an . If not specified, Bitmap is the default.

The parameter *ImgName* tells the name of the image. If *ImgName* is a numeric resource ID, it can be given as a numeric expression or the string equivalent with a leading pound sign (e.g. "#10023"). Otherwise, the string resource ID or the file name is given as a string expression. If the string name contains a period, it's presumed to be the name of a disk file. Otherwise, an attempt is made to load it as a resource; if not found, it's presumed to be a disk file.

The parameters *x1!*, *y1!* define the upper left corner of the target rectangle, while *x2!*, *y2!* define the lower right corner of that rectangle. If the target rectangle is larger or smaller than the original, the image is stretched or condensed to the requested size.

The following code will retrieve the natural size of an image in a bitmap file, in pixels:

```
nFile& = FREEFILE
OPEN "myimage.bmp" FOR BINARY AS nFile&
GET #nFile&, 19, nWidth&
GET #nFile&, 23, nHeight&
CLOSE nFile&
```

See also GRAPHIC COPY, GRAPHIC GET STRETCHMODE, GRAPHIC IMAGELIST, GRAPHIC SET STRETCHMODE, GRAPHIC STRETCH

GRAPHIC SAVE statement

GRAPHIC SAVE statement

Purpose Save an image to a bitmap (.BMP) file.

Syntax **GRAPHIC SAVE** ***BmpName$***

Remarks The selected graphic target (a graphic

, control, or window, etc.) is saved to a disk file using the filename specified by *BmpName$*. The bitmap is always saved in a single plane, 24-bit format, to allow for the maximum (true color) resolution.

See also CONTROL ADD GRAPHIC, GRAPHIC ATTACH, GRAPHIC BITMAP LOAD, GRAPHIC BITMAP NEW

GRAPHIC SCALE statement

GRAPHIC SCALE statement

Purpose Define a custom coordinate system for the graphic target.

Syntax **GRAPHIC SCALE (*****x1!*****,** ***y1!*****) - (*****x2!*****,** ***y2!*****)**
GRAPHIC SCALE PIXELS

Remarks The graphic target must first be chosen with GRAPHIC ATTACH. GRAPHIC SCALE lets you define your own world coordinate system for subsequent

statements. The custom coordinates remain with the graphic target until GRAPHIC SCALE is repeated, or the target is deleted. World coordinates may be values, with the only requirement that *x1!* not equal *x2!*, and *y1!* not equal *y2!*. If either is equal, the statement is ignored.

If *x2!* is greater than *x1!*, coordinates grow larger as they move to the right. Otherwise, they grow larger as they move to the left.

If *y2!* is greater than *y1!*, coordinates grow larger as they move downward. Otherwise, they grow larger as they move upward.

By default, the position x2!/y2! translates to the first pixel which is outside of the client area, and therefore not drawn. However, if OVERLAP MODE is enabled by GRAPHIC SET OVERLAP, x2!/y2! translates to the final pixel in the client area and is drawn.

GRAPHIC SCALE PIXELS sets or resets the coordinate system to pixel coordinates. This can be particularly valuable when the original coordinates are in Dialog Units, since this provides increased resolution for other graphic functions.

See also GRAPHIC ATTACH, GRAPHIC CELL, GRAPHIC CELL SIZE, GRAPHIC GET SCALE, GRAPHIC SET OVERLAP

GRAPHIC SET AUTOSIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET AUTOSIZE statement New!

Purpose Expands a graphic target into autosize mode.

Syntax **GRAPHIC SET AUTOSIZE *nWidth*, *nHeight* [,USERSIZE]**

Remarks AUTOSIZE mode allows the attached graphic target (control or window)to display the contents of a virtual window, which may be larger or smaller. The entire contents of the virtual window are always displayed on the screen, so the image is stretched or condensed to fit properly. The physical size of the display area is not changed. If the graphic target is a

, no operation is performed, as there is no display area.

This statement may be used to change a target to AUTOSIZE mode, or to change the sizes and UserSize option of an existing AUTOSIZE target.

When executed, a new virtual bitmap of the specified height and width is created. *nWidth* and *nHeight* are always specified in Pixels or Dialog Units, depending upon the original window creation. The new virtual bitmap is immediately filled with the original bitmap, but stretched or condensed to fit. This is done to avoid flashing effects which sometimes occur with a brief color change. Your program may now draw to the new bitmap in the normal fashion for a bitmap of the new size.

If a clip area had been established to create margins, it is reset. If scaled coordinates had been established, they are also reset, as neither would be appropriate for the altered size. You can enable these attributes again with GRAPHIC SCALE or GRAPHIC SET CLIP, based upon the new size of the drawing area. You can retrieve the size of the virtual drawing area, at any time, with GRAPHIC GET CANVAS.

AUTOSIZE mode is quite similar to VIRTUAL mode. Both create a virtual window which is the target of your drawing and text printing operations. The difference is the way in which they are displayed. VIRTUAL displays a viewport, smaller than the virtual window, which can be moved to various positions. This allows the user to view one selected section at a time. AUTOSIZE displays the entire virtual window, all of the time, by stretching or condensing it as needed.

If you add the USERSIZE option, an attached graphic window is displayed with a thick frame, which allows the user to "drag" the edges to a new size at any time. This option is not appropriate for a graphic control, and is ignored in that case.

See also GRAPHIC GET CANVAS, GRAPHIC SCALE, GRAPHIC SET CLIP, GRAPHIC SET FIXED, GRAPHIC SET VIRTUAL,

GRAPHIC SET BITS statement

GRAPHIC SET BITS statement

Purpose Replace a copy of a bitmap that was retrieved as a device-independent bitmap.

Syntax **GRAPHIC SET BITS *bitexpr$***

Remarks This statement replaces a bitmap that was originally retrieved with the GRAPHIC GET BITS statement. The bitmap is assigned to the selected graphic target from the string expression specified by *bitexpr$*. This allows you to make many modifications to the bitmap very quickly, particularly operations which may not be directly supported by PowerBASIC. For example, a typical use might be to change all red pixels in a bitmap to blue.

The *bitexpr$* string contains a series of four-byte values, each of which represents a long integer. You can convert the four-byte string sections to numeric values with the CVL function, and convert a numeric value to a four-byte string with MKL$. The first four-byte value specifies the width of the bitmap, in pixels, and the second specifies the height. Following that will be one four-byte value for each pixel in the bitmap, which represents the color of that pixel. So, a 20 by 20 bitmap would have 400 pixels and require 1600 bytes (400 * 4), plus 4 bytes for the width and 4 bytes for the height, or a total of 1608 bytes.

The first four-byte pixel value in the string represents the top-left corner of the image, the second represents the second pixel of the first row, and so on. After the last pixel of the first row will be the first pixel of the second row, etc.

If execution speed is most important, it's likely that the string can be manipulated most efficiently with pointer variables.

Some Windows API functions, namely those which reference Device-Independent Bitmaps (DIB), require that colors be specified in the reverse of normal RGB sequence (Blue-Green-Red instead of Red-Green-Blue). To maximize performance, GRAPHIC SET BITS uses BGR format as well. You can use the BGR function to translate an RGB value to its BGR equivalent.

See also Built In RGB Color Equates, BGR, CVL, GRAPHIC GET BITS, MKL$, RGB

Example

```
' Change all red pixels to blue
LOCAL PixelPtr AS LONG PTR
GRAPHIC GET BITS TO bmp$
xsize& = CVL(bmp$,1)
ysize& = CVL(bmp$,5)
PixelPtr = STRPTR(bmp$) + 8
FOR i& = 1 TO xsize& * ysize&
```

```
  IF @PixelPtr = BGR(%red) THEN @PixelPtr = BGR(%blue)
  INCR PixelPtr
NEXT
GRAPHIC SET BITS bmp$
```

GRAPHIC SET CAPTION statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET CAPTION statement New!

Purpose Change the caption on a Graphic Window.

Syntax **GRAPHIC SET CAPTION *CaptionExpr$***

Remarks If the selected Graphic Target has a title bar, the caption is changed to the contents of the string expression.

See also GRAPHIC WINDOW

GRAPHIC SET CLIENT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET CLIENT statement New!

Purpose Change the size of a graphic control or graphic window to a specific client area size.

Syntax **GRAPHIC SET CLIENT *nWide&, nHigh&***

nWide&, *nHigh&* Integral numeric expressions which specify the desired size of the client area. Width and height are specified in pixels or dialog units, depending upon the system used when created.

Remarks Client size may be smaller than overall size, depending on the type of borders used. The client area is the part inside the borders, which varies depending upon the style and exstyle at creation. Overall size includes the borders. A graphic target with a border will typically have a larger overall size than one without a border.

Beginning with this version of PowerBASIC, GRAPHIC CONTROLS may be resized with CONTROL SET CLIENT, GRAPHIC SET CLIENT, CONTROL SET SIZE, and GRAPHIC SET SIZE.

The original bitmap is copied, pixel for pixel, to the newly resized graphic control or window. Any expanded area is filled with the current background color. Your program draws to it in the normal fashion for a bitmap of the new size.

If a clip area had been established to create margins, it is reset. If scaled coordinates had been established, they are also reset, as neither would be appropriate for the altered size. You can enable these attributes again with GRAPHIC SCALE or GRAPHIC SET CLIP, based upon the new size of the drawing area.

See also CONTROL GET CLIENT, CONTROL GET SIZE, CONTROL SET CLIENT, CONTROL SET SIZE, GRAPHIC GET CANVAS, GRAPHIC GET CLIENT, GRAPHIC GET SIZE, GRAPHIC SET CLIP, GRAPHIC SET SIZE

GRAPHIC SET CLIP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET CLIP statement New!

Purpose Establishes margins around the outer edges of the graphic target.

Syntax `GRAPHIC SET CLIP LeftMargin!, TopMargin!, RightMargin!, BottomMargin!`

Remarks This statement establishes margins on any or all sides of the graphic target. All subsequent

operations are "clipped" on these boundaries, so that no additional text or graphics are displayed in these protected areas. However, the margins are not erased, so anything already written in these areas will remain unchanged.

Each of the 4 parameters is specified in the PAGE UNITS currently in effect. However, as this statement changes the target space available to you, the page units are immediately set to pixels. The upper left corner of the clip area is now addressed as point (0,0), while the right and bottom limits are reduced by the size of the margins. If you would prefer to use Scaled Page Units for this revised clip area, you must execute a new GRAPHIC SCALE.

GRAPHIC SET CLIP is particularly useful for displaying text, where enclosing "white space" improves the appearance a good deal.

You can disable a clip area by executing GRAPHIC SET CLIP 0,0,0,0.

See also GRAPHIC GET CLIP, GRAPHIC SCALE

GRAPHIC SET FIXED statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET FIXED statement New!

Purpose Restores a graphic target to standard fixed mode.

Syntax `GRAPHIC SET FIXED`

Remarks The attached graphic target (control or window) is restored to the standard FIXED mode. The drawing area is set equal to the physical size of the display area, which is not changed.

When executed, it is assumed that the graphic subsystem is set to AUTOSIZE or VIRTUAL mode. If not, no operation is performed. A new bitmap of the client area size is created. The original bitmap is copied, pixel for pixel, at the existing size. Any expanded area is filled with the current background color. Your program draws to it in the normal fashion for a bitmap of the new size.

If a clip area had been established to create margins, it is reset. If scaled coordinates had been established, they are also reset, as neither would be appropriate for the altered size. You can enable these attributes again with GRAPHIC SCALE or GRAPHIC SET CLIP, based upon the new size of the drawing area. You can retrieve the size of the drawing area with GRAPHIC GET CANVAS or GRAPHIC GET CLIENT.

See also GRAPHIC GET CANVAS, GRAPHIC GET CLIENT, GRAPHIC SCALE, GRAPHIC SET AUTOSIZE, GRAPHIC SET VIRTUAL

GRAPHIC SET FOCUS statement

GRAPHIC SET FOCUS statement

Purpose Bring the selected graphic window to the foreground and direct focus to it.

Syntax `GRAPHIC SET FOCUS`

Remarks A graphic window must first be chosen with GRAPHIC ATTACH. The GRAPHIC SET FOCUS statement brings the graphic window to the foreground, directing focus to it. This is particularly useful when another window may overlap the graphic window.

See also GRAPHIC ATTACH, GRAPHIC WINDOW

GRAPHIC SET FONT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET FONT statement IMPROVED

Purpose Select a font for use on the graphic target.

Syntax `GRAPHIC SET FONT fonthndl&`

fonthndl& The numeric handle returned by the FONT NEW statement.

Remarks The font specified by *fonthndl&* is selected to be used by all of the following GRAPHIC PRINT, GRAPHIC INPUT, and GRAPHIC LINE INPUT statements. This is the most efficient way to change fonts and their general appearance (size, style, etc.). If you specify a *fonthndl&* of zero, the font is changed back to the original default font chosen by PowerBASIC.

You can predefine virtually any number of fonts and attributes by executing FONT NEW statements for each of them. That makes them ready for immediate use when selected by GRAPHIC SET FONT.

If no specific font is selected, the default font is MS Sans Serif, 8 point, with no style attributes.

Restrictions GRAPHIC SET FONT replaces GRAPHIC FONT. Note that the GRAPHIC FONT statement is no longer supported, so update your code to use the new syntax.

See also FONT NEW, GRAPHIC ATTACH, GRAPHIC CELL, GRAPHIC CELL SIZE, GRAPHIC CHR SIZE, GRAPHIC INPUT, GRAPHIC LINE INPUT, GRAPHIC PRINT, GRAPHIC TEXT SIZE

GRAPHIC SET LOC statement

GRAPHIC SET LOC statement

Purpose Change the location of the selected Graphic Window on the screen.

Syntax `GRAPHIC SET LOC x&, y&`

Remarks This statement changes the location of the selected Graphic Window. If no graphic target is selected, or it is not a Graphic Window, no action is taken. The location is always given in pixels, relative to the upper left corner of the screen.

See also GRAPHIC ATTACH, GRAPHIC GET LOC, GRAPHIC GET PPI

GRAPHIC SET MIX statement

GRAPHIC SET MIX statement

Purpose Set the color mix mode for the selected graphic target.

Syntax `GRAPHIC SET MIX mode&`

Remarks There are 16 mix modes available to use for mixing the drawing color with the color that already exists at the drawing location. The mix mode equates are predefined in PowerBASIC.

%mix_Blackness	Pixel is always 0 (black).
%mix_NotMergeSrc	Pixel is the inverse of the MergeSrc color.
%mix_MaskNotSrc	Pixel is a combination of the colors common to both the pixel and the inverse of the source.
%mix_NotCopySrc	Pixel is the inverse of the pen color.
%mix_MaskSrcNot	Pixel is a combination of the colors common to both the source and the inverse of the pixel.
%mix_Not	Pixel is the inverse of the pixel color.
%mix_XorSrc	Pixel is a combination of the colors in the source and in the pixel, but not in both.
%mix_NotMaskSrc	Pixel is the inverse of the MaskSrc color.
%mix_MaskSrc	Pixel is a combination of the colors common to both the source and the pixel.

%mix_NotXorSrc	Pixel is the inverse of the XorSrc color.
%mix_Nop	Pixel remains unchanged.
%mix_MergeNotSrc	Pixel is a combination of the source color and the inverse of the pixel color.
%mix_CopySrc	Pixel is the source color (default).
%mix_MergeSrcNot	Pixel is a combination of the source color and the inverse of the pixel color.
%mix_MergeSrc	Pixel is a combination of the source color and the pixel color.
%mix_Whiteness	Pixel is always 1 (white).

See also GRAPHIC ATTACH, GRAPHIC GET MIX

GRAPHIC SET OVERLAP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET OVERLAP statement New!

Purpose Enables or disables Graphic Overlap Mode.

Syntax **GRAPHIC SET OVERLAP [*NumrExpr&*]**

Remarks GRAPHIC SET OVERLAP enables or disables overlap mode for the graphic target which is currently attached to the graphic stream. It has no effect on any other graphic target. If *NumrExpr&* is true (non-zero), overlap mode is enabled. If false (zero), wrap mode is disabled. If *NumrExpr&* is missing, the default is to enable Overlap Mode.

With Overlap Mode, you control how PowerBASIC treats

operations which involve a RECT structure in their definition. Windows graphic conventions consider the bottom and right coordinates of a RECT to be exclusive. In other words, the pixels at the bottom and right edges lie immediately outside the rectangle. They are not drawn, but are ignored. For example:

```
GRAPHIC BOX (0,0) - (50,50)
```

In this case, a box is drawn from 0,0 to 49,49. The final pixels at the bottom and right edge are simply not drawn. However, if Overlap Mode is enabled with GRAPHIC SET OVERLAP, the box is drawn from 0,0 to 50,50.

The Overlap Mode affects drawing operations involving GRAPHIC SCALE, GRAPHIC BOX, GRAPHIC ELLIPSE, GRAPHIC LINE, GRAPHIC POLYLINE, etc.

See also GRAPHIC GET OVERLAP

GRAPHIC SET PIXEL statement

GRAPHIC SET PIXEL statement

Purpose Draw a single pixel.

Syntax **GRAPHIC SET PIXEL [STEP] (*x!*, *y!*) [, *rgbColor&*]**

Remarks The coordinate point is specified in Page Units. If the STEP option is included, the *x!* and *y!* coordinates are relative to the last point referenced (POS).

See also Built In RGB Color Equates, GRAPHIC COLOR, GRAPHIC GET PIXEL, GRAPHIC SET BITS

GRAPHIC SET POS statement

GRAPHIC SET POS statement

Purpose Set the last point referenced (POS) for the selected graphic target.

Syntax `GRAPHIC SET POS [STEP] (x!, y!)`

Remarks The coordinate point is specified in Page Units. If the STEP option is included, the *x!* and *y!* coordinates are relative to the last point referenced (POS).

See also GRAPHIC ATTACH, GRAPHIC CELL, GRAPHIC GET POS, GRAPHIC SCALE

GRAPHIC SET SCROLLTEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET SCROLLTEXT statement New!

Purpose Enables or disables Graphic ScrollText Mode.

Syntax `GRAPHIC SET SCROLLTEXT [NumrExpr&]`

Remarks GRAPHIC SET SCROLLTEXT enables or disables scroll mode for the graphic target which is currently attached to the graphic stream. It has no effect on any other graphic target. If *NumrExpr&* is true (non-zero), ScrollText mode is enabled. If false (zero), the mode is disabled. If *NumrExpr&* is missing, the default is to enable ScrollText Mode.

With ScrollText Mode, you can control how PowerBASIC prints text on a graphic target when it reaches the end of a page. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the page.

When ScrollText Mode is enabled, scrolling of a page is triggered only by GRAPHIC PRINT. If the POS (last point referenced) is located on the bottom row of the graphic target, and a GRAPHIC PRINT statement moves the POS off of the page, the entire contents of the graphic target is scrolled one row, and a new blank row is opened at the bottom.

See also GRAPHIC GET SCROLLTEXT, GRAPHIC SET AUTOSIZE, GRAPHIC SET VIRTUAL, GRAPHIC SET WORDWRAP, GRAPHIC SET WRAP

GRAPHIC SET SIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET SIZE statement New!

Purpose	Change the overall size of a graphic control or graphic window.
Syntax	`GRAPHIC SET SIZE nWide&, nHigh&`
Remarks	Overall size may be larger than client size, depending on the type of borders used. The client area is the part inside the borders, while overall size includes the borders. A graphic target with a border will typically have a larger overall size than one without a border. Beginning with this version of PowerBASIC, GRAPHIC CONTROLS may be resized with CONTROL SET CLIENT, GRAPHIC SET CLIENT, CONTROL SET SIZE, and GRAPHIC SET SIZE. The original bitmap is copied, pixel for pixel, to the newly resized control. Any expanded area is filled with the current background color. Your program draws to it in the normal fashion for a bitmap of the new size. If a clip area had been established to create margins, it is reset. If scaled coordinates had been established, they are also reset, as neither would be appropriate for the altered size. You can enable these attributes again with GRAPHIC SCALE or GRAPHIC SET CLIP, based upon the new size of the drawing area.
nWide&, *nHigh&*	Integral numeric expressions which specify the desired size of the overall area. Width and height are specified in pixels or dialog units, depending upon the system used at creation.
See also	CONTROL SET CLIENT, CONTROL SET SIZE, GRAPHIC GET SIZE, GRAPHIC SET CLIENT,

GRAPHIC SET STRETCHMODE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET STRETCHMODE statement New!

Purpose	Sets the default bitmap stretching mode for the current DC.
Syntax	`GRAPHIC SET STRETCHMODE ModeExpr`
Remarks	There are several operations in PowerBASIC which involve stretching or condensing images on bitmaps, most notably GRAPHIC STRETCH. As individual pixels must be added or removed, there is a good chance that the quality of the image will be degraded. However, if you describe the nature of the image by defining a StretchMode, you can

substantially enhance the appearance.

The default StretchMode is maintained individually for each DC. You can set the default mode with this statement, or retrieve it with GRAPHIC GET STRETCHMODE. Of course, you can also override the default StretchMode when you execute one of the affected statements.

The 4 stretch mode equates are predefined in PowerBASIC.

Equate	Value	Description
%BLACKONWHITE	1	This is the default Windows stretch mode, and is most appropriate for monochrome bitmaps, or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels.
%WHITEONBLACK	2	Performs a boolean OR of eliminated and existing pixels. It preserves white pixels at the expense of black pixels.
%COLORONCOLOR	3	Deletes eliminated lines of pixels without trying to preserve their information.
%HALFTONE	4	This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source pixel block.

See also GRAPHIC BITMAP LOAD, GRAPHIC COPY, GRAPHIC GET STRETCHMODE, GRAPHIC RENDER, GRAPHIC STRETCH

GRAPHIC SET VIEW statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SET VIEW statement New!

Purpose Changes the position of the viewport on a virtual graphic target.

Syntax `GRAPHIC SET VIEW XPos, YPos`

Remarks Moves the position of the viewport to the new position on a virtual graphic target. The position is specified in Page Units. If no graphic target has been attached, or no virtual window has been created, then no operation is performed.

See also GRAPHIC GET VIEW, GRAPHIC SET AUTOSIZE, GRAPHIC SET VIRTUAL

GRAPHIC SET VIRTUAL statement

Keyword Template

Purpose
Syntax
Remarks
See also
Example

GRAPHIC SET VIRTUAL statement New!

Purpose Expands a graphic target into virtual mode.

Syntax **GRAPHIC SET VIRTUAL** ***nWidth&, nHeight&*** **[,USERSIZE]**

Remarks VIRTUAL mode allows the attached graphic target (control or window) to display the contents of a larger virtual window. The physical size of the display area is not changed. Instead, the display area acts as a smaller viewport, which can be moved around the larger virtual window to view one section at a time. The physical size of the display area is not changed. If the graphic target is a

, no operation is performed, as there would be no display area.

This statement may be used to change a target to VIRTUAL mode, or to change the sizes and UserSize option of an existing VIRTUAL target.

When executed, a new virtual bitmap of the specified height and width is created. *nWidth&* and *nHeight&* are always specified in Pixels or Dialog Units, depending upon the original window creation. The original bitmap is copied, pixel for pixel, at the existing size. Any expanded area is filled with the current background color. Your program draws to it in the normal fashion for a bitmap of the new size. Scroll bars are added so the user can move the viewport to the desired section. The size of the viewport is not changed.

The graphic viewport is initially placed at the upper-left corner of the virtual window. If a clip area had been established to create margins, it is reset. If scaled coordinates had been established, they are also reset, as neither would be appropriate for the altered size. You can enable these attributes again with GRAPHIC SCALE or GRAPHIC SET CLIP, based upon the new size of the drawing area. You can retrieve the size of the virtual drawing area, at any time, with GRAPHIC GET CANVAS.

The graphic viewport can be moved by clicking the scrollbars, or by moving the mouse wheel to alter the vertical position. Depressing the control key, along with the mouse wheel, alters the horizontal position. In addition, the cursor movement keys (Left, Right, Up, Down, PageUp, PageDown, Home, End) may also be used for this purpose. VIRTUAL mode is quite similar to AUTOSIZE mode. Both create a virtual window which is the target of your drawing and text printing operations. The difference is the way in which they are displayed.

VIRTUAL displays a viewport, smaller than the virtual window, which can be moved to various positions. This allows the user to view one selected section at a time. AUTOSIZE displays the entire virtual window, all of the time, by stretching or condensing it as needed.

If you add the USERSIZE option, an attached graphic window is displayed with a thick frame, which allows the user to "drag" the edges to a new size at any time. This option is not appropriate for a graphic control, and is ignored in that case.

Generally speaking, it is not advisable to enable ScrollText mode on a virtual graphic window, as the display may be confusing to the user.

See also GRAPHIC GET CANVAS, GRAPHIC GET VIEW, GRAPHIC SET AUTOSIZE, GRAPHIC SET FIXED, GRAPHIC SET VIEW

GRAPHIC SET WORDWRAP statement

GRAPHIC SET WORDWRAP statement New!

Purpose Enables or disables Graphic WordWrap Mode.

Syntax `GRAPHIC SET WORDWRAP [NumrExpr&]`

Remarks GRAPHIC SET WORDWRAP enables or disables WordWrap mode for the graphic target which is currently attached to the graphic stream. It has no effect on any other graphic target. If *NumrExpr&* is true (non-zero), WordWrap mode is enabled. If false (zero), wrap mode is disabled. If *NumrExpr&* is missing, the default is to enable WordWrap Mode.

With WordWrap Mode, you can control how PowerBASIC prints text on a graphic target when it reaches the end of a line. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the line.

When WordWrap mode is enabled, it affects only GRAPHIC PRINT operations. If GRAPHIC PRINT attempts to display a word beyond the end of a row, the entire word is automatically wrapped to the first column of the next row.

See also GRAPHIC CELL, GRAPHIC GET WORDWRAP, GRAPHIC SET WORDWRAP, GRAPHIC SET WRAP, GRAPHIC SPLIT

GRAPHIC SET WRAP statement

GRAPHIC SET WRAP statement New!

Purpose Enables or disables Graphic Wrap Mode.

Syntax `GRAPHIC SET WRAP [NumrExpr&]`

Remarks GRAPHIC SET WRAP enables or disables wrap mode for the graphic target which is currently attached to the graphic stream. It has no effect on any other graphic target. If *NumrExpr&* is true (non-zero), wrap mode is enabled. If false (zero), wrap mode is disabled. If *NumrExpr&* is missing, the default is to enable Wrap Mode.

With Wrap Mode, you can control how PowerBASIC prints text on a graphic target when it reaches the end of a line. Since a graphic target operates on a full page basis, the default is to ignore text which is printed past the end of the line.

When Wrap Mode is enabled, it affects only GRAPHIC PRINT operations. If GRAPHIC PRINT attempts to display a character beyond the end of a row, it is automatically wrapped to the first column of the next row.

See also GRAPHIC CELL, GRAPHIC GET WRAP, GRAPHIC PRINT, GRAPHIC SET SCROLLTEXT, GRAPHIC SET WORDWRAP, GRAPHIC SPLIT

GRAPHIC SPLIT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC SPLIT statement New!

Purpose Splits a string into two parts for display on a graphic target.

Syntax **GRAPHIC SPLIT [WORD]** ***MainStr*****,** ***Part1Len*** **To** ***Part1Var*****,** ***Part2Var***

Remarks Generally speaking, GRAPHIC SPLIT allows you to determine how much text will fit on a line (or a line section), so you don't overrun the end. This is critical with variable-width fonts. Since these text characters have different widths, you cannot rely on a simple character count.

GRAPHIC SPLIT separates the *MainStr* string expression into two parts, which are then assigned to the two

variables specified by *Part1Var* and *Part2Var*. The numeric expression *Part1Len* specifies the maximum width of the print field, using page units (pixels, dialog units, scaled units). After completion of GRAPHIC SPLIT, the *Part1Var* will contain those characters which can be safely displayed in the print field. The *Part2Var* will contain the remaining characters, which might be displayed on following lines.

Since this operation creates a "line break" not contemplated in the original text, you may have to modify the results in order to obtain the best appearance. For example, it's usually best to remove any leading spaces from Part2Var before printing it.

If the WORD option is included, PowerBASIC guarantees that *Part1Var* will not end on a partial word. This may require that *Part1Len* is adjusted to a smaller value. In that case, *Part2Var* would be assigned these characters to compensate.

See also GRAPHIC CELL, GRAPHIC PRINT, GRAPHIC SET SCROLLTEXT, GRAPHIC SET WORDWRAP, GRAPHIC SET WRAP, SPLIT

GRAPHIC STRETCH statement

GRAPHIC STRETCH statement IMPROVED

Purpose Copy and resize a bitmap to the selected graphic target.

Syntax
GRAPHIC STRETCH ***hBmp*****,** ***ID*****, (*****x1*****,*****y1*****)-(*****x2*****,*****y2*****) TO (*****x3*****,*****y3*****)-(*****x4*****,*****y4*****) [,** ***Mix*****,** ***Stretch*****]**
GRAPHIC STRETCH PAGE ***hBmp*****,** ***ID*** **[,** ***Mix*****,** ***Stretch*****]**

Remarks You can copy a complete bitmap, or a portion of it, to the selected graphic target, while resizing it to a larger or smaller size. The handle variable *hBmp* specifies the handle of the source bitmap, control, or window. The parameter *ID* is the control identifier (1 to 65535) assigned with the CONTROL ADD GRAPHIC. *ID* must be zero (0) for a GRAPHIC WINDOW or a

. The destination of the stretch operation is always the attached graphic target. The bitmap is automatically resized to fit the destination parameters. You must use care that your parameters are valid for the specified bitmap, or the result of the operation is undefined.

The second form, GRAPHIC STRETCH PAGE, is a shortcut for copying a complete bitmap to the clip or client area of the selected graphic target. The image is automatically stretched or condensed to fit the target appropriately.

Mix If the *Mix* parameter is included, it is one of the values in the following table. If not included, or the value zero (0), a default of %mix_CopySrc is presumed. There are 16 mix modes available to use for mixing drawing colors with the colors which already exist at the drawing location. The mix mode equates are predefined in PowerBASIC.

%mix_Blackness	Pixel is always 0 (black).
%mix_NotMergeSrc	Pixel is the inverse of the MergeSrc color.
%mix_MaskNotSrc	Pixel is a combination of the colors common to both the pixel and

	the inverse of the source.
%mix_NotCopySrc	Pixel is the inverse of the pen color.
%mix_MaskSrcNot	Pixel is a combination of the colors common to both the source and the inverse of the pixel.
%mix_Not	Pixel is the inverse of the pixel color.
%mix_XorSrc	Pixel is a combination of the colors in the source and in the pixel, but not in both.
%mix_NotMaskSrc	Pixel is the inverse of the MaskSrc color.
%mix_MaskSrc	Pixel is a combination of the colors common to both the source and the pixel.
%mix_NotXorSrc	Pixel is the inverse of the XorSrc color.
%mix_Nop	Pixel remains unchanged.
%mix_MergeNotSrc	Pixel is a combination of the source color and the inverse of the pixel color.
%mix_CopySrc	Pixel is the source color (default).
%mix_MergeSrcNot	Pixel is a combination of the source color and the inverse of the pixel color.
%mix_MergeSrc	Pixel is a combination of the source color and the pixel color.
%mix_Whiteness	Pixel is always 1 (white).

Stretch If the *stretch&* parameter is included, it is one of the values in the following table. If not included, or it is the value zero (0), the stretch mode is unchanged. An appropriate choice of stretch mode can substantially enhance the quality of bitmaps which are changed in size. The stretch mode equates are predefined in PowerBASIC.

Equate	**Value**	**Description**
%BLACKONWHITE	1	This is the default Windows stretch mode, and is most appropriate for monochrome bitmaps, or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels.
%WHITEONBLACK	2	Performs a boolean OR of eliminated and existing pixels. It preserves white pixels at the expense of black pixels.
%COLORONCOLOR	3	Deletes eliminated lines of pixels without trying to preserve their information.
%HALFTONE	4	This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source pixel block.

See also GRAPHIC COPY, GRAPHIC IMAGELIST, GRAPHIC RENDER, GRAPHIC SET STRETCHMODE

GRAPHIC STYLE statement

GRAPHIC STYLE statement

Purpose Set the line style to be used by various statements in the selected graphic target.

Syntax `GRAPHIC STYLE linestyle&`

Remarks The graphic target must first be selected with GRAPHIC ATTACH. Due to limitations in the Windows graphics device interface (GDI), styles are only applied if the line width is set to 1, the default. If the line width is greater than 1, the style is interpreted as 0, solid.

Available line styles are:

0 Solid (default)
1 Dash
2 Dot
3 DashDot
4 DashDotDot

See also GRAPHIC ARC, GRAPHIC ATTACH, GRAPHIC BOX, GRAPHIC ELLIPSE, GRAPHIC LINE, GRAPHIC PIE, GRAPHIC WIDTH

Example

```
' Draw a square box with red, dotted lines
GRAPHIC WIDTH 1
GRAPHIC STYLE 2
GRAPHIC BOX (10, 10) - (110, 110), 0, %RED
```

GRAPHIC TEXT SIZE statement

GRAPHIC TEXT SIZE statement IMPROVED

Purpose Calculate the size of text to be printed.

Syntax

```
GRAPHIC TEXT SIZE txt$ TO WidthVar!, HeightVar!
```

Function Form:

```
WidthVar!  = GRAPHIC(TEXT.SIZE.X, txt$)
HeightVar! = GRAPHIC(TEXT.SIZE.Y, txt$)
```

Remarks This statement calculates the total size of the printed text, based upon the current font for the graphic target. The sizes returned are specified in Page Units.

This allows you to easily calculate the appropriate print position, particularly when using a proportional font.

See also FONT NEW, GRAPHIC CELL, GRAPHIC CELL SIZE, GRAPHIC CHR SIZE, GRAPHIC PRINT, GRAPHIC SET FONT, GRAPHIC SCALE, GRAPHIC SET WORDWRAP, GRAPHIC SET WRAP, GRAPHIC SPLIT

GRAPHIC WAITKEY$ statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC WAITKEY$ statement IMPROVED

Purpose Reads a keyboard character or extended key, waiting until one is ready.

Syntax

```
GRAPHIC WAITKEY$ [To WaitVar$]
GRAPHIC WAITKEY$ ([KeyMask$] [,TimeOut&]) [TO WaitVar$]
```

Function Form:

```
WaitVar$ = GRAPHIC$(WAITKEY$)
WaitVar$ = GRAPHIC$(WAITKEY$, [KeyMask$] [,TimeOutVal&])
```

Remarks Reads a character or extended key from the keyboard without echoing anything to the screen. If no data is available, GRAPHIC WAITKEY$ will wait for an event to occur. It is very similar to GRAPHIC INKEY$, except that it waits for input to be available. While waiting, time slices are released to the operating system to reduce CPU load.

It returns a

of one or two characters if a key was pressed. If the TO clause is omitted, the keyboard character is discarded.

If the optional *KeyMask$* expression is included, only a limited set of keys are recognized. *KeyMask$* may include any number of Sub-Masks, one for each key to observe. For example, GRAPHIC WAITKEY$("YyNn") will recognize upper-case or lower-case Y or N (for yes/no answers), while any other key will be ignored. If *KeyMask$* is omitted, or evaluates to a zero-length string, any key event will be recognized.

If the optional *TimeOutVal&* expression is included, it tells the maximum number of milliseconds to wait for a key. GRAPHIC WAITKEY$(5000) will wait a maximum of 5 seconds. The specified TimeOut period will only be approximate, so you should not rely upon precision accuracy. If the TimeOut period is exceeded, a zero-length string is returned. If the *TimeOutVal&* parameter is omitted, or evaluates to zero (0), it will wait an infinite length of time. The maximum *TimeOut&* permitted is one hour.

A string length of one (LEN(i$) = 1) means that a standard character key was pressed. The result string contains the character. An ASC()value between 1 and 31 indicates a control code.

A string length of two (LEN(i$) = 2) means that an extended key was pressed. In this case, the first character in the result string has an ASC() value of zero (0), and the second is the extended keyboard scan code. For example, pressing the F1 key will return CHR$(0, 59).

See also GRAPHIC INKEY$, GRAPHIC INPUT, GRAPHIC INPUT FLUSH, GRAPHIC INSTAT, GRAPHIC LINE INPUT

GRAPHIC WIDTH statement

GRAPHIC WIDTH statement

Purpose Set the line width to be used by various statements in the selected graphic target.

Syntax **GRAPHIC WIDTH** ***linewidth&***

Remarks If line width is set to a value greater than 1 (default), the line style is always interpreted to be 0 (solid).

See also GRAPHIC ARC, GRAPHIC BOX, GRAPHIC ELLIPSE, GRAPHIC LINE, GRAPHIC PIE, GRAPHIC STYLE

Example

```
' Draw a square box with red, thick lines
GRAPHIC WIDTH 10
GRAPHIC BOX (10, 10) - (110, 110), 0, %RED
```

GRAPHIC WINDOW statement

GRAPHIC WINDOW statement IMPROVED

Purpose Creates a new standalone graphic window.

Syntax

```
GRAPHIC WINDOW NEW  Caption$, x&, y&, nWidth&, nHeight& [,hFont] TO
hWinVar [,HIDE|NORMALIZE]
GRAPHIC WINDOW TEXT Caption$, x&, y&, nRows&, nColumns& [,hFont] TO
hWinVar [,HIDE|NORMALIZE]
```

Remarks A Graphic Window is a standalone window which is used to display most any form of text and graphics. After a graphic window has been created with this statement, GRAPHIC ATTACH would normally be used to choose it as the selected graphic target. However, if there is no selected graphic target at the time of creation, the new Graphic Window is automatically attached and selected. You can then draw text, lines, circles, and other forms with various statements.

GRAPHIC WINDOW END can be used to close and destroy the selected Graphic window at any time. Otherwise, the window is automatically destroyed when the program ends.

All PowerBASIC graphical displays are persistent -- they are automatically redrawn for you after resuming from being minimized or temporarily covered by other windows.

The TEXT option is used to create a window oriented more towards the display of text. The size of the window is specified in rows and columns (rather than pixels), based upon the size of initial font -- the default font (MS Sans Serif, 8 point) or the optional initial font specified by the Font parameter. This does not limit the ability to display graphics, as every

function is still available. It simply makes it easier to create a window of the desired size. This option is best used with fonts which have a fixed width for each character (Courier, Lucida, etc.).

The parameter *Caption$* contains the text to be displayed in the title or caption bar of the graphic window. If *caption$* is empty (zero-length), the window is displayed without a title bar, so the appearance is different and the window cannot be dragged by the user.

The parameters *x&* and *y&* specify the location of the window, in pixels, relative to the upper left corner of the desktop.

The parameter *nWidth&* gives the width of the client area of the window, not including the frame. The width is specified in pixels.

The Parameter *nHeight&* gives the height of the client area of the window, not including the frame. The height is specified in pixels.

The parameter *hFont* specifies the handle of the initial font to be used in the GRAPHIC WINDOW. If this optional parameter is included, it is the handle of a font created with FONT NEW. This parameter is particularly important when you use the TEXT option, as the size of the window is based upon the size of the initial font. If not included, the default font (MS Sans Serif, 8 point) is selected for you.

The Long/DWord variable *hWinVar* receives the handle of the newly created window. If the window could not be created, *hWinVar* is assigned the value zero (0).

The option words HIDE or NORMALIZE determine whether the window will be made visible immediately. You may wish to initially hide the window so you can first make additional changes to it, such as with the GRAPHIC WINDOW STABILIZE statement. If neither HIDE nor NORMALIZE is chosen, the default is to show it immediately.

A newly-created GRAPHIC WINDOW automatically receives the focus. That is, keyboard input is directed to the graphic window until it is closed, or you choose another focus target.

See also CONTROL ADD GRAPHIC, GRAPHIC ATTACH, GRAPHIC CELL, GRAPHIC COLOR, GRAPHIC DETACH, GRAPHIC SET AUTOSIZE, GRAPHIC SET CAPTION, GRAPHIC SET CLIENT, GRAPHIC SET CLIP, GRAPHIC SET FIXED, GRAPHIC SET FONT, GRAPHIC SET LOC, GRAPHIC SET OVERLAP, GRAPHIC SET SCROLLTEXT, GRAPHIC SET SIZE, GRAPHIC SET STRETCHMODE, GRAPHIC SET VIRTUAL, GRAPHIC SET WORDWRAP, GRAPHIC SET WRAP, GRAPHIC WINDOW CLICK, GRAPHIC WINDOW END, GRAPHIC WINDOW HIDE, GRAPHIC WINDOW MINIMIZE, GRAPHIC WINDOW NONSTABLE, GRAPHIC WINDOW NORMALIZE, GRAPHIC WINDOW STABILIZE, TXT pseudo-object

Example

```
FUNCTION PBMAIN () AS LONG
  ' Create and show a Graphic window on screen
  LOCAL hWin AS DWORD
  GRAPHIC WINDOW "Box", 300, 300, 130, 130 TO hWin
```

```
  GRAPHIC ATTACH hWin, 0
  GRAPHIC BOX (10, 10) - (120, 120), 0, %BLUE
  SLEEP 5000  ' show it for 5 seconds, then end
END FUNCTION
```

GRAPHIC WINDOW CLICK statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC WINDOW CLICK statement

Purpose	Check whether a GRAPHIC WINDOW has been clicked with the mouse.
Syntax	**GRAPHIC WINDOW CLICK [*hwin&*] TO *click&*, *x!*, *y!***
hWin&	Handle of the GRAPHIC WINDOW to check.
Remarks	GRAPHIC WINDOW CLICK checks whether the specified GRAPHIC WINDOW has been clicked since the last time this statement was executed on this window. If so, the value one (1) is assigned to the *click&* variable for a single click, or two (2) for a double click. Also, the mouse position is assigned to *x!* and *y!*. If the has been no click, the value zero (0) is assigned to all three result variables. In case of a double click, a *click&* value of one (1) is returned immediately after the first click, and a *click&* value of two (2) is also returned after the second click. If the optional handle (*hwin&*) is omitted, the graphic window which is currently selected with GRAPHIC ATTACH is used.
See also	GRAPHIC WINDOW

GRAPHIC WINDOW END statement

GRAPHIC WINDOW END statement

Purpose	Close and destroy a graphic window.
Syntax	**GRAPHIC WINDOW END [*hWin*]**
Remarks	The GRAPHIC WINDOW identified by the handle *hWin* is closed and destroyed. If *hWin* is omitted, or is equal to zero (0), the currently attached graphic window is destroyed. GRAPHIC WINDOW END can be used to close and destroy a graphic window at any time. Otherwise, the window is automatically destroyed when the program ends.
See also	GRAPHIC DETACH, GRAPHIC WINDOW, GRAPHIC WINDOW HIDE

GRAPHIC WINDOW HIDE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC WINDOW HIDE statement New!

Purpose Make a graphic window invisible.

Syntax `GRAPHIC WINDOW HIDE [hWin]`

Remarks The GRAPHIC WINDOW identified by the handle *hWin* is made invisible. If *hWin* is omitted, or is equal to zero (0), the currently attached graphic window is made invisible.

See also GRAPHIC WINDOW END, GRAPHIC WINDOW MINIMIZE, GRAPHIC WINDOW NONSTABLE, GRAPHIC WINDOW NORMALIZE, GRAPHIC WINDOW STABILIZE

GRAPHIC WINDOW MINIMIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC WINDOW MINIMIZE statement New!

Purpose Minimize a graphic window.

Syntax `GRAPHIC WINDOW MINIMIZE [hWin]`

Remarks The GRAPHIC WINDOW identified by the handle *hWin* is minimized. If *hWin* is omitted, or is equal to zero (0), the currently attached graphic window is minimized. You can restore the graphic window to its normal state with GRAPHIC WINDOW NORMALIZE.

See also GRAPHIC WINDOW HIDE, GRAPHIC WINDOW NONSTABLE, GRAPHIC WINDOW NORMALIZE, GRAPHIC WINDOW STABILIZE

GRAPHIC WINDOW NONSTABLE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC WINDOW NONSTABLE statement

New!

Purpose	Make a graphic window non-stable (closeable).
Syntax	`GRAPHIC WINDOW NONSTABLE [hWin]`
Remarks	The GRAPHIC WINDOW identified by the handle *hWin* is made non-stable, meaning that it can be closed by the user. If there is a system menu, the close option and the close box are enabled. The ALT-F4 close key is also enabled. This is the default mode of operation. If *hWin* is omitted, or is equal to zero (0), the currently attached graphic window is made non-stable.
See also	GRAPHIC WINDOW HIDE, GRAPHIC WINDOW MINIMIZE, GRAPHIC WINDOW NORMALIZE, GRAPHIC WINDOW STABILIZE

GRAPHIC WINDOW NORMALIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC WINDOW NORMALIZE statement

New!

Purpose	Make a graphic window visible.
Syntax	`GRAPHIC WINDOW NORMALIZE [hWin]`
Remarks	The GRAPHIC WINDOW identified by the handle *hWin* is made visible. If *hWin* is omitted, or is equal to zero (0), the currently attached graphic window is made visible.
See also	GRAPHIC WINDOW HIDE, GRAPHIC WINDOW MINIMIZE, GRAPHIC WINDOW NONSTABLE, GRAPHIC WINDOW STABILIZE

GRAPHIC WINDOW STABILIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

GRAPHIC WINDOW STABILIZE statement New!

Purpose Make a graphic window stabilized (non-closeable).

Syntax `GRAPHIC WINDOW STABILIZE [hWin]`

Remarks The GRAPHIC WINDOW identified by the handle *hWin* is stabilized, meaning that it cannot be closed by the user. If there is a system menu, the close option and the close box are grayed. The ALT-F4 close key is disabled. This allows you to be certain that your operations on the graphic window can be completed. When a graphic window is stabilized, only GRAPHIC WINDOW END or program termination will close it.

See also GRAPHIC WINDOW END, GRAPHIC WINDOW HIDE, GRAPHIC WINDOW MINIMIZE, GRAPHIC WINDOW NONSTABLE, GRAPHIC WINDOW NORMALIZE

GRAPHIC WINDOW TEXT statement

GRAPHIC WINDOW statement IMPROVED

Purpose Creates a new standalone graphic window.

Syntax

```
GRAPHIC WINDOW NEW  Caption$, x&, y&, nWidth&, nHeight& [,hFont] TO
hWinVar [,HIDE|NORMALIZE]
GRAPHIC WINDOW TEXT Caption$, x&, y&, nRows&, nColumns& [,hFont] TO
hWinVar [,HIDE|NORMALIZE]
```

Remarks A Graphic Window is a standalone window which is used to display most any form of text and graphics. After a graphic window has been created with this statement, GRAPHIC ATTACH would normally be used to choose it as the selected graphic target. However, if there is no selected graphic target at the time of creation, the new Graphic Window is automatically attached and selected. You can then draw text, lines, circles, and other forms with various statements.

GRAPHIC WINDOW END can be used to close and destroy the selected Graphic window at any time. Otherwise, the window is automatically destroyed when the program ends.

All PowerBASIC graphical displays are persistent -- they are automatically redrawn for you after resuming from being minimized or temporarily covered by other windows.

The TEXT option is used to create a window oriented more towards the display of text. The size of the window is specified in rows and columns (rather than pixels), based upon the size of initial font -- the default font (MS Sans Serif, 8 point) or the optional initial font specified by the Font parameter. This does not limit the ability to display graphics, as every

function is still available. It simply makes it easier to create a window of the desired size. This option is best used with fonts which have a fixed width for each character (Courier, Lucida, etc.).

The parameter *Caption$* contains the text to be displayed in the title or caption bar of the graphic window. If *caption$* is empty (zero-length), the window is displayed without a title bar, so the appearance is different and the window cannot be dragged by the user.

The parameters *x&* and *y&* specify the location of the window, in pixels, relative to the upper left corner of the desktop.

The parameter *nWidth&* gives the width of the client area of the window, not including the frame. The width is specified in pixels.

The Parameter *nHeight&* gives the height of the client area of the window, not including the frame. The height is specified in pixels.

The parameter *hFont* specifies the handle of the initial font to be used in the GRAPHIC WINDOW. If this optional parameter is included, it is the handle of a font created with FONT NEW. This parameter is particularly important when you use the TEXT option, as the size of the window is based upon the size of the initial font. If not included, the default font (MS Sans Serif, 8 point) is selected for you.

The Long/DWord variable *hWinVar* receives the handle of the newly created window. If the window could not be created, *hWinVar* is assigned the value zero (0).

The option words HIDE or NORMALIZE determine whether the window will be made visible immediately. You may wish to initially hide the window so you can first make additional changes to it, such as with the GRAPHIC WINDOW STABILIZE statement. If neither HIDE nor NORMALIZE is chosen, the default is to show it immediately.

A newly-created GRAPHIC WINDOW automatically receives the focus. That is, keyboard input is directed to the graphic window until it is closed, or you choose another focus target.

See also CONTROL ADD GRAPHIC, GRAPHIC ATTACH, GRAPHIC CELL, GRAPHIC COLOR, GRAPHIC DETACH, GRAPHIC SET AUTOSIZE, GRAPHIC SET CAPTION, GRAPHIC SET CLIENT, GRAPHIC SET CLIP, GRAPHIC SET FIXED, GRAPHIC SET FONT, GRAPHIC SET LOC, GRAPHIC SET OVERLAP, GRAPHIC SET SCROLLTEXT, GRAPHIC SET SIZE, GRAPHIC SET STRETCHMODE, GRAPHIC SET VIRTUAL, GRAPHIC SET WORDWRAP, GRAPHIC SET WRAP, GRAPHIC WINDOW CLICK, GRAPHIC WINDOW END, GRAPHIC WINDOW HIDE, GRAPHIC WINDOW MINIMIZE, GRAPHIC WINDOW NONSTABLE, GRAPHIC WINDOW NORMALIZE, GRAPHIC WINDOW STABILIZE, TXT pseudo-object

Example

```
FUNCTION PBMAIN () AS LONG
  ' Create and show a Graphic window on screen
  LOCAL hWin AS DWORD
  GRAPHIC WINDOW "Box", 300, 300, 130, 130 TO hWin
  GRAPHIC ATTACH hWin, 0
  GRAPHIC BOX (10, 10) - (120, 120), 0, %BLUE
  SLEEP 5000  ' show it for 5 seconds, then end
END FUNCTION
```

GUID$ function

GUID$ function

Purpose Return a 16-byte (128-bit) Globally Unique Identifier (GUID) or Universally Unique Identifier (UUID) binary

.

Syntax

```
id$ = GUID$[()]
id$ = GUID$(guidtext$)
```

Remarks The GUID$ function, with no parameter (or a null, zero-length string parameter) will return a new, unique 16-byte string GUID (Globally Unique Identifier). This GUID may be used as a new class identifier or an interface identifier, or for some other purpose where a unique identifier may be required, such as for a one-time encryption key.

If *guidtext$* is specified, GUID$ examines a text string, and converts the first standard format, human-readable GUID it finds, and returns a 16-byte binary string. This 16-byte string contains the internal GUID representation as a 128-bit data item.

To be valid, the GUID string in *guidtext$* string must contain exactly 32 hexadecimal digits, optionally delimited by spaces or hyphens, but which must be enclosed overall by curly braces. For example: "{01234567-89AB-CDEF-FEDC-BA9876543210}".

The GUID$ function is the logical complement to the GUIDTXT$ function.

id$ The return string may be assigned to a dynamic string, or a fixed-length string of at least 16 bytes, or (typically) a GUID variable. See DIM for more information on creating GUID variables.

Restrictions If any errors are encountered, GUID$ returns a null (zero-length) string instead of the 16-byte GUID string. GUID$ can also be used in string equate assignments provided an explicit human-readable GUIDTXT$ argument string is assigned. For example:

```
   $AppGuid = GUID$("{01234567-89AB-CDEF-FEDC-BA9876543210}")
```

See also DIM, CLSID$, GUIDTXT$, How are GUID's used with objects?, INTERFACE (Direct), INTERFACE (IDBind), ISINTERFACE, ISNOTHING, ISOBJECT, Just what is COM?, LET (with Objects), OBJECT, OBJACTIVE, OBJPTR, OBJRESULT, PROGID$, What is an object, anyway?

Example

```
DIM oID1 AS GUID, oID2 AS GUID
oID1 = GUID$("{01234567-89AB-CDEF-FEDC-BA9876543210}")
oID2 = GUID$("The GUID we need is shown as
{0123456789ABCDEFFEDCBA9876543210}")
```

GUIDTXT$ function

GUIDTXT$ function

Purpose Return a 38-byte human-readable Globally Unique Identifier (GUID) or Universally Unique Identifier (UUID) string from a 16-byte GUID

.

Syntax ***id$*** **= GUIDTXT$(*guid16$*)**

Remarks The GUIDTXT$ function takes a string parameter *guid16$* that must be exactly 16-bytes long (and represents a 128-bit GUID string), and returns a 38-byte GUID text string. *guid16$* is usually a GUID variable but may also be a dynamic or fixed-length string, etc.

The GUIDTXT$ function is the logical complement to the GUID$ function.

Restrictions If any errors are encountered, GUIDTXT$ returns a null (zero-length) string instead of the 38-byte GUID text string.

See also DIM, CLSID$, GUID$, INTERFACE (Direct), INTERFACE (IDBind), ISINTERFACE, ISNOTHING, ISOBJECT, LET (with Objects), OBJECT, OBJACTIVE, OBJPTR, OBJRESULT, PROGID$, What is an object, anyway?

Example

```
oID1$ = GUID$("{01234567-89AB-CDEF-FEDC-BA9876543210}")
oID2$ = GUIDTXT$(oID1$)
```

HEADER GET COUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

HEADER statement New!

Purpose Manipulate a HEADER control in order to set/retrieve data.

Syntax **HEADER SEND *hWin*, *ID&*, *Msg&*, *wParam&*, *lParam&* [TO *ResultVar&*]**

hWin Handle of the window that owns the Header.

ID& The Header control identifier.

Msg& The message you want to send to the Header.

wParam& The first message parameter (message dependent).

lParam& The second message parameter (message dependent).

ResultVar& Variable which receives the message return value.

Remarks The HEADER statement is used to communicate with a HEADER control to set or retrieve various types of data. While you may create a custom header control for your own purposes, the most common usage is to communicate with the HEADER control which is embedded in every LISTVIEW control.

To communicate with a LISTVIEW HEADER, use the LISTVIEW GET HEADERID to get the values for the *hWin* and *ID&* parameters. Otherwise, those parameters would be assigned as with any other control.

HEADER GET COUNT *hWin*, *ID&* TO *CountVar&*

Retrieves the count of the items in a header control. If the operation was successful, the count value is assigned to the variable specified by *CountVar&*. If the operation failed, the value -1 is assigned to *CountVar&* instead.

HEADER GET ITEM *hWin*, *ID&*, *Index&*, *ItemPtr* [TO *ResultVar&*]

Retrieves an HD_Item structure which describes an item in a Header Control. *Index&* defines the item to be retrieved (1=first, 2=second, etc.). *ItemPtr* is the address of an HD_Item structure to be filled. If the operation succeeds, true is assigned to the variable specified by *ResultVar&*. If it fails, false is assigned instead.

HEADER SEND *hWin*, *ID&*, *Msg&*, *wParam&*, *lParam&* [TO *ResultVar&*]

A window message specified by *Msg&* is sent to the HEADER control, along with message dependent parameters (if any). If a result is returned, it is assigned to the variable specified by *ResultVar&*.

HEADER SET ITEM *hWin*, *ID&*, *Index&*, *ItemPtr* [TO *ResultVar&*]

Sets the attributes of the specified item in a Header Control. *Index&* defines the item to be set (1=first, 2=second, etc.). *ItemPtr* is the address of an HD_Item structure which defines the attributes. If the operation succeeds, true is assigned to the variable specified by *ResultVar&*. If it fails, false is assigned instead.

See also LISTVIEW

HEADER GET ITEM statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

HEADER statement New!

Purpose Manipulate a HEADER control in order to set/retrieve data.

Syntax `HEADER SEND hWin, ID&, Msg&, wParam&, lParam& [TO ResultVar&]`

hWin Handle of the window that owns the Header.

ID& The Header control identifier.

Msg& The message you want to send to the Header.

wParam& The first message parameter (message dependent).

lParam& The second message parameter (message dependent).

ResultVar& Variable which receives the message return value.

Remarks The HEADER statement is used to communicate with a HEADER control to set or retrieve various types of data. While you may create a custom header control for your own purposes, the most common usage is to communicate with the HEADER control which is embedded in every LISTVIEW control.

To communicate with a LISTVIEW HEADER, use the LISTVIEW GET HEADERID to get the values for the *hWin* and *ID&* parameters. Otherwise, those parameters would be assigned as with any other control.

HEADER GET COUNT *hWin, ID&* TO *CountVar&*

Retrieves the count of the items in a header control. If the operation was successful, the count value is assigned to the variable specified by *CountVar&*. If the operation failed, the value -1 is assigned to *CountVar&* instead.

HEADER GET ITEM *hWin, ID&, Index&, ItemPtr* [TO *ResultVar&*]

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HEADER SEND *hWin, ID&, Msg&, wParam&, lParam&* [TO *ResultVar&*]

A window message specified by *Msg&* is sent to the HEADER control, along with message dependent parameters (if any). If a result is returned, it is assigned to the variable specified by *ResultVar&*.

HEADER SET ITEM *hWin, ID&, Index&, ItemPtr* [TO *ResultVar&*]

Sets the attributes of the specified item in a Header Control. *Index&* defines the item to be set (1=first, 2=second, etc.). *ItemPtr* is the address of an HD_Item structure which defines the attributes. If the operation succeeds, true is assigned to the variable specified by *ResultVar&*. If it fails, false is assigned instead.

See also LISTVIEW

HEADER SEND statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

HEADER statement New!

Purpose Manipulate a HEADER control in order to set/retrieve data.

Syntax `HEADER SEND hWin, ID&, Msg&, wParam&, lParam& [TO ResultVar&]`

hWin	Handle of the window that owns the Header.
ID&	The Header control identifier.
Msg&	The message you want to send to the Header.
wParam&	The first message parameter (message dependent).
lParam&	The second message parameter (message dependent).
ResultVar&	Variable which receives the message return value.

Remarks

The HEADER statement is used to communicate with a HEADER control to set or retrieve various types of data. While you may create a custom header control for your own purposes, the most common usage is to communicate with the HEADER control which is embedded in every LISTVIEW control.

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Retrieves an HD_Item structure which describes an item in a Header Control. *Index&* defines the item to be retrieved (1=first, 2=second, etc.). *ItemPtr* is the address of an HD_Item structure to be filled. If the operation succeeds, true is assigned to the variable specified by *ResultVar&*. If it fails, false is assigned instead.

HEADER SEND *hWin, ID&, Msg&, wParam&, lParam&* [TO *ResultVar&*]

A window message specified by *Msg&* is sent to the HEADER control, along with message dependent parameters (if any). If a result is returned, it is assigned to the variable specified by *ResultVar&*.

HEADER SET ITEM *hWin, ID&, Index&, ItemPtr* [TO *ResultVar&*]

Sets the attributes of the specified item in a Header Control. *Index&* defines the item to be set (1=first, 2=second, etc.). *ItemPtr* is the address of an HD_Item structure which defines the attributes. If the operation succeeds, true is assigned to the variable specified by *ResultVar&*. If it fails, false is assigned instead.

See also LISTVIEW

HEADER SET ITEM statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

HEADER statement New!

Purpose Manipulate a HEADER control in order to set/retrieve data.

Syntax `HEADER SEND hWin, ID&, Msg&, wParam&, lParam& [TO ResultVar&]`

hWin Handle of the window that owns the Header.

ID& The Header control identifier.

Msg& The message you want to send to the Header.

wParam& The first message parameter (message dependent).

lParam& The second message parameter (message dependent).

ResultVar& Variable which receives the message return value.

Remarks The HEADER statement is used to communicate with a HEADER control to set or retrieve various types of data. While you may create a custom header control for your own purposes, the most common usage is to communicate with the HEADER control which is embedded in every LISTVIEW control.

To communicate with a LISTVIEW HEADER, use the LISTVIEW GET HEADERID to get the values for the *hWin* and *ID&* parameters. Otherwise, those parameters would be assigned as with any other control.

HEADER GET COUNT *hWin, ID&* TO *CountVar&*

Retrieves the count of the items in a header control. If the operation was successful, the count value is assigned to the variable specified by *CountVar&*. If the operation failed, the value -1 is assigned to *CountVar&* instead.

HEADER GET ITEM *hWin, ID&, Index&, ItemPtr* [TO *ResultVar&*]

Retrieves an HD_Item structure which describes an item in a Header Control. *Index&* defines the item to be retrieved (1=first, 2=second, etc.). *ItemPtr* is the address of an HD_Item structure to be filled. If the operation succeeds, true is assigned to the variable specified by *ResultVar&*. If it fails, false is assigned instead.

HEADER SEND *hWin, ID&, Msg&, wParam&, lParam&* [TO *ResultVar&*]

A window message specified by *Msg&* is sent to the HEADER control, along with message dependent parameters (if any). If a result is returned, it is assigned to the variable specified by *ResultVar&*.

HEADER SET ITEM *hWin, ID&, Index&, ItemPtr* [TO *ResultVar&*]

Sets the attributes of the specified item in a Header Control. *Index&* defines the item to be set (1=first, 2=second, etc.). *ItemPtr* is the address of an HD_Item structure which defines the attributes. If the operation succeeds, true is assigned to the variable specified by *ResultVar&*. If it fails, false is assigned instead.

See also LISTVIEW

HEX$ function

HEX$ function IMPROVED

Purpose Convert an integral value to a hexadecimal

.

Syntax `s$ = HEX$(IntVal [, Digits [, LeadSpaces [, TrailSpaces]]])`

Remarks *IntVal* is a numeric expression in the range of a 64-bit Quad Integer (-9223372036854775808 to +9223372036854775807). Any fractional part of the value is rounded. The result string is always formatted as an integral number using all the significant digits in *IntVal*. It is never expressed in scientific notation.

If *Digits* is 0 (or not given), no leading characters will be added to the numeric field. If *Digits* is a positive number greater than 0, the result string will be prepended with leading zeros to achieve the desired length. If Digits is a negative number, leading spaces are added to reach the absolute length. Digits may be in the range of -16 to +16.

LeadSpaces specifies additional leading spaces to be prepended, regardless of the length of the numeric portion of the string.

TrailSpaces specifies additional trailing spaces to be appended to the end of the string.

See also BIN$, DEC$, FORMAT$, OCT$, STR$, TRIM$, USING$, VAL

HI function

HI function

Purpose Extract the most significant (high-order) portion of an value.

Syntax ***result*** **= HI(*DataType*, *value*)**

Remarks The value returned by HI is unsigned if *DataType* is BYTE, WORD, or DWORD, and signed if *DataType* is INTEGER or LONG. *value* may be up to twice the size of the data type specified by *DataType*. In the following example, *n* may be up to a 16-bit value (twice the size of a BYTE):

```
b = HI(BYTE,n)
```

Restrictions HI replaces HIBYT, HIWRD, and HIINT. Note that those functions are no longer supported, so update your code to use the new syntax.

See also LO, MAK

HOST ADDR statement

HOST ADDR statement

Purpose Translate a host name into a corresponding IP address.

Syntax

```
HOST ADDR [hostname$] TO ip&
HOST ADDR(index&) TO ip&
```

Remarks *hostname$* is the name of a computer on the network or a domain name such as "powerbasic.com". If *hostname$* is zero-length or not specified, the primary IP address of the current computer is returned.

ip& receives the IP address of the specified host name. *ip&* may be a REGISTER or memory variable.

It is possible for a computer to have more than one IP address. For example, if you have a network card in your computer, and you are dialed into the Internet using a modem, your computer will have two IP addresses. By using the indexed form of the statement:

```
HOST ADDR(index&) TO ip&
```

…you can retrieve the first IP address with *index& = 1*, the second with *index& = 2*, etc. If, on return, *ip&* contains zero (0), there are no further IP addresses to retrieve on that computer.

A numeric IP address can be easily converted to a dotted IP address with the following code:

```
DIM p AS BYTE PTR
HOST ADDR "localhost" TO ip&
```

```
p = VARPTR(ip&)
a$ = USING$("#_.#_.#_.#", @p, @p[1], @p[2], @p[3])
' returns "127.0.0.1"
```

Restrictions In order to obtain the IP address of the current computer, you must have at least one socket open, or you must first obtain the name of the computer by using the HOST NAME statement.

See also HOST NAME, TCP and UDP Communications, TCP OPEN, UDP OPEN

Example

```
HOST ADDR "powerbasic.com" TO ip& ' Primary IP

FUNCTION HowManyIPs() AS LONG
  DIM p AS BYTE PTR
  RESET index&
  DO
    HOST ADDR(index&+1) TO ip&
    IF ISTRUE ip& THEN
      INCR index&
      p = VARPTR(ip&)
      a$ = USING$("#_.#_.#_.#", @p, @p[1], @p[2], @p[3])
    END IF
  LOOP UNTIL ip& = 0
  FUNCTION = index&
END FUNCTION
```

HOST NAME statement

HOST NAME statement

Purpose Translate an IP address into a corresponding host name.

Syntax `HOST NAME [ip&] TO hostname$`

Remarks *ip&* is the IP address you want to look up. If *ip&* is zero (0) or not specified, the name of the current computer is returned. *hostname$* receives the name of the host corresponding to the IP address.

In order to translate an IP address into an Internet domain name, your computer will need to be connected to a DNS server on the Internet or local Intranet.

See also HOST ADDR, TCP and UDP Communications, TCP OPEN, UDP OPEN

Example

```
HOST ADDR "powerbasic.com" TO ip&
HOST NAME ip& TO hostname$
CALL ShowResult(hostname$, ip&)
```

IDISPINFO pseudo-object

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IDISPINFO pseudo-object

Purpose Sets and returns additional information about certain Dispatch Status Codes for the OBJRESULT function.

Syntax

```
info& = IDISPINFO.CODE
info& = IDISPINFO.CONTEXT
info$ = IDISPINFO.DESC$
info$ = IDISPINFO.HELP$
info$ = IDISPINFO.SOURCE$
IDISPINFO.CLEAR
IDISPINFO.SET code& [, source$, desc$, help$, context&]
```

Remarks

GET Properties

IDISPINFO.CODE

When OBJRESULT is %DISP_E_EXCEPTION, this Get Property returns a long integer value which represents a more specific error code. If the value is less than 65536, it is known as a WCODE, which is usually defined by the application when found in 32-bit or 64-bit Windows. Much more common are the larger values known as an SCODE. These are usually defined by Windows, although application defined values are allowed. The most common are:

```
%E_UNEXPECTED          = &H8000FFFF&
%E_NOTIMPL             = &H80004001&
%E_NOINTERFACE         = &H80004002&
%E_POINTER             = &H80004003&
%E_ABORT               = &H80004004&
%E_FAIL                = &H80004005&
%E_ACCESSDENIED        = &H80070005&
%E_HANDLE              = &H80070006&
%E_OUTOFMEMORY         = &H8007000E&
%E_INVALIDARG          = &H80070057&
```

IDISPINFO.CONTEXT

When OBJRESULT is %DISP_E_EXCEPTION, this Get Property returns a long integer value which is the context of the topic within the help file (IDISPINFO.HELP$). This property is only valid if IDISPINFO.HELP returns a valid string.

IDISPINFO.DESC$

When OBJRESULT is %DISP_E_EXCEPTION, this Get Property returns a string containing a textual, human-readable description of the status. It is intended to be read by the customer. If no description is available, a null, zero-length string is returned.

IDISPINFO.HELP$

When OBJRESULT is %DISP_E_EXCEPTION, this Get Property returns a string containing drive, path, and filename of a Help File with more information about this particular status code. If no help is available, a null, zero-length string is returned.

IDISPINFO.PARAM

When OBJRESULT is either %DISP_E_PARAMNOTFOUND or %DISP_E_TYPEMISMATCH, this Get Property returns a long integer value which represents the parameter number of the first parameter which failed to match the requirements needed. The value is indexed to zero, which is the standard numbering convention for Dispatch parameters. The first parameter is 0, the second is 1, and so on.

IDISPINFO.SOURCE$

When OBJRESULT is %DISP_E_EXCEPTION, this Get Property returns a string containing a textual, human-readable description of the source of the exception. Typically, this will be the application name. If no source is available, a null, zero-length string is returned.

SET Properties

IDISPINFO.CLEAR	Clears all properties which may have been set by prior execution of IDISPINFO.SET in this thread.
IDISPINFO.SET	This statement may be executed in a METHOD or PROPERTY on a Dual Interface, so that the calling code can obtain additional information about Dispatch exception conditions. These five data items are passed back to the caller in the EXCEPINFO structure, so that they can be retrieved with IDISPINFO GET Properties, or other functions in other programming languages. This data is only available when using the Dispatch interface. It is unavailable to Direct Methods. The first parameter (*code&*) is required, and must be identical to the value which you return with METHOD OBJRESULT or PROPERTY OBJRESULT. The actual OBJRESULT will then be changed to %DISP_E_EXCEPTION, so that the caller will know that this data must also be retrieved. Note that the last four parameters are optional.

Restrictions You should only execute the GET PROPERTY methods listed above when OBJRESULT returns the specified status code. In any other case, IDISPINFO Get Properties will return zero or a null string.

See also OBJECT, OBJRESULT, OBJRESULT$, What is an object, anyway?, What is DISPATCH?

Example

```
IDISPINFO.SET &H80004040, "MyApp", "Valve stem error","C:\Help.chm", 1773
```

IF statement

IF statement

Purpose Test a condition and execute one or more program statements only if the condition is met.

Syntax **IF *integer_expression* THEN {*sub* | *label* | *statements*} [ELSE {*sub* | *label* | *statements*}]**

Remarks If *integer_expression* is TRUE (evaluates to a non-zero value), the statements following THEN are executed, and the statements following the optional ELSE are not executed. If *integer_expression* is FALSE (zero), the statements following THEN are not executed, and the statements following the optional ELSE are executed. If the ELSE clause is omitted, execution continues with the next line of the program, provided *integer_expression* evaluates to FALSE.

integer_expression will often be a result returned by a relational operator as shown here:

```
IF Income > Expenses THEN x$ = "OK!" ELSE x$ = "Uh-oh"
```

integer_expression can also be a boolean value. For example, your program could set the variable *BeepOn* to 1 (or any non-zero value) if audible beeps are requested, and to 0 if not, then use an IF statement to control output:

```
IF BeepOn THEN BEEP
```

…is equivalent to:

```
IF BeepOn <> 0 THEN BEEP
```

integer_expression can include the logical operators AND and OR, as in:

```
IF (a = b) AND (c = d) THEN x$ = "They are equal"
```

label If a *label* is specified, the label must appear within the same Sub, Function, Method, or Property as the IF statement. The GOTO keyword is implied by THEN, or can replace THEN:

```
IF EOF(1) THEN GotFile
```

```
IF EOF(1) GOTO GotFile
```

proc — If *proc* is specified, it must identify a Sub, Function, Method, or Property.

The IF statement and all its associated statements, including those after an ELSE, must appear on the same logical program line. The following is therefore illegal:

```
IF a < b THEN t = 15 : u = 16 : v = 17
  ELSE t = 17 : u = 16 : v = 15
```

…because the compiler treats the ELSE statement as a brand-new statement unrelated to the one above it. If you have more statements than you can fit on one line, you can use the line continuation character, the underscore "_", to spread a single logical line over several physical lines. For example, the following is a legal way of restating the last example:

```
IF a < b THEN t = 15 : u = 16 : v = 17 _
  ELSE t = 17 : u = 16 : v = 15
```

A better method of programming long and complex IF/THEN constructs is to use the IF block statement.

Also note that every statement following the ELSE will be executed if *integer_expression* is FALSE. For example, you might expect the following statement:

```
Taxable = %TRUE
Price = 1.00
Rate = .05
Total = 5.00
IF Taxable THEN Tax = Price * Rate ELSE Tax = 0: Total = Total + Tax
```

…to bring *Total* to 5.05, but it won't. The Total = Total + Tax statement will only be executed if *Taxable* is FALSE. It's easy to get the correct results using the IF block:

```
IF Taxable THEN
  Tax = Price * Rate
ELSE
  Tax = 0
END IF
Total = Total + Tax
```

Short-Circuit Evaluation

Note that PowerBASIC features short-circuit evaluation of relational expressions using AND and OR. This optimization means that evaluation of a relational expression in an IF, IF/END IF, DO/LOOP, or WHILE/WEND is terminated just as soon as it is possible to tell what the result will be. For example:

```
IF LEN(a$) AND MyFunc(a$) THEN CALL ShowText("Ok!")
```

In the above example, if LEN(*a$*) is zero, there is no further need to evaluate the expression, because 0 and *anything* will always be FALSE. So, if LEN(*a$*) is zero, *MyFunc()* is not called at all, and *ShowText()* is not executed.

To give short-circuit optimization an extra boost, AND and OR are treated as a Boolean operator rather than a bitwise operator, and this can sometimes produce unexpected results. For example, consider the following expression:

```
a& = 4
b& = 2
IF a& AND b& THEN CALL ShowText("TRUE") ELSE CALL ShowText("FALSE")
```

Applying the traditional BASIC bitwise evaluation, you would expect to see FALSE displayed because (4 AND 2) = 0. Due to the short-circuit optimization though, each value is treated as a Boolean, just as if you had written:

```
IF ISTRUE a& AND ISTRUE b& THEN ...
```

If you believe this may be a problem for your particular code, you can disable the short-circuit evaluation by surrounding the entire conditional expression in parentheses:

```
IF (a& AND b&) THEN CALL ShowText("TRUE") ELSE CALL ShowText("FALSE")
```

The parentheses force the entire expression to be evaluated, so AND reverts to being a bitwise operator.

See also CHOOSE, CHOOSE&, CHOOSE$, IF block, IIF, IIF&, IIF$, MAX, MAX&, MAX$, MIN, MIN&, MIN$, SWITCH, SWITCH&, SWITCH$, SELECT

Example

```
IF x > 100 THEN y = 3 ELSE y = 4
```

IF/END IF block

IF/END IF block

Purpose Create IF/THEN/ELSE constructs with multiple lines and/or conditions.

Syntax

```
IF integer_expression THEN
  [statements]
[ELSEIF integer_expression THEN
  [statements]]
[ELSE
  [statements]]
END IF
```

Remarks In executing IF blocks, the truth of the *integer_expression* in the initial IF statement is checked first. If it evaluates to FALSE (zero), each of the following ELSEIF statements is examined in order. There can be as many ELSEIF statements as desired. As soon as one is found to be TRUE (non-zero), PowerBASIC executes the statement(s) *following* the associated THEN and *before* the next ELSEIF or ELSE.

Execution then jumps to the statement just after the terminating END IF without making any further tests. If none of the test expressions evaluates to TRUE, the statement(s) in the ELSE clause (which is optional) are executed.

Note that there must be nothing following the THEN keyword in an IF block; that's how the compiler distinguishes an IF block from a conventional IF statement. There must also be nothing on the same line as the ELSE (except for remarks).

IF blocks can be nested; that is, any of the statements after any of the THENs may contain IF blocks. Although the compiler doesn't care, the clarity of source code is improved by indenting the statements controlled by each test a couple of spaces, as shown in the example.

IF blocks must be terminated with a matching END IF statement. Note that the END IF statement requires a space and the ELSEIF statement does not.

See the IF statement for notes on PowerBASIC's Short-circuit evaluation and its possible side effects.

See also CHOOSE, CHOOSE&, CHOOSE$, EXIT, IF, IIF, IIF&, IIF$, MAX, MAX&, MAX$, MIN, MIN&, MIN$, SELECT, Short-circuit evaluation, SWITCH, SWITCH&, SWITCH$, SELECT

Example

```
X = (RND * 500) + 1
IF X = 1 THEN
  x$ = "The number is 1"
ELSEIF X = 2 THEN
  x$ = "The number is 2"
ELSE
  IF X < 50 THEN
    x$ = "The number is less than 50"
  ELSEIF X < 100 THEN
    x$ = "Greater than 49 and less than 100"
  ELSE
    x$ = "The number is 100 or greater"
  END IF
END IF
```

IIF function

IIF function

Purpose Return one of two values based upon a TRUE/FALSE evaluation.

Syntax

```
var  = IIF(num_expression, truepart, falsepart)
var& = IIF&(num_expression, truepart&, falsepart&)
var$ = IIF$(num_expression, truepart$, falsepart$)
```

Remarks IIF expects parts of any numeric type. IIF& expects parts optimized for long integer type. IIF$ expects parts of

type.

If *num_expression* evaluates to TRUE (non-zero), the *truepart* is returned, else the *falsepart* is returned. *num_expression* is evaluated as a normal PowerBASIC Boolean expression, which offers short-circuit expression evaluation as needed.

IIF(1 AND 2, 3, 4) would return the *truepart* (3) because both terms in *num_expression* are TRUE, and therefore evaluate to TRUE.

To force a bitwise evaluation of *num_expression*, enclose it in parentheses. For example, IIF$((1 AND 2), "True", "False") would return "False".

IIF% is recognized as a valid synonym for IIF&.

Restrictions Contrary to the implementation in some other languages, only the selected expression (*truepart* or *falsepart*) is evaluated at run-time, not both. This ensures optimum execution speed, as well as the elimination of unanticipated side effects.

See also CHOOSE, CHOOSE&, CHOOSE$, SWITCH, SWITCH&, SWITCH$

Example

```
iLOGFONT.lfWeight = IIF&(Weight&, 700&, 400&)
Score& = Score& + IIF&(Answer = %FALSE, 0, 10)
```

ILinkListCollection.ADD method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

`ADD <3> (PowerKey AS WString, PowerItem AS Variant)`

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

`CLEAR <4>`

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

`CONTAINS <5> (PowerKey AS WString) AS Long`

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

`COUNT <6> AS Long`

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns % S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

`REMOVE <11> (`*`Index`*` AS Long)`

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

`REPLACE <12> (Index AS Long, PowerItem AS Variant)`

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

`CLEAR <1>`

All *PowerItems* are removed from the StackCollection.

`COUNT <2> AS Long`

The number of data items currently contained in the StackCollection is returned to the caller.

`POP <3> AS Variant`

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`PUSH <4> (PowerItem AS Variant)`

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

`CLEAR <1>`

All *PowerItems* are removed from the QueueCollection.

`COUNT <2> AS Long`

The number of data items currently contained in the QueueCollection is returned to the

caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

ILinkListCollection.CLEAR method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the

same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it

to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

`COUNT <5> AS Long`

The number of data items currently contained in the LinkListCollection is returned to the caller.

`FIRST <1> AS Long`

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

`INDEX <6> (`*`Index`*` AS Long) AS Long`

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

`IndexVar&` **`=`** ***`ObjectVar`*****`.INDEX(0)`**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

`INSERT <7> (`*`Index`*` AS Long, `*`PowerItem`*` AS Variant)`

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

`ITEM <8> (`*`Index`*` AS Long) AS Variant`

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`LAST <9> AS Long`

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

`NEXT <2> AS Variant`

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

`PREVIOUS <10> AS Variant`

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

`REMOVE <11> (`*`Index`*` AS Long)`

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

`REPLACE <12> (Index AS Long, PowerItem AS Variant)`

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL

interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

ILinkListCollection.COUNT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as

either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved

sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

`REMOVE <12> (`*`PowerKey`*` AS WString)`

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

`REPLACE <13> (`*`PowerKey`*` AS WString, `*`PowerItem`*` AS Variant)`

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

`SORT <14> (`*`Flags`*` AS Long)`

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

`ADD <3> (`*`PowerItem`*` AS Variant)`

The *PowerItem* variant is added to the end of the LinkListCollection.

`CLEAR <4>`

All *PowerItems* are removed from the LinkListCollection.

`COUNT <5> AS Long`

The number of data items currently contained in the LinkListCollection is returned to the caller.

`FIRST <1> AS Long`

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

`INDEX <6> (`*`Index`*` AS Long) AS Long`

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

`IndexVar& = ObjectVar.INDEX(0)`

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

`INSERT <7> (`*`Index`*` AS Long, `*`PowerItem`*` AS Variant)`

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If

the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

ILinkListCollection.FIRST method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may

be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position

number, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is

successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

ILinkListCollection.INDEX method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should

be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the

caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**

<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

ILinkListCollection.INSERT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

ILinkListCollection.ITEM method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

```
IndexVar& = ObjectVar.INDEX(0)
```

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
```

```
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

`REPLACE <12> (Index AS Long, PowerItem AS Variant)`

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

`CLEAR <1>`

All *PowerItems* are removed from the StackCollection.

`COUNT <2> AS Long`

The number of data items currently contained in the StackCollection is returned to the caller.

`POP <3> AS Variant`

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`PUSH <4> (PowerItem AS Variant)`

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

`CLEAR <1>`

All *PowerItems* are removed from the QueueCollection.

`COUNT <2> AS Long`

The number of data items currently contained in the QueueCollection is returned to the caller.

`DEQUEUE <3> AS Variant`

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`ENQUEUE <4> (PowerItem AS Variant)`

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

ILinkListCollection.LAST method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

`COUNT <2> AS Long`

The number of data items currently contained in the StackCollection is returned to the caller.

`POP <3> AS Variant`

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`PUSH <4> (PowerItem AS Variant)`

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

`CLEAR <1>`

All *PowerItems* are removed from the QueueCollection.

`COUNT <2> AS Long`

The number of data items currently contained in the QueueCollection is returned to the caller.

`DEQUEUE <3> AS Variant`

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`ENQUEUE <4> (PowerItem AS Variant)`

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

ILinkListCollection.NEXT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

`SORT <14> (Flags AS Long)`

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

`ADD <3> (PowerItem AS Variant)`

The *PowerItem* variant is added to the end of the LinkListCollection.

`CLEAR <4>`

All *PowerItems* are removed from the LinkListCollection.

`COUNT <5> AS Long`

The number of data items currently contained in the LinkListCollection is returned to the caller.

`FIRST <1> AS Long`

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

`INDEX <6> (Index AS Long) AS Long`

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

`IndexVar& = ObjectVar.INDEX(0)`

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

`INSERT <7> (Index AS Long, PowerItem AS Variant)`

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

`ITEM <8> (Index AS Long) AS Variant`

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`LAST <9> AS Long`

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

`CLEAR <1>`

All *PowerItems* are removed from the QueueCollection.

`COUNT <2> AS Long`

The number of data items currently contained in the QueueCollection is returned to the caller.

`DEQUEUE <3> AS Variant`

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`ENQUEUE <4> (PowerItem AS Variant)`

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

ILinkListCollection.PREVIOUS method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

ILinkListCollection.REMOVE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL

interface).

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = *ObjectVar*.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

ILinkListCollection.REPLACE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

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[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns % S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

`PREVIOUS <10> AS Variant`

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

`REMOVE <11> (Index AS Long)`

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

`REPLACE <12> (Index AS Long, PowerItem AS Variant)`

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

`CLEAR <1>`

All *PowerItems* are removed from the StackCollection.

`COUNT <2> AS Long`

The number of data items currently contained in the StackCollection is returned to the caller.

`POP <3> AS Variant`

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`PUSH <4> (PowerItem AS Variant)`

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IMAGELIST ADD BITMAP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IMAGELIST statement

Purpose Create and manage an IMAGELIST object to use with other functions.

Syntax

```
IMAGELIST ADD BITMAP hLst, hBmp [,hMsk] [TO dataValue&]
IMAGELIST ADD BITMAP hLst, Bmp$ [,Msk$] [TO dataValue&]
IMAGELIST ADD ICON hLst, hIcn [TO dataValue&]
IMAGELIST ADD ICON hLst, Icn$ [TO dataValue&]
IMAGELIST ADD MASKED hLst, hBmp, rgbColor& [TO dataValue&]
IMAGELIST ADD MASKED hLst, Bmp$, rgbColor& [TO dataValue&]
IMAGELIST GET COUNT hLst TO dataValue&
IMAGELIST KILL hLst
IMAGELIST NEW BITMAP|ICON nWidth&, nHeight&, depth&, initial& TO hLst
IMAGELIST SET OVERLAY hLst, image&, overlay&
```

hBmp Handle of a Bitmap.

hIcn Handle of an Icon.

hLst Handle of the IMAGELIST.

hMsk Handle of a Mask.

dataValue& A long integer variable to which result data is assigned.

rgbColor& A RGB color used in the bitmap to specify transparent pixels.

Remarks An IMAGELIST is a structure which contains any number of graphical images, either bitmaps or icons, but not a mixture. All of the images are automatically converted to the type, size, and color depth specified when the IMAGELIST is created. A bitmap (file type *.BMP) is a single color image, while an icon (file type *.ICO) supports transparency by including both a color bitmap and a mask bitmap. The mask bitmap is a monochrome image (one bit per pixel), where each "set" bit describes a pixel which remains transparent. The IMAGELIST structure can best be described as a set, or array, of images. You can retrieve the images individually by index number, or pass the entire IMAGELIST to a control which requires it (LISTVIEW, etc.).

An empty ImageList is first created with IMAGELIST NEW. Images are then added with IMAGELIST ADD, until the structure is complete. If you add an image which is wider than the size specified by *nWidth&*, the image is separated into multiple bitmaps, each of which is added in sequence. When an IMAGELIST is attached to a control like LISTVIEW, it is usually destroyed automatically when the control is destroyed. Consult the control documentation for that information. If not, you must explicitly destroy it with IMAGELIST KILL.

IMAGELIST ADD BITMAP *hLst*, *hBmp* [,*hMsk*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with

). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD BITMAP *hLst*, *Bmp$* [,*Msk$*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a name

(*Bmp$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst*, *hIcn* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a handle (*hIcn*), so it must have been loaded into memory (e.g. with the WinApi LoadIcon. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst*, *Icn$* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a name string (*Icn$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the icon name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *hBmp*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with GRAPHIC BITMAP). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *Bmp$*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a name string (*Bmp$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST GET COUNT *hLst* TO *dataValue&*

The number of images in the IMAGELIST is retrieved, and assigned to the long integer variable specified by *dataValue&*.

IMAGELIST KILL *hLst*

The IMAGELIST specified by *hLst* is destroyed. All allocated memory and resources are released.

IMAGELIST NEW BITMAP|ICON *nWidth&*, *nHeight&*, *depth&*, *initial&* TO *hLst*

A new ImageList structure is created. If you specify BITMAP, each image you add will be stored as a single bitmap. If you specify ICON, each image you add will be stored as two bitmaps in order to support transparent areas. The parameters *nWidth&* and *nHeight&* specify the size of each image in pixels. The *depth&* parameter specifies the color depth in bits per pixel (4,8,16,24,32). A depth of 4 offers 16 colors, 8 offers 256 colors, etc. The *initial&* parameter specifies the initial size of the ImageList. While it can grow beyond this number, it is most efficient to allocate space accurately at the time of creation. The variable *hLst* receives the handle of the newly created ImageList, or zero if the operation failed.

IMAGELIST SET OVERLAY *hLst*, *image&*, *overlay&*

The image specified by the index number *image&* is declared to be an overlay image. The *overlay&* parameter must be in the range of 1 to 15, and it is used later to retrieve and/or specify this particular overlay image.

See also GRAPHIC BITMAP LOAD, GRAPHIC BITMAP NEW, GRAPHIC IMAGELIST, LISTVIEW, TAB SET IMAGELIST, TREEVIEW, XPRINT IMAGELIST

IMAGELIST ADD ICON statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IMAGELIST statement

Purpose Create and manage an IMAGELIST object to use with other functions.

Syntax

```
IMAGELIST ADD BITMAP hLst, hBmp [,hMsk] [TO dataValue&]
IMAGELIST ADD BITMAP hLst, Bmp$ [,Msk$] [TO dataValue&]
IMAGELIST ADD ICON hLst, hIcn [TO dataValue&]
IMAGELIST ADD ICON hLst, Icn$ [TO dataValue&]
IMAGELIST ADD MASKED hLst, hBmp, rgbColor& [TO dataValue&]
IMAGELIST ADD MASKED hLst, Bmp$, rgbColor& [TO dataValue&]
IMAGELIST GET COUNT hLst TO dataValue&
IMAGELIST KILL hLst
IMAGELIST NEW BITMAP|ICON nWidth&, nHeight&, depth&, initial& TO hLst
IMAGELIST SET OVERLAY hLst, image&, overlay&
```

hBmp Handle of a Bitmap.

hIcn Handle of an Icon.

hLst Handle of the IMAGELIST.

hMsk Handle of a Mask.

dataValue& A long integer variable to which result data is assigned.

rgbColor& A RGB color used in the bitmap to specify transparent pixels.

Remarks An IMAGELIST is a structure which contains any number of graphical images, either bitmaps or icons, but not a mixture. All of the images are automatically converted to the type, size, and color depth specified when the IMAGELIST is created. A bitmap (file type *.BMP) is a single color image, while an icon (file type *.ICO) supports transparency by including both a color bitmap and a mask bitmap. The mask bitmap is a monochrome image (one bit per pixel), where each "set" bit describes a pixel which remains transparent. The IMAGELIST structure can best be described as a set, or array, of images. You can retrieve the images individually by index number, or pass the entire IMAGELIST to a control which requires it (LISTVIEW, etc.).

An empty ImageList is first created with IMAGELIST NEW. Images are then added with IMAGELIST ADD, until the structure is complete. If you add an image which is wider than the size specified by *nWidth&*, the image is separated into multiple bitmaps, each of which is added in sequence. When an IMAGELIST is attached to a control like LISTVIEW, it is usually destroyed automatically when the control is destroyed. Consult the control documentation for that information. If not, you must explicitly destroy it with IMAGELIST KILL.

IMAGELIST ADD BITMAP *hLst*, *hBmp* [,*hMsk*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with

). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD BITMAP *hLst*, *Bmp$* [,*Msk$*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a name

(*Bmp$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign

("#12345"). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst*, *hIcn* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a handle (*hIcn*), so it must have been loaded into memory (e.g. with the WinApi LoadIcon. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst*, *Icn$* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a name string (*Icn$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the icon name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *hBmp*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with GRAPHIC BITMAP). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *Bmp$*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a name string (*Bmp$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST GET COUNT *hLst* TO *dataValue&*

The number of images in the IMAGELIST is retrieved, and assigned to the long integer variable specified by *dataValue&*.

IMAGELIST KILL *hLst*

The IMAGELIST specified by *hLst* is destroyed. All allocated memory and resources are released.

IMAGELIST NEW BITMAP|ICON *nWidth&*, *nHeight&*, *depth&*, *initial&* TO *hLst*

A new ImageList structure is created. If you specify BITMAP, each image you add will be stored as a single bitmap. If you specify ICON, each image you add will be stored as two bitmaps in order to support transparent areas. The parameters *nWidth&* and *nHeight&* specify the size of each image in pixels. The *depth&* parameter specifies the color depth in bits per pixel (4,8,16,24,32). A depth of 4 offers 16 colors, 8 offers 256 colors, etc. The *initial&* parameter specifies the initial size of the ImageList. While it can grow beyond this number, it is most efficient to allocate space accurately at the time of creation. The variable *hLst* receives the handle of the newly created ImageList, or zero if the operation failed.

IMAGELIST SET OVERLAY *hLst*, *image&*, *overlay&*

The image specified by the index number *image&* is declared to be an overlay image. The *overlay&* parameter must be in the range of 1 to 15, and it is used later to retrieve and/or specify this particular overlay image.

See also GRAPHIC BITMAP LOAD, GRAPHIC BITMAP NEW, GRAPHIC IMAGELIST, LISTVIEW, TAB SET IMAGELIST, TREEVIEW, XPRINT IMAGELIST

IMAGELIST ADD MASKED statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IMAGELIST statement

Purpose Create and manage an IMAGELIST object to use with other functions.

Syntax

```
IMAGELIST ADD BITMAP hLst, hBmp [,hMsk] [TO dataValue&]
IMAGELIST ADD BITMAP hLst, Bmp$ [,Msk$] [TO dataValue&]
IMAGELIST ADD ICON hLst, hIcn [TO dataValue&]
IMAGELIST ADD ICON hLst, Icn$ [TO dataValue&]
IMAGELIST ADD MASKED hLst, hBmp, rgbColor& [TO dataValue&]
IMAGELIST ADD MASKED hLst, Bmp$, rgbColor& [TO dataValue&]
IMAGELIST GET COUNT hLst TO dataValue&
IMAGELIST KILL hLst
IMAGELIST NEW BITMAP|ICON nWidth&, nHeight&, depth&, initial& TO hLst
IMAGELIST SET OVERLAY hLst, image&, overlay&
```

hBmp Handle of a Bitmap.

hIcn Handle of an Icon.

hLst Handle of the IMAGELIST.

hMsk Handle of a Mask.

dataValue& A long integer variable to which result data is assigned.

rgbColor& A RGB color used in the bitmap to specify transparent pixels.

Remarks An IMAGELIST is a structure which contains any number of graphical images, either bitmaps or icons, but not a mixture. All of the images are automatically converted to the type, size, and color depth specified when the IMAGELIST is created. A bitmap (file type *.BMP) is a single color image, while an icon (file type *.ICO) supports transparency by including both a color bitmap and a mask bitmap. The mask bitmap is a monochrome image (one bit per pixel), where each "set" bit describes a pixel which remains transparent. The IMAGELIST structure can best be described as a set, or array, of images. You can retrieve the images individually by index number, or pass the entire IMAGELIST to a control which requires it (LISTVIEW, etc.).

An empty ImageList is first created with IMAGELIST NEW. Images are then added with IMAGELIST ADD, until the structure is complete. If you add an image which is wider than the size specified by *nWidth&*, the image is separated into multiple bitmaps, each of which is added in sequence. When an IMAGELIST is attached to a control like LISTVIEW, it is usually destroyed automatically when the control is destroyed. Consult the control documentation for that information. If not, you must explicitly destroy it with IMAGELIST KILL.

IMAGELIST ADD BITMAP *hLst*, *hBmp* [,*hMsk*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD BITMAP *hLst*, *Bmp$* [,*Msk$*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a name (*Bmp$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst*, *hIcn* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a handle (*hIcn*), so it must have been loaded into memory (e.g. with the WinApi LoadIcon. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst*, *Icn$* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a name string (*Icn$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the icon name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *hBmp*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with GRAPHIC BITMAP). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *Bmp$*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a name string (*Bmp$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST GET COUNT *hLst* TO *dataValue&*

The number of images in the IMAGELIST is retrieved, and assigned to the long integer variable specified by *dataValue&*.

IMAGELIST KILL *hLst*

The IMAGELIST specified by *hLst* is destroyed. All allocated memory and resources are released.

IMAGELIST NEW BITMAP|ICON *nWidth&*, *nHeight&*, *depth&*, *initial&* TO *hLst*

A new ImageList structure is created. If you specify BITMAP, each image you add will be stored as a single bitmap. If you specify ICON, each image you add will be stored as two bitmaps in order to support transparent areas. The parameters *nWidth&* and *nHeight&* specify the size of each image in pixels. The *depth&* parameter specifies the color depth in bits per pixel (4,8,16,24,32). A depth of 4 offers 16 colors, 8 offers 256 colors, etc. The *initial&* parameter specifies the initial size of the ImageList. While it can grow beyond this number, it is most efficient to allocate space accurately at the time of creation. The variable *hLst* receives the handle of the newly created ImageList, or zero if the operation failed.

IMAGELIST SET OVERLAY *hLst*, *image&*, *overlay&*

The image specified by the index number *image&* is declared to be an overlay image. The *overlay&* parameter must be in the range of 1 to 15, and it is used later to retrieve and/or specify this particular overlay image.

See also GRAPHIC BITMAP LOAD, GRAPHIC BITMAP NEW, GRAPHIC IMAGELIST, LISTVIEW, TAB SET IMAGELIST, TREEVIEW, XPRINT IMAGELIST

IMAGELIST GET COUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IMAGELIST statement

Purpose Create and manage an IMAGELIST object to use with other functions.

Syntax

```
IMAGELIST ADD BITMAP hLst, hBmp [,hMsk] [TO dataValue&]
IMAGELIST ADD BITMAP hLst, Bmp$ [,Msk$] [TO dataValue&]
IMAGELIST ADD ICON hLst, hIcn [TO dataValue&]
IMAGELIST ADD ICON hLst, Icn$ [TO dataValue&]
IMAGELIST ADD MASKED hLst, hBmp, rgbColor& [TO dataValue&]
IMAGELIST ADD MASKED hLst, Bmp$, rgbColor& [TO dataValue&]
IMAGELIST GET COUNT hLst TO dataValue&
IMAGELIST KILL hLst
IMAGELIST NEW BITMAP|ICON nWidth&, nHeight&, depth&, initial& TO hLst
IMAGELIST SET OVERLAY hLst, image&, overlay&
```

hBmp Handle of a Bitmap.

hIcn Handle of an Icon.

hLst Handle of the IMAGELIST.

hMsk Handle of a Mask.

dataValue& A long integer variable to which result data is assigned.

rgbColor& A RGB color used in the bitmap to specify transparent pixels.

Remarks An IMAGELIST is a structure which contains any number of graphical images, either bitmaps or icons, but not a mixture. All of the images are automatically converted to the type, size, and color depth specified when the IMAGELIST is created. A bitmap (file type *.BMP) is a single color image, while an icon (file type *.ICO) supports transparency by including both a color bitmap and a mask bitmap. The mask bitmap is a monochrome image (one bit per pixel), where each "set" bit describes a pixel which remains transparent. The IMAGELIST structure can best be described as a set, or array, of images. You can retrieve the images individually by index number, or pass the entire IMAGELIST to a control which requires it (LISTVIEW, etc.).

An empty ImageList is first created with IMAGELIST NEW. Images are then added with IMAGELIST ADD, until the structure is complete. If you add an image which is wider than the size specified by *nWidth&*, the image is separated into multiple bitmaps, each of which is added in sequence. When an IMAGELIST is attached to a control like LISTVIEW, it is usually destroyed automatically when the control is destroyed. Consult the control documentation for that information. If not, you must explicitly destroy it with IMAGELIST KILL.

IMAGELIST ADD BITMAP *hLst*, *hBmp* [,*hMsk*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with

). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD BITMAP *hLst*, *Bmp$* [,*Msk$*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a name

(*Bmp$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst*, *hIcn* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a handle (*hIcn*), so it must have been loaded into memory (e.g. with the WinApi LoadIcon. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst*, *Icn$* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a name string (*Icn$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the icon name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *hBmp*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with GRAPHIC BITMAP). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *Bmp$*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a name string (*Bmp$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST GET COUNT *hLst* TO *dataValue&*

The number of images in the IMAGELIST is retrieved, and assigned to the long integer variable specified by *dataValue&*.

IMAGELIST KILL *hLst*

The IMAGELIST specified by *hLst* is destroyed. All allocated memory and resources are released.

IMAGELIST NEW BITMAP|ICON *nWidth&*, *nHeight&*, *depth&*, *initial&* TO *hLst*

A new ImageList structure is created. If you specify BITMAP, each image you add will be stored as a single bitmap. If you specify ICON, each image you add will be stored as two bitmaps in order to support transparent areas. The parameters *nWidth&* and *nHeight&* specify the size of each image in pixels. The *depth&* parameter specifies the color depth in bits per pixel (4,8,16,24,32). A depth of 4 offers 16 colors, 8 offers 256 colors, etc. The *initial&* parameter specifies the initial size of the ImageList. While it can grow beyond this number, it is most efficient to allocate space accurately at the time of creation. The variable *hLst* receives the handle of the newly created ImageList, or zero if the operation failed.

IMAGELIST SET OVERLAY *hLst*, *image&*, *overlay&*

The image specified by the index number *image&* is declared to be an overlay image. The *overlay&* parameter must be in the range of 1 to 15, and it is used later to retrieve and/or specify this particular overlay image.

See also GRAPHIC BITMAP LOAD, GRAPHIC BITMAP NEW, GRAPHIC IMAGELIST, LISTVIEW, TAB SET IMAGELIST, TREEVIEW, XPRINT IMAGELIST

IMAGELIST KILL statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IMAGELIST statement

Purpose Create and manage an IMAGELIST object to use with other functions.

Syntax

```
IMAGELIST ADD BITMAP hLst, hBmp [,hMsk] [TO dataValue&]
IMAGELIST ADD BITMAP hLst, Bmp$ [,Msk$] [TO dataValue&]
IMAGELIST ADD ICON hLst, hIcn [TO dataValue&]
IMAGELIST ADD ICON hLst, Icn$ [TO dataValue&]
IMAGELIST ADD MASKED hLst, hBmp, rgbColor& [TO dataValue&]
IMAGELIST ADD MASKED hLst, Bmp$, rgbColor& [TO dataValue&]
IMAGELIST GET COUNT hLst TO dataValue&
IMAGELIST KILL hLst
IMAGELIST NEW BITMAP|ICON nWidth&, nHeight&, depth&, initial& TO hLst
IMAGELIST SET OVERLAY hLst, image&, overlay&
```

hBmp Handle of a Bitmap.

hIcn Handle of an Icon.

hLst Handle of the IMAGELIST.

hMsk Handle of a Mask.

dataValue& A long integer variable to which result data is assigned.

rgbColor& A RGB color used in the bitmap to specify transparent pixels.

Remarks An IMAGELIST is a structure which contains any number of graphical images, either bitmaps or icons, but not a mixture. All of the images are automatically converted to the type, size, and color depth specified when the IMAGELIST is created. A bitmap (file type *.BMP) is a single color image, while an icon (file type *.ICO) supports transparency by including both a color bitmap and a mask bitmap. The mask bitmap is a monochrome image (one bit per pixel), where each "set" bit describes a pixel which remains transparent. The IMAGELIST structure can best be described as a set, or array, of images. You can retrieve the images individually by index number, or pass the entire IMAGELIST to a control which requires it (LISTVIEW, etc.).

An empty ImageList is first created with IMAGELIST NEW. Images are then added with IMAGELIST ADD, until the structure is complete. If you add an image which is wider than the size specified by *nWidth&*, the image is separated into multiple bitmaps, each of which is added in sequence. When an IMAGELIST is attached to a control like LISTVIEW, it is usually destroyed automatically when the control is destroyed. Consult the control documentation for that information. If not, you must explicitly destroy it with IMAGELIST KILL.

IMAGELIST ADD BITMAP *hLst*, *hBmp* [,*hMsk*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with

). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD BITMAP *hLst*, *Bmp$* [,*Msk$*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a name

(*Bmp$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst*, *hIcn* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a handle (*hIcn*), so it must have been loaded into memory (e.g. with the WinApi LoadIcon. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst*, *Icn$* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a name string (*Icn$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the icon name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *hBmp*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with

GRAPHIC BITMAP). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *Bmp$*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a name string (*Bmp$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST GET COUNT *hLst* TO *dataValue&*

The number of images in the IMAGELIST is retrieved, and assigned to the long integer variable specified by *dataValue&*.

IMAGELIST KILL *hLst*

The IMAGELIST specified by *hLst* is destroyed. All allocated memory and resources are released.

IMAGELIST NEW BITMAP|ICON *nWidth&*, *nHeight&*, *depth&*, *initial&* TO *hLst*

A new ImageList structure is created. If you specify BITMAP, each image you add will be stored as a single bitmap. If you specify ICON, each image you add will be stored as two bitmaps in order to support transparent areas. The parameters *nWidth&* and *nHeight&* specify the size of each image in pixels. The *depth&* parameter specifies the color depth in bits per pixel (4,8,16,24,32). A depth of 4 offers 16 colors, 8 offers 256 colors, etc. The *initial&* parameter specifies the initial size of the ImageList. While it can grow beyond this number, it is most efficient to allocate space accurately at the time of creation. The variable *hLst* receives the handle of the newly created ImageList, or zero if the operation failed.

IMAGELIST SET OVERLAY *hLst*, *image&*, *overlay&*

The image specified by the index number *image&* is declared to be an overlay image. The *overlay&* parameter must be in the range of 1 to 15, and it is used later to retrieve and/or specify this particular overlay image.

See also GRAPHIC BITMAP LOAD, GRAPHIC BITMAP NEW, GRAPHIC IMAGELIST, LISTVIEW, TAB SET IMAGELIST, TREEVIEW, XPRINT IMAGELIST

IMAGELIST NEW BITMAP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IMAGELIST statement

Purpose	Create and manage an IMAGELIST object to use with other functions.
Syntax	**IMAGELIST ADD BITMAP *hLst*, *hBmp* [,*hMsk*] [TO *dataValue&*]** **IMAGELIST ADD BITMAP *hLst*, *Bmp$* [,*Msk$*] [TO *dataValue&*]** **IMAGELIST ADD ICON *hLst*, *hIcn* [TO *dataValue&*]** **IMAGELIST ADD ICON *hLst*, *Icn$* [TO *dataValue&*]** **IMAGELIST ADD MASKED *hLst*, *hBmp*, *rgbColor&* [TO *dataValue&*]** **IMAGELIST ADD MASKED *hLst*, *Bmp$*, *rgbColor&* [TO *dataValue&*]** **IMAGELIST GET COUNT *hLst* TO *dataValue&*** **IMAGELIST KILL *hLst*** **IMAGELIST NEW BITMAP|ICON *nWidth&*, *nHeight&*, *depth&*, *initial&* TO *hLst*** **IMAGELIST SET OVERLAY *hLst*, *image&*, *overlay&***
hBmp	Handle of a Bitmap.
hIcn	Handle of an Icon.
hLst	Handle of the IMAGELIST.
hMsk	Handle of a Mask.
dataValue&	A long integer variable to which result data is assigned.
rgbColor&	A RGB color used in the bitmap to specify transparent pixels.

Remarks

An IMAGELIST is a structure which contains any number of graphical images, either bitmaps or icons, but not a mixture. All of the images are automatically converted to the type, size, and color depth specified when the IMAGELIST is created. A bitmap (file type *.BMP) is a single color image, while an icon (file type *.ICO) supports transparency by including both a color bitmap and a mask bitmap. The mask bitmap is a monochrome image (one bit per pixel), where each "set" bit describes a pixel which remains transparent. The IMAGELIST structure can best be described as a set, or array, of images. You can retrieve the images individually by index number, or pass the entire IMAGELIST to a control which requires it (LISTVIEW, etc.).

An empty ImageList is first created with IMAGELIST NEW. Images are then added with IMAGELIST ADD, until the structure is complete. If you add an image which is wider than the size specified by *nWidth&*, the image is separated into multiple bitmaps, each of which is added in sequence. When an IMAGELIST is attached to a control like LISTVIEW, it is usually destroyed automatically when the control is destroyed. Consult the control documentation for that information. If not, you must explicitly destroy it with IMAGELIST KILL.

IMAGELIST ADD BITMAP *hLst*, *hBmp* [,*hMsk*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD BITMAP *hLst*, *Bmp$* [,*Msk$*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a name (*Bmp$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst*, *hIcn* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a handle (*hIcn*), so it must have been loaded into memory (e.g. with the WinApi LoadIcon. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst*, *Icn$* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a name string (*Icn$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the icon name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *hBmp*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with GRAPHIC BITMAP). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *Bmp$*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a name string (*Bmp$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST GET COUNT *hLst* TO *dataValue&*

The number of images in the IMAGELIST is retrieved, and assigned to the long integer variable specified by *dataValue&*.

IMAGELIST KILL *hLst*

The IMAGELIST specified by *hLst* is destroyed. All allocated memory and resources are released.

IMAGELIST NEW BITMAP|ICON *nWidth&, nHeight&, depth&, initial&* TO *hLst*

A new ImageList structure is created. If you specify BITMAP, each image you add will be stored as a single bitmap. If you specify ICON, each image you add will be stored as two bitmaps in order to support transparent areas. The parameters *nWidth&* and *nHeight&* specify the size of each image in pixels. The *depth&* parameter specifies the color depth in bits per pixel (4,8,16,24,32). A depth of 4 offers 16 colors, 8 offers 256 colors, etc. The *initial&* parameter specifies the initial size of the ImageList. While it can grow beyond this number, it is most efficient to allocate space accurately at the time of creation. The variable *hLst* receives the handle of the newly created ImageList, or zero if the operation failed.

IMAGELIST SET OVERLAY *hLst, image&, overlay&*

The image specified by the index number *image&* is declared to be an overlay image. The *overlay&* parameter must be in the range of 1 to 15, and it is used later to retrieve and/or specify this particular overlay image.

See also GRAPHIC BITMAP LOAD, GRAPHIC BITMAP NEW, GRAPHIC IMAGELIST, LISTVIEW, TAB SET IMAGELIST, TREEVIEW, XPRINT IMAGELIST

IMAGELIST NEW ICON statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IMAGELIST statement

Purpose Create and manage an IMAGELIST object to use with other functions.

Syntax

```
IMAGELIST ADD BITMAP hLst, hBmp [,hMsk] [TO dataValue&]
IMAGELIST ADD BITMAP hLst, Bmp$ [,Msk$] [TO dataValue&]
IMAGELIST ADD ICON hLst, hIcn [TO dataValue&]
IMAGELIST ADD ICON hLst, Icn$ [TO dataValue&]
IMAGELIST ADD MASKED hLst, hBmp, rgbColor& [TO dataValue&]
IMAGELIST ADD MASKED hLst, Bmp$, rgbColor& [TO dataValue&]
IMAGELIST GET COUNT hLst TO dataValue&
IMAGELIST KILL hLst
IMAGELIST NEW BITMAP|ICON nWidth&, nHeight&, depth&, initial& TO hLst
IMAGELIST SET OVERLAY hLst, image&, overlay&
```

hBmp Handle of a Bitmap.

hIcn Handle of an Icon.

hLst Handle of the IMAGELIST.

hMsk Handle of a Mask.

dataValue& A long integer variable to which result data is assigned.

rgbColor& A RGB color used in the bitmap to specify transparent pixels.

Remarks An IMAGELIST is a structure which contains any number of graphical images, either bitmaps or icons, but not a mixture. All of the images are automatically converted to the type, size, and color depth specified when the IMAGELIST is created. A bitmap (file type *.BMP) is a single color image, while an icon (file type *.ICO) supports transparency by including both a color bitmap and a mask bitmap. The mask bitmap is a monochrome image (one bit per pixel), where each "set" bit describes a pixel which remains transparent. The IMAGELIST structure can best be described as a set, or array, of images. You can retrieve the images individually by index number, or pass the entire IMAGELIST to a control which requires it (LISTVIEW, etc.).

An empty ImageList is first created with IMAGELIST NEW. Images are then added with IMAGELIST ADD, until the structure is complete. If you add an image which is wider than the size specified by *nWidth&*, the image is separated into multiple bitmaps, each of which is added in sequence. When an IMAGELIST is attached to a control like LISTVIEW, it is usually destroyed automatically when the control is destroyed. Consult the control documentation for that information. If not, you must explicitly destroy it with IMAGELIST KILL.

IMAGELIST ADD BITMAP *hLst*, *hBmp* [,*hMsk*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with

). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD BITMAP *hLst*, *Bmp$* [,*Msk$*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a name

(*Bmp$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst*, *hIcn* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a handle (*hIcn*), so it must have been loaded into memory (e.g. with the WinApi LoadIcon. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst*, *Icn$* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a name string (*Icn$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the icon name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *hBmp*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with GRAPHIC BITMAP). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *Bmp$*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a name string (*Bmp$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST GET COUNT *hLst* TO *dataValue&*

The number of images in the IMAGELIST is retrieved, and assigned to the long integer variable specified by *dataValue&*.

IMAGELIST KILL *hLst*

The IMAGELIST specified by *hLst* is destroyed. All allocated memory and resources are released.

IMAGELIST NEW BITMAP|ICON *nWidth&*, *nHeight&*, *depth&*, *initial&* TO *hLst*

A new ImageList structure is created. If you specify BITMAP, each image you add will be stored as a single bitmap. If you specify ICON, each image you add will be stored as two bitmaps in order to support transparent areas. The parameters *nWidth&* and *nHeight&* specify the size of each image in pixels. The *depth&* parameter specifies the color depth in bits per pixel (4,8,16,24,32). A depth of 4 offers 16 colors, 8 offers 256 colors, etc. The *initial&* parameter specifies the initial size of the ImageList. While it can grow beyond this number, it is most efficient to allocate space accurately at the time of creation. The variable *hLst* receives the handle of the newly created ImageList, or zero if the operation failed.

IMAGELIST SET OVERLAY *hLst*, *image&*, *overlay&*

The image specified by the index number *image&* is declared to be an overlay image. The *overlay&* parameter must be in the range of 1 to 15, and it is used later to retrieve and/or specify this particular overlay image.

See also GRAPHIC BITMAP LOAD, GRAPHIC BITMAP NEW, GRAPHIC IMAGELIST, LISTVIEW, TAB SET IMAGELIST, TREEVIEW, XPRINT IMAGELIST

IMAGELIST SET OVERLAY statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IMAGELIST statement

Purpose Create and manage an IMAGELIST object to use with other functions.

Syntax

```
IMAGELIST ADD BITMAP hLst, hBmp [,hMsk] [TO dataValue&]
IMAGELIST ADD BITMAP hLst, Bmp$ [,Msk$] [TO dataValue&]
IMAGELIST ADD ICON hLst, hIcn [TO dataValue&]
IMAGELIST ADD ICON hLst, Icn$ [TO dataValue&]
IMAGELIST ADD MASKED hLst, hBmp, rgbColor& [TO dataValue&]
IMAGELIST ADD MASKED hLst, Bmp$, rgbColor& [TO dataValue&]
IMAGELIST GET COUNT hLst TO dataValue&
IMAGELIST KILL hLst
IMAGELIST NEW BITMAP|ICON nWidth&, nHeight&, depth&, initial& TO hLst
IMAGELIST SET OVERLAY hLst, image&, overlay&
```

hBmp Handle of a Bitmap.

hIcn Handle of an Icon.

hLst Handle of the IMAGELIST.

hMsk Handle of a Mask.

dataValue& A long integer variable to which result data is assigned.

rgbColor& A RGB color used in the bitmap to specify transparent pixels.

Remarks An IMAGELIST is a structure which contains any number of graphical images, either bitmaps or icons, but not a mixture. All of the images are automatically converted to the type, size, and color depth specified when the IMAGELIST is created. A bitmap (file type *.BMP) is a single color image, while an icon (file type *.ICO) supports transparency by including both a color bitmap and a mask bitmap. The mask bitmap is a monochrome image (one bit per pixel), where each "set" bit describes a pixel which remains transparent. The IMAGELIST structure can best be described as a set, or array, of images. You can retrieve the images individually by index number, or pass the entire IMAGELIST to a control which requires it (LISTVIEW, etc.).

An empty ImageList is first created with IMAGELIST NEW. Images are then added with IMAGELIST ADD, until the structure is complete. If you add an image which is wider than the size specified by *nWidth&*, the image is separated into multiple bitmaps, each of which is added in sequence. When an IMAGELIST is attached to a control like LISTVIEW, it is usually destroyed automatically when the control is destroyed. Consult the control documentation for that information. If not, you must explicitly destroy it with IMAGELIST KILL.

IMAGELIST ADD BITMAP *hLst*, *hBmp* [,*hMsk*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD BITMAP *hLst*, *Bmp$* [,*Msk$*] [TO *dataValue&*]

An image is added to the ImageList specified by *hLst*. With this syntax, the image is specified by a name

(*Bmp$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the ImageList is an ICON type, a second mask bitmap is also specified by a handle (*hMsk*). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst*, *hIcn* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a handle (*hIcn*), so it must have been loaded into memory (e.g. with the WinApi LoadIcon. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD ICON *hLst*, *Icn$* [TO *dataValue&*]

An icon is added to the ImageList specified by *hLst*. With this syntax, the icon is specified by a name string (*Icn$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the icon name is a numeric resource, it should be described with a leading pound sign ("#12345"). If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *hBmp*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a handle (*hBmp*), so it must have been loaded into memory (e.g. with GRAPHIC BITMAP). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added icon (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST ADD MASKED *hLst*, *Bmp$*, *rgbColor&* [TO *dataValue&*]

A bitmap is added to the icon ImageList specified by *hLst*. With this syntax, the bitmap is specified by a name string (*Bmp$*), which is the name of an embedded resource or a disk file. If the name string contains a period, it is presumed to be a disk file. Otherwise, an attempt is made to load it from a resource - if not found, it is then presumed to be a disk file. If the image name is a numeric resource, it should be described with a leading pound sign ("#12345"). The parameter *rgbColor&* specifies the RGB color used in the bitmap to specify transparent pixels. Each pixel of that color is changed to the color black, and a mask bitmap is created to describe the transparent pixels. If the TO clause is included, the index position of the first added bitmap (starting with 1) is assigned to the variable designated by *dataValue&*. If the operation fails, the value 0 is assigned.

IMAGELIST GET COUNT *hLst* TO *dataValue&*

The number of images in the IMAGELIST is retrieved, and assigned to the long integer variable specified by *dataValue&*.

IMAGELIST KILL *hLst*

The IMAGELIST specified by *hLst* is destroyed. All allocated memory and resources are released.

IMAGELIST NEW BITMAP|ICON *nWidth&*, *nHeight&*, *depth&*, *initial&* TO *hLst*

A new ImageList structure is created. If you specify BITMAP, each image you add will be stored as a single bitmap. If you specify ICON, each image you add will be stored as two bitmaps in order to support transparent areas. The parameters *nWidth&* and *nHeight&* specify the size of each image in pixels. The *depth&* parameter specifies the color depth in bits per pixel (4,8,16,24,32). A depth of 4 offers 16 colors, 8 offers 256 colors, etc. The *initial&* parameter specifies the initial size of the ImageList. While it can grow beyond this number, it is most efficient to allocate space accurately at the time of creation. The variable *hLst* receives the handle of the newly created ImageList, or zero if the operation failed.

IMAGELIST SET OVERLAY *hLst*, *image&*, *overlay&*

The image specified by the index number *image&* is declared to be an overlay image. The *overlay&* parameter must be in the range of 1 to 15, and it is used later to retrieve and/or specify this particular overlay image.

See also GRAPHIC BITMAP LOAD, GRAPHIC BITMAP NEW, GRAPHIC IMAGELIST, LISTVIEW, TAB SET IMAGELIST, TREEVIEW, XPRINT IMAGELIST

IMP operator

IMP operator

Purpose The IMP operator works as both a logical and a bitwise arithmetic operator.

Syntax ***p* IMP *q***

Remarks

IMP as a logical operator

The IMP operator returns FALSE (zero) if and only if its first operand is TRUE (non-zero), and its second operand is FALSE. In all other cases, it returns TRUE.

Truth table

x	y	x IMP y
T	T	T
T	F	F
F	T	T
F	F	T

Using IMP as a bitwise arithmetic operator

IMP is seldom used as a bitwise arithmetic operator, but here is a sample:

```
              1001 0111 0000 0000 = &H9700
IMP           0011 1111 1111 1111 = &H3FFF (the mask)
              0111 1111 1111 1111 = &H7FFF (result)
MSB                                 LSB (bit 0)
```

See also Arithmetic Operators, AND, EQV, ISFALSE, ISTRUE, NOT, OR, XOR

IMPORT ADDR statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IMPORT statement New!

Purpose Load or free a library (DLL) to access an imported procedure.

Syntax
```
IMPORT ADDR  ProcName$, LibName$ TO AddrVar& [, HndlVar&]
IMPORT CLOSE LibHndl
```

Remarks In most cases, libraries are implicitly loaded automatically when you list an IMPORT or LIB option in a DECLARE statement. While that's the easiest approach, it can cause a fatal problem if the DLL is missing, or it's a version which does not include the Sub/Function you need. In that case, your program will fail at startup, and not execute at all.

IMPORT ADDR allows you to load a DLL explicitly, by name, so that you can handle a problem gracefully if the operation fails for any reason. With IMPORT ADDR, *ProcName$* specifies the name of the SUB or Function you wish to access, while *LibName$* specifies the name of the DLL and where it is located. *ProcName$* must use the correct upper/lower case for all alphabetic characters or it will fail. If the load is successful, the address of the entry point of the Sub/Function is assigned to the variable *AddrVar&*, and the handle of the DLL is assigned to the optional variable *HndlVar&*. Both of these variables must be Long Integers or DWords. If the load fails for any reason, the value zero (0) is assigned to both.

After the library (DLL) is loaded successfully, you can access the Sub/Function with CALL DWORD *AddrVar&*.

Once you are through using the library, you can release it and regain the memory used by executing IMPORT CLOSE. The expression *LibHndl* must specify the value returned in *HndlVar&* when the DLL was loaded. If you do not execute an IMPORT CLOSE, the DLL will be automatically released when your program terminates.

See also CALL DWORD, DECLARE

IMPORT CLOSE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

IMPORT statement New!

Purpose Load or free a library (DLL) to access an imported procedure.

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See also CALL DWORD, DECLARE

INCR statement

INCR statement

Purpose Increment a variable by 1; increment a pointer by the size of its target; or increment the target of a numeric pointer by 1.

Syntax **INCR *variable***

Remarks *variable* can be a

or a pointer variable. When INCR is used with a numeric variable, 1 is added to the numeric variable.

When INCR is used with a pointer variable itself, the value of the pointer is incremented by the size of the pointer's target.

When INCR is used on a numeric pointer's target (i.e., INCR @IntPtr) the value of the target is incremented by 1.

For example, given a pointer to an array where the pointer targets element 1000, applying INCR to the pointer would result in the pointer aiming at element 1001. The actual address held by the pointer would have risen by two, because the target of the pointer is an Integer which is two bytes wide.

Conversely, if INCR was used on the target of this Integer pointer, the value of the element itself would be incremented by 1.

See also DECR, LET

Example

```
DIM x&, LongPtr AS LONG POINTER
INCR x&
INCR LongPtr
INCR @LongPtr
```

INPUT# statement

INPUT# statement

Purpose Load variables with data from a sequential file.

Syntax **INPUT #*filenum&*, *variable_list***

Remarks *filenum&* is the file number, or variable containing a file number, given when the file was opened. *variable_list* is a comma-delimited sequence of one or more

or variables. When the INPUT# statement reads an unquoted data item from a file, it removes leading spaces. If leading spaces are significant, place quotes around the file data, either directly or by using WRITE# to save the data to disk. Please note that data to be quoted should not contain embedded quotes.

The data in the file must match the type(s) of the variable(s) defined in the INPUT# statement. The file data should be separated by commas with a carriage return at the end. The WRITE# statement is ideal for creating such files.

INPUT# also supports fixed-length and nul-terminated string variables; however, data that is longer than the string is truncated to fit into the string. Dynamic strings receive the data without truncation. UDT variables may not be used, although fixed-length and nul-terminated UDT member variables are supported.

See also LINE INPUT#, PRINT#, WRITE#

Example

```
SUB MakeFile
  ' MakeFile opens a sequential file for output.
  ' Using WRITE#, it writes lines of different
  ' data types to 'the file.
  OPEN "INPUT#.DTA" FOR OUTPUT AS #1
  StringVariable$ = "I'll be back."
  IntegerVar% = 1000
  FloatingPoint! = 30000.12
  ' Write a line of text to the sequential file.
  WRITE #1, StringVariable$, IntegerVar%, FloatingPoint!
  CLOSE #1
END SUB

SUB ReadFile
  ' This procedure opens a sequential file for
  ' input. Using INPUT# it reads lines of
  ' different data types from the file.
  OPEN "INPUT#.DTA" FOR INPUT AS #1
  RESET StringVariable$
  RESET IntegerVar%
  RESET FloatingPoint!
  ' Read a line of text from the sequential file.
  INPUT #1, StringVariable$, IntegerVar%, FloatingPoint!
  CLOSE #1
END SUB
```

INPUTBOX$ function

INPUTBOX$ function

Purpose INPUTBOX$ displays a dialog box containing a prompt. INPUTBOX$ waits for the user to enter text, and accept or cancel the dialog. INPUTBOX$ returns the contents of the text box.

Syntax ***sResult$* = INPUTBOX$(*prompt$* [[, *title$*], *default$*] [, *xpos%*, *ypos%*])**

Remarks *Prompt$* is the text prompt displayed in the Inputbox dialog.

Title$ is the caption for the Inputbox dialog and is optional.

Default$ is the default result text displayed in the edit section of the Inputbox dialog, and is optional.

xpos% and *ypos%* specify the location on the screen to display the Inputbox, in dialog units. If these are not specified, the Inputbox dialog is centered on the screen.

Restrictions The returned string value is limited to 255 characters.

See also MSGBOX function, MSGBOX statement, TXT pseudo-object

Example

```
sResult$ = INPUTBOX$("Enter your Name",, "Jane Doe")
```

INSTANCE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

INSTANCE statement

Purpose Declare INSTANCE variables which are unique to each object.

Syntax

```
INSTANCE variable[()] [AS type] [, variable[()]]
INSTANCE variable[()] [, variable[()]] [, ...] AS type
```

Remarks INSTANCE statements are used to declare instance variables for an object. A unique set of instance variables is created for every new object, which may only be referenced from within that object. INSTANCE statements may only be placed at the beginning of a CLASS/END CLASS block, preceding all

blocks.

INSTANCE will optionally accept a list of variables, each of which are defined by the descriptor which follows it:

```
INSTANCE x as integer, y as long
```

INSTANCE will also accept a list of variables, all of which are defined by the single descriptor at the end of the list;

```
INSTANCE aaa, bbb, ccc AS INTEGER
INSTANCE vptr, aptr() AS LONG PTR
```

To declare an array as an instance variable, use an empty set of parentheses in the variable list: You can then use the DIM statement to dimension the array.

See also GLOBAL,INTERFACE (Direct), LOCAL, STATIC, THREADED, What is an object, anyway?

INSTR function

INSTR function

Purpose Search a

for the existence of a second string.

Syntax `y& = INSTR([Position&,] MainStr$, [ANY] MatchStr$)`

Remarks INSTR returns the position of *MatchStr$* within *MainStr$*. The return value is indexed to one, while zero means "not found".

Position& specifies the character position to begin the search. If *Position&* is one or greater, *MainStr$* is searched left to right. The value one starts at the first character, two the second, etc. If *Position&* is -1 or less, *MainStr$* is searched from right to left. The value -1 starts at the last character, -2 the second to last, etc. If *Position&* is not given, the default value of +1 is assumed.

```
x& = INSTR("xyz", "y")   ' returns 2
x& = INSTR("xyz", "a")   ' returns 0
a$ = "My Dog" : b$ = " "
x& = INSTR(a$, b$)       ' returns 3
```

It is important to note that in all cases, even when *Position&* is negative, the return value of INSTR() is the absolute position of the match, from left to right, starting with the first character.

ANY — If the ANY keyword is included, *MatchStr$* specifies a list of single characters. INSTR searches for each of these characters individually. As soon as any one of these characters is found, INSTR returns the position of the match.

```
x& = INSTR(-2, "efcdef", ANY "ef")   returns a result of 5
```

INSTR is case-sensitive, meaning that upper-case and lower-case letters must match exactly in *MatchStr$* and *MainStr$*.

Restrictions — Special search terms are evaluated in this sequence:

1. If *Position&* is zero, or beyond the length of *MainStr$*, the value zero is returned.
2. If *MainStr$* is null, the value zero is returned.
3. If *MatchStr$* is null, the absolute *Position&* value (default of 1) is returned.

See also — EXTRACT$, LCASE$, LEFT$, LTRIM$, MID$, RIGHT$, RTRIM$, SHRINK$, TALLY, TRIM$, UCASE$, VERIFY

Example

```
' x$ = first command-line argument, assuming spaces, commas,
' periods, and tabs are valid delimiters.
IF INSTR(COMMAND$, ANY " ,." + CHR$(9)) > 0 THEN
 x$ = "There is more than one command-line argument"
ELSE
 x$ = "There is at most one command-line argument"
END IF
```

INT function

INT function

Purpose — Convert a numeric expression to an value.

Syntax — ***y*** **= INT(*numeric_expression*)**

Remarks — INT rounds *numeric_expression* to the largest integral value that is less than or equal to *numeric_expression*.

See also — CEIL, CINT, FIX, FRAC, ROUND

Example

```
DIM X AS SINGLE, Y AS LONG
FOR X = -1.1 TO 2.1 STEP .5
  Y = INT(X)
NEXT X
```

Result

```
  X      Y
-1.1    -2
-0.6    -1
-0.1    -1
 0.4     0
```

```
0.9     0
1.4     1
1.9     1
```

INTERFACE / END INTERFACE Block (Direct)

Keyword Template

Purpose

Syntax

Remarks

See also

Example

INTERFACE / END INTERFACE Block (Direct)

Purpose

Declare a direct object interface and its member Methods/Properties.

Syntax

```
INTERFACE interfacename [$GUID] [AS EVENT] [AS HIDDEN]
  {METHOD | PROPERTY} name [([arguments])] [AS type]]
END INTERFACE
```

Remarks

The first line in an Interface Block must be an INHERIT statement. INHERIT specifies the base class or the user interface upon which this new interface is built. It defines the base methods available, the optional user methods which are available, and the calling conventions which will apply. In the current version of PowerBASIC, the following may be used:

INHERIT IUnknown

This defines a Custom Interface with only direct access to the interface methods. OBJRESULT (an hResult value) is not supported. Return values are typically passed in CPU/FPU registers, just like a user defined FUNCTION. This is the format most often used for internal objects, as it offers access to more data types than the other forms. You may substitute the word CUSTOM for IUNKNOWN, as they are synonyms.

INHERIT IAutomation

This defines an Automation Interface with only direct access to the interface methods. OBJRESULT (an hResult value) is always supported. Return values are passed as a hidden, last parameter (automatically, by PowerBASIC). Parameters and return values are limited to COM data types. A User Defined Type used as a return value or parameter will be converted to a BYVAL DWORD. This is the format most often used for COM objects which do not require access to the IDispatch interface. You may substitute the word AUTOMATION for IAUTOMATION, as they are synonyms.

INHERIT IDispatch

This defines a Dual Interface, which offers both direct access and Dispatch access to the interface methods. OBJRESULT (an hResult value) is always supported. This interface inherits from IAutomation, so the calling conventions are identical to IAutomation when used for direct access. You may substitute the word DUAL for IDISPATCH, as they are synonyms.

INHERIT *<UserClass>, <UserInterface>*

This defines an inherited user-written interface, so the new interface implements the base class IUnknown, IDispatch, etc.) and all of the Methods and Properties, as well. It's necessary to specify both the class and the interface name to be inherited, because it's possible to have multiple implementations of any particular interface.

INTERFACE / END INTERFACE statements enclose the METHOD and PROPERTY definitions which constitute a class. There are two forms of the INTERFACE / END INTERFACE block. When it appears outside of a CLASS block, it is simply a declaration of the interface, much like DECLARE statements are used for functions:

```
INTERFACE name  [$GUID]  [AS EVENT]
  INHERIT IUnknown
  METHOD MyMethod(xyz AS LONG)
  PROPERTY GET MyProp() AS STRING
END INTERFACE
```

The above form is used to declare an interface which is implemented in another .EXE or .DLL, but will be accessed here through COM services. It may also be used for added self-documentation of internal classes. If it appears within a CLASS block, it is the implementation of the Methods/Properties for the Class. The interface implementation must precisely match any prior interface declaration.

```
CLASS name  [$GUID] [AS COM]
  INTERFACE name  [$GUID] [AS HIDDEN]
    INHERIT iUnknown
    METHOD MyMethod(xyz AS LONG)
      [statements]
    END METHOD
    PROPERTY GET MyProp() AS STRING
      [statements]
    END PROPERTY
  END INTERFACE
END CLASS
```

The name and optional $GUID are supplied by the programmer to uniquely identify the interface. The first entry in every INTERFACE block must be the base class upon which it is built. Every interface must ultimately inherit from IUnknown, which is a requirement.

By default, a class is considered private, so that the methods are accessible only from within the EXE or DLL where it is defined. The AS COM attribute to the CLASS statement makes the class available externally, to virtually any process which is COM-aware.

The optional AS HIDDEN attribute to the INTERFACE statement prevents the interface from being documented when the type library is created. When marked as hidden, any and all uses of the interface are hidden, even if they appear in multiple classes.

With an internal class, the $GUID on CLASS and INTERFACE statements may be freely omitted, as PowerBASIC can readily identify them by name. With a published COM class, you should insert a specific GUID of your choice. If omitted, a random GUID will be created by the compiler, but it will change every time you compile the program. This will be difficult to synchronize with other programs which wish to identify and access your object.

The following code defines a dual interface whose methods are available for both direct access and Dispatch access. This is the form you will typically use for COM objects, since it offers the best compatibility with varied client modules.

```
INTERFACE DispatchIface
  INHERIT IDispatch
  METHOD  MethodDef()
    [statements]
  END METHOD
END INTERFACE
```

You should note that the IDispatch interface itself inherits from IUnknown, so that both interfaces are ultimately available. As an additional required base class, the IDispatch declaration is built into the PowerBASIC Compiler.

Every method and property in a dual interface needs a positive, long integer value to identify it. That integral value is known as a DispID (Dispatch ID), and it's used internally by COM services to call the correct function on a Dispatch interface. You can specify a particular DispID by enclosing it in angle brackets immediately following the Method/Property name in an Interface definition block.

```
INTERFACE DualIface
  INHERIT IDispatch
  METHOD  MethodOne <76> ()
  METHOD  MethodTwo <77> ()
END INTERFACE
```

If you don't specify a DispID, PowerBASIC will assign a random value for you. This is fine for internal objects, but may cause a failure for published COM objects, as the DispID could change each time you compile your program. It is particularly important that you specify a DispID for each Method/Property in a COM Event Interface.

Inherited User-Written Interfaces

PowerBASIC offers Implementation Inheritance of user-written interfaces. That is, an interface can inherit all of the code in the methods and properties of a selected interface. You can then add additional methods and properties to the new interface. When you inherit a user-written interface, you must specify both the class name and the interface name, since COM allows you to have multiple implementations of any particular interface.

You can override an inherited method or property by coding a replacement which is preceded by the word OVERRIDE. It's possible to one or many override procedures, but they must appear in the same sequence as the ones they replace.

```
CLASS MyClass
  INTERFACE MyFace
    INHERIT IDispatch
    METHOD aaa()
      ' code...
    END METHOD
    METHOD bbb()
      ' code...
    END METHOD
    METHOD ccc()
      ' code...
    END METHOD
    METHOD ddd()
      ' code...
    END METHOD
  END INTERFACE
END CLASS

CLASS TheClass
  INTERFACE TheFace
    INHERIT MyClass, MyFace
    OVERRIDE METHOD bbb()
      ' new code...
    END METHOD
    OVERRIDE METHOD ddd()
      ' new code...
    END METHOD
    METHOD xxx()
      ' code...
    END METHOD
  END INTERFACE
END CLASS
```

Note that in the above example, the new interface "TheFace" first inherits all four methods from "MyFace" (aaa,bbb,ccc,ddd). However, because of the OVERRIDE statements, both bbb() and ddd() are replaced by newer versions of the methods. Because of the nature of Virtual Function Tables, the OVERRIDE procedures must remain in the original sequence. That is, bbb() must precede ddd(), and both must precede any added methods, such as xxx().

Because of the nature of code replacement necessary in implementation inheritance, the interface to be inherited must always physically precede the new, child interface.

See also INTERFACE (IDBind), CLASS, INSTANCE, ISINTERFACE, LET (with Objects), ME, METHOD, MYBASE, PROPERTY, What does an Interface look like?, What is inheritance?

INTERFACE/END INTERFACE block (Dispatch)

INTERFACE/END INTERFACE block (IDBind)

Purpose Declare a dispatch interface and its member Methods/Properties for the purposes of IDBinding to a Dispatch COM interface.

Syntax

```
INTERFACE IDBIND interfacename
  MEMBER {CALL | GET | SET | LET} membername <dispid> ( [[OPTIONAL
      [IN | OUT | INOUT]] paramname <dispid> [AS type] [,...]] )
      [AS {vartype | interface}]
  [...]
END INTERFACE
```

Remarks In order to provide IDBinding services, PowerBASIC must be able to pre-construct the references to the DISPATCH COM interface members at compile-time. Without an interface definition block, only late-binding at run-time would be possible. Late-binding is less efficient than IDBinding.

You may list every Method/Property in the interface, or just the ones that are referenced in the code. They can appear in any sequence. Member names may contain (normally) reserved keywords such as INPUT or KILL, etc

The most important aspect of an interface block is that it clearly associates a *dispid* with the each Method/Property name. Named parameters in the *paramname* list also require an appropriate *dispid* value, as does any Property which returns an object to be used in a nested object reference. All *dispid* values must be enclosed in angle brackets (< and >), and may be expressed as hexadecimal or decimal numeric literals.

You can look up the *dispid* values of COM servers using an Object Browser, or by reading your object documentation. You can even insert additional information about the types and return value for your own reference, even though the compiler does not use them.

Previous versions of PowerBASIC compilers used an older style syntax of "INTERFACE DISPATCH *interfacename*" for this structure. It was updated to better reflect the nature of the description. While the older syntax will be recognized in this version, we suggest you update the word DISPATCH to IDBIND soon.

Restrictions If the compiler cannot resolve the interface name definition specified in a DIM or LET statement, a compile-time error is generated accordingly.

interfacename must not be a PowerBASIC keyword. If a keyword conflict arises, the addition of an arbitrary prefix is acceptable. For example, INTERFACE IDBIND Shell() could be changed to INTERFACE IDBIND MyShell() and PowerBASIC will still resolve the interface correctly.

Method/Property *membername* items may freely use PowerBASIC keywords without concern for conflicts with normal code syntax. For example, MEMBER CALL Open() is a valid syntax for an interface method.

See also DIM, ID Binding, INTERFACE (Direct), ISINTERFACE, LET (with Objects), Late Binding, LET (with Variants), OBJACTIVE, OBJECT, OBJPTR, OBJRESULT, PROGID$, What is an object, anyway?, What is DISPATCH?

Example

```
INTERFACE IDBIND IAPPUser
  MEMBER CALL DELETE<&H1>()
  MEMBER GET Name<&H2>() AS STRING
  MEMBER LET Name<&H2>() 'Param Type As String
  MEMBER LET Password<&H3>() 'Param Type As String
  MEMBER GET ReadOnly<&H4>() AS LONG
  MEMBER LET ReadOnly<&H4>()   'Param Type As Long
  MEMBER GET ProjectRights<&H5>(OPTIONAL IN Project AS STRING<&H0>) AS
LONG
  MEMBER LET ProjectRights<&H5>(OPTIONAL IN Project AS STRING<&H0>)
  MEMBER CALL RemoveProjectRights<&H6>(IN Project AS STRING<&H0>)
END INTERFACE

INTERFACE IDBIND IAPPItems
  MEMBER GET Count<&H1>() AS LONG
  MEMBER GET Item<&H0>(IN sItem AS VARIANT<&H0>) AS IAPPItem
END INTERFACE

DIM oApp AS IAPPUser
LET oApp = NEW IAPPUser IN "com.server.0"
```

IPowerArray.ARRAYBASE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2         = 2          %vt_ui4         = 19
```

```
%vt_i4          = 3      %vt_i8           = 20
%vt_r4          = 4      %vt_int          = 22
%vt_r8          = 5      %vt_uint         = 23
%vt_cy          = 6      %vt_ptr          = 26
%vt_date        = 7      %vt_userdefined  = 29
%vt_bstr        = 8      %vt_filetime     = 64
%vt_dispatch    = 9      %vt_astr         = 201
%vt_bool        = 11     %vt_stringfix    = 203
%vt_variant     = 12     %vt_wstringfix   = 204
%vt_unknown     = 13     %vt_stringz      = 205
%vt_decimal     = 14     %vt_wstringz     = 206
%vt_i1          = 16     %vt_type         = 211
%vt_ui1         = 17     %vt_ext          = 221
%vt_ui2         = 18     %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds              TYPE PowerBound
  Elements1 AS LONG             Elements AS LONG
  LowBound1 AS LONG             LowBound AS LONG
  Elements2 AS LONG           END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.ARRAYDESC method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2          %vt_ui4          = 19
%vt_i4          = 3          %vt_i8           = 20
%vt_r4          = 4          %vt_int          = 22
%vt_r8          = 5          %vt_uint         = 23
%vt_cy          = 6          %vt_ptr          = 26
%vt_date        = 7          %vt_userdefined  = 29
%vt_bstr        = 8          %vt_filetime     = 64
%vt_dispatch    = 9          %vt_astr         = 201
%vt_bool        = 11         %vt_stringfix    = 203
%vt_variant     = 12         %vt_wstringfix   = 204
%vt_unknown     = 13         %vt_stringz      = 205
%vt_decimal     = 14         %vt_wstringz     = 206
%vt_i1          = 16         %vt_type         = 211
%vt_ui1         = 17         %vt_ext          = 221
%vt_ui2         = 18         %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds
  Elements1 AS LONG
  LowBound1 AS LONG
  Elements2 AS LONG
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

```
TYPE PowerBound
  Elements AS LONG
  LowBound AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.ARRAYINFO property get

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2        %vt_ui4          = 19
%vt_i4          = 3        %vt_i8           = 20
%vt_r4          = 4        %vt_int          = 22
%vt_r8          = 5        %vt_uint         = 23
%vt_cy          = 6        %vt_ptr          = 26
%vt_date        = 7        %vt_userdefined  = 29
%vt_bstr        = 8        %vt_filetime     = 64
%vt_dispatch    = 9        %vt_astr         = 201
%vt_bool        = 11       %vt_stringfix    = 203
%vt_variant     = 12       %vt_wstringfix   = 204
%vt_unknown     = 13       %vt_stringz      = 205
%vt_decimal     = 14       %vt_wstringz     = 206
%vt_i1          = 16       %vt_type         = 211
%vt_ui1         = 17       %vt_ext          = 221
%vt_ui2         = 18       %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds              TYPE PowerBound
  Elements1 AS LONG             Elements AS LONG
  LowBound1 AS LONG             LowBound AS LONG
  Elements2 AS LONG           END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

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METHOD RESET () <21>

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METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

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METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.ARRAYINFO property set

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

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Remarks All array operations are executed with METHOD and PROPERTY invocations on a

PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
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%vt_cy          = 6        %vt_ptr          = 26
%vt_date        = 7        %vt_userdefined  = 29
%vt_bstr        = 8        %vt_filetime     = 64
%vt_dispatch    = 9        %vt_astr         = 201
%vt_bool        = 11       %vt_stringfix    = 203
%vt_variant     = 12       %vt_wstringfix   = 204
%vt_unknown     = 13       %vt_stringz      = 205
%vt_decimal     = 14       %vt_wstringz     = 206
%vt_i1          = 16       %vt_type         = 211
%vt_ui1         = 17       %vt_ext          = 221
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```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds               TYPE PowerBound
  Elements1 AS LONG              Elements AS LONG
  LowBound1 AS LONG              LowBound AS LONG
  Elements2 AS LONG            END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.CLONE method

Keyword Template

Purpose

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Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2        %vt_ui4          = 19
%vt_i4          = 3        %vt_i8           = 20
%vt_r4          = 4        %vt_int          = 22
%vt_r8          = 5        %vt_uint         = 23
%vt_cy          = 6        %vt_ptr          = 26
%vt_date        = 7        %vt_userdefined  = 29
%vt_bstr        = 8        %vt_filetime     = 64
%vt_dispatch    = 9        %vt_astr         = 201
%vt_bool        = 11       %vt_stringfix    = 203
%vt_variant     = 12       %vt_wstringfix   = 204
%vt_unknown     = 13       %vt_stringz      = 205
%vt_decimal     = 14       %vt_wstringz     = 206
%vt_i1          = 16       %vt_type         = 211
%vt_ui1         = 17       %vt_ext          = 221
%vt_ui2         = 18       %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds                TYPE PowerBound
  Elements1 AS LONG               Elements AS LONG
  LowBound1 AS LONG               LowBound AS LONG
  Elements2 AS LONG             END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.COPYFROMVARIANT method

Keyword Template

Purpose

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Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2        %vt_ui4          = 19
%vt_i4          = 3        %vt_i8           = 20
%vt_r4          = 4        %vt_int          = 22
%vt_r8          = 5        %vt_uint         = 23
%vt_cy          = 6        %vt_ptr          = 26
%vt_date        = 7        %vt_userdefined  = 29
%vt_bstr        = 8        %vt_filetime     = 64
%vt_dispatch    = 9        %vt_astr         = 201
%vt_bool        = 11       %vt_stringfix    = 203
%vt_variant     = 12       %vt_wstringfix   = 204
%vt_unknown     = 13       %vt_stringz      = 205
%vt_decimal     = 14       %vt_wstringz     = 206
%vt_i1          = 16       %vt_type         = 211
%vt_ui1         = 17       %vt_ext          = 221
%vt_ui2         = 18       %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds                TYPE PowerBound
  Elements1 AS LONG               Elements AS LONG
  LowBound1 AS LONG               LowBound AS LONG
  Elements2 AS LONG             END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.COPYTOVARIANT method

Keyword Template

Purpose

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Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

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A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2          %vt_ui4          = 19
%vt_i4          = 3          %vt_i8           = 20
%vt_r4          = 4          %vt_int          = 22
%vt_r8          = 5          %vt_uint         = 23
%vt_cy          = 6          %vt_ptr          = 26
%vt_date        = 7          %vt_userdefined  = 29
%vt_bstr        = 8          %vt_filetime     = 64
%vt_dispatch    = 9          %vt_astr         = 201
%vt_bool        = 11         %vt_stringfix    = 203
%vt_variant     = 12         %vt_wstringfix   = 204
%vt_unknown     = 13         %vt_stringz      = 205
%vt_decimal     = 14         %vt_wstringz     = 206
%vt_i1          = 16         %vt_type         = 211
%vt_ui1         = 17         %vt_ext          = 221
%vt_ui2         = 18         %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the [DIM]() method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with [RedimPreserve](). It is also predefined in the compiler.

```
TYPE PowerBounds              TYPE PowerBound
  Elements1 AS LONG             Elements AS LONG
  LowBound1 AS LONG             LowBound AS LONG
  Elements2 AS LONG           END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the [OBJRESULT]() function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a [wide text]() string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a [wide dynamic string]() to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>**

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.DIM method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2         %vt_ui4          = 19
%vt_i4          = 3         %vt_i8           = 20
%vt_r4          = 4         %vt_int          = 22
%vt_r8          = 5         %vt_uint         = 23
%vt_cy          = 6         %vt_ptr          = 26
%vt_date        = 7         %vt_userdefined  = 29
%vt_bstr        = 8         %vt_filetime     = 64
%vt_dispatch    = 9         %vt_astr         = 201
%vt_bool        = 11        %vt_stringfix    = 203
%vt_variant     = 12        %vt_wstringfix   = 204
%vt_unknown     = 13        %vt_stringz      = 205
%vt_decimal     = 14        %vt_wstringz     = 206
%vt_i1          = 16        %vt_type         = 211
%vt_ui1         = 17        %vt_ext          = 221
%vt_ui2         = 18        %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds              TYPE PowerBound
  Elements1 AS LONG             Elements AS LONG
  LowBound1 AS LONG             LowBound AS LONG
  Elements2 AS LONG           END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.ELEMENTPTR method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2       %vt_ui4          = 19
%vt_i4          = 3       %vt_i8           = 20
%vt_r4          = 4       %vt_int          = 22
%vt_r8          = 5       %vt_uint         = 23
%vt_cy          = 6       %vt_ptr          = 26
%vt_date        = 7       %vt_userdefined  = 29
%vt_bstr        = 8       %vt_filetime     = 64
%vt_dispatch    = 9       %vt_astr         = 201
%vt_bool        = 11      %vt_stringfix    = 203
%vt_variant     = 12      %vt_wstringfix   = 204
%vt_unknown     = 13      %vt_stringz      = 205
%vt_decimal     = 14      %vt_wstringz     = 206
%vt_i1          = 16      %vt_type         = 211
%vt_ui1         = 17      %vt_ext          = 221
%vt_ui2         = 18      %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds              TYPE PowerBound
  Elements1 AS LONG             Elements AS LONG
  LowBound1 AS LONG             LowBound AS LONG
  Elements2 AS LONG           END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, % vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.ELEMENTSIZE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2       %vt_ui4         = 19
%vt_i4          = 3       %vt_i8          = 20
%vt_r4          = 4       %vt_int         = 22
%vt_r8          = 5       %vt_uint        = 23
%vt_cy          = 6       %vt_ptr         = 26
%vt_date        = 7       %vt_userdefined = 29
%vt_bstr        = 8       %vt_filetime    = 64
%vt_dispatch    = 9       %vt_astr        = 201
%vt_bool        = 11      %vt_stringfix   = 203
%vt_variant     = 12      %vt_wstringfix  = 204
%vt_unknown     = 13      %vt_stringz     = 205
%vt_decimal     = 14      %vt_wstringz    = 206
%vt_i1          = 16      %vt_type        = 211
%vt_ui1         = 17      %vt_ext         = 221
%vt_ui2         = 18      %vt_curx        = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds              TYPE PowerBound
  Elements1 AS LONG             Elements AS LONG
  LowBound1 AS LONG             LowBound AS LONG
  Elements2 AS LONG           END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, % vt_wstringz, and %vt_type.

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METHOD RESET () <21>

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METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

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METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.ERASE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

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Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2        %vt_ui4          = 19
%vt_i4          = 3        %vt_i8           = 20
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%vt_r8          = 5        %vt_uint         = 23
%vt_cy          = 6        %vt_ptr          = 26
%vt_date        = 7        %vt_userdefined  = 29
%vt_bstr        = 8        %vt_filetime     = 64
%vt_dispatch    = 9        %vt_astr         = 201
%vt_bool        = 11       %vt_stringfix    = 203
%vt_variant     = 12       %vt_wstringfix   = 204
%vt_unknown     = 13       %vt_stringz      = 205
%vt_decimal     = 14       %vt_wstringz     = 206
%vt_i1          = 16       %vt_type         = 211
%vt_ui1         = 17       %vt_ext          = 221
%vt_ui2         = 18       %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds                TYPE PowerBound
  Elements1 AS LONG               Elements AS LONG
  LowBound1 AS LONG               LowBound AS LONG
  Elements2 AS LONG             END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, % vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.LBOUND method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2       %vt_ui4          = 19
%vt_i4          = 3       %vt_i8           = 20
%vt_r4          = 4       %vt_int          = 22
%vt_r8          = 5       %vt_uint         = 23
%vt_cy          = 6       %vt_ptr          = 26
%vt_date        = 7       %vt_userdefined  = 29
%vt_bstr        = 8       %vt_filetime     = 64
%vt_dispatch    = 9       %vt_astr         = 201
%vt_bool        = 11      %vt_stringfix    = 203
%vt_variant     = 12      %vt_wstringfix   = 204
%vt_unknown     = 13      %vt_stringz      = 205
%vt_decimal     = 14      %vt_wstringz     = 206
%vt_i1          = 16      %vt_type         = 211
%vt_ui1         = 17      %vt_ext          = 221
%vt_ui2         = 18      %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds
  Elements1 AS LONG
  LowBound1 AS LONG
  Elements2 AS LONG
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

```
TYPE PowerBound
  Elements AS LONG
  LowBound AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.LOCK method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2        %vt_ui4          = 19
%vt_i4          = 3        %vt_i8           = 20
%vt_r4          = 4        %vt_int          = 22
%vt_r8          = 5        %vt_uint         = 23
%vt_cy          = 6        %vt_ptr          = 26
%vt_date        = 7        %vt_userdefined  = 29
%vt_bstr        = 8        %vt_filetime     = 64
%vt_dispatch    = 9        %vt_astr         = 201
%vt_bool        = 11       %vt_stringfix    = 203
%vt_variant     = 12       %vt_wstringfix   = 204
%vt_unknown     = 13       %vt_stringz      = 205
%vt_decimal     = 14       %vt_wstringz     = 206
%vt_i1          = 16       %vt_type         = 211
%vt_ui1         = 17       %vt_ext          = 221
%vt_ui2         = 18       %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds             TYPE PowerBound
  Elements1 AS LONG            Elements AS LONG
  LowBound1 AS LONG            LowBound AS LONG
  Elements2 AS LONG          END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, % vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.MOVEFROMVARIANT

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

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Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2         %vt_ui4         = 19
%vt_i4          = 3         %vt_i8          = 20
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%vt_r8          = 5         %vt_uint        = 23
%vt_cy          = 6         %vt_ptr         = 26
%vt_date        = 7         %vt_userdefined = 29
%vt_bstr        = 8         %vt_filetime    = 64
%vt_dispatch    = 9         %vt_astr        = 201
%vt_bool        = 11        %vt_stringfix   = 203
%vt_variant     = 12        %vt_wstringfix  = 204
%vt_unknown     = 13        %vt_stringz     = 205
%vt_decimal     = 14        %vt_wstringz    = 206
%vt_i1          = 16        %vt_type        = 211
%vt_ui1         = 17        %vt_ext         = 221
%vt_ui2         = 18        %vt_curx        = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds                TYPE PowerBound
  Elements1 AS LONG               Elements AS LONG
  LowBound1 AS LONG               LowBound AS LONG
  Elements2 AS LONG             END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.MOVETOVARIANT

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2        %vt_ui4          = 19
%vt_i4          = 3        %vt_i8           = 20
%vt_r4          = 4        %vt_int          = 22
%vt_r8          = 5        %vt_uint         = 23
%vt_cy          = 6        %vt_ptr          = 26
%vt_date        = 7        %vt_userdefined  = 29
%vt_bstr        = 8        %vt_filetime     = 64
%vt_dispatch    = 9        %vt_astr         = 201
%vt_bool        = 11       %vt_stringfix    = 203
%vt_variant     = 12       %vt_wstringfix   = 204
%vt_unknown     = 13       %vt_stringz      = 205
%vt_decimal     = 14       %vt_wstringz     = 206
%vt_i1          = 16       %vt_type         = 211
%vt_ui1         = 17       %vt_ext          = 221
%vt_ui2         = 18       %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds               TYPE PowerBound
  Elements1 AS LONG              Elements AS LONG
  LowBound1 AS LONG              LowBound AS LONG
  Elements2 AS LONG            END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>**

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, % vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.REDIM method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2          %vt_ui4         = 19
%vt_i4          = 3          %vt_i8          = 20
%vt_r4          = 4          %vt_int         = 22
%vt_r8          = 5          %vt_uint        = 23
%vt_cy          = 6          %vt_ptr         = 26
%vt_date        = 7          %vt_userdefined = 29
%vt_bstr        = 8          %vt_filetime    = 64
%vt_dispatch    = 9          %vt_astr        = 201
%vt_bool        = 11         %vt_stringfix   = 203
%vt_variant     = 12         %vt_wstringfix  = 204
%vt_unknown     = 13         %vt_stringz     = 205
%vt_decimal     = 14         %vt_wstringz    = 206
%vt_i1          = 16         %vt_type        = 211
%vt_ui1         = 17         %vt_ext         = 221
%vt_ui2         = 18         %vt_curx        = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds                 TYPE PowerBound
  Elements1 AS LONG                Elements AS LONG
  LowBound1 AS LONG                LowBound AS LONG
  Elements2 AS LONG              END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, % vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.REDIMPRESERVE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

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A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2          %vt_ui4          = 19
%vt_i4          = 3          %vt_i8           = 20
%vt_r4          = 4          %vt_int          = 22
%vt_r8          = 5          %vt_uint         = 23
%vt_cy          = 6          %vt_ptr          = 26
%vt_date        = 7          %vt_userdefined  = 29
%vt_bstr        = 8          %vt_filetime     = 64
%vt_dispatch    = 9          %vt_astr         = 201
%vt_bool        = 11         %vt_stringfix    = 203
%vt_variant     = 12         %vt_wstringfix   = 204
%vt_unknown     = 13         %vt_stringz      = 205
%vt_decimal     = 14         %vt_wstringz     = 206
%vt_i1          = 16         %vt_type         = 211
%vt_ui1         = 17         %vt_ext          = 221
%vt_ui2         = 18         %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds              TYPE PowerBound
  Elements1 AS LONG             Elements AS LONG
  LowBound1 AS LONG             LowBound AS LONG
  Elements2 AS LONG           END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

```
METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
                   Opt ByVal Index3&, Opt ByVal Index4&)
AS LONG <11>
```

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

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METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

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METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.RESET method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

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Remarks

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```
%vt_i2          = 2         %vt_ui4          = 19
%vt_i4          = 3         %vt_i8           = 20
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%vt_r8          = 5         %vt_uint         = 23
%vt_cy          = 6         %vt_ptr          = 26
%vt_date        = 7         %vt_userdefined  = 29
%vt_bstr        = 8         %vt_filetime     = 64
%vt_dispatch    = 9         %vt_astr         = 201
%vt_bool        = 11        %vt_stringfix    = 203
%vt_variant     = 12        %vt_wstringfix   = 204
%vt_unknown     = 13        %vt_stringz      = 205
%vt_decimal     = 14        %vt_wstringz     = 206
%vt_i1          = 16        %vt_type         = 211
%vt_ui1         = 17        %vt_ext          = 221
%vt_ui2         = 18        %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds                TYPE PowerBound
  Elements1 AS LONG               Elements AS LONG
  LowBound1 AS LONG               LowBound AS LONG
  Elements2 AS LONG             END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.SUBSCRIPTS method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2         %vt_ui4          = 19
%vt_i4          = 3         %vt_i8           = 20
%vt_r4          = 4         %vt_int          = 22
%vt_r8          = 5         %vt_uint         = 23
%vt_cy          = 6         %vt_ptr          = 26
%vt_date        = 7         %vt_userdefined  = 29
%vt_bstr        = 8         %vt_filetime     = 64
%vt_dispatch    = 9         %vt_astr         = 201
%vt_bool        = 11        %vt_stringfix    = 203
%vt_variant     = 12        %vt_wstringfix   = 204
%vt_unknown     = 13        %vt_stringz      = 205
%vt_decimal     = 14        %vt_wstringz     = 206
%vt_i1          = 16        %vt_type         = 211
%vt_ui1         = 17        %vt_ext          = 221
%vt_ui2         = 18        %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds
  Elements1 AS LONG
  LowBound1 AS LONG
  Elements2 AS LONG
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

```
TYPE PowerBound
  Elements AS LONG
  LowBound AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.UBOUND method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2       %vt_ui4          = 19
%vt_i4          = 3       %vt_i8           = 20
%vt_r4          = 4       %vt_int          = 22
%vt_r8          = 5       %vt_uint         = 23
%vt_cy          = 6       %vt_ptr          = 26
%vt_date        = 7       %vt_userdefined  = 29
%vt_bstr        = 8       %vt_filetime     = 64
%vt_dispatch    = 9       %vt_astr         = 201
%vt_bool        = 11      %vt_stringfix    = 203
%vt_variant     = 12      %vt_wstringfix   = 204
%vt_unknown     = 13      %vt_stringz      = 205
%vt_decimal     = 14      %vt_wstringz     = 206
%vt_i1          = 16      %vt_type         = 211
%vt_ui1         = 17      %vt_ext          = 221
%vt_ui2         = 18      %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds                TYPE PowerBound
  Elements1 AS LONG               Elements AS LONG
  LowBound1 AS LONG               LowBound AS LONG
  Elements2 AS LONG             END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>**

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.UNLOCK method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2        %vt_ui4          = 19
%vt_i4          = 3        %vt_i8           = 20
%vt_r4          = 4        %vt_int          = 22
%vt_r8          = 5        %vt_uint         = 23
%vt_cy          = 6        %vt_ptr          = 26
%vt_date        = 7        %vt_userdefined  = 29
%vt_bstr        = 8        %vt_filetime     = 64
%vt_dispatch    = 9        %vt_astr         = 201
%vt_bool        = 11       %vt_stringfix    = 203
%vt_variant     = 12       %vt_wstringfix   = 204
%vt_unknown     = 13       %vt_stringz      = 205
%vt_decimal     = 14       %vt_wstringz     = 206
%vt_i1          = 16       %vt_type         = 211
%vt_ui1         = 17       %vt_ext          = 221
%vt_ui2         = 18       %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds                TYPE PowerBound
  Elements1 AS LONG               Elements AS LONG
  LowBound1 AS LONG               LowBound AS LONG
  Elements2 AS LONG             END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.VALUEGET method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2      %vt_ui4          = 19
%vt_i4          = 3      %vt_i8           = 20
%vt_r4          = 4      %vt_int          = 22
%vt_r8          = 5      %vt_uint         = 23
%vt_cy          = 6      %vt_ptr          = 26
%vt_date        = 7      %vt_userdefined  = 29
%vt_bstr        = 8      %vt_filetime     = 64
%vt_dispatch    = 9      %vt_astr         = 201
%vt_bool        = 11     %vt_stringfix    = 203
%vt_variant     = 12     %vt_wstringfix   = 204
%vt_unknown     = 13     %vt_stringz      = 205
%vt_decimal     = 14     %vt_wstringz     = 206
%vt_i1          = 16     %vt_type         = 211
%vt_ui1         = 17     %vt_ext          = 221
%vt_ui2         = 18     %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds              TYPE PowerBound
  Elements1 AS LONG             Elements AS LONG
  LowBound1 AS LONG             LowBound AS LONG
  Elements2 AS LONG           END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

```
METHOD ELEMENTPTR (ByVal Index1&, Opt ByVal Index2&, _
                   Opt ByVal Index3&, Opt ByVal Index4&)
AS LONG <11>
```

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, % vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.VALUESET method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2        %vt_ui4         = 19
%vt_i4          = 3        %vt_i8          = 20
%vt_r4          = 4        %vt_int         = 22
%vt_r8          = 5        %vt_uint        = 23
%vt_cy          = 6        %vt_ptr         = 26
%vt_date        = 7        %vt_userdefined = 29
%vt_bstr        = 8        %vt_filetime    = 64
%vt_dispatch    = 9        %vt_astr        = 201
%vt_bool        = 11       %vt_stringfix   = 203
%vt_variant     = 12       %vt_wstringfix  = 204
%vt_unknown     = 13       %vt_stringz     = 205
%vt_decimal     = 14       %vt_wstringz    = 206
%vt_i1          = 16       %vt_type        = 211
%vt_ui1         = 17       %vt_ext         = 221
%vt_ui2         = 18       %vt_curx        = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds              TYPE PowerBound
  Elements1 AS LONG             Elements AS LONG
  LowBound1 AS LONG             LowBound AS LONG
  Elements2 AS LONG           END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, % vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerArray.VALUETYPE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

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A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2        %vt_ui4          = 19
%vt_i4          = 3        %vt_i8           = 20
%vt_r4          = 4        %vt_int          = 22
%vt_r8          = 5        %vt_uint         = 23
%vt_cy          = 6        %vt_ptr          = 26
%vt_date        = 7        %vt_userdefined  = 29
%vt_bstr        = 8        %vt_filetime     = 64
%vt_dispatch    = 9        %vt_astr         = 201
%vt_bool        = 11       %vt_stringfix    = 203
%vt_variant     = 12       %vt_wstringfix   = 204
%vt_unknown     = 13       %vt_stringz      = 205
%vt_decimal     = 14       %vt_wstringz     = 206
%vt_i1          = 16       %vt_type         = 211
%vt_ui1         = 17       %vt_ext          = 221
%vt_ui2         = 18       %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds              TYPE PowerBound
  Elements1 AS LONG             Elements AS LONG
  LowBound1 AS LONG             LowBound AS LONG
  Elements2 AS LONG           END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

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METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, % vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

IPowerCollection.ADD method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).*

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

`REMOVE <11> (`*`Index`*` AS Long)`

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

`REPLACE <12> (Index AS Long, PowerItem AS Variant)`

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

`CLEAR <1>`

All *PowerItems* are removed from the StackCollection.

`COUNT <2> AS Long`

The number of data items currently contained in the StackCollection is returned to the caller.

`POP <3> AS Variant`

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`PUSH <4> (PowerItem AS Variant)`

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

`CLEAR <1>`

All *PowerItems* are removed from the QueueCollection.

`COUNT <2> AS Long`

The number of data items currently contained in the QueueCollection is returned to the

caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IPowerCollection.CLEAR method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the

same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

```
IndexVar& = ObjectVar.INDEX(0)
```

The above example retrieves the current index number, without changing it, and assigns it

to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL

interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IPowerCollection.CONTAINS method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

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[LET] VrntVar = TypeVar AS STRING
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In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as

either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved

sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If

the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IPowerCollection.COUNT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may

be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

[LET] *VrntVar* = *TypeVar* AS STRING

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

***CollObj*.Add(*Key$$*, *UDTVar* AS STRING)**

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = ObjectVar.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position

number, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).*

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is

successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IPowerCollection.ENTRY method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should

be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

```
IndexVar& = ObjectVar.INDEX(0)
```

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the

caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
```

<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IPowerCollection.FIRST method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

`REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)`

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

`SORT <14> (Flags AS Long)`

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

`ADD <3> (PowerItem AS Variant)`

The *PowerItem* variant is added to the end of the LinkListCollection.

`CLEAR <4>`

All *PowerItems* are removed from the LinkListCollection.

`COUNT <5> AS Long`

The number of data items currently contained in the LinkListCollection is returned to the caller.

`FIRST <1> AS Long`

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

`INDEX <6> (Index AS Long) AS Long`

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

`IndexVar& = ObjectVar.INDEX(0)`

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

`INSERT <7> (Index AS Long, PowerItem AS Variant)`

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

`ITEM <8> (Index AS Long) AS Variant`

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IPowerCollection.INDEX method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

[LET] *VrntVar* = *TypeVar* AS STRING

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

***CollObj*.Add(*Key$$*, *UDTVar* AS STRING)**

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`FIRST <1> AS Long`

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

`INDEX <8> (`*`Index`*` AS Long) AS Long`

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& **=** ***ObjectVar*****.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

`ITEM <9> (`*`PowerKey`*` AS WString) AS Variant`

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`LAST <10> AS Long`

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

`NEXT <2> AS Variant`

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

`PREVIOUS <11> AS Variant`

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

`REMOVE <12> (`*`PowerKey`*` AS WString)`

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

`REPLACE <13> (`*`PowerKey`*` AS WString, `*`PowerItem`*` AS Variant)`

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

`SORT <14> (`*`Flags`*` AS Long)`

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<*ObjectVar*>.membername(*params*)

***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IPowerCollection.ITEM method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

```
IndexVar& = ObjectVar.INDEX(0)
```

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IPowerCollection.LAST method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& = _ObjectVar_.INDEX(0)

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IPowerCollection.NEXT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IPowerCollection.PREVIOUS method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL

interface).

***<ObjectVar>*.membername(*params*)**
***RetVal* = *<ObjectVar>*.membername(*params*)**
<ObjectVar>*.membername(*params*) TO *ReturnVariable

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

`POP <3> AS Variant`

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`PUSH <4> (PowerItem AS Variant)`

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

`CLEAR <1>`

All *PowerItems* are removed from the QueueCollection.

`COUNT <2> AS Long`

The number of data items currently contained in the QueueCollection is returned to the caller.

`DEQUEUE <3> AS Variant`

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`ENQUEUE <4> (PowerItem AS Variant)`

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IPowerCollection.REMOVE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

`PREVIOUS <10> AS Variant`

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

`REMOVE <11> (Index AS Long)`

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

`REPLACE <12> (Index AS Long, PowerItem AS Variant)`

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

`CLEAR <1>`

All *PowerItems* are removed from the StackCollection.

`COUNT <2> AS Long`

The number of data items currently contained in the StackCollection is returned to the caller.

`POP <3> AS Variant`

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`PUSH <4> (PowerItem AS Variant)`

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IPowerCollection.REPLACE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also

FOR EACH/NEXT

IPowerCollection.SORT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

***<ObjectVar>*.membername(*params*)**
***RetVal* = *<ObjectVar>*.membername(*params*)**
<ObjectVar>*.membername(*params*) TO *ReturnVariable

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IPowerThread.Close method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

THREAD objects offer a collection of methods which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object. Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined interface named "IPowerThread", which is a DUAL interface (Dispatch and direct access). When you create a thread object, you first inherit IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private CLASS METHOD, which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the LAUNCH method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the MAIN (or PBMAIN) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

Instance variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another object variable.
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the Thread Code Group. Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS *Long* <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, true (-1) is returned; if not, false (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef *Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a

, Long Integer, or Dword. In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER

 THREAD METHOD MyMethod() AS LONG
   xyz# = ThreadParam.member1
   ... other code
END METHOD
```

```
  ...
  MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
%THREAD_PRIORITY_LOWEST        =  -2
%THREAD_PRIORITY_BELOW_NORMAL  =  -1
%THREAD_PRIORITY_NORMAL        =   0
%THREAD_PRIORITY_ABOVE_NORMAL  =  +1
%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
%THREAD_PRIORITY_LOWEST        =  -2
%THREAD_PRIORITY_BELOW_NORMAL  =  -1
%THREAD_PRIORITY_NORMAL        =   0
%THREAD_PRIORITY_ABOVE_NORMAL  =  +1
%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

PowerTime, THREAD Code Group

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
```

```
END FUNCTION
```

IPowerThread.Equals method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

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We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined interface named "IPowerThread", which is a DUAL interface (Dispatch and direct access). When you create a thread object, you first inherit IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private CLASS METHOD, which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the LAUNCH method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the MAIN (or PBMAIN) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

Instance variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another object variable.
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the Thread Code Group. Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

`METHOD CLOSE() <2>`

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

`METHOD EQUALS(ObjectVar AS InterfaceName) AS Long <3>`

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, true (-1) is returned; if not, false (0) is returned.

`METHOD HANDLE() AS Long <4>`

Retrieves the handle of the thread for use with Windows API functions.

`METHOD ID() AS Long <5>`

Retrieves the ID of the thread for use with Windows API functions.

`METHOD ISALIVE() AS Long <6>`

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

`METHOD JOIN(ThreadObjectVar AS InterfaceName, TimeOutVal AS Long) <7>`

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef *Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a

, Long Integer, or Dword. In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER

 THREAD METHOD MyMethod() AS LONG
   xyz# = ThreadParam.member1
   ... other code
END METHOD
...
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
%THREAD_PRIORITY_LOWEST        =  -2
%THREAD_PRIORITY_BELOW_NORMAL  =  -1
%THREAD_PRIORITY_NORMAL        =   0
%THREAD_PRIORITY_ABOVE_NORMAL  =  +1
%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
%THREAD_PRIORITY_LOWEST        =  -2
%THREAD_PRIORITY_BELOW_NORMAL  =  -1
%THREAD_PRIORITY_NORMAL        =   0
%THREAD_PRIORITY_ABOVE_NORMAL  =  +1
%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

PowerTime, THREAD Code Group

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
```

```
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

IPowerThread.Handle method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

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It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the LAUNCH method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the MAIN (or PBMAIN) function in your executable.

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There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

Instance variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

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1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another object variable.
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the Thread Code Group. Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS *Long* <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, true (-1) is returned; if not, false (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef *Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

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INSTANCE ThreadParam as MyInterface
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When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a

, Long Integer, or Dword. In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER

 THREAD METHOD MyMethod() AS LONG
   xyz# = ThreadParam.member1
   ... other code
```

```
END METHOD
...
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
%THREAD_PRIORITY_LOWEST        =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL        =   0
%THREAD_PRIORITY_ABOVE_NORMAL =  +1
%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
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%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

Restrictions Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also PowerTime, THREAD Code Group

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"
```

```
  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

IPowerThread.Id method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

THREAD objects offer a collection of methods which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object. Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed with ease.

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6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
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Remarks

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Retrieves the ID of the thread for use with Windows API functions.

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Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

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When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a

, Long Integer, or Dword. In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
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Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

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INSTANCE ThreadParam AS MyType POINTER

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   ... other code
END METHOD
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PROPERTY GET PRIORITY() AS Long <9>

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```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

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METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

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Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

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Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

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METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

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METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

Restrictions Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also PowerTime, THREAD Code Group

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace
```

```
  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
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IPowerThread.IsAlive method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

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is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

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```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
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Remarks

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The Dispatch ID (DispID) for each member method is displayed within angle brackets.

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METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS *Long* <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, true (-1) is returned; if not, false (0) is returned.

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Retrieves the handle of the thread for use with Windows API functions.

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Retrieves the ID of the thread for use with Windows API functions.

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Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef *Param* as *UDT*) <8>

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```
INSTANCE ThreadParam as LONG
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MyThread.Launch(ByVal MyNumber&)
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Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

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```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE         = -15
%THREAD_PRIORITY_LOWEST       =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL       =   0
%THREAD_PRIORITY_ABOVE_NORMAL =  +1
%THREAD_PRIORITY_HIGHEST      =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all

the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

Restrictions Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also PowerTime, THREAD Code Group

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"
```

```
  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

IPowerThread.Join method

Keyword Template

THREAD Object New!

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

THREAD objects offer a collection of methods which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object. Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined interface named "IPowerThread", which is a DUAL interface (Dispatch and direct access). When you create a thread object, you first inherit IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private CLASS METHOD, which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the LAUNCH method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the MAIN (or PBMAIN) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

Instance variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another object variable.
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

***<ObjectVar>.membername*(*params*)**
***RetVal* = *<ObjectVar>.membername*(*params*)**
<ObjectVar>.membername*(*params*) TO *ReturnVariable

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the Thread Code Group. Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS *Long* <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, true (-1) is returned; if not, false (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal*

AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef *Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a

, Long Integer, or Dword. In that case, you must pass the launch parameter using a
option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER

 THREAD METHOD MyMethod() AS LONG
   xyz# = ThreadParam.member1
   ... other code
END METHOD
...
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
%THREAD_PRIORITY_LOWEST        =  -2
%THREAD_PRIORITY_BELOW_NORMAL  =  -1
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%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

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```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved

and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

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PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

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Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

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Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

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A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

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Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

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Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

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See also PowerTime, THREAD Code Group

Example

```
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  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

IPowerThreadLaunch method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

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5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the Thread Code Group. Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

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METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

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LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

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```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a

, Long Integer, or Dword. In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
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```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

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METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

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Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"
```

```
  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

IPowerThread.Priority property get

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

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It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the LAUNCH method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the MAIN (or PBMAIN) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

Instance variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another object variable.
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params)* TO *ReturnVariable

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the Thread Code Group. Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS *Long* <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, true (-1) is returned; if not, false (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal*

AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef *Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
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When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a

, Long Integer, or Dword. In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER

 THREAD METHOD MyMethod() AS LONG
   xyz# = ThreadParam.member1
   ... other code
END METHOD
...
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
%THREAD_PRIORITY_LOWEST        =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL        =   0
%THREAD_PRIORITY_ABOVE_NORMAL =  +1
%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
%THREAD_PRIORITY_LOWEST        =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
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%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved

and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

`METHOD RESUME() AS Long <11>`

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

`PROPERTY GET STACKSIZE() AS Long <13>`

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

`PROPERTY SET STACKSIZE(Long) <13>`

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

`METHOD SUSPEND() AS Long <14>`

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

`METHOD TIMECREATE() AS Quad <16>`

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

`METHOD TIMEEXIT() AS Quad <17>`

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

`METHOD TIMEKERNEL() AS Quad <18>`

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

`METHOD TIMEUSER() AS Quad <19>`

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

Restrictions Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also PowerTime, THREAD Code Group

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

IPowerThread.Priority property set

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

THREAD objects offer a collection of methods which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object. Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

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5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the Thread Code Group. Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS *Long* <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, true (-1) is returned; if not, false (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef *Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a

, Long Integer, or Dword. In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
 THREAD METHOD MyMethod() AS LONG
   xyz# = ThreadParam.member1
   ... other code
END METHOD
...
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
%THREAD_PRIORITY_LOWEST        =  -2
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%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
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METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

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the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

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`METHOD TIMECREATE() AS Quad <16>`

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

`METHOD TIMEEXIT() AS Quad <17>`

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

`METHOD TIMEKERNEL() AS Quad <18>`

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

`METHOD TIMEUSER() AS Quad <19>`

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

PowerTime, THREAD Code Group

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"
```

```
  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

IPowerThread.Result method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

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5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the Thread Code Group. Thread objects provide much greater control, and much better thread parameter handling for the programmer.

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The Dispatch ID (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS *Long* <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, true (-1) is returned; if not, false (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal*

AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef *Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

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```
INSTANCE ThreadParam as MyInterface
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In simpler cases, you may choose to declare THREADPARAM as a

, Long Integer, or Dword. In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER

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   xyz# = ThreadParam.member1
   ... other code
END METHOD
...
MyThread.Launch(ByVal VARPTR(MyType))
```

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Retrieves the priority value for this thread. The thread priority value is one of the following:

```
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%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
%THREAD_PRIORITY_LOWEST        =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL        =   0
%THREAD_PRIORITY_ABOVE_NORMAL =  +1
%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved

and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

Restrictions Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also PowerTime, THREAD Code Group

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

IPowerThread.Resume method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

THREAD objects offer a collection of methods which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object. Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined interface named "IPowerThread", which is a DUAL interface (Dispatch and direct access). When you create a thread object, you first inherit IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private CLASS METHOD, which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the LAUNCH method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the MAIN (or PBMAIN) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

Instance variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another object variable.
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the Thread Code Group. Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS *Long* <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, true (-1) is returned; if not, false (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef *Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a

, Long Integer, or Dword. In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
 THREAD METHOD MyMethod() AS LONG
   xyz# = ThreadParam.member1
   ... other code
END METHOD
...
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
%THREAD_PRIORITY_LOWEST        =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL        =   0
%THREAD_PRIORITY_ABOVE_NORMAL =  +1
%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
%THREAD_PRIORITY_LOWEST        =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL        =   0
%THREAD_PRIORITY_ABOVE_NORMAL =  +1
%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

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the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

Restrictions Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also PowerTime, THREAD Code Group

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"
```

```
  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

IPowerThread.StackSize property get

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

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It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the LAUNCH method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the MAIN (or PBMAIN) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

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Instance variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another object variable.
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the Thread Code Group. Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS *Long* <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, true (-1) is returned; if not, false (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal*

AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef *Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

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```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a

, [Long Integer], or [Dword]. In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER

 THREAD METHOD MyMethod() AS LONG
   xyz# = ThreadParam.member1
   ... other code
END METHOD
...
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
%THREAD_PRIORITY_LOWEST        =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL        =   0
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%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
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%THREAD_PRIORITY_TIME_CRITICAL= +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved

and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

`METHOD RESUME() AS Long <11>`

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

`PROPERTY GET STACKSIZE() AS Long <13>`

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

`PROPERTY SET STACKSIZE(Long) <13>`

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

`METHOD SUSPEND() AS Long <14>`

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

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`METHOD TIMECREATE() AS Quad <16>`

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`METHOD TIMEEXIT() AS Quad <17>`

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`METHOD TIMEKERNEL() AS Quad <18>`

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

`METHOD TIMEUSER() AS Quad <19>`

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

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Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

IPowerThread.StackSize property set

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

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It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the LAUNCH method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the MAIN (or PBMAIN) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

Instance variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another object variable.
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the Thread Code Group. Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS *Long* <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, true (-1) is returned; if not, false (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef *Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

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INSTANCE ThreadParam as MyInterface
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When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a

, Long Integer, or Dword. In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
 THREAD METHOD MyMethod() AS LONG
   xyz# = ThreadParam.member1
   ... other code
END METHOD
...
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE         = -15
%THREAD_PRIORITY_LOWEST       =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL       =   0
%THREAD_PRIORITY_ABOVE_NORMAL =  +1
%THREAD_PRIORITY_HIGHEST      =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE         = -15
%THREAD_PRIORITY_LOWEST       =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
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%THREAD_PRIORITY_HIGHEST      =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all

the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

Restrictions Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also PowerTime, THREAD Code Group

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"
```

```
  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

IPowerThread.Suspend method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

THREAD objects offer a collection of methods which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object. Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

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5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the Thread Code Group. Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

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Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, true (-1) is returned; if not, false (0) is returned.

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Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

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Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal*

AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

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INSTANCE ThreadParam as MyInterface
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When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a

, Long Integer, or Dword. In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER

 THREAD METHOD MyMethod() AS LONG
   xyz# = ThreadParam.member1
   ... other code
END METHOD
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```

PROPERTY GET PRIORITY() AS Long <9>

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%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
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```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved

and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

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A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

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METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

Restrictions Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also PowerTime, THREAD Code Group

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
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END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

IPowerThread.TimeCreate method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

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Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
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Remarks

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The Dispatch ID (DispID) for each member method is displayed within angle brackets.

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METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS *Long* <3>

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Retrieves the handle of the thread for use with Windows API functions.

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Retrieves the ID of the thread for use with Windows API functions.

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Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef *Param* as *UDT*) <8>

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```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

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, Long Integer, or Dword. In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
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...
MyThread.Launch(ByVal MyNumber&)
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Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
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 THREAD METHOD MyMethod() AS LONG
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%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
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%THREAD_PRIORITY_LOWEST        =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL        =   0
%THREAD_PRIORITY_ABOVE_NORMAL =  +1
%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all

the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

PowerTime, THREAD Code Group

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"
```

```
  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

IPowerThread.TimeExit method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

THREAD objects offer a collection of methods which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object. Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined interface named "IPowerThread", which is a DUAL interface (Dispatch and direct access). When you create a thread object, you first inherit IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private CLASS METHOD, which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the LAUNCH method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the MAIN (or PBMAIN) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

Instance variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another object variable.
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

***<ObjectVar>.membername*(*params*)**
***RetVal* = *<ObjectVar>.membername*(*params*)**
<ObjectVar>.membername*(*params*) TO *ReturnVariable

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the Thread Code Group. Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS *Long* <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, true (-1) is returned; if not, false (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal*

AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef *Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a

, Long Integer, or Dword. In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER

 THREAD METHOD MyMethod() AS LONG
   xyz# = ThreadParam.member1
   ... other code
END METHOD
...
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE         = -15
%THREAD_PRIORITY_LOWEST       =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL       =   0
%THREAD_PRIORITY_ABOVE_NORMAL =  +1
%THREAD_PRIORITY_HIGHEST      =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE         = -15
%THREAD_PRIORITY_LOWEST       =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL       =   0
%THREAD_PRIORITY_ABOVE_NORMAL =  +1
%THREAD_PRIORITY_HIGHEST      =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved

and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

`METHOD RESUME() AS Long <11>`

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

`PROPERTY GET STACKSIZE() AS Long <13>`

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

`PROPERTY SET STACKSIZE(Long) <13>`

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

`METHOD SUSPEND() AS Long <14>`

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

`METHOD TIMECREATE() AS Quad <16>`

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

`METHOD TIMEEXIT() AS Quad <17>`

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

`METHOD TIMEKERNEL() AS Quad <18>`

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

`METHOD TIMEUSER() AS Quad <19>`

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

Restrictions Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also PowerTime, THREAD Code Group

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

IPowerThread.TimeKernel method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

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It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the LAUNCH method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the MAIN (or PBMAIN) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

Instance variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another object variable.
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the Thread Code Group. Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS *Long* <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, true (-1) is returned; if not, false (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef *Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a

, Long Integer, or Dword. In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER
```

```
 THREAD METHOD MyMethod() AS LONG
   xyz# = ThreadParam.member1
   ... other code
END METHOD
...
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE         = -15
%THREAD_PRIORITY_LOWEST       =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL       =   0
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%THREAD_PRIORITY_HIGHEST      =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE         = -15
%THREAD_PRIORITY_LOWEST       =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
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%THREAD_PRIORITY_TIME_CRITICAL= +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

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the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

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METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

PowerTime, THREAD Code Group

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"
```

```
  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

IPowerThread.TimeUser method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose

A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

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PowerBASIC provides a pre-defined interface named "IPowerThread", which is a DUAL interface (Dispatch and direct access). When you create a thread object, you first inherit IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private CLASS METHOD, which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the LAUNCH method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the MAIN (or PBMAIN) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

Instance variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another object variable.
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

<*ObjectVar*>.*membername*(*params*)
***RetVal* = <*ObjectVar*>.*membername*(*params*)**
<*ObjectVar*>.*membername*(*params*) TO *ReturnVariable*

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the Thread Code Group. Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS *Long* <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, true (-1) is returned; if not, false (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal*

AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef *Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a

, [Long Integer](), or [Dword](). In that case, you must pass the launch parameter using a option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER

 THREAD METHOD MyMethod() AS LONG
   xyz# = ThreadParam.member1
   ... other code
END METHOD
...
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE         = -15
%THREAD_PRIORITY_LOWEST       =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL       =   0
%THREAD_PRIORITY_ABOVE_NORMAL =  +1
%THREAD_PRIORITY_HIGHEST      =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE         = -15
%THREAD_PRIORITY_LOWEST       =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL       =   0
%THREAD_PRIORITY_ABOVE_NORMAL =  +1
%THREAD_PRIORITY_HIGHEST      =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved

and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

`METHOD RESUME() AS Long <11>`

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

`PROPERTY GET STACKSIZE() AS Long <13>`

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

`PROPERTY SET STACKSIZE(Long) <13>`

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

`METHOD SUSPEND() AS Long <14>`

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

`METHOD TIMECREATE() AS Quad <16>`

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

`METHOD TIMEEXIT() AS Quad <17>`

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

`METHOD TIMEKERNEL() AS Quad <18>`

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

`METHOD TIMEUSER() AS Quad <19>`

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

Restrictions Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also PowerTime, THREAD Code Group

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

IPowerTime.AddDays method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.AddHours method

Keyword Template

Purpose
Syntax
Remarks
See also
Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

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Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

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Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

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Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

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Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

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Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

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MonthString <25> () AS String

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NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

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The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.AddMinutes method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

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```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the

PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.AddMonths method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the

PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.AddMSeconds method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal

***Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)**

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.AddSeconds method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

`Today <38> ()`

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

`ToLocalTime <39> ()`

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

`ToUTC <40> ()`

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

`Year <42> () as Long`

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.AddTicks method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

`AddDays <1> (ByVal Days&)`

Adds the specified number of days to the value of this object. You can subtract days by

using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
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TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.AddYears method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

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ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
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In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.DateDiff method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime, Sign&, Years&, Months&, Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal

***Day&*)**

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

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TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

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***ThisObject*.TimeDiff(*ThatObject*, *Sign&*, BYVAL *0*, BYVAL *0*, *Minutes&*)**

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

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ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.DateString method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

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LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

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Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

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AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.DateStringLong method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&*

parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.Day method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
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In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.DayOfWeek method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
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Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

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An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

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AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

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Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.DayOfWeekString method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

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Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

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Today <38> ()

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The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.DaysInMonth method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
```

```
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT

***Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)**

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

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ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
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TimeString24 <35> () AS WString

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TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.FileTime property get

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

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Second <31> () as Long

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Year <42> () as Long

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See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.FileTime property set

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

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LET Built = CLASS "PowerTime"
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MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

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Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

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Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

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Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

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. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.Hour method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to

Minutes& (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.IsLeapYear method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.Minute method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

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Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

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In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

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Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

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Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.Month method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

`Today <38> ()`

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

`ToLocalTime <39> ()`

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

`ToUTC <40> ()`

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

`Year <42> () as Long`

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.MonthString method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

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LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

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An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.MSecond method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601.   A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

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ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.NewDate method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

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MSGBOX  Built.DateString
MSGBOX  Built.TimeString
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POWERTIME Methods

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Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

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Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

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Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by

using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

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DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.NewTime method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.Now method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
```

```
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.NowUTC method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

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ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
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In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.Second method

Keyword Template

Purpose
Syntax
Remarks
See also
Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

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MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

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NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

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ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
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In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

`ToUTC <40> ()`

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

`Year <42> () as Long`

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.Tick method

Keyword Template

Purpose

Syntax

Remarks

See also

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Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

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PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the

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See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.TimeDiff method

Keyword Template

Purpose

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PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

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IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

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MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

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See also DATE$, DAYNAME$, MONTHNAME$, TIME$

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Keyword Template

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Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal

***Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)**

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.TimeString24 method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
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In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.TimeStringFull method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by

using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.Today method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

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Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

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TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

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ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
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TimeString <34> () AS String

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TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.ToLocalTime method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

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An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal

***Day&*)**

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.ToUTC method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
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In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

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Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IPowerTime.Year method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime*, *Sign&*, *Years&*, *Months&*, *Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&*

parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal *Day&*)

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object.

The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

`TimeString <34> () AS String`

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

`TimeString24 <35> () AS WString`

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

`TimeStringFull <36> () AS WString`

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

`Today <38> ()`

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

`ToLocalTime <39> ()`

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

`ToUTC <40> ()`

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

`Year <42> () as Long`

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

IQueueCollection.CLEAR method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the

OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

`COUNT <2> AS Long`

The number of data items currently contained in the QueueCollection is returned to the caller.

`DEQUEUE <3> AS Variant`

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`ENQUEUE <4> (PowerItem AS Variant)`

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IQueueCollection.COUNT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax *The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IQueueCollection.DEQUEUE method

Keyword Template

Purpose

Syntax
Remarks
See also
Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IQueueCollection.ENQUEUE method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

`REMOVE <11> (`*`Index`*` AS Long)`

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

`REPLACE <12> (Index AS Long, PowerItem AS Variant)`

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

`CLEAR <1>`

All *PowerItems* are removed from the StackCollection.

`COUNT <2> AS Long`

The number of data items currently contained in the StackCollection is returned to the caller.

`POP <3> AS Variant`

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`PUSH <4> (PowerItem AS Variant)`

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

`CLEAR <1>`

All *PowerItems* are removed from the QueueCollection.

`COUNT <2> AS Long`

The number of data items currently contained in the QueueCollection is returned to the

caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IStackCollection.CLEAR method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the

same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

```
IndexVar& = ObjectVar.INDEX(0)
```

The above example retrieves the current index number, without changing it, and assigns it

to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL

interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IStackCollection.COUNT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as

either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

IndexVar& **=** ***ObjectVar*****.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved

sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If

the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IStackCollection.POP method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may

be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

[LET] *VrntVar* = *TypeVar* AS STRING

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

***CollObj*.Add(*Key$$*, *UDTVar* AS STRING)**

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position

number, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).*

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**
<*ObjectVar*>.membername(*params*) TO *ReturnVariable*

Remarks Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is

successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IStackCollection.PUSH method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose

A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should

be limited to PowerBASIC applications.

Power Collection A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax *The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

FIRST <1> AS Long

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <8> (*Index* AS Long) AS Long

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

ITEM <9> (*PowerKey* AS WString) AS Variant

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <10> AS Long

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <11> AS Variant

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <12> (*PowerKey* AS WString)

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <13> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

SORT <14> (*Flags* AS Long)

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the

caller.

`FIRST <1> AS Long`

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

<*ObjectVar*>.membername(*params*)
***RetVal* = <*ObjectVar*>.membername(*params*)**

```
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax *The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).*

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

IStringBuilderA.Add method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for ANSI strings, and one for WIDE (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID (DispID) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString$*) **Method<1>**

The *PowerString$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HResult of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated.

CAPACITY () AS Long **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (*Index&, Count&*) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString$, Index&*) **Method<6>**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderA.Capacity Property Get

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for ANSI strings, and one for WIDE (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID (DispID) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

`ADD (`*`PowerString$`*`)` **`Method<1>`**

The *PowerString$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HResult of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated.

`CAPACITY () AS Long` **`Get Property<2>`**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

`CAPACITY () = Long` **`Set Property<2>`**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

`CHAR (`*`Index&`*`) AS Long` **`Get Property<3>`**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

`CHAR (`*`Index&`*`) = Long` **`Set Property<3>`**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

`CLEAR` **`Method<4>`**

All data in the object is erased.

`DELETE (`*`Index&, Count&`*`)` **`Method<5>`**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

`INSERT (`*`PowerString$, Index&`*`)` **`Method<6>`**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

`LEN () AS Long` **`Method<7>`**

The number of characters currently stored in the object is returned as a long integer value.

`STRING AS String` **`Method<8>`**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderA.Capacity Property Set

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for ANSI strings, and one for WIDE (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID (DispID) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString$*) — **Method<1>**

The *PowerString$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HResult of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated.

CAPACITY () AS Long — **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long — **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long — **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long — **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR — **Method<4>**

All data in the object is erased.

`DELETE (Index&, Count&)` **`Method<5>`**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

`INSERT (PowerString$, Index&)` **`Method<6>`**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

`LEN () AS Long` **`Method<7>`**

The number of characters currently stored in the object is returned as a long integer value.

`STRING AS String` **`Method<8>`**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderA.Char Property Get

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for ANSI strings, and one for WIDE (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID (DispID) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString$*) **Method<1>**

The *PowerString$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HResult of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated.

CAPACITY () AS Long **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (*Index&, Count&*) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString$, Index&*) **Method<6>**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderA.Char Property Set

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose

The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks

There are two forms of the StringBuilder object, one for ANSI strings, and one for WIDE (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID (DispID) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString$*) **Method<1>**

The *PowerString$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HResult of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated.

CAPACITY () AS Long **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (*Index&, Count&*) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString$, Index&*) **Method<6>**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderA.Clear method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for ANSI strings, and one for WIDE (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID (DispID) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's

usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString$*) **Method<1>**

The *PowerString$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HResult of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated.

CAPACITY () AS Long **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (*Index&, Count&*) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString$, Index&*) **Method<6>**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderA.Delete method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

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StringBuilder Methods/Properties

ADD (*PowerString$*) **Method<1>**

The *PowerString$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HResult of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated.

CAPACITY () AS Long **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (*Index&, Count&*) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString$, Index&*) **Method<6>**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderA.Insert method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

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StringBuilder Methods/Properties

`ADD (`*`PowerString$`*`)` **`Method<1>`**

The *PowerString$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HResult of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated.

`CAPACITY () AS Long` **`Get Property<2>`**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

`CAPACITY () = Long` **`Set Property<2>`**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

`CHAR (`*`Index&`*`) AS Long` **`Get Property<3>`**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

`CHAR (`*`Index&`*`) = Long` **`Set Property<3>`**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

`CLEAR` **`Method<4>`**

All data in the object is erased.

`DELETE (`*`Index&, Count&`*`)` **`Method<5>`**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

`INSERT (`*`PowerString$, Index&`*`)` **`Method<6>`**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

`LEN () AS Long` **`Method<7>`**

The number of characters currently stored in the object is returned as a long integer value.

`STRING AS String` **`Method<8>`**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderA.Len method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for ANSI strings, and one for WIDE (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID (DispID) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString$*) **Method<1>**

The *PowerString$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HResult of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated.

CAPACITY () AS Long **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (*Index&, Count&*) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString$, Index&*) **Method<6>**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderA.String method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks There are two forms of the StringBuilder object, one for ANSI strings, and one for WIDE (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID (DispID) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's

usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString$*) — **Method<1>**

The *PowerString$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HResult of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated.

CAPACITY () AS Long — **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long — **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long — **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long — **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR — **Method<4>**

All data in the object is erased.

DELETE (*Index&, Count&*) — **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString$, Index&*) — **Method<6>**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long — **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String — **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderW.Add method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose

The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks

There are two forms of the StringBuilder object, one for ANSI strings, and one for WIDE (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID (DispID) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString$*) **Method<1>**

The *PowerString$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HResult of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated.

CAPACITY () AS Long **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (*Index&, Count&*) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString$, Index&*) **Method<6>**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderW.Capacity Property Get

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

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StringBuilder Methods/Properties

ADD (*PowerString$*) **Method<1>**

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CAPACITY () AS Long **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (*Index&, Count&*) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString$, Index&*) **Method<6>**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderW.Capacity Property Set

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

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StringBuilder Methods/Properties

ADD (*PowerString$*) **Method<1>**

The *PowerString$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HResult of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated.

CAPACITY () AS Long **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (*Index&, Count&*) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString$, Index&*) **Method<6>**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderW.Char Property Get

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

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StringBuilder Methods/Properties

ADD (*PowerString$*) **Method<1>**

The *PowerString$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HResult of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated.

CAPACITY () AS Long **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (*Index&, Count&*) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString$, Index&*) **Method<6>**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderW.Char Property Set

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

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CAPACITY () AS Long **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

`DELETE (Index&, Count&)` **`Method<5>`**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

`INSERT (PowerString$, Index&)` **`Method<6>`**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

`LEN () AS Long` **`Method<7>`**

The number of characters currently stored in the object is returned as a long integer value.

`STRING AS String` **`Method<8>`**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderW.Clear method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

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StringBuilder Methods/Properties

`ADD (`*`PowerString$`*`)` **`Method<1>`**

The *PowerString$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HResult of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated.

`CAPACITY () AS Long` **`Get Property<2>`**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

`CAPACITY () = Long` **`Set Property<2>`**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

`CHAR (`*`Index&`*`) AS Long` **`Get Property<3>`**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

`CHAR (`*`Index&`*`) = Long` **`Set Property<3>`**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

`CLEAR` **`Method<4>`**

All data in the object is erased.

`DELETE (`*`Index&, Count&`*`)` **`Method<5>`**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

`INSERT (`*`PowerString$, Index&`*`)` **`Method<6>`**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

`LEN () AS Long` **`Method<7>`**

The number of characters currently stored in the object is returned as a long integer value.

`STRING AS String` **`Method<8>`**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderW.Delete method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

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StringBuilder Methods/Properties

ADD (*PowerString$*) **Method<1>**

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CAPACITY () AS Long **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

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The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (*Index&, Count&*) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString$, Index&*) **Method<6>**

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LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderW.Insert method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

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ADD (*PowerString$*) **Method<1>**

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CLEAR **Method<4>**

All data in the object is erased.

DELETE (*Index&, Count&*) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString$, Index&*) **Method<6>**

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STRING AS String **Method<8>**

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See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderW.Len method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

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CHAR (*Index&*) = Long **Set Property<3>**

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CLEAR **Method<4>**

All data in the object is erased.

DELETE (*Index&, Count&*) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString$, Index&*) **Method<6>**

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The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

IStringBuilderW.String method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

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StringBuilder Methods/Properties

ADD (*PowerString$*) — **Method<1>**

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CAPACITY () AS Long — **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long — **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long — **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long — **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR — **Method<4>**

All data in the object is erased.

DELETE (*Index&, Count&*) — **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString$, Index&*) — **Method<6>**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long — **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String — **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

ISFALSE operator

ISFALSE and ISTRUE operators

Purpose Return the logical truth or falsity of a given expression.

Syntax

```
ISFALSE expr
ISTRUE expr
```

Remarks ISTRUE returns -1 (TRUE) when expr evaluates as non-zero; otherwise, it returns zero

(FALSE). ISFALSE returns -1 when expr evaluates as 0 (FALSE); otherwise, it returns zero.

Truth table

operator	***expr***	**Result**
ISTRUE	= 0	0
ISTRUE	<> 0	-1
ISFALSE	= 0	-1
ISFALSE	<> 0	0

PowerBASIC's NOT operator serves a double duty: it returns the one's-complement of an expression and "reverses" the value of a TRUE/FALSE (Boolean) expression. Usually, these two functions do not conflict, but since PowerBASIC accepts any non-zero value as TRUE, the following condition can arise:

```
test1 = 0           ' test1 is FALSE (zero)
IF NOT test1 THEN   ' TRUE (-1 is non-zero)
[statements]

test2 = 1           ' test2 is TRUE (1 is non-zero)
IF NOT test2 THEN   ' still TRUE (-2 is non-zero)
[statements]
```

In this case, NOT does not reverse the TRUE/FALSE value of test2. ISFALSE ensures that the test is performed exactly as you would expect:
test2 = 1 ' test2 is TRUE (non-zero)

```
IF ISFALSE test2 THEN ' ISFALSE detects test2 is
[statements]          ' TRUE so the IF test fails
```

This problem does not exist when you're testing for logical truth. PowerBASIC considers that an expression is TRUE in every case *except* when the expression is zero. However, ISTRUE converts all non-zero values to the "most true" value, -1, which provides the most consistent results with both boolean and arithmetic expressions.

Restrictions ISTRUE and ISFALSE operators evaluate the "whole" expression following the keyword, subject to their Operator Precedence level. For example, parentheses contained within the expression are regarded as an integral part of the expression, and do not act as delimiters for the ISTRUE and ISFALSE operators.

With this in mind, combining a logical test result into a further expression means that the expressions must be separated to ensure the correct evaluation.

Consider the following statement:

```
IF ISTRUE (x&) + y& THEN
```

PowerBASIC evaluates the entire expression *(x&) + y&* and then calculates the logical truth from the overall result of that expression. That is, the parentheses around the first part of the expression do not stop ISTRUE from evaluating the whole expression. To demonstrate this, the statement can be rewritten to concisely demonstrate the scope of the logical evaluation:

```
IF ISTRUE (x& + 2) THEN
```

or it could be simplified even further:

```
IF ISTRUE x& + 2 THEN
```

If you wish to utilize the numeric result of the logical test in a further expression, parentheses must be added to separate the expressions correctly:

```
IF (ISTRUE x&) + 2 THEN
```

See also Arithmetic Operators, NOT, Short-circuit evaluation

ISFILE Function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ISFILE Function

Purpose	Determine whether or not a file exists.
Syntax	***FileExists&* = ISFILE(*FileName*)**
Remarks	The file subsystem is checked to determine whether the file specified by *FileName* currently exists. If it is found in any form (hidden, system, read-only, etc.), the value true (-1) is returned. Otherwise, the value false (0) is returned. *Filename* is an unambiguous file name, which may not contain an asterisk (*) or query (?). If it contains one or more of those characters, the function always returns false (0).
See also	DIR$, DISPLAY BROWSE, DISPLAY OPENFILE, DISPLAY SAVEFILE, ISFOLDER, PATHSCAN$

ISFOLDER function

ISFOLDER function

Purpose	Determine whether or not a folder exists.
Syntax	***FolderExists&* = ISFOLDER(*FolderName*)**
Remarks	The file subsystem is checked to determine whether the folder specified by *FolderName* currently exists. If it is found in any form (hidden, system, read-only, etc.), the value true (-1) is returned. Otherwise, the value false (0) is returned. The root directory (for example, "C:\") is considered to be a folder, and returns the value true (-1). *FolderName* is an unambiguous file name, which may not contain an asterisk (*) or query (?). If it contains one or more of those characters, the function always returns false (0).
See also	DIR$, DISPLAY BROWSE, DISPLAY OPENFILE, DISPLAY SAVEFILE, ISFILE, PATHSCAN$

ISINTERFACE Function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ISINTERFACE Function

Purpose Determine whether an object supports a particular interface.

Syntax `IfaceValid = ISINTERFACE(ObjectVar, InterfaceName)`

Remarks The object referenced by the parameter *ObjectVar* is tested to determine if the specified *InterfaceName* is supported. If so, the value true (-1) is returned. Otherwise, the value false (0) is returned.

See also CLASS, INTERFACE (Direct), INTERFACE (IDBind), What is an object, anyway?

ISMISSING function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ISMISSING function

Purpose Determine whether an

was passed by the calling code.

Syntax `ParamStatus = ISMISSING(ParamVar)`

Remarks The ISMISSING function may be used to test certain optional parameters to determine whether or not the parameter was actually passed by the calling code. It may be used to test

VARIANT parameters, or other variable types passed ByRef. An attempt to test a ByVAL parameter other than VARIANT will generate an error 579 (BYREF variable or BYVAL/BYREF variant expected) to be generated during compilation.

A ByRef parameter is considered to be missing when the pointer has the value zero. A variant parameter is considered to be missing when it has a type of %VT_ERROR and an error value of %DISP_E_PARAMNOTFOUND.

If the specified optional parameter is missing, the value true (-1) is returned. Otherwise, the value false (0) is returned.

Restrictions The ISMISSING function may only be used within the procedure which uses the specified optional parameter.

See also DECLARE, FUNCTION, METHOD, PROPERTY, SUB

ISNOTHING function

ISNOTHING function

Purpose Determine the current status of a given object variable.

Syntax `oStatus = ISNOTHING(objectvar)`

Remarks ISNOTHING is particularly useful in determining the success or failure of a LET statement. It returns TRUE (-1) if the object variable contains nothing, or FALSE (0) if it contains a valid current reference to an object interface.

ISNOTHING is the complement to the ISOBJECT function.

Restrictions *objectvar* must be an
or IDispatch object variable.

See also DIM, INTERFACE (Direct), INTERFACE (IDBind), ISOBJECT, LET (with Objects), OBJECT, What is an object, anyway?

Example

```
DIM oApp AS IAPPDatabase
LET oApp = NEW IAPPDatabase IN "DBApp.0"
IF ISNOTHING(oApp) OR ERR THEN ' Handle error
```

ISNOTNULL function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ISNOTNULL function New!

Purpose Determine if a
is not null (contains 1 or more characters).

Syntax `ResultVar& = ISNOTNULL(StrgExpr)`

Remarks The *StrgExpr* is examined to determine if it is null, or if it contains one or more characters. The value true (-1) is returned if the *StrgExpr* contains characters, or false (0) if it is null (zero-length).

The complementary function is ISNULL.

See also ISNULL

ISNULL function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ISNULL function New!

Purpose Determine if a
is null (zero-length).

Syntax `ResultVar& = ISNULL(StrgExpr)`

Remarks The *StrgExpr* is examined to determine whether it is null (has zero characters). The value true (-1) is returned if the *StrgExpr* is null, or false (0) if it contains characters.

The complementary function is ISNOTNULL.

See also ISNOTNULL

ISOBJECT function

ISOBJECT function

Purpose Determine the current status of a given object variable.

Syntax `oStatus = ISOBJECT(objectvar)`

Remarks ISOBJECT is particularly useful in determining the success or failure of a LET (with Objects) statement. It returns TRUE (-1) if the object variable contains a valid current reference to an object interface, or FALSE (0) if it contains nothing.

ISOBJECT is the complement to the ISNOTHING function.

Restrictions *objectvar* must be an

or IDispatch object variable.

See also DIM, INTERFACE (Direct), INTERFACE (IDBind), ISNOTHING, LET (with Objects), OBJECT, What is an object, anyway?

Example

```
DIM oApp AS IAPPDatabase
LET oApp = NEWCOM "DBApp.0"
IF ISOBJECT(oApp) AND ISFALSE ERR THEN 'Handle error
```

IStackCollection

Keyword Template

Purpose

Syntax

Remarks

See also

Example

COLLECTION Object Group New!

Purpose A collection object is a set of items which can be referred to as a unit. It provides a convenient way to refer to a related group of items as a single object. The items in a collection need only be related by the fact that they exist in the collection. They do not have to share the same data type.

You create a collection the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL Collect AS IPowerCollection
LET Collect = CLASS "PowerCollection"
```

Once you have created a collection object, you can manipulate it using the member methods. Each data item in the set is stored as a variant variable, which may contain any valid data type (

, string, UDT, object, etc.). Collection interfaces are DUAL -- member methods may be referenced using either Direct or Dispatch form.

While the collection object expects to receive your data items as variant variables, you can take advantage of the auto-conversion options in PowerBASIC. If a variant parameter is expected, and you pass a single variable instead, PowerBASIC will automatically convert it with no intervention needed on your part.

Very often, it's convenient to create a collection of user defined types (UDT). While a variant may not normally contain a UDT, PowerBASIC offers a special methodology to do so. At programmer direction, a TYPE may be assigned to a variant (as a byte string) by using:

```
[LET] VrntVar = TypeVar AS STRING
```

In the same manner, a UDT argument can be auto-converted to the variant type by appending AS STRING:

```
CollObj.Add(Key$$, UDTVar AS STRING)
```

The data contained in the User-Defined Type variable (UDTVar) is stored in the variant argument as a dynamic string of bytes (vt_bstr). When the collection object retrieves that UDT data, it understands the content and handles it accurately. This special technique offers ease of coding and much improved execution speed. If you like, you can use the same sort of functionality in your own PowerBASIC code. However, you should keep in mind that other programming languages may not understand this technique, so it should be limited to PowerBASIC applications.

Power Collection

A Power Collection creates a set of data items, each of which is associated with an alpha-numeric

key which you define. The data item is passed and stored as a variant, while the key is passed and stored as a wide (Unicode) string. You can retrieve these data items directly by using their key, by their position in the collection, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "PowerCollection". The INTERFACE is IPowerCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

Items in a PowerCollection may be retrieved by their key using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS method. Each key in a PowerCollection must be unique. Keys in a PowerCollection are case-sensitive. To access the keys in a case-insensitive manner, you must create and retrieve all keys as either upper case or lower case, but not mixed.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Power Collection Methods

ADD <3> (*PowerKey* AS WString, *PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the PowerCollection. It is associated with the *PowerKey* string for later retrieval. If the operation was successful, an HResult of S_OK (0) is returned. If it fails because of a duplicate key, an HResult of E_DUPLICATEKEY (&H800A01C9) is returned, and an Object Error (99) is generated.

CLEAR <4>

All *PowerKeys* and *PowerItems* are removed from the PowerCollection.

CONTAINS <5> (*PowerKey* AS WString) AS Long

The PowerCollection is scanned to determine if the specified *PowerKey* is present. If found, the Index number of this Item (range of 1 - COUNT) is returned. This value will always evaluate as true. If not found, the value false (0) is returned.

COUNT <6> AS Long

The number of data items currently contained in the PowerCollection is returned to the caller.

ENTRY <7> (*Index* AS Long, OUT *PowerKey* as WString, OUT *PowerItem* as Variant)

The PowerCollection entry specified by the *Index* number is returned to the caller in the two specified OUT parameters. If the index number is less than one, or greater than the item count, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`FIRST <1> AS Long`

The current INDEX for the PowerCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

`INDEX <8> (Index AS Long) AS Long`

The current INDEX for the PowerCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than the current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

```
IndexVar& = ObjectVar.INDEX(0)
```

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

`ITEM <9> (PowerKey AS WString) AS Variant`

The *PowerItem* associated with the specified *PowerKey* is returned. If the specified key is not found, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

`LAST <10> AS Long`

The current INDEX for the PowerCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

`NEXT <2> AS Variant`

The NEXT method allows the PowerCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

`PREVIOUS <11> AS Variant`

The PREVIOUS method allows the PowerCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

`REMOVE <12> (PowerKey AS WString)`

The specified *PowerKey*, and the *PowerItem* associated with it, are removed from the PowerCollection. The index number of each data item past the removed item is decremented by one. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

`REPLACE <13> (PowerKey AS WString, PowerItem AS Variant)`

The *PowerItem* associated with the specified *PowerKey* is replaced by the new specified *PowerItem*. If the requested *PowerKey* is not found, OBJRESULT returns %S_FALSE (1) and no operation is performed.

`SORT <14> (Flags AS Long)`

The data items in the PowerCollection are sorted based upon the text in the associated *PowerKeys*. If the parameter Flags is zero(0), the items are sorted in ascending sequence. If one (1), the items are sorted in descending sequence.

LinkList Collection

A Linked List Collection is an ordered set of data items, which are accessed by their position in the list rather than by an alphanumeric string key. Each data item is passed and stored as a variant variable. You can retrieve these data items by their position number, or sequentially in ascending or descending sequence.

Syntax

The CLASS is "LinkListCollection". The INTERFACE is ILinkListCollection (a DUAL

interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks Items in a LinkListCollection may be retrieved by their position number using the ITEM method. They may be retrieved sequentially using the NEXT or PREVIOUS methods.

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

LinkList Collection Methods

ADD <3> (*PowerItem* AS Variant)

The *PowerItem* variant is added to the end of the LinkListCollection.

CLEAR <4>

All *PowerItems* are removed from the LinkListCollection.

COUNT <5> AS Long

The number of data items currently contained in the LinkListCollection is returned to the caller.

FIRST <1> AS Long

The current INDEX for the LinkListCOLLECTION is set to one (1), so that subsequent references to the NEXT method will access member items from the beginning. The previous value of the INDEX is returned to the caller.

INDEX <6> (*Index* AS Long) AS Long

The current INDEX for the LinkListCOLLECTION is set to the specified *index* number. If the parameter is less than one, or greater than current count of data items, the INDEX is not changed. The previous value of the INDEX is returned to the caller.

***IndexVar&* = *ObjectVar*.INDEX(0)**

The above example retrieves the current index number, without changing it, and assigns it to the variable *IndexVar&*.

INSERT <7> (*Index* AS Long, *PowerItem* AS Variant)

The *PowerItem* variant is added to the collection at the position specified by the *Index*. If the index number is less than one, or greater than the count, the item is added to the end of the list.

ITEM <8> (*Index* AS Long) AS Variant

The *PowerItem* at the position specified by *Index* is returned. If the specified item is not present, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

LAST <9> AS Long

The current INDEX for the LinkListCOLLECTION is set to the last item so that subsequent references to the PREVIOUS method will access member items from the end. The previous value of the INDEX is returned to the caller.

NEXT <2> AS Variant

The NEXT method allows the LinkListCollection data items to be retrieved sequentially. Each time NEXT is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is incremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

PREVIOUS <10> AS Variant

The PREVIOUS method allows the LinkListCollection data items to be retrieved sequentially. Each time PREVIOUS is referenced, the data item at the position specified by the INDEX is returned to the caller, and the INDEX is decremented. If the operation is successful, the OBJRESULT is set to %S_OK (0). When there are no more data items to retrieve, the OBJRESULT is set to %S_FALSE (1).

REMOVE <11> (*Index* AS Long)

The *PowerItem* at the position specified by *Index* is removed from the LinkListCollection. The index number of each data item past the removed item is decremented by one. If the requested item is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

REPLACE <12> (Index AS Long, PowerItem AS Variant)

The *PowerItem* at the position specified by *Index* is replaced by the new specified *PowerItem*. If the requested *PowerItem* is not present, OBJRESULT returns %S_FALSE (1) and no operation is performed.

Stack Collection

A Stack Collection is an ordered set of data items, which are accessed on a LIFO (Last-In / First-Out) basis. This collection follows the same algorithm as the machine stack on your Intel CPU. Each data item is passed and stored as a variant variable, using the PUSH and POP methods.

Syntax

The CLASS is "StackCollection". The INTERFACE is IStackCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Stack Collection Methods

CLEAR <1>

All *PowerItems* are removed from the StackCollection.

COUNT <2> AS Long

The number of data items currently contained in the StackCollection is returned to the caller.

POP <3> AS Variant

The *PowerItem* at the "Stack-Top" (the item most recently added) is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

PUSH <4> (PowerItem AS Variant)

The specified *PowerItem* is added to the StackCollection at the "Stack-Top" position.

Queue Collection

A Queue Collection is an ordered set of data items, which are accessed on a FIFO (First-In / First-Out) basis. Each data item is passed and stored as a variant variable, using the ENQUEUE and DEQUEUE methods.

Syntax

The CLASS is "QueueCollection". The INTERFACE is IQueueCollection (a DUAL interface).

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

Queue Collection Methods

CLEAR <1>

All *PowerItems* are removed from the QueueCollection.

COUNT <2> AS Long

The number of data items currently contained in the QueueCollection is returned to the caller.

DEQUEUE <3> AS Variant

The *PowerItem* at the "oldest" position is retrieved and returned to the caller. When there are no more data items to retrieve, the variant returned will be of type empty (VT_EMPTY), and the OBJRESULT will be %S_FALSE (1).

ENQUEUE <4> (*PowerItem* AS Variant)

The specified *PowerItem* is added to the QueueCollection at the "newest" position.

See Also FOR EACH/NEXT

ISTRUE operator

ISFALSE and ISTRUE operators

Purpose Return the logical truth or falsity of a given expression.

Syntax

```
ISFALSE expr
ISTRUE expr
```

Remarks ISTRUE returns -1 (TRUE) when expr evaluates as non-zero; otherwise, it returns zero (FALSE). ISFALSE returns -1 when expr evaluates as 0 (FALSE); otherwise, it returns zero.

Truth table

operator	*expr*	Result
ISTRUE	= 0	0
ISTRUE	<> 0	-1
ISFALSE	= 0	-1
ISFALSE	<> 0	0

PowerBASIC's NOT operator serves a double duty: it returns the one's-complement of an expression and "reverses" the value of a TRUE/FALSE (Boolean) expression. Usually, these two functions do not conflict, but since PowerBASIC accepts any non-zero value as TRUE, the following condition can arise:

```
test1 = 0           ' test1 is FALSE (zero)
IF NOT test1 THEN   ' TRUE (-1 is non-zero)
[statements]

test2 = 1           ' test2 is TRUE (1 is non-zero)
IF NOT test2 THEN   ' still TRUE (-2 is non-zero)
[statements]
```

In this case, NOT does not reverse the TRUE/FALSE value of test2. ISFALSE ensures that the test is performed exactly as you would expect:

test2 = 1 ' test2 is TRUE (non-zero)

```
IF ISFALSE test2 THEN ' ISFALSE detects test2 is
[statements]          ' TRUE so the IF test fails
```

This problem does not exist when you're testing for logical truth. PowerBASIC considers that an expression is TRUE in every case *except* when the expression is zero. However, ISTRUE converts all non-zero values to the "most true" value, -1, which provides the most consistent results with both boolean and arithmetic expressions.

Restrictions ISTRUE and ISFALSE operators evaluate the "whole" expression following the keyword, subject to their Operator Precedence level. For example, parentheses contained within the expression are regarded as an integral part of the expression, and do not act as delimiters for the ISTRUE and ISFALSE operators.

With this in mind, combining a logical test result into a further expression means that the expressions must be separated to ensure the correct evaluation.

Consider the following statement:

```
IF ISTRUE (x&) + y& THEN
```

PowerBASIC evaluates the entire expression *(x&) + y&* and then calculates the logical truth from the overall result of that expression. That is, the parentheses around the first part of the expression do not stop ISTRUE from evaluating the whole expression. To demonstrate this, the statement can be rewritten to concisely demonstrate the scope of the logical evaluation:

```
IF ISTRUE (x& + 2) THEN
```

or it could be simplified even further:

```
IF ISTRUE x& + 2 THEN
```

If you wish to utilize the numeric result of the logical test in a further expression, parentheses must be added to separate the expressions correctly:

```
IF (ISTRUE x&) + 2 THEN
```

See also Arithmetic Operators, NOT, Short-circuit evaluation

ISWIN function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ISWIN function

Purpose Determine whether a

/Dialog/Window currently exists

Syntax

```
DialogExists&  = ISWIN(hDlg&)
ControlExists& = ISWIN(hParentDlg&, Ident&)
```

Remarks The Window subsystem is checked to determine whether the specified Dialog or Control currently exists. This function may be used for a wide range of purposes, but it's particularly valuable when you want to be sure that a CONTROL was created successfully with the

statement.

If you use a single parameter, it must specify the handle of a Window, Dialog, or Control you are checking. If you use two parameters, you would specify the handle of the parent and the identifier of the Control you are checking.

If the target of the function currently exists, TRUE (-1) is returned. If it does not exist, the return value is FALSE (0).

See also , CONTROL HANDLE, DIALOG NEW

ITERATE statement

ITERATE statement

Purpose Start an immediate iteration of a

structure.

Syntax

```
ITERATE [DO | LOOP | FOR]
```

Remarks ITERATE is just like using a GOTO to the line immediately before the NEXT statement (of a FOR...NEXT loop), the LOOP statement (of a DO...LOOP loop), or the WEND statement (of a WHILE..WEND loop). For example, the following code fragments are equivalent:

```
FOR ix = 1 TO 100
  [statements]
```

```
  ITERATE FOR
  [statements]
NEXT

FOR ix = 1 TO 100
  [statements]
  GOTO iterateForLoop
  [statements]
iterateForLoop:
NEXT
```

If you do not specify DO, LOOP, or FOR, ITERATE will iterate the most recently executed structure. For example:

```
FOR ix = 1 TO 10
  DO UNTIL x > 10
    [statements]
    ITERATE  ' will iterate the DO LOOP
    [statements]
  LOOP
NEXT
ITERATE DO and ITERATE LOOP are interchangeable.
```

Use this statement...	To iterate this kind of loop
ITERATE FOR	FOR/NEXT
ITERATE DO, ITERATE LOOP	DO/LOOP, WHILE/WEND

See also DO/LOOP, EXIT, FOR EACH/NEXT, FOR/NEXT, WHILE/WEND

JOIN$ function

JOIN$ function

Purpose Return a

consisting of all of the strings in an array, each separated by a delimiter.

Syntax ***A$* = JOIN$(*array()*, {*delim$* | BINARY})**

Remarks JOIN$ requires a delimiter string *delim$* which may be any length.

If the delimiter expression is a null (zero-length) string, no separators are inserted between the string sections. If the delimiter expression is the 3-byte value of "," (which may be expressed in your source code as the string literal """,""") , a leading and trailing double-quote is added to each string section. This ensures that the returned string contains standard, comma-delimited quoted fields that can be easily parsed.

The array specified by *array()* may be any data type.

BINARY If the array consists of fixed size elements (

, Nul-Terminated Strings, etc.), the returned string consists of an exact memory image of the array data in internal format. If the array contains variable length data (Dynamic string, Field string), it is stored in PowerBASIC and/or Visual Basic packed string format: If a string is shorter than 65535 bytes, it starts with a 2-byte length WORD followed by the string data. Otherwise, it will start with a 2-byte value of 65535, followed by a DWORD indicating the string length, then finally the string data itself.

The JOIN$ function is the natural complement to the PARSE statement.

See also BUILD$, PARSE, PARSE$, PARSECOUNT

Example

```
FUNCTION PBMAIN
  DIM a$(2), s1$, s2$
  a$(0) = "Hello"
```

```
  a$(1) = "Power"
  a$(2) = "BASIC"
  s1$ = JOIN$(a$(),""",""")
  s2$ = JOIN$(a$(),$SPC)
END FUNCTION
```

Result

```
s1$ contains:  "Hello","Power","BASIC"
s2$ contains:  Hello Power BASIC
```

KILL statement

KILL statement

Purpose Delete a disk file.

Syntax **KILL *filespec***

Remarks *filespec* is a string expression specifying the file or files to be deleted, and can include a path name and/or "wildcard" characters. *filespec* may be either a Short File Name (SFN) or a Long File Name (LFN). For example:

```
KILL "TEST.DOC"
KILL "C:\MY APPLICATION DATA\INCOME.?87"
MyFile$ = "*.BAS"
KILL MyFile$     ' Potentially dangerous!
```

If *filespec* does not exist, Error 53 ("File not found") is generated. If *filespec* is read only, Error 70 ("Permission denied") occurs. You should not attempt to KILL an open file.

Files with the HIDDEN or SYSTEM attribute can not be deleted with KILL. An attempt to do so is ignored, with no error generated.

KILL is analogous to the DOS "DEL" and "ERASE" commands. KILL cannot delete a directory - use RMDIR instead, after first deleting all the files in the directory.

See also FILEATTR, FILECOPY, FILENAME$, GETATTR, NAME, RMDIR, SETATTR, SETEOF

LBOUND function

LBOUND function

Purpose Return the smallest possible subscript (boundary) for an array's specified dimension.

Syntax

```
y& = LBOUND(array [(dimension)])
y& = LBOUND(array, dimension)
```

Remarks LBOUND can be used in combination with UBOUND to determine the size of an array. LBOUND of an undimensioned array returns zero. The LBOUND function has the following parts:

array Name of the array of interest.

dimension An

indicating which dimension's lower bound is returned. If not specified, the first dimension is assumed.

Restrictions LBOUND cannot be used on arrays within User-Defined Types.

See also ARRAYATTR, DIM, REDIM, UBOUND

Example

```
' Dimension an array with lower and upper bounds
DIM MyArray%(1900 TO 2000,5 TO 10)
' get the values of the array
l1 = LBOUND(MyArray%)
u2 = UBOUND(MyArray%)
l2 = LBOUND(MyArray%(2))
```

```
u2 = UBOUND(MyArray%, 2)
```

LCASE$ function

LCASE$ function

Purpose Return a lowercase version of a

argument.

Syntax `s$ = LCASE$(string_expression [,ANSI | OEM])`

Remarks LCASE$ returns a string equivalent to *string_expression*, except that uppercase letters in *string_expression* are converted to lowercase. The optional ANSI or OEM parameter specifies whether the conversion is made using the ANSI charset for the system, or the original IBM OEM charset. If no charset is specified, PowerBASIC for Windows uses the system ANSI charset, while PB/CC uses the IBM OEM charset. Only "International" characters in the range of CHR$(128) to CHR$(255) are affected by this parameter.

The OEM charset is based upon the original IBM OEM charset to ensure compatibility with programs written for all previous versions of the PowerBASIC compiler.

See also MCASE$, UCASE$

Example
```
x$ = LCASE$("Cats aren't ALWAYS good.")
```

Result
```
cats aren't always good.
```

LEFT$ function

LEFT$ function

Purpose Return the left-most *n* characters of a

.

Syntax `s$ = LEFT$(string_expression, n&)`

Remarks *n&* is a Long-integer expression and specifies the number of characters in *string_expression* to be returned.

LEFT$ returns a string consisting of the left most *n&* characters of its string argument. If *n&* is greater than or equal to the length of *string_expression*, all of *string_expression* is returned. If *n&* is zero, LEFT$ returns an empty string. If the length value parameter is negative, it is interpreted as LEN(*string_expression*)-ABS(*n&*). For example, LEFT$("1234567890",-2) returns "12345678".

See also EXTRACT$, INSTR, LTRIM$, MID$, RIGHT$, RTRIM$, SPLIT, TALLY, TRIM$, VERIFY

Example
```
' Demonstrate LEFT$ and RIGHT$ functions
DIM TestString$, x$, y$, n AS LONG
TestString$ = "ABCDEFGHIJKLMNOP"
FOR n = 1 TO 14 STEP 2
  x$ = LEFT$(TestString$,n)
  y$ = RIGHT$(TestString$,n)
NEXT n
```

LEN function

LEN function

Purpose Return the logical length of a variable, User-Defined Type, or Union.

Syntax `y& = LEN(target)`

Remarks If *target* is a variable or a string expression, LEN returns a value from 0 to the current string length, representing the number of characters in *target*. If *target* is a fixed-length string, the length of the fixed buffer is returned. If *target* is an nul-terminated string, the length of the data stored in the nul-terminated string is returned, not the maximum size of the nul-terminated string. Use SIZEOF to determine the maximum size of an nul-terminated string.

When used with pointers, LEN returns a value of 4, since a pointer is always stored as a DWORD. You can use LEN with the target of a pointer to return the size of target. If the target is a dynamic string, you will receive the length of the string, not the length of the handle.

target can also be any other variable type, including and User-Defined Types (defined with TYPE/END TYPE). In that case, PowerBASIC will return the number of bytes needed to store a variable of that type.

When measuring the size of a padded (aligned) UDT structure with the LEN (or SIZEOF) statement, the measured length includes any padding that was added to the structure. For example, the following UDT structure:

```
TYPE LengthTestType DWORD
  a AS INTEGER
END TYPE
' code here
DIM abc AS LengthTestType
x& = LEN(abc)
```

Returns a length of 4 bytes in *x&*, since the UDT was padded with 2 additional bytes to enforce DWORD alignment. Note that the LEN of individual UDT members returns the true size of the member without regard to padding or alignment. In the previous example, LEN(abc.a) returns 2.

See also CHRBYTES, SIZEOF

Example

```
DIM p AS BYTE POINTER
ByteLen = LEN(p)  ' size of a pointer = 4 bytes
ByteLen = LEN(@p) ' size of byte (target) = 1 byte
```

LET statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LET statement

Purpose Assign a value to a variable.

Syntax

```
[LET] variable  = expression
[LET] variable += expression
[LET] variable -= expression
[LET] variable *= expression
```

```
[LET] variable /= expression
[LET] variable \= expression
[LET] variable &= expression
[LET] variable AND= expression
[LET] variable OR= expression
[LET] variable EQV= expression
[LET] variable IMP= expression
[LET] variable MOD= expression
[LET] variable XOR= expression
```

Remarks

Simple assignment

variable is a

or variable, and expression is of a suitable type (that is, a string expression for string variables and numeric expression for numeric variables).

The word LET is optional in assignment statements. It is allowed to provide compatibility BASIC source files written for early versions of BASIC. In practice, the word LET is very rarely used.

To allow easy conversion, PowerBASIC allows a User-Defined Type in a string expression. The User-Defined Type is simply copied, byte for byte, into the expression. However, to assign a string back to a User-Defined Type, you should use the TYPE SET statement.

```
DIM abc as MyType
MyString$ = abc
```

Please refer to the following sections of the LET statement for special information regarding assignment using Object variables, Variant variables, and User-Defined Type variables.

Compound assignment

A compound assignment statement combines a binary arithmetic operator, a binary

, or a binary string operator (concatenation) as an integral part of the assignment. This offers the programmer a "shortcut" in your source code, and can even result in more efficient code generation. That's because the target variable is evaluated only once, even if an array or pointer calculation could have a side effect which changes it.

Compound assignments are available for the standard arithmetic operations of add, subtract, multiply, divide, int-divide, and modulo (+ - * / \ MOD), the bitwise operations (AND, OR, XOR, EQV, IMP), and the concatenation operators (+ &). Each are represented by one of the following tokens:

`+=`	`AND=`
`-=`	`OR=`
`/=`	`EQV=`
`\=`	`IMP=`
`&=`	`MOD=`
`*=`	`XOR=`

Each of the following pairs of code are functionally identical:

`x = x + 1`	`x += 1`
`x = x / y`	`x /= y`
`x = x XOR 3`	`x XOR= 3`
`x(7) = x(7) AND 5`	`x(7) AND= 5`
`x$ = x$ + y$`	`x$ += y$`

See also BUILD$, JOIN$, LET (with Objects), LET (with Variants), LET (with Types), TYPE SET

Example

```
MyString$ = "This is a test."
LET TempStr$ = MyString$
LET MyVarr -= YourVar
```

LET statement (with Objects)

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LET statement (with Objects)

Purpose Assign an object reference to an object variable.

Syntax `[LET] objvar = object expression`

Remarks The LET Statement, and its implied form (without using the word LET), may be used to assign an object reference to an object variable. After you declare an object variable as a particular interface, you must create an object and or assign an object reference to it before you can use the objects members (methods, properties, etc.).

If an object creation or assignment fails for any reason, the *objvar* is set to NOTHING. If this statement fails, no errors are generated, nor is an OBJRESULT set. You should test for success of the operation with ISOBJECT(*objvar*) before trying to use the object or execute its methods.

LET *objvar* = CLASS *ClassName$*

The term *ClassName* must be specified as a quoted string literal, which is the name of a class implemented within the program. Since the class is internal (the name is known at compile-time), you may not use a

variable or expression. Upon execution, a new object is created, and a reference to that object is assigned to the object variable *objvar*. The interface requested is determined by the original declaration of *objvar*. If InterfaceName is DISPATCH, you can reference it with the OBJECT statement -- otherwise, regular Method and Property references are used.

LET *objvar* = NEWCOM *PrgID$*
LET *objvar* = GETCOM *PrgID$*
LET *objvar* = ANYCOM *PrgID$*

This form of the LET statement is used to obtain an object reference external to the program using the COM facilities of Windows. If the requested object is in a DLL (in-process server), you will always use the NEWCOM option, as you're asking for a new object. If the request is successful, the object reference is assigned to the *objvar*.

If the requested object is in an EXE (out-of-process server), you may use any of the three options. If the director word NEWCOM is specified, a new instance of a COM application is created. With GETCOM, an interface will be opened on an existing, running application, which has been registered as the active automation object for its class. With ANYCOM, the compiler will first try to use an existing, running application if available, or a new instance if not.

The string expression *ProID$* evaluates to a ProgID name on an external COM server. If the InterfaceName is DISPATCH, you can reference it with the OBJECT statement -- otherwise, regular Method and Property references are used instead.

LET *objvar* = NEWCOM CLSID *ClassID$*
LET *objvar* = GETCOM CLSID *ClassID$*
LET *objvar* = ANYCOM CLSID *ClassID$*

This form also obtains a COM object, just as the examples in the above section. There is always a one-to-one relationship between a ProgID and a CLSID (Class ID). An object can be identified by either of these tokens, as long as they are both available. In some instances, you may encounter an object which has no ProgID published. You can substitute the clause "CLSID *ClassID$*" for the *PrgID$*. It works exactly as the usual form above, except that it describes the requested object by its 16-byte GUID which is the CLSID (Class ID) of the object.

LET *objvar* = NEWCOM CLSID *ClassID$* LIB *DLLPath$*

PowerBASIC offers the unique ability to create and reference COM objects without any reference to the registry at all. As long as you know the CLSID (Class ID) and the file path/name of the DLL to be accessed, you can do so with no registry access at all. You don't need a special type of COM server. This technique can be used with any server, whether created by PowerBASIC or another compiler. By using this method of object creation, there is simply no need for the server to be registered at all. That allows you to keep local copies of the COM servers you use, with no chance they will be altered or replaced by another application. You use the above form, where the clause "CLSID *ClassID$*" identifies the 16-byte Class ID, and the clause "LIB *DllPath$*" identifies the file path and file name of the COM Server. Once you've obtained the COM object reference in *objvar*, it is used exactly as you would with a traditional object.

LET *objvar1* = *objvar2*

If both object variables have been declared as the same object type (the same interface name), the source variable (*objvar2*) is copied to the destination variable (*objvar1*), and the reference count of the object is incremented. If the object variables are of different object types, a new interface (of the type implied by *objvar1*) is opened on *objvar2*, and a reference to it is assigned to *objvar1*.

LET *objvar* = *objmethod*(*params*)

It is assumed that the METHOD or GET PROPERTY specified by *objmethod* returns an object of the type of *objvar*. The *objmethod* is evaluated, and the object reference which it returns is assigned to *objvar*.

LET *objvar* = ME

This form may only be used within a METHOD or PROPERTY. A new interface (of the type implied by *objvar*) is opened on the current object, and a reference to it is assigned to *objvar*.

LET *objvar* = NOTHING

This destroys an object variable, discontinuing its association with a specific object. This in turn releases all system and memory resources associated with the object when no more object variables refer to it.

LET *objvar* = *vrnt*

Attempts to open an interface of the specified class for *objvar* on the object of *vrnt*, and assigns a reference to *objvar*. It assumes that *vrnt* contains a reference to an object of type %VT_UNKNOWN or %VT_DISPATCH. If the desired interface can not be opened, the object variable *objvar* is set to NOTHING.

LET *vrnt* = *objvar*

This may be used to assign an object reference from an object variable to a variant variable. It attempts to open an IDispatch interface, else an IUnknown interface on the object of *objvar*, and assigns that reference to *vrnt*. Variant variables can not contain references to custom interfaces, only IDispatch or IUnknown. If the assignment is successful, VARIANTVT(*vrnt*) will return either %VT_UNKNOWN or %VT_DISPATCH. If it is unsuccessful, *vrnt* is set to %VT_EMPTY.

Previous versions of PowerBASIC Compilers used the SET statement for creation of objects. LET now includes all the functionality of the old SET statement, so you should plan to remove all SET statements as soon as possible. This involves nothing more than changing every SET to LET, or simply deleting every SET.

See also LET, LET (with Variants), LET (with Types), INTERFACE (Direct), INTERFACE (IDBind), ISINTERFACE,ISNOTHING, ISOBJECT, Just what is COM?, ME, OBJECT, What is an object, anyway?

LET statement (with Types)

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LET statement (with Types) IMPROVED

Purpose Assign data to a user-defined type variable.

Syntax

```
[LET] TypeVar = TypeVar
[LET] TypeVar = VARIANT$(VrntVar)
```

Remarks *Typevar* is a user-defined type variable. In order to perform direct assignment of data from one user-defined type variable to another, they must be dimensioned to the same type. To assign data between two different types, you should use the TYPE SET statement instead.

The word LET is optional in assignment statements. It is allowed to provide compatibility BASIC source files written for early versions of BASIC. In practice, the word LET is very rarely used.

When User-Defined Type data is stored in a variant variable, it may be extracted as in the second syntax example. The Variant$() function understands that UDT data is stored as a byte string.

To allow easy conversion, PowerBASIC allows a User-Defined Type in a string expression. The User-Defined Type is simply copied, byte for byte, into the expression. To assign a string back to a User-Defined Type, you may also use the TYPE SET statement. Generally speaking, if a UDT is used in a WIDE string expression (Unicode), it will give unpredictable results from the character conversions.

```
DIM abc as MyType
MyString$ = abc
```

See also LET, LET (with Objects), LET (with Variants), TYPE SET, VARIANT$

Example

```
MyString$ = "This is a test."
LET TempStr$ = MyString$
```

LET statement (with Variants)

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LET statement (with Variants) IMPROVED

Purpose Assign a value or an object reference to a variant variable.

Syntax

```
[LET] VariantVar = variant expression
[LET] VariantVar = TypeVar AS STRING
```

Remarks Although notoriously lacking in efficiency, Variant variables are commonly used as COM Object parameters due to their flexibility. They also prove valuable in a situation where a procedure must run properly with parameters of multiple data types (a Collection would be a good example). You can think of a Variant as a kind of container, which can hold a variable of most any data type,

, , object, or even a UDT or an entire array. This simplifies the process of calling procedures in a COM Object Server, as there is little need to worry about the myriad of possible data types for each parameter.

This flexibility comes at a great price in performance, so PowerBASIC limits their use to data storage and parameters only. You may assign a numeric value, a string value, a UDT, an object, or even an entire array to a Variant with the LET statement, or its implied equivalent. In the same way, you may assign one Variant value to another Variant variable, or even assign an array contained in a Variant to a compatible PowerBASIC array, or the reverse.

You may extract a scalar value from a Variant with VARIANT# (for numeric values), VARIANT$ (for ANSI byte strings or user-defined types), or VARIANT$$ (for wide Unicode strings). When you assign string data to a variant variable, ANSI strings are automatically converted to wide Unicode characters, as this is the accepted standard for variants. However, when you assign UDT data to a variant variable, it is stored as a dynamic string of bytes. When you retrieve that UDT data (with Variant$), PowerBASIC understands the content and handles it accurately. However, other programming languages may not, so the use of this technique should be limited to PowerBASIC applications.

LET *VrntVar*= *vrntvar*

This form duplicates the contents of one variant variable, assigning it to a second variant variable.

LET *VrntVar*= *expression* [AS *vartype*]

The numeric or string expression is evaluated, and the result is stored in the variant variable. PowerBASIC will choose an appropriate numeric or string data type to use. However, you can specify a preferred format by adding an optional AS vartype clause. This can be BYTE, WORD, DWORD, INTEGER, LONG, QUAD, SINGLE, DOUBLE, CURRENCY, or WSTRING. Strings in a variant are always stored in wide Unicode, regardless of whether you add AS WSTRING or not. PowerBASIC handles the conversion automatically, if it is needed.

In prior versions of PowerBASIC, the term AS STRING was interpreted to mean AS WSTRING for wide Unicode. However, with the new support for Unicode data types, this can no longer be allowed. All references to AS STRING with variants must be changed to AS WSTRING.

LET *VrntVar* = *TypeVar* AS STRING

The data contained in the User-Defined Type variable (UDT) is stored in the variant variable. It is stored internally as a dynamic string of bytes (vt_bstr). When you retrieve that UDT data (with Variant$), PowerBASIC understands the content and handles it accurately. However, other programming languages may not understand this technique, so it should generally be limited to PowerBASIC applications.

In prior versions of PowerBASIC, the AS STRING clause was not a requirement, as it is currently. Although it represents a change, it was a necessary restriction to confirm that the conversion to string is your intention.

LET *VrntVar* = EMPTY

The variant variable is set to %VT_EMPTY, which means it contains no value of any kind.

LET *VrntVar* = ERROR *numr*

This form assigns a specific COM error number, which is usually a COM specific error, such as %E_NOINTERFACE, etc.

LET *VrntVar* = *array()*

An entire PowerBASIC array is assigned to a variant variable. In the case of a string array, PowerBASIC automatically handles Unicode conversions needed for the COM specification. Array assignment is limited to the following data types: BYTE, WORD, DWORD, INTEGER, LONG, QUAD, SINGLE, DOUBLE, CURRENCY, or STRING, as Windows does not support all PowerBASIC data forms.

LET *array()* = *vrntvar*

An entire array is assigned from a variant variable to a PowerBASIC array. In the case of a string array, PowerBASIC automatically handles Unicode conversions. You can not assign an array with more than eight dimensions to a PowerBASIC array.

LET *VrntVar* = BYREF *variable*

This form is used to allow a variant to contain a typed pointer to a specific variable. Any changes to the variant will cause the variable to be changed, as it is the target of the pointer. The variable may be of any data type which is supported by variants and COM objects: Byte, Word, Dword, Integer, Long, Quad, Single, Double, Currency, Variant, String, and WString. If you attempt to use an unsupported variable type (like Extended, Bit, STRINGZ, etc.), PowerBASIC will generate an error 482 (Data Type Mismatch). Further, you may not use a register variable (automatic or explicit), or an error 491 (Invalid Register Variable) will be generated. Note that strings used with COM objects are expected to be in Unicode format, rather than ANSI. The ACODE$ and UCODE$ functions may be used to convert the strings as necessary. You should exercise caution with a BYREF ANSI string, as it may not be recognized accurately by other code which expects only Unicode strings.

LET *objvar* = *vrnt*

Attempts to open an interface of the specified class for *objvar* on the object of *vrnt*, and assigns a reference to *objvar*. It assumes that *vrnt* contains a reference to an object of type %VT_UNKNOWN or %VT_DISPATCH. If the desired interface can not be opened, the object variable *objvar* is set to NOTHING. You can test for success/failure with the ISOBJECT(*objvar*) function.

LET *vrnt* = *objvar*

This may be used to assign an object reference from an object variable to a variant variable. It attempts to open an IDispatch interface, else an IUnknown interface on the object of *objvar*, and assigns that reference to *vrnt*. Variant variables can not contain references to custom interfaces, only IDispatch or IUnknown. If the assignment is successful, VARIANTVT(*vrnt*) will return either %VT_UNKNOWN or %VT_DISPATCH. If it is unsuccessful, *vrnt* is set to %VT_EMPTY.

See also Just what is COM?, LET, LET (with Objects), LET (with Types), VARIANT#, VARIANT$, VARIANTVT

LIBMAIN function

LIBMAIN function

Purpose LIBMAIN (or its synonym DLLMAIN) is an optional user-defined function called by Windows each time a DLL is loaded into, and unloaded from, memory. The PBLIBMAIN function performs a similar task to LIBMAIN, but takes no parameters.

Syntax

```
FUNCTION { LIBMAIN | DLLMAIN } ( _
  BYVAL hInstance AS DWORD, _
  BYVAL lReason AS LONG, _
  BYVAL lReserved AS LONG ) AS LONG
```

In 32-bit Windows, LIBMAIN is called by Windows each time a DLL is loaded or unloaded by an application or process, and (usually) when a thread is started and stopped. Your code should never call LIBMAIN.

Remarks The LIBMAIN / DLLMAIN function provides the following parameters:

hInstance The unique instance handle of the DLL. This handle is used by the calling application to identify the DLL. The instance handle value is commonly used to load resources embedded within the DLL, and to obtain the actual file name of the DLL (via the GetModuleFilename API function). In these cases, it is common to copy the *hInstance* value to a global variable, allowing the instance handle value to be utilized elsewhere in the DLL.

lReason This flag indicates why the DLL entry-point is being called. It can be one of the following values (as defined in WIN32API.INC):

%DLL_PROCESS_ATTACH	Indicates that the DLL is being loaded by a process (another DLL or EXE is loading the DLL). DLLs can use this opportunity to initialize any instance or global data, such as arrays. *lReserved* is zero if the DLL is being loaded explicitly (run-time linking) using LoadLibrary(), or non-zero if the DLL is being loaded implicitly (load-time linking) during process initialization.
%DLL_PROCESS_DETACH	Indicates that the DLL is being cleanly unloaded or detached from the calling application. DLLs can take this opportunity to clean up all resources for all threads attached and known to the DLL. This is functionally equivalent to the WEP function in 16-bit DLLs. *lReserved* is zero if LIBMAIN was executed via the FreeLibrary API and the DLLs reference count reached zero (no further instances of the DLL are loaded), or non-zero if LIBMAIN is executed during process termination. A %DLL_PROCESS_DETACH does not generate %DLL_THREAD_DETACH for active threads.
%DLL_THREAD_ATTACH	Indicates that the DLL is being loaded by a new thread in the calling application. DLLs can use this opportunity

	to initialize any Thread Local Storage (TLS). This execution occurs in the context of the new thread.
%DLL_THREAD_DETACH	Indicates that the thread is exiting cleanly. If the DLL has allocated any thread-specific storage (Thread Local Storage or TLS), it should be released. This may occur even if there was no matching %DLL_THREAD_ATTACH call. A %DLL_PROCESS_DETACH does not generate %DLL_THREAD_DETACH for active threads.

lReserved The *lReserved* parameter specifies further aspects of the DLL initialization and cleanup. If *lReason* is %DLL_PROCESS_ATTACH, *lReserved* is zero (0) for explicit (dynamic) loads and non-zero for implicit loads. If *lReason* is %DLL_PROCESS_DETACH, *lReserved* is zero if LIBMAIN has been called by using the FreeLibrary API call, and non-zero if LIBMAIN has been called during process termination.

Return value If LIBMAIN is called with %DLL_PROCESS_ATTACH, your LIBMAIN function should return a zero (0) if any part of your initialization process fails, or a one (1) if no errors were encountered. If a zero is returned, Windows will abort and unload the DLL from memory. When LIBMAIN is called with any other value than %DLL_PROCESS_ATTACH, the return value is ignored.

Restrictions Note that Windows does not guarantee that LIBMAIN will be called in a "balanced" manner. For example, a %DLL_PROCESS_ATTACH is not followed by a %DLL_THREAD_ATTACH for the primary thread. In some conditions, %DLL_THREAD_DETACH may not occur at all. Further discussion on these Windows traits are beyond the scope of this documentation; however, an excellent source of information can be found in "Win32 Programming", Rector/Newcomer, ISBN 0-201-63492-9.

At the point where a DLL is loaded into memory during process startup, Windows only guarantees that the KERNEL32.DLL system library will be loaded in memory. On this basis, API calls made from within LIBMAIN must be restricted to the range of API functions present in KERNEL32.DLL, with the exception of the LoadLibrary, LoadLibraryEx, and FreeLibrary API functions.

In addition, code within LIBMAIN must not call API functions in any other DLL (for example, USER32.DLL, SHELL32.DLL, ADVAPU32.DLL, GDI32.DLL, etc), because some API functions in those DLLs may attempt to load other libraries via LoadLibrary, etc. For example, never call the MessageBox API function from within LIBMAIN, nor use the related MSGBOX function or MSGBOX statement.

Failure to observe these restrictions will result in Access Violation or General Protection Faults (GPFs), typically caused by the execution of code in DLLs that has yet to be initialized.

See also DLLMAIN, PBLIBMAIN, PBMAIN, THREAD CREATE, WINMAIN

Example

```
#DIM ALL
#COMPILE DLL "LIBTEST.DLL"
#INCLUDE "WIN32API.INC"

GLOBAL gNumOfTimes AS DWORD

FUNCTION LIBMAIN(BYVAL hInstance AS DWORD, _
  BYVAL lReason AS LONG, _
  BYVAL lReserved AS LONG) AS LONG

  INCR gNumOfTimes

  SELECT CASE AS LONG lReason

    CASE %DLL_PROCESS_ATTACH
      ' This DLL has been mapped into the memory context of
      ' the calling program, and can be initialized as required.
      ' Here we return a non-zero LIBMAIN result to indicate success.
```

```
        LIBMAIN = 1
        EXIT FUNCTION

      CASE %DLL_PROCESS_DETACH
        ' This DLL is about to be unloaded
        EXIT FUNCTION

      CASE %DLL_THREAD_ATTACH
        ' A [New] thread is starting (see THREADID)
        EXIT FUNCTION

      CASE %DLL_THREAD_DETACH
        ' This thread is closing (see THREADID)
        EXIT FUNCTION

    END SELECT

    ' Theoretically execution should never get to this point.
    ' However, if the DLL is being implicitly linked then return
    ' Zero (0) and the process (program) will fail to start
    ' running. For Explicit linking, returning Zero (0) will
    ' simply cause the LoadLibrary/LoadLibraryEx API call to fail.
    LIBMAIN = 0 ' Indicate failure to initialize the DLL!
  END FUNCTION

  SUB TestIt ALIAS "TestIt" () EXPORT
    MSGBOX "TestIt" + $CRLF + _"gNumOfTimes =" + STR$(gNumOfTimes)
  END SUB
```

LINE INPUT# statement

LINE INPUT# statement

Purpose
Read line(s) from a sequential file into a variable or string array, ignoring delimiters.

Syntax
LINE INPUT #*filenum&*, *string_variable*
LINE INPUT #*filenum&*, *Arr$()* [RECORDS *rcds*] [TO *count*]

Remarks
filenum& is the file number, or variable containing a file number, given when the file was opened. *string_variable* is the string variable to be loaded with the data read from the file.

string_variable may be a fixed-length, nul-terminated, or dynamic string. For fixed-length and nul-terminated strings, data that is longer than the string is truncated to fit into the string. Dynamic strings receive the data without truncation. *string_variable* may not be a UDT variable, although fixed-length and nul-terminated UDT member variables are supported.

LINE INPUT# is intended for use with text files composed of lines terminated by CR/LF ($CRLF or CHR$(13,10)) sequences. It reads a line from the file and returns it, minus the CR/LF delimiter. Commas, quotation marks and other characters have no special meaning for LINE INPUT#, and are treated like any other text.

If the file consists of comma-delimited data items, INPUT# is likely to be more suitable then LINE INPUT#.

The second syntax definition of LINE INPUT# reads a file opened for INPUT, assigning full lines of text to each element of the array.

It is assumed the data is standard text, delimited by a CR/LF ($CRLF) or EOF (1A hex or $EOF). LINE INPUT# attempts to read the number of lines specified in the RECORDS *rcds* option, or the number of elements in the array, whichever is smaller.

The actual number of lines read is assigned to the variable specified in the optional TO *count* clause. FILESCAN is useful in conjunction, to determine the dimensioned size of the string array. EOF is set just as with single Line Input.

See also EOF, FILESCAN, INPUT#, PRINT#

Example

```
SUB MakeFile
  ' Open a sequential file for output. Use PRINT#
  ' to write different data types to the file.
  OPEN "LINEINP#.DTA" FOR OUTPUT AS #1

  ' Define some variables.
  sVar$ = "There's trouble in River City, by George."
  iVar% = 1000
  fpVar! = 30000.12

  ' Write a line of text to the file.
  PRINT# 1, sVar$; iVar%; fpVar!
  CLOSE #1      'close the file
END SUB 'end procedure MakeFile

SUB ReadFile
  'Open a sequential file for input, then use
  'LINE INPUT # to read lines of different
  'data types from the file.

  OPEN "LINEINP#.DTA" FOR INPUT AS #1
  StringVar$ = ""

  'Input an entire line regardless of length or
  'delimiters.
  LINE INPUT #1, StringVar$
  CLOSE #1      'close the file
END SUB 'end procedure ReadFile
```

LISTBOX ADD statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a LISTBOX control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
```

```
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg Handle of the dialog that owns the list box.

id& The control identifier assigned with CONTROL ADD LISTBOX.

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the %LBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1

(1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id&* [*,item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTBOX GET TEXT *hDlg, id&* [*,item&*] TO *txtv$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv$*. With a multiple-selection listbox (%LBS_MULTIPLESEL or %LBS_EXTENDEDSEL style), the text of the first (base) selected item is assigned to *txtv$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item&* TO *datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX INSERT *hDlg, id&, item&, StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort all of the items, use LISTBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions

Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also

Dynamic Dialog Tools, CONTROL ADD LISTBOX, CONTROL SET COLOR, CONTROL SET FONT

LISTBOX DELETE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a LISTBOX control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg Handle of the dialog that owns the list box.

id& The control identifier assigned with CONTROL ADD LISTBOX.

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the %LBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire

LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTBOX GET TEXT *hDlg, id&* [,*item&*] TO *txtv$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv$*. With a multiple-selection listbox (%LBS_MULTIPLESEL or %LBS_EXTENDEDSEL style), the text of the first (base) selected item is assigned to *txtv$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item&* TO *datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort all of the items, use LISTBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg*, *id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg*, *id&*, *item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg*, *id&*, *item&*, *StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg*, *id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTBOX, CONTROL SET COLOR, CONTROL SET FONT

LISTBOX FIND statement

Keyword Template

Purpose

Syntax
Remarks
See also
Example

LISTBOX statement IMPROVED

Purpose Manipulate a LISTBOX control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg Handle of the dialog that owns the list box.

id& The control identifier assigned with CONTROL ADD LISTBOX.

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the %LBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg*, *id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv$*. With a multiple-selection listbox (%LBS_MULTIPLESEL or %LBS_EXTENDEDSEL style), the text of the first (base) selected item is assigned to *txtv$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item&* TO *datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort all of the items, use LISTBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg*, *id&*, *item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg*, *id&*, *item&*, *StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg*, *id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTBOX, CONTROL SET COLOR, CONTROL

SET FONT

LISTBOX FIND EXACT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a LISTBOX control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg Handle of the dialog that owns the list box.

id& The control identifier assigned with CONTROL ADD LISTBOX.

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the %LBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg*, *id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv$*.

If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv$*. With a multiple-selection listbox (%LBS_MULTIPLESEL or %LBS_EXTENDEDSEL style), the text of the first (base) selected item is assigned to *txtv$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort all of the items, use LISTBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg*, *id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg*, *id&*, *item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg*, *id&*, *item&*, *StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg*, *id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTBOX, CONTROL SET COLOR, CONTROL SET FONT

LISTBOX GET COUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a LISTBOX control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg Handle of the dialog that owns the list box.

id& The control identifier assigned with CONTROL ADD LISTBOX.

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the %LBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg*, *id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTBOX GET TEXT *hDlg, id&* [,*item&*] TO *txtv$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv$*. With a multiple-selection listbox (%LBS_MULTIPLESEL or %LBS_EXTENDEDSEL style), the text of the first (base) selected item is assigned to *txtv$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item&* TO *datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX INSERT *hDlg, id&, item&, StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort all of the items, use LISTBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTBOX, CONTROL SET COLOR, CONTROL SET FONT

LISTBOX GET SELCOUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a LISTBOX control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg Handle of the dialog that owns the list box.

id& The control identifier assigned with CONTROL ADD LISTBOX.

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A

	expression passed as a parameter.
StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks

In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the %LBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTBOX GET TEXT *hDlg, id&* [,*item&*] TO *txtv$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv$*. With a multiple-selection listbox (%LBS_MULTIPLESEL or %LBS_EXTENDEDSEL style), the text of the first (base) selected item is assigned to *txtv$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item&* TO *datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX INSERT *hDlg, id&, item&, StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort all of the items, use LISTBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTBOX, CONTROL SET COLOR, CONTROL SET FONT

LISTBOX GET SELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a LISTBOX control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
```

```
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg Handle of the dialog that owns the list box.

id& The control identifier assigned with CONTROL ADD LISTBOX.

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the %LBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg*, *id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv$*. With a multiple-selection listbox (%LBS_MULTIPLESEL or %LBS_EXTENDEDSEL style), the text of the first (base) selected item is assigned to *txtv$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort all of the items, use LISTBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg*, *id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTBOX, CONTROL SET COLOR, CONTROL SET FONT

LISTBOX GET STATE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a LISTBOX control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
```

```
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg Handle of the dialog that owns the list box.

id& The control identifier assigned with CONTROL ADD LISTBOX.

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the %LBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg*, *id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv$*. With a multiple-selection listbox (%LBS_MULTIPLESEL or %LBS_EXTENDEDSEL style), the text of the first (base) selected item is assigned to *txtv$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort all of the items, use LISTBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTBOX, CONTROL SET COLOR, CONTROL SET FONT

LISTBOX GET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a LISTBOX control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg Handle of the dialog that owns the list box.

id& The control identifier assigned with CONTROL ADD LISTBOX.

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the %LBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive.

Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTBOX GET TEXT *hDlg, id&* [,*item&*] TO *txtv$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv$*. With a multiple-selection listbox (%LBS_MULTIPLESEL or %LBS_EXTENDEDSEL style), the text of the first (base) selected item is assigned to *txtv$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item&* TO *datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort all of the items, use LISTBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg*, *id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg*, *id&*, *item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg*, *id&*, *item&*, *StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg*, *id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTBOX, CONTROL SET COLOR, CONTROL SET FONT

LISTBOX GET USER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a LISTBOX control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg Handle of the dialog that owns the list box.

id& The control identifier assigned with CONTROL ADD LISTBOX.

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the %LBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg*, *id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv$*. With a multiple-selection listbox (%LBS_MULTIPLESEL or %LBS_EXTENDEDSEL style), the text of the first (base) selected item is assigned to *txtv$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item&* TO *datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX INSERT *hDlg, id&, item&, StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort all of the items, use LISTBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of

	Windows, the actual string data contained by the list box is limited only by available memory.
See also	Dynamic Dialog Tools, CONTROL ADD LISTBOX, CONTROL SET COLOR, CONTROL SET FONT

LISTBOX INSERT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a LISTBOX control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg	Handle of the dialog that owns the list box.
id&	The control identifier assigned with CONTROL ADD LISTBOX.
item&	Position of data in the LISTBOX. First string=1, second=2...
NumExpr	A expression passed as a parameter.
StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the %LBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg*, *id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv$*. With a multiple-selection listbox (%LBS_MULTIPLESEL or %LBS_EXTENDEDSEL style), the text of the first (base) selected item is assigned to *txtv$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort all of the items, use LISTBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg*, *id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg*, *id&*, *item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg*, *id&*, *item&*, *StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET

USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg*, *id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTBOX, CONTROL SET COLOR, CONTROL SET FONT

LISTBOX RESET statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a LISTBOX control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg Handle of the dialog that owns the list box.

id& The control identifier assigned with CONTROL ADD LISTBOX.

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the %LBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg*, *id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv$*. With a multiple-selection listbox (%LBS_MULTIPLESEL or %LBS_EXTENDEDSEL style), the text of the first (base) selected item is assigned to *txtv$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort all of the items, use LISTBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg*, *id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg*, *id&*, *item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg*, *id&*, *item&*, *StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTBOX, CONTROL SET COLOR, CONTROL SET FONT

LISTBOX SELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a LISTBOX control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg Handle of the dialog that owns the list box.

id& The control identifier assigned with CONTROL ADD LISTBOX.

item&	Position of data in the LISTBOX. First string=1, second=2...
NumExpr	A expression passed as a parameter.
StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks

In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the %LBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg*, *id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv$*. With a multiple-selection listbox (%LBS_MULTIPLESEL or %LBS_EXTENDEDSEL style), the text of the first (base) selected item is assigned to *txtv$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort all of the items, use LISTBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg*, *id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg*, *id&*, *item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTBOX, CONTROL SET COLOR, CONTROL SET FONT

LISTBOX SET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a LISTBOX control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
```

```
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg	Handle of the dialog that owns the list box.
id&	The control identifier assigned with CONTROL ADD LISTBOX.
item&	Position of data in the LISTBOX. First string=1, second=2...
NumExpr	A expression passed as a parameter.
StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks

In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg*, *id&*, *StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the %LBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg*, *id&*, *item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg*, *id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv$*. With a multiple-selection listbox (%LBS_MULTIPLESEL or %LBS_EXTENDEDSEL style), the text of the first (base) selected item is assigned to *txtv$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort all of the items, use LISTBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg, id&, item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg, id&, item&, StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg, id&, item&, NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTBOX, CONTROL SET COLOR, CONTROL SET FONT

LISTBOX SET USER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTBOX statement IMPROVED

Purpose Manipulate a LISTBOX control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg Handle of the dialog that owns the list box.

id& The control identifier assigned with CONTROL ADD LISTBOX.

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the %LBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire

LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg*, *id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg*, *id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg*, *id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg*, *id&*, *item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTBOX GET TEXT *hDlg*, *id&* [,*item&*] TO *txtv$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv$*. With a multiple-selection listbox (%LBS_MULTIPLESEL or %LBS_EXTENDEDSEL style), the text of the first (base) selected item is assigned to *txtv$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort all of the items, use LISTBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg*, *id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg*, *id&*, *item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg*, *id&*, *item&*, *StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg*, *id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTBOX, CONTROL SET COLOR, CONTROL SET FONT

LISTBOX UNSELECT statement

Keyword Template

Purpose

Syntax
Remarks
See also
Example

LISTBOX statement IMPROVED

Purpose Manipulate a LISTBOX control in order to set/retrieve data.

Syntax

```
LISTBOX ADD hDlg, id&, StrExpr [TO datav&]
LISTBOX DELETE hDlg, id&, item&
LISTBOX FIND hDlg, id&, item&, StrExpr TO datav&
LISTBOX FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTBOX GET COUNT hDlg, id& TO datav&
LISTBOX GET SELCOUNT hDlg, id& TO datav&
LISTBOX GET SELECT hDlg, id& [,item&] TO datav&
LISTBOX GET STATE hDlg, id&, item& TO datav&
LISTBOX GET TEXT hDlg, id& [,item&] TO txtv$
LISTBOX GET USER hDlg, id&, item& TO datav&
LISTBOX INSERT hDlg, id&, item&, StrExpr [TO datav&]
LISTBOX RESET hDlg, id&
LISTBOX SELECT hDlg, id&, item&
LISTBOX SET TEXT hDlg, id&, item&, StrExpr
LISTBOX SET USER hDlg, id&, item&, NumExpr
LISTBOX UNSELECT hDlg, id& [,item&]
```

hDlg Handle of the dialog that owns the list box.

id& The control identifier assigned with CONTROL ADD LISTBOX.

item& Position of data in the LISTBOX. First string=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks In each of the following samples and descriptions, the LISTBOX control which is the subject of the statement is identified by the handle of the dialog that owns the LISTBOX (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD LISTBOX.

The value *item&* refers to the position of the string data item in the LISTBOX, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

LISTBOX ADD *hDlg, id&, StrExpr* [TO *datav&*]

The string value specified by *StrExpr* is added to the LISTBOX control. If the LISTBOX has the %LBS_SORT style, the new string is inserted in alphanumeric order; otherwise it is added to the end of the existing list. If the optional TO clause is included, the index position of the added string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was added.

LISTBOX DELETE *hDlg, id&, item&*

The string at the position specified by *item&* is deleted from the LISTBOX. The parameter *item&* is indexed to one (1 for the first string, 2 for the second, and so on).

LISTBOX FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the LISTBOX are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTBOX. Searching does not wrap to the beginning of the list. The item number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTBOX starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTBOX GET COUNT *hDlg, id&* TO *datav&*

The number of items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELCOUNT *hDlg, id&* TO *datav&*

The number of selected items in the LISTBOX is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTBOX GET SELECT *hDlg, id&* [,*item&*] TO *datav&*

The LISTBOX is searched to find the first selected item. If the *item&* parameter is included, searching starts at that position to facilitate retrieving multiple selected items. If *item&* is omitted, the search starts at the first data item. The index number of the selected item is assigned to the variable designated by *datav&*. If no item is selected, the value zero (0) is assigned to it.

LISTBOX GET STATE *hDlg, id&, item&* TO *datav&*

A data item is checked to see if it is currently selected. The numeric value *item&* specifies which user value is to be checked, 1 for the first item, 2 for the second item, etc. If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTBOX GET TEXT *hDlg, id&* [,*item&*] TO *txtv$*

Text is retrieved from the LISTBOX and assigned to the string variable specified by *txtv$*. If the numeric expression *item&* is included, it determines which text string is returned, 1 for the first item, 2 for the second item, etc.

The parameter *item&* may be omitted, or contain the value zero (0). In the case of a single-selection listbox, the current selected text (if any) is retrieved and assigned to *txtv$*. With a multiple-selection listbox (%LBS_MULTIPLESEL or %LBS_EXTENDEDSEL style), the text of the first (base) selected item is assigned to *txtv$*. To retrieve additional selected text items from a multiple-selection listbox, use LISTBOX GET SELECT to retrieve selected item numbers. Then apply the item numbers with LISTBOX GET TEXT to retrieve the string data.

LISTBOX GET USER *hDlg, id&, item&* TO *datav&*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first item, 2 for the second item, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTBOX user values are assigned with the LISTBOX SET USER statement. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX INSERT *hDlg*, *id&*, *item&*, *StrExpr* [TO *datav&*]

The text for a new data item, specified by *StrExpr*, is inserted at the location given by *item&*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort all of the items, use LISTBOX ADD instead. If the optional TO clause is included, the index position of the inserted string is assigned to the variable represented by *datav&*. The index is one for the first string, two for the second, etc. If the index is less than one, an error occurred and no string was inserted.

LISTBOX RESET *hDlg, id&*

Delete all contents of the specified LISTBOX.

LISTBOX SELECT *hDlg*, *id&*, *item&*

The string data item specified by *item&* is chosen as selected text for the LISTBOX control, and the selected text is scrolled into a visible position. The value of *item&* = 1 for the first item, 2 for the second item, etc. If the value of *item&* = 0 with a multiple selection listbox, then all string data items are selected. LISTBOX SELECT may be used with both single and multiple selection listboxes.

LISTBOX SET TEXT *hDlg*, *id&*, *item&*, *StrExpr*

The text for the data item specified by *item&* is replaced with the new text in *StrExpr*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The list of data items is not re-sorted, even if the LISTBOX was created with the style %LBS_SORT. If you wish to sort the items, use LISTBOX DELETE followed by LISTBOX ADD instead.

LISTBOX SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each item in a LISTBOX may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTBOX SET USER, and retrieved with LISTBOX GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTBOX user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTBOX UNSELECT *hDlg, id&* [,*item&*]

The string value specified by *item&* is set to an unselected state for the LISTBOX control. The value of *item&* = 1 for the first item, 2 for the second item, etc. If *item&* is missing, or has the value zero, all items are set to an unselected state. LISTBOX UNSELECT may be used with both single and multiple selection listboxes.

Restrictions Under Windows 95/98/ME, a list box is limited to 32,767 items. In all versions of Windows, the actual string data contained by the list box is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTBOX, CONTROL SET COLOR, CONTROL

SET FONT

LISTVIEW DELETE COLUMN statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg	Handle of the dialog that owns the ListView.
hLst	Handle of the ImageList to be used for graphical items.
hLV	Handle of the ListView Control.
id&	The control identifier assigned with CONTROL ADD LISTVIEW.

item&	A data item number. First=1, second=2...
col&	A vertical column number. First=1, second=2...
NumExpr	A expression passed as a parameter.
StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks

There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0	Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 1	Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 2	Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 3	List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either

dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker

%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView

control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW DELETE ITEM statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
```

LISTVIEW SET COLUMN ***hDlg, id&, col&, NumExpr***
LISTVIEW SET HEADER ***hDlg, id&, col&, StrExpr***
LISTVIEW SET IMAGE ***hDlg, id&, item&, NumExpr***
LISTVIEW SET IMAGE2 ***hDlg, id&, item&, NumExpr***
LISTVIEW SET IMAGELIST ***hDlg, id&, hLst, NumExpr***
LISTVIEW SET MODE ***hDlg, id&, NumExpr***
LISTVIEW SET OVERLAY ***hDlg, id&, item&, NumExpr***
LISTVIEW SET STYLEXX ***hDlg, id&, NumExpr***
LISTVIEW SET TEXT ***hDlg, id&, item&, col&, StrExpr***
LISTVIEW SET USER ***hDlg, id&, item&, NumExpr***
LISTVIEW SORT ***hDlg, id&, col&* [, *options*...]**
LISTVIEW UNSELECT ***hDlg, id&, item&*, [*col&*]**
LISTVIEW VISIBLE ***hDlg, id&, item&***

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the

unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number

(1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&*

specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
% LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode

% LVS_EX_ONECLICKACTIVATE	Notification sent on single click
% LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format:

	, , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW FIND statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
```

LISTVIEW GET COLUMN ***hDlg, id&, col&*** **TO** ***datav&***
LISTVIEW GET COUNT ***hDlg, id&*** **TO** ***datav&***
LISTVIEW GET HEADER ***hDlg, id&, col&*** **TO** ***txtv$***
LISTVIEW GET HEADERID ***hDlg, id&*** **TO** ***hLV, idv&***
LISTVIEW GET MODE ***hDlg, id&*** **TO** ***datav&***
LISTVIEW GET SELCOUNT ***hDlg, id&*** **TO** ***datav&***
LISTVIEW GET SELECT ***hDlg, id&*** **[,** ***item&*****] TO** ***datav&***
LISTVIEW GET STATE ***hDlg, id&, item&, col&*** **TO** ***datav&***
LISTVIEW GET STYLEXX ***hDlg, id&*** **TO** ***datav&***
LISTVIEW GET TEXT ***hDlg, id&, item&, col&*** **TO** ***txtv$***
LISTVIEW GET USER ***hDlg, id&, item&*** **TO** ***datav&***
LISTVIEW INSERT COLUMN ***hDlg, id&, col&, StrExpr, ColWidth&, format&***
LISTVIEW INSERT ITEM ***hDlg, id&, item&, image&, StrExpr***
LISTVIEW RESET ***hDlg, id&***
LISTVIEW SELECT ***hDlg, id&, item&*** **[,** ***col&*****]**
LISTVIEW SET COLUMN ***hDlg, id&, col&, NumExpr***
LISTVIEW SET HEADER ***hDlg, id&, col&, StrExpr***
LISTVIEW SET IMAGE ***hDlg, id&, item&, NumExpr***
LISTVIEW SET IMAGE2 ***hDlg, id&, item&, NumExpr***
LISTVIEW SET IMAGELIST ***hDlg, id&, hLst, NumExpr***
LISTVIEW SET MODE ***hDlg, id&, NumExpr***
LISTVIEW SET OVERLAY ***hDlg, id&, item&, NumExpr***
LISTVIEW SET STYLEXX ***hDlg, id&, NumExpr***
LISTVIEW SET TEXT ***hDlg, id&, item&, col&, StrExpr***
LISTVIEW SET USER ***hDlg, id&, item&, NumExpr***
LISTVIEW SORT ***hDlg, id&, col&*** **[,** ***options...*****]**
LISTVIEW UNSELECT ***hDlg, id&, item&,*** **[*****col&*****]**
LISTVIEW VISIBLE ***hDlg, id&, item&***

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon

IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is

assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for

the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg*, *id&*, *NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg*, *id&*, *item&*, *col&*, *StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe

the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW FIND EXACT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg	Handle of the dialog that owns the ListView.
hLst	Handle of the ImageList to be used for graphical items.
hLV	Handle of the ListView Control.
id&	The control identifier assigned with CONTROL ADD LISTVIEW.
item&	A data item number. First=1, second=2...
col&	A vertical column number. First=1, second=2...
NumExpr	A expression passed as a parameter.
StrExpr	A string expression passed as a parameter.
txtv$	A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of

the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are

currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted

from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use

LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW FIT CONTENT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
```

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]
LISTVIEW UNSELECT *hDlg*, *id&*, *item&*, [*col&*]
LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary

image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg*, *id&*, *hLst*, *NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg*, *id&*, *NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg*, *id&*, *item&*, *NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg*, *id&*, *NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text

%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg*, *id&*, *item&*, *col&*, *StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW FIT HEADER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
```

```
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg	Handle of the dialog that owns the ListView.
hLst	Handle of the ImageList to be used for graphical items.
hLV	Handle of the ListView Control.
id&	The control identifier assigned with CONTROL ADD LISTVIEW.
item&	A data item number. First=1, second=2...
col&	A vertical column number. First=1, second=2...
NumExpr	A expression passed as a parameter.
StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks

There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 — Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 — Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 — Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 — List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data

item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection

%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col&* [, *options...*]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string

NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW GET COLUMN statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
```

```
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg	Handle of the dialog that owns the ListView.
hLst	Handle of the ImageList to be used for graphical items.
hLV	Handle of the ListView Control.
id&	The control identifier assigned with CONTROL ADD LISTVIEW.
item&	A data item number. First=1, second=2...
col&	A vertical column number. First=1, second=2...
NumExpr	A expression passed as a parameter.
StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks

There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0	Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 1	Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in

each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2	Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 3	List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is

found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg*, *id&*, *item&* [, *col&*]

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg*, *id&*, *col&*, *NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg*, *id&*, *col&*, *StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg*, *id&*, *item&*, *NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg*, *id&*, *item&*, *NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg*, *id&*, *hLst*, *NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg*, *id&*, *NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg*, *id&*, *item&*, *NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW GET COUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks

There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0	Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 1	Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 2	Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 3	List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins

with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id&* TO *hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not

a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons

%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the

optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW GET HEADER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
```

LISTVIEW SET STYLEXX ***hDlg, id&, NumExpr***
LISTVIEW SET TEXT ***hDlg, id&, item&, col&, StrExpr***
LISTVIEW SET USER ***hDlg, id&, item&, NumExpr***
LISTVIEW SORT ***hDlg, id&, col&*** **[,** ***options*****...]**
LISTVIEW UNSELECT ***hDlg, id&, item&,*** **[*****col&*****]**
LISTVIEW VISIBLE ***hDlg, id&, item&***

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column

numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable

specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text

%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg*, *id&*, *item&*, *col&*, *StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and

	delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW GET HEADERID statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
```

```
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one

item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*)

is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This

special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg*, *id&*, *item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg*, *id&*, *col&*, *NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If

NumExpr is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.

UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW GET MODE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to

multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1	Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 2	Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 3	List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which

exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id&* TO *hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to

facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
% LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
% LVS_EX_ONECLICKACTIVATE	Notification sent on single click
% LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user

value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools], [CONTROL ADD LISTVIEW], [CONTROL SET COLOR], [CONTROL SET FONT], [HEADER], [IMAGELIST]

LISTVIEW GET SELCOUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

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LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
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hLst Handle of the ImageList to be used for graphical items.

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item& A data item number. First=1, second=2...

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expression passed as a parameter.

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datav& A long integer variable to which result data is assigned.

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Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either

dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker

%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView

control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW GET SELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
```

```
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the

unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number

(1=first, 2=second, etc.).

<u>LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*</u>

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

<u>LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*</u>

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

<u>LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*</u>

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

<u>LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*</u>

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

<u>LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*</u>

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

<u>LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*</u>

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

<u>LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*</u>

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

<u>LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*</u>

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

<u>LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*</u>

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg*, *id&*, *item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg*, *id&*, *col&*, *NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg*, *id&*, *col&*, *StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&*

specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
% LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode

%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg*, *id&*, *item&*, *col&*, *StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format:

	, , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW GET STATE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
```

```
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon

IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is

assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for

the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg*, *id&*, *NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg*, *id&*, *item&*, *col&*, *StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe

the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the [ASCII](#) value of each byte, so that case is significant. Comparison is limited to the first 255 [bytes](#) of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools](#), [CONTROL ADD LISTVIEW](#), [CONTROL SET COLOR](#), [CONTROL SET FONT](#), [HEADER](#), [IMAGELIST](#)

LISTVIEW GET STYLEXX statement

Keyword Template

Purpose

Syntax
Remarks
See also
Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0	Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 1	Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 2	Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 3	List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of

the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id&* TO *hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are

currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted

from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use

LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW GET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
```

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]
LISTVIEW UNSELECT *hDlg*, *id&*, *item&*, [*col&*]
LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary

image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text

%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW GET USER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
```

```
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg	Handle of the dialog that owns the ListView.
hLst	Handle of the ImageList to be used for graphical items.
hLV	Handle of the ListView Control.
id&	The control identifier assigned with CONTROL ADD LISTVIEW.
item&	A data item number. First=1, second=2...
col&	A vertical column number. First=1, second=2...
NumExpr	A expression passed as a parameter.
StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0	Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 1	Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 2	Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 3	List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data

item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg*, *id&*, *item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg*, *id&*, *col&*, *NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection

%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col&* [, *options...*]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string

NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW INSERT COLUMN statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
```

```
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg — Handle of the dialog that owns the ListView.

hLst — Handle of the ImageList to be used for graphical items.

hLV — Handle of the ListView Control.

id& — The control identifier assigned with CONTROL ADD LISTVIEW.

item& — A data item number. First=1, second=2...

col& — A vertical column number. First=1, second=2...

NumExpr — A

expression passed as a parameter.

StrExpr — A string expression passed as a parameter.

txtv$ — A

variable to which result text is assigned.

datav& — A long integer variable to which result data is assigned.

Remarks — There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

- Mode 0 — Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
- Mode 1 — Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in

each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is

found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id&* TO *hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg*, *id&*, *item&* [, *col&*]

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg*, *id&*, *col&*, *NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg*, *id&*, *col&*, *StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg*, *id&*, *item&*, *NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg*, *id&*, *item&*, *NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg*, *id&*, *hLst*, *NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg*, *id&*, *NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg*, *id&*, *item&*, *NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg*, *id&*, *NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg*, *id&*, *item&*, *col&*, *StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW INSERT ITEM statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks

There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0	Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 1	Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 2	Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 3	List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins

with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id&* TO *hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not

a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg*, *id&*, *item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg*, *id&*, *col&*, *NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg*, *id&*, *col&*, *StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg*, *id&*, *item&*, *NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg*, *id&*, *item&*, *NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg*, *id&*, *hLst*, *NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons

%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the

optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW RESET statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

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LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
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LISTVIEW SET STYLEXX ***hDlg, id&, NumExpr***
LISTVIEW SET TEXT ***hDlg, id&, item&, col&, StrExpr***
LISTVIEW SET USER ***hDlg, id&, item&, NumExpr***
LISTVIEW SORT ***hDlg, id&, col&*** **[,** ***options...*****]**
LISTVIEW UNSELECT ***hDlg, id&, item&,*** **[*****col&*****]**
LISTVIEW VISIBLE ***hDlg, id&, item&***

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column

numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable

specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.
NumExpr defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text

%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg*, *id&*, *item&*, *col&*, *StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and

	delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW SELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

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Syntax

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LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
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LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
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hDlg	Handle of the dialog that owns the ListView.
hLst	Handle of the ImageList to be used for graphical items.
hLV	Handle of the ListView Control.
id&	The control identifier assigned with CONTROL ADD LISTVIEW.
item&	A data item number. First=1, second=2...
col&	A vertical column number. First=1, second=2...
NumExpr	A expression passed as a parameter.
StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks

There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0	Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 1	Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 2	Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 3	List Mode - String data items are displayed as a list, top to bottom, one

item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*)

is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This

special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg*, *id&*, *item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg*, *id&*, *col&*, *NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If

NumExpr is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.

UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW SET COLUMN statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to

multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1	Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 2	Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 3	List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which

exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to

facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user

value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also [Dynamic Dialog Tools], [CONTROL ADD LISTVIEW], [CONTROL SET COLOR], [CONTROL SET FONT], [HEADER], [IMAGELIST]

LISTVIEW SET HEADER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id&	The control identifier assigned with CONTROL ADD LISTVIEW.
item&	A data item number. First=1, second=2...
col&	A vertical column number. First=1, second=2...
NumExpr	A expression passed as a parameter.
StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks

There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either

dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg*, *id&*, *hLst*, *NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg*, *id&*, *NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg*, *id&*, *item&*, *NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg*, *id&*, *NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker

%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView

control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW SET IMAGE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
```

```
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the

unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number

(1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&*

specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
% LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode

% LVS_EX_ONECLICKACTIVATE	Notification sent on single click
% LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg*, *id&*, *item&*, *col&*, *StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format:

	, , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW SET IMAGE2 statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
```

```
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon

IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is

assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg, id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg, id&, item&, col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg, id&, item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for

the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg*, *id&*, *NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg*, *id&*, *item&*, *col&*, *StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe

the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW SET IMAGELIST statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg	Handle of the dialog that owns the ListView.
hLst	Handle of the ImageList to be used for graphical items.
hLV	Handle of the ListView Control.
id&	The control identifier assigned with CONTROL ADD LISTVIEW.
item&	A data item number. First=1, second=2...
col&	A vertical column number. First=1, second=2...
NumExpr	A expression passed as a parameter.
StrExpr	A string expression passed as a parameter.
txtv$	A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of

the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id&* TO *hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are

currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted

from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use

LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW SET MODE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
```

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]
LISTVIEW UNSELECT *hDlg*, *id&*, *item&*, [*col&*]
LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

hDlg	Handle of the dialog that owns the ListView.
hLst	Handle of the ImageList to be used for graphical items.
hLV	Handle of the ListView Control.
id&	The control identifier assigned with CONTROL ADD LISTVIEW.
item&	A data item number. First=1, second=2...
col&	A vertical column number. First=1, second=2...
NumExpr	A expression passed as a parameter.
StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks

There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0	Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 1	Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 2	Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 3	List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg*, *id&*, *item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg*, *id&*, *col&*, *NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg*, *id&*, *col&*, *StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg*, *id&*, *item&*, *NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg*, *id&*, *item&*, *NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary

image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg*, *id&*, *hLst*, *NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg*, *id&*, *NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg*, *id&*, *item&*, *NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg*, *id&*, *NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text

%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg*, *id&*, *item&*, *col&*, *StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

YYYYDDMM — A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW SET OVERLAY statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
```

```
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg	Handle of the dialog that owns the ListView.
hLst	Handle of the ImageList to be used for graphical items.
hLV	Handle of the ListView Control.
id&	The control identifier assigned with CONTROL ADD LISTVIEW.
item&	A data item number. First=1, second=2...
col&	A vertical column number. First=1, second=2...
NumExpr	A expression passed as a parameter.
StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks

There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0	Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 1	Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 2	Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 3	List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data

item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg*, *id&*, *item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg*, *id&*, *col&*, *NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection

%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg*, *id&*, *item&*, *col&*, *StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string

NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW SET STYLEXX statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
```

```
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in

each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is

found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item& [, col&]*

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg*, *id&*, *NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg*, *id&*, *item&*, *col&*, *StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW SET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

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Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

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LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg	Handle of the dialog that owns the ListView.
hLst	Handle of the ImageList to be used for graphical items.
hLV	Handle of the ListView Control.
id&	The control identifier assigned with CONTROL ADD LISTVIEW.
item&	A data item number. First=1, second=2...
col&	A vertical column number. First=1, second=2...
NumExpr	A expression passed as a parameter.

StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks

There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0	Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 1	Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 2	Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 3	List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg, id&, col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg, id&, item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins

with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id&* TO *hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not

a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg*, *id&*, *item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg*, *id&*, *col&*, *NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg*, *id&*, *col&*, *StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg*, *id&*, *item&*, *NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg*, *id&*, *item&*, *NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg*, *id&*, *hLst*, *NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons

%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the

optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW SET USER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
```

```
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg	Handle of the dialog that owns the ListView.
hLst	Handle of the ImageList to be used for graphical items.
hLV	Handle of the ListView Control.
id&	The control identifier assigned with CONTROL ADD LISTVIEW.
item&	A data item number. First=1, second=2...
col&	A vertical column number. First=1, second=2...
NumExpr	A expression passed as a parameter.
StrExpr	A string expression passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A long integer variable to which result data is assigned.

Remarks

There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0	Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 1	Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 2	Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 3	List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column

numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable

specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg, id&, col&, StrExpr, ColWidth&, format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&/col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&/col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text

%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg*, *id&*, *item&*, *col&*, *StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg*, *id&*, *item&*, *NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and

	delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg, id&, item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg, id&, item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW SORT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
```

```
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one

item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg*, *id&*, *col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*)

is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg*, *id&*, *col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg*, *id&*, *col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg*, *id&* TO *hLV*, *idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This

special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg*, *id&*, *item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg*, *id&*, *col&*, *NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If

NumExpr is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg, id&, hLst, NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg, id&, NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col&* [, *options...*]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.

UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW UNSELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id& The control identifier assigned with CONTROL ADD LISTVIEW.

item& A data item number. First=1, second=2...

col& A vertical column number. First=1, second=2...

NumExpr A

expression passed as a parameter.

StrExpr A string expression passed as a parameter.

txtv$ A

variable to which result text is assigned.

datav& A long integer variable to which result data is assigned.

Remarks There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control style parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to

	multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 1	Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with header text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 2	Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.
Mode 3	List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard LISTBOX control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg*, *id&*, *item&*, *StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which

exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id&* TO *hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg, id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg, id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg, id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to

facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg*, *id&*, *item&*, *image&*, *StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg*, *id&*, *item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg*, *id&*, *col&*, *NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg*, *id&*, *col&*, *StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg*, *id&*, *item&*, *NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg*, *id&*, *item&*, *NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg*, *id&*, *hLst*, *NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg*, *id&*, *NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg, id&, item&, NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg, id&, NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker
%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user

value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg*, *id&*, *col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LISTVIEW VISIBLE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

LISTVIEW statement IMPROVED

Purpose Manipulate a LISTVIEW control in order to set/retrieve data.

Syntax

```
LISTVIEW DELETE COLUMN hDlg, id&, col&
LISTVIEW DELETE ITEM hDlg, id&, item&
LISTVIEW FIND hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIND EXACT hDlg, id&, item&, StrExpr TO datav&
LISTVIEW FIT CONTENT hDlg, id&, col&
LISTVIEW FIT HEADER hDlg, id&, col&
LISTVIEW GET COLUMN hDlg, id&, col& TO datav&
LISTVIEW GET COUNT hDlg, id& TO datav&
LISTVIEW GET HEADER hDlg, id&, col& TO txtv$
LISTVIEW GET HEADERID hDlg, id& TO hLV, idv&
LISTVIEW GET MODE hDlg, id& TO datav&
LISTVIEW GET SELCOUNT hDlg, id& TO datav&
LISTVIEW GET SELECT hDlg, id& [, item&] TO datav&
LISTVIEW GET STATE hDlg, id&, item&, col& TO datav&
LISTVIEW GET STYLEXX hDlg, id& TO datav&
LISTVIEW GET TEXT hDlg, id&, item&, col& TO txtv$
LISTVIEW GET USER hDlg, id&, item& TO datav&
LISTVIEW INSERT COLUMN hDlg, id&, col&, StrExpr, ColWidth&, format&
LISTVIEW INSERT ITEM hDlg, id&, item&, image&, StrExpr
LISTVIEW RESET hDlg, id&
LISTVIEW SELECT hDlg, id&, item& [, col&]
LISTVIEW SET COLUMN hDlg, id&, col&, NumExpr
LISTVIEW SET HEADER hDlg, id&, col&, StrExpr
LISTVIEW SET IMAGE hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGE2 hDlg, id&, item&, NumExpr
LISTVIEW SET IMAGELIST hDlg, id&, hLst, NumExpr
LISTVIEW SET MODE hDlg, id&, NumExpr
LISTVIEW SET OVERLAY hDlg, id&, item&, NumExpr
LISTVIEW SET STYLEXX hDlg, id&, NumExpr
LISTVIEW SET TEXT hDlg, id&, item&, col&, StrExpr
LISTVIEW SET USER hDlg, id&, item&, NumExpr
LISTVIEW SORT hDlg, id&, col& [, options...]
LISTVIEW UNSELECT hDlg, id&, item&, [col&]
LISTVIEW VISIBLE hDlg, id&, item&
```

hDlg Handle of the dialog that owns the ListView.

hLst Handle of the ImageList to be used for graphical items.

hLV Handle of the ListView Control.

id&	The [control identifier]() assigned with [CONTROL ADD LISTVIEW]().
item&	A data item number. First=1, second=2...
col&	A vertical column number. First=1, second=2...
NumExpr	A expression passed as a parameter.
StrExpr	A [string expression]() passed as a parameter.
txtv$	A variable to which result text is assigned.
datav&	A [long integer]() variable to which result data is assigned.

Remarks

There are 4 general display modes available with a LISTVIEW control. The initial display mode is established at the time the control is created, as a part of the control [style]() parameter. It may be changed from time to time with LISTVIEW SET MODE.

Mode 0 Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 1 Report Mode - String data items are displayed as a list, top to bottom, one item per line. The control may have one or more columns, with [header]() text to describe each of them. Additional sub-items may be displayed in each column, by specifying a column number greater than one. This is the most frequently used ListView mode, and the default mode if not specified at the time the control is created. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 2 Small Icon Mode - String data items are displayed left to right, wrapped to multiple lines as necessary. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

Mode 3 List Mode - String data items are displayed as a list, top to bottom, one item per line. This mode is very similar in appearance to a standard [LISTBOX]() control. In this mode, it's often convenient to think of the item number as a row number. If a small icon IMAGELIST is attached to the LISTVIEW control, images from that list are displayed with each data item.

In all of the following descriptions, the LISTVIEW control which is the subject of the statement is identified by the handle of the dialog that owns the LISTVIEW (*hDlg*), and the unique control identifier (*id&*) you gave it upon creation in CONTROL ADD LISTVIEW.

Each data item (or sub-item) is referenced by a combination of its item number (*item&*) and its column number (*col&*). A primary data item always has a column number of 1, while sub-items always have a column number greater than 1. Sub-items are only displayed in Report Mode. In all other display modes, they are hidden from view.

It's important to note that both primary item numbers (*item&*) and sub-item column numbers (*col&*) start at 1. The first=1, the second=2, and so forth.

LISTVIEW DELETE COLUMN *hDlg*, *id&*, *col&*

The column specified by *col&*, including its associated header text (if any), is deleted from the LISTVIEW control. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). Column one of a list-view control cannot be deleted. If you must delete column one, insert a zero length dummy column one and delete column two and above. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW DELETE ITEM *hDlg*, *id&*, *item&*

The data item specified by *item&* is deleted from the LISTVIEW control. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIND *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which begins with the data in *StrExpr*, regardless of any characters which follow. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIND EXACT *hDlg, id&, item&, StrExpr* TO *datav&*

Strings in the first column of a LISTVIEW are searched to find the first string which exactly matches the data in *StrExpr*. Comparisons are not case-sensitive. Strings are searched beginning with the string specified by *item&*, and ending with the last string in the LISTVIEW. Searching does not wrap to the beginning of the list. The row number (*item&*) is indexed to 1 (1=first, 2=second, etc.). To search the entire LISTVIEW starting with the first string, *item&* should be set to one (1). If a matching string is found, the index value of the match is assigned to the variable specified by *datav&*. If no match is found, the value zero (0) is assigned to it.

LISTVIEW FIT CONTENT *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the data items displayed in that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.).

LISTVIEW FIT HEADER *hDlg, id&, col&*

The width of the column specified by *col&* is adjusted to fit the width of the rows displayed in that column, and the header text at the top of that column. The column number (*col&*) is indexed to 1 (1=first, 2=second, etc.). If the specified column is the last column, its width is set to fill the remaining width of the list-view control.

LISTVIEW GET COLUMN *hDlg, id&, col&* TO *datav&*

The width of the designated column is retrieved from the ListView and assigned to the variable specified by *datav&*. The width is specified in either pixels or dialog units, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of rows in the LISTVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

LISTVIEW GET HEADER *hDlg, id&, col&* TO *txtv$*

Column header text is retrieved from the LISTVIEW and assigned to the string variable specified by *txtv$*. The value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW GET HEADERID *hDlg, id&* TO *hLV, idv&*

The handle of the LISTVIEW control and the ID of HEADER control (a child of the LISTVIEW) are retrieved and assigned to the variables represented by *hLV* and *idv&* respectively. These two items may then be used with the HEADER statement for advanced handling of the header control which is embedded in the LISTVIEW.

LISTVIEW GET MODE *hDlg*, *id&* TO *datav&*

The display mode of the specified LISTVIEW control is retrieved and assigned to the variable designated by *datav&*. Possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW GET SELCOUNT *hDlg*, *id&* TO *datav&*

The LISTVIEW is interrogated to determine the number of primary data items which are currently selected. This count is assigned to the long integer variable specified by *datav&*. To determine the count of sub-items selections, you must execute LISTVIEW GET STATE on every active sub-item.

LISTVIEW GET SELECT *hDlg*, *id&* [, *item&*] TO *datav&*

The LISTVIEW is interrogated to determine the next primary data item which is currently selected. The parameter *item&* specifies the starting item number for the search, to facilitate retrieving multiple selected items. To start at the beginning, use an *item&* of one (1), or just omit that parameter. The selected item number is assigned to the long integer variable specified by *datav&*. If no selected items are found, the value zero (0) is returned. To find selected sub-items, you must execute LISTVIEW GET STATE on remaining active sub-items.

LISTVIEW GET STATE *hDlg*, *id&*, *item&*, *col&* TO *datav&*

A data item is tested to see if it is currently selected. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.). If the item is selected, -1 (true) is assigned to the variable specified by *datav&*. Otherwise, 0 (false) is assigned to it.

LISTVIEW GET STYLEXX *hDlg*, *id&* TO *datav&*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement retrieves the current setting of this special extended style, and assigns it to the long integer variable specified by *datav&*. A list of the available extended styles can be found under LISTVIEW SET STYLEXXX. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW.

LISTVIEW GET TEXT *hDlg*, *id&*, *item&*, *col&* TO *txtv$*

A string data item is retrieved from the LISTVIEW control and assigned to the string variable specified by *txtv$*. The values of *item&*/*col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW GET USER *hDlg*, *id&*, *item&* TO *datav&*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is requested, 1 for the first row, 2 for the second row, etc. The returned user value is assigned to the long integer variable specified by *datav&*. LISTVIEW user values are assigned with the LISTVIEW SET USER statement. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW INSERT COLUMN *hDlg*, *id&*, *col&*, *StrExpr*, *ColWidth&*, *format&*

A new vertical column is defined for Report Mode of this LISTVIEW control. The value *col&* specifies the column number (1=first, 2=second, etc.). *StrExpr* describes the text name of the column header. The value *ColWidth&* specifies the width of the column in either

dialog units or pixels, depending upon which was specified at creation. The value *format&* describes the format and justification of the text: 0=left, 1=right, 2=center. Column 1 is always left-justified, regardless of what is requested here. When inserting a new column 1, the contents of the original column 1 are copied to the new column 1. This only occurs when inserting a new left most column, when inserting other columns, no data is copied to the new column. This is a limitation of the Microsoft Windows Listview control and not a PowerBASIC limitation.

LISTVIEW INSERT ITEM *hDlg, id&, item&, image&, StrExpr*

A new row is added to this LISTVIEW control. The value *item&* specifies the row number (1=first, 2=second, etc.), and *StrExpr* tells the text to be displayed in the first column. The remaining columns are empty, but you can fill them by executing LISTVIEW SET TEXT. If an IMAGELIST has been attached to this control, the parameter *image&* specifies which image should be displayed (1=first, 2=second, etc.). If no image is needed, the value 0 should be used.

LISTVIEW RESET *hDlg, id&*

All data items are deleted from the specified LISTVIEW control. Any columns, and their associated headers, which may have been defined for Report Display mode are retained without change.

LISTVIEW SELECT *hDlg, id&, item&* [, *col&*]

The string data item specified by *item&*/*col&* is chosen as selected text for the LISTVIEW control and the item is highlighted. The values of *item&*/*col&* = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to select the primary data item.

LISTVIEW SET COLUMN *hDlg, id&, col&, NumExpr*

The width of a LISTVIEW column is changed to that designated by the *NumExpr*. The value is specified in either dialog units or pixels, depending upon which was used at creation. The value *col&* specifies the column number (1=first, 2=second, etc.). If *NumExpr* is -1, then the column width is adjusted to fit the data items in that column. If *NumExpr* is -2, the column width is adjusted to fit both the data items and the header text. These options are functionally identical to LISTVIEW FIT CONTENT and LISTVIEW FIT HEADER.

LISTVIEW SET HEADER *hDlg, id&, col&, StrExpr*

New column header text is displayed above the specified column on the LISTVIEW control. The string expression *StrExpr* specifies the new header text, while the value *col&* specifies the column number (1=first, 2=second, etc.).

LISTVIEW SET IMAGE *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed next to the item specified by *item&*. If no IMAGELIST is attached to the LISTVIEW, nothing is displayed.

LISTVIEW SET IMAGE2 *hDlg, id&, item&, NumExpr*

The image specified by *NumExpr* (1=first, 2=second, etc.) is displayed as a secondary "status" image next to the primary image. If *NumExpr* evaluates to zero, no secondary image is displayed. A secondary image is usually used to specify item status, with an image such as a check mark. Secondary images are generally not displayed in either of the icon modes. If no Status Image List is attached to the LISTVIEW (using the LISTVIEW IMAGELIST statement), nothing is displayed. A maximum of 15 status images are supported, so *NumExpr* must evaluate in the range of 1-15.

LISTVIEW SET IMAGELIST *hDlg*, *id&*, *hLst*, *NumExpr*

The IMAGELIST specified by *hLst* is attached to this LISTVIEW control. The value of *NumExpr* specifies the type of IMAGELIST:

%LVSIL_NORMAL	Large icons
%LVSIL_SMALL	Small icons
%LVSIL_STATE	Status images

Up to three IMAGELIST structures may be attached to each LISTVIEW to display images as needed with each data item. Depending upon the mode in effect, icons are extracted from either the large icon or small icon list for that purpose. If a status image list is also attached, the LISTVIEW SET IMAGE2 statement may be used to display a secondary image. When the LISTVIEW control is destroyed, any attached IMAGELIST is automatically destroyed unless the %LVS_SHAREIMAGELISTS style was specified at the time the LISTVIEW was created.

LISTVIEW SET MODE *hDlg*, *id&*, *NumrExpr*

The display mode of the specified LISTVIEW control is changed to that designated by the value of *NumExpr*. The possible mode values are 0=icon mode, 1=report mode, 2=small icon mode, 3=list mode.

LISTVIEW SET OVERLAY *hDlg*, *id&*, *item&*, *NumExpr*

The overlay image specified by *NumExpr* (1=first, 2=second, etc.) is displayed on top of the image specified by *item&*. If *NumExpr* evaluates to zero, or if no IMAGELIST is attached to the LISTVIEW, no overlay is displayed.

LISTVIEW SET STYLEXX *hDlg*, *id&*, *NumExpr*

ListView controls offer a number of optional additional style attributes which are unique and specific to a ListView. This statement allows you to alter the current setting of this special extended style. This special extended style is named STYLEXX to distinguish it from the primary style and extended style specified in CONTROL ADD LISTVIEW. *NumExpr* defines the new style from any combination of the following extended styles:

%LVS_EX_GRIDLINES	Grid lines added in report mode
%LVS_EX_SUBITEMIMAGES	Icons added to sub-items in report mode
%LVS_EX_CHECKBOXES	Enables checkboxes to items
%LVS_EX_TRACKSELECT	Enables hot track selection
%LVS_EX_HEADERDRAGDROP	Enables drag-drop reordering of columns in report mode
%LVS_EX_FULLROWSELECT	Selection highlights full row in report mode
%LVS_EX_ONECLICKACTIVATE	Notification sent on single click
%LVS_EX_TWOCLICKACTIVATE	Notification sent on double click
%LVS_EX_FLATSB	Enables flat scroll bars
%LVS_EX_REGIONAL	Sets ListView region to icons and text
%LVS_EX_INFOTIP	Listview does InfoTips for you
%LVS_EX_UNDERLINEHOT	Hot items have underlined text
%LVS_EX_UNDERLINECOLD	Non-hot items have underlined text
%LVS_EX_MULTIWORKAREAS	Will not auto-arrange until work areas defined
%LVS_EX_LABELTIP	Listview unfolds partly hidden labels
%LVS_EX_BORDERSELECT	Border selection style instead of highlight
%LVS_EX_DOUBLEBUFFER	Paints via double-buffering and reduces flicker

%LVS_EX_HIDELABELS	Hides labels in Icon and Small Icon mode
%LVS_EX_SINGLEROW	Display a single row
%LVS_EX_SNAPTOGRID	Icons automatically snap to grid
%LVS_EX_SIMPLESELECT	Changes overlay rendering to top right

LISTVIEW SET TEXT *hDlg, id&, item&, col&, StrExpr*

The text, if any, for the specified data item is replaced by the new text in *StrExpr*. You must keep in mind that this statement does not create a new item (horizontal row), but changes existing text, if any, to new text. To create a new data item (horizontal row), use LISTVIEW INSERT ITEM instead. The values of *item&/col&* specify the position of the data item (1=first, 2=second, etc.).

LISTVIEW SET USER *hDlg, id&, item&, NumExpr*

Each row in a LISTVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with LISTVIEW SET USER, and retrieved with LISTVIEW GET USER. The numeric value *item&* specifies which user value is to be accessed, 1 for the first item, 2 for the second item, etc. The value specified by *NumExpr* is saved for later retrieval. In addition to these LISTVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

LISTVIEW SORT *hDlg, id&, col&* [, *options*...]

All of the items in a LISTVIEW are sorted, based upon the value of the data in a particular column. The column number (*col&*) is specified as 1 for the first column, 2 for the second column, etc. The options are one or more comma-delimited parameters which describe the sequence and the nature of the data in the sort-key column:

ASCEND	The items are arranged in ascending sequence.
DESCEND	The items are arranged in descending sequence.
ALPHANUM	The items consist of alphanumeric data. They are sequenced based upon the ASCII value of each byte, so that case is significant. Comparison is limited to the first 255 bytes of each string.
UCASE	The items consist of alphanumeric data. The case of each alphabetic character is not significant. This is accomplished by treating all alphabetic characters as upper case letters. Comparison is limited to the first 255 bytes of each string
NUMERIC	The items start with numeric data, and evaluation is stopped at the first non-numeric character. If numeric characters are not found, the value is assumed to be zero (0). This data may be in any supported PowerBASIC format: , , scientific notation, radix format, etc.
MMDDYYYY	A date in the format mm/dd/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
DDMMYYYY	A date in the format dd/mm/yyyy which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYMMDD	A date in the format yyyy/mm/dd which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.
YYYYDDMM	A date in the format yyyy/dd/mm which is exactly ten bytes in length. Leading zeros may be replaced by spaces, and delimiters may be any character.

It is important to note that Windows may overwrite USER data when sorting your ListView

control. You should avoid the use of the LISTVIEW GET USER and LISTVIEW SET USER statements if you may also execute a LISTVIEW SORT on the same control.

LISTVIEW UNSELECT *hDlg*, *id&*, *item&* [, *col&*]

The string value specified by item&/col& is set to an unselected state for the LISTVIEW control. The values of item&/col& = 1 for the first item, 2 for the second item, etc. If the optional parameter *col&* is not given, the default value of 1 is used to unselect the primary data item.

LISTVIEW VISIBLE *hDlg*, *id&*, *item&*

A row is scrolled, if necessary, to ensure that the data specified by *item&* is visible. The value of *item&* = 1 for the first row, 2 for the second row, etc.

Restrictions Under Windows 95/98/ME, a ListView is limited to 32,767 items. In all versions of Windows, the actual string data contained by the ListView is limited only by available memory.

See also Dynamic Dialog Tools, CONTROL ADD LISTVIEW, CONTROL SET COLOR, CONTROL SET FONT, HEADER, IMAGELIST

LO function

LO function

Purpose Extract the least significant (low-order) portion of an value.

Syntax `result = LO(DataType, value)`

Remarks The value returned by LO is unsigned if *DataType* is BYTE, WORD, or DWORD, and signed if *DataType* is INTEGER or LONG. *value* may be up to twice the size of the data type specified by *DataType*. In the following example, *n* may be up to a 16-bit value (twice the size of a BYTE):

```
b = LO(BYTE,n)
```

Restrictions LO replaces LOBYT, LOWRD, and LOINT. Note that those functions are no longer supported, so update your code to use the new syntax.

See also HI, MAK

LOC function

LOC function

Purpose Determine the current seek position in an open disk file.

Syntax `qResult&& = LOC([#] filenum&)`

Remarks LOC is provided for compatibility with older BASICs. It is recommended that code is modified to use the SEEK function instead. The Number symbol (#) is optional, but recommended for clarity.

See also FILEATTR, SEEK function, SEEK statement

LOCAL statement

LOCAL statement

Purpose Declare local variables inside a Sub, Function, Method, or Property. Local variables retain their values only until the end of the procedure.

Syntax
```
LOCAL variable[()] [AS type] [, variable[()]] [...]
LOCAL variable[()] [, variable[()]] [, ...] AS type
```

Remarks The LOCAL statement is valid only inside a Sub, Function, Method, or Property. Local variables lose their values when the procedure ends. Storage space for local variables is allocated on the stack, and each local variable is initialized to zero (or, for

variables, an empty string) each time the enclosing procedure is called.

To declare an array as a local variable, use an empty set of parentheses in the variable list: You can then use the DIM statement to dimension the array.

```
LOCAL MyArray%()
LOCAL StringArray() AS STRING
```

The LOCAL statement may, optionally, accept a list of variables, all of which are defined by the type descriptor keyword that follows them. For example:

```
LOCAL aaa, bbb, ccc AS INTEGER
LOCAL vptr, aptr() AS LONG PTR
```

Restrictions DEF*type* has no effect on variables defined by a LOCAL statement.

See also DIM, GLOBAL, INSTANCE, STATIC, THREADED

Example
```
Test% = 100
ShowText "Before: " + STR$(Test%)
CALL Locals
ShowText "After:  " + STR$(Test%)

SUB Locals
  LOCAL Test%
  Test% = 0
  ShowText "In SUB: " + STR$(Test%)
END SUB
```

Result
```
Before:  100
In SUB:    0
After:   100
```

LOCK statement

LOCK statement

Purpose Lock part or all of an open file, to prevent other processes from accessing it.

Syntax
```
LOCK [#] filenum& [, {record&& | startbyte&& TO endbyte&&}]
```

Remarks LOCK prevents another process from accessing a record, range of records, byte, or range of bytes in a file opened as file number *filenum&*.

If the file was opened in random-access mode, *record&&*, *startbyte&&*, and *endbyte&&* specify record numbers. When used with binary mode files, *record&&*, *startbyte&&*, and *endbyte&&* specify byte positions, starting from either zero or one (the default).

If a record is specified, only that record (or byte) is locked. Otherwise, a range of records (or bytes) is locked, from *startbyte&&* to *endbyte&&*.

If no records are specified, or if the file was opened in sequential mode, the entire file is locked.

All records (or bytes) to be locked must be subsequently unlocked using the UNLOCK statement. Multiple locks may be placed on a file, and locks may be unlocked in any order. However, the parameters used for each UNLOCK statement must exactly match those used for the previous corresponding LOCK statement.

All locked records (or bytes) must be unlocked using the UNLOCK statement

before the file can be closed.

If a lock attempt fails, PowerBASIC sets the ERR system variable to reflect a run-time Error 70 ("Permission denied"), or Error 75 ("Path/file access error").

See also OPEN, UNLOCK

Example

```
OPEN "PATIENTS.DAT" FOR RANDOM AS #1 LEN = 1024
' determine the record number to retrieve
LOCK #1, recnum
GET #1, recnum
' process the record here
PUT #1, recnum
UNLOCK #1, recnum
CLOSE #1
```

LOF function

LOF function

Purpose Return the length of an open disk file.

Syntax ***y&&*** **= LOF([#]** ***filenum&*****)**

Remarks *filenum&* is the file number with which the file was opened. LOF returns the size of the indicated file in bytes, in the Quad-integer range 0 to 2^63-1. The Number symbol (#) is optional, but recommended for clarity.

See also FILEATTR, LOC, SEEK function, SEEK statement

Example

```
OPEN "RECIPES.DAT" FOR BINARY AS #1
x&& = LOF(1)
CLOSE #1
```

LOG function

LOG, LOG2 and LOG10 functions

Purpose LOG returns the natural (base *e*) logarithm of its argument. LOG2 returns the base 2 logarithm. LOG10 returns the common (base 10) logarithm.

Syntax

y **= LOG(*****numeric_expression*****)**
y **= LOG2(*****numeric_expression*****)**
y **= LOG10(*****numeric_expression*****)**

Remarks A logarithm of a number is the power to which the base would have to be raised to yield the number. Thus:

```
logarithm (base b) of n = x  if  b^x = n
```

and:

```
(base)^log(n) = n
```

The EXP functions complement the LOG functions. For example, if `s = LOG(t)`, then `t = EXP(s)`.

By definition, the logarithm (any base) of 1 is 0. LOG returns the natural logarithm (base *e*, where *e* = 2.718282...) of its argument. LOG2 and LOG10 return the logarithm for base 2 and 10, respectively.

numeric_expression must be a value greater than zero.

LOG, LOG2, and LOG10 return Extended-precision values.

See also EXP, EXP2, EXP10, SQR, Arithmetic Operators

LOG2 function

LOG, LOG2 and LOG10 functions

Purpose LOG returns the natural (base *e*) logarithm of its argument. LOG2 returns the base 2 logarithm. LOG10 returns the common (base 10) logarithm.

Syntax

```
y = LOG(numeric_expression)
y = LOG2(numeric_expression)
y = LOG10(numeric_expression)
```

Remarks A logarithm of a number is the power to which the base would have to be raised to yield the number. Thus:

```
logarithm (base b) of n = x  if  b^x = n
```

and:

```
(base)^log(n) = n
```

The EXP functions complement the LOG functions. For example, if `s = LOG(t)`, then `t = EXP(s)`.

By definition, the logarithm (any base) of 1 is 0. LOG returns the natural logarithm (base *e*, where *e* = 2.718282...) of its argument. LOG2 and LOG10 return the logarithm for base 2 and 10, respectively.

numeric_expression must be a value greater than zero.

LOG, LOG2, and LOG10 return Extended-precision values.

See also EXP, EXP2, EXP10, SQR, Arithmetic Operators

LOG10 function

LOG, LOG2 and LOG10 functions

Purpose LOG returns the natural (base *e*) logarithm of its argument. LOG2 returns the base 2 logarithm. LOG10 returns the common (base 10) logarithm.

Syntax

```
y = LOG(numeric_expression)
y = LOG2(numeric_expression)
y = LOG10(numeric_expression)
```

Remarks A logarithm of a number is the power to which the base would have to be raised to yield the number. Thus:

```
logarithm (base b) of n = x  if  b^x = n
```

and:

```
(base)^log(n) = n
```

The EXP functions complement the LOG functions. For example, if `s = LOG(t)`, then `t = EXP(s)`.

By definition, the logarithm (any base) of 1 is 0. LOG returns the natural logarithm (base *e*, where *e* = 2.718282...) of its argument. LOG2 and LOG10 return the logarithm for base 2 and 10, respectively.

numeric_expression must be a value greater than zero.

LOG, LOG2, and LOG10 return Extended-precision values.

See also EXP, EXP2, EXP10, SQR, Arithmetic Operators

LPRINT statement

LPRINT statement

Purpose Output (device-dependent) text and data to a printer device.

Syntax `LPRINT [expression] [SPC(n)] [TAB(n)] [,] [;]`

Remarks The LPRINT functionality is identical to the traditional PRINT statement, except that the data is sent directly to a line printer rather than to a display. A line printer is one which will accept standard ASCII text and associated control codes, such as $CR, $LF, and $FF.

PowerBASIC inserts a carriage return and linefeed at the end of each printed line. A semi-colon between expressions is an optional delimiter which leaves the printer column position unchanged. A comma moves the printer position to the next column of 14 positions each. A trailing semi-colon suppresses the final CR/LF. If TAB(n) is less than the current printer position, output is placed at the requested position on the following line.

Before you execute an LPRINT statement, you must explicitly connect to the intended line printer using the LPRINT ATTACH statement. If the connection to the device is unsuccessful, all LPRINT statements are ignored until a valid printer device has been attached. LPRINT communicates directly with the attached device, bypassing the Windows operating system and printer driver. Therefore, any settings such as "work offline" in your printer properties dialog will be ignored.

Once all the data has been sent to the printer, detach the printer so other applications can use it., with the LPRINT CLOSE statement

Host-based (Windows-only) printers use proprietary control protocols so, sending print data to them with LPRINT is unlikely to produce any output at all. PowerBASIC supports host-based printers through

and related statements.

See also LPRINT ATTACH, LPRINT CLOSE, LPRINT FLUSH, LPRINT FORMFEED, LPRINT$, XPRINT, XPRINT ATTACH

Example

```
' Typical LPRINT printing strategy
ERRCLEAR
LPRINT ATTACH "LPT2"    ' Use LPT2 device
IF ISFALSE ERR AND ISTRUE LEN(LPRINT$) THEN
  LPRINT "This is your line-printer talking"
  LPRINT FORMFEED       ' Issue a formfeed
  LPRINT FLUSH          ' flush the buffer
  LPRINT CLOSE          ' detach the printer
END IF
```

LPRINT ATTACH statement

LPRINT ATTACH statement

Purpose Connect to a line-printer device for use with LPRINT.

Syntax `LPRINT ATTACH device$`

Remarks LPRINT ATTACH attempts a direct connection to the specified [line] printer device. A line printer is one that will accept standard ASCII text and any device-specific control codes, such as CR, LF, and FF.

A line printer is named by the port to which it is attached (LPT1, etc.) because the data is sent directly to the port, not through a device driver. That is, LPRINT communicates directly with the attached line printer device, bypassing the spooler and printer driver. Therefore, any settings such as "work offline" in the Printer Properties dialog will be ignored.

Once the printer is attached by LPRINT ATTACH, print data can be sent to it with the LPRINT statement.

LPRINT ATTACH allows you to change the printer device used by LPRINT operation. When executed, the current connection (if any) is closed and the new connection is established. No colon is used in the device name. For example, to connect to *LPT2:*

```
LPRINT ATTACH "LPT2"
```

or to a printer on a network server:

```
LPRINT ATTACH "\\SERVER\HPLJ5"
```

*device$* must be a valid device name and cannot exceed 32 characters in length. In some circumstances, such as with the Novell network client, LPRINT ATTACH with a UNC name may be rejected, and the LPRINT ATTACH will be unsuccessful, and a subsequent LPRINT$ test will return an empty string.

If LPRINT ATTACH is not successful, an Error 68 ("Device unavailable") is generated and LPRINT$ returns a nul (empty)

. If no LPRINT ATTACH is ever executed (successful or not), PowerBASIC will attempt to connect to the line printer at LPT1. Once any LPRINT ATTACH is attempted, no default to LPT1 will be presumed.

Care must be used with line printers in Windows, since if there is no available printer attached to the port, program execution may be suspended, with no errors. So, it is wise to use LPRINT ATTACH to explicitly connect the intended printer device, and test for the successful connection by the examination of LPRINT$ and ERR. For example:

```
ERRCLEAR
LPRINT ATTACH "LPT3"
IF ERR OR LPRINT$ = "" THEN PRINT "Connection failed"
```

Once all the data has been sent to the printer, detach the printer so other applications can use it., with the LPRINT CLOSE statement

Note: The Win32 API call *EnumPrinters* can give you a list of all valid printers and print devices, or you can enumerate the list of printers with the PRINTERCOUNT and PRINTER$ functions.

Restrictions If *device$* is an empty string, the current connection (if any) is detached. This is equivalent to the LPRINT CLOSE statement.

See also LPRINT, LPRINT CLOSE, LPRINT FLUSH, LPRINT FORMFEED, LPRINT$, XPRINT, XPRINT ATTACH

Example

```
' Typical LPRINT printing strategy
ERRCLEAR
LPRINT ATTACH "LPT2" ' Use LPT2 device
IF (ERR<>0) OR (LEN(LPRINT$)) THEN
  LPRINT "This is your line-printer talking"
  LPRINT FORMFEED      ' Issue a formfeed
  LPRINT FLUSH         ' flush the buffer
  LPRINT CLOSE     ' detach the printer
END IF
```

LPRINT CLOSE statement

LPRINT CLOSE statement

Purpose Disconnect the current printer device.

Syntax `LPRINT CLOSE`

Remarks LPRINT CLOSE detaches the currently selected printer connection (established with the

LPRINT ATTACH statement) from LPRINT operations, allowing the spooler subsystem to commence print operations. Once a connection is closed, LPRINT$ will return an empty printer device name string until a new connection is established.

LPRINT CLOSE is equivalent to using LPRINT ATTACH with an empty printer device name string.

Restrictions LPRINT CLOSE is an essential step in the print process. To ensure the printer device is available to other applications, printers should always be closed when not in use. Failing to close a connection may cause significant delays before printing commences. In some cases, some or all of the print data may be lost.

See also LPRINT, LPRINT ATTACH, LPRINT FLUSH, LPRINT FORMFEED, LPRINT$, XPRINT, XPRINT ATTACH

Example

```
' Typical LPRINT printing strategy
ERRCLEAR
LPRINT ATTACH "LPT2" ' Use LPT2 device
IF ISTRUE ERR OR ISFALSE LEN(LPRINT$) THEN
  LPRINT "This is your line-printer talking"
  LPRINT FORMFEED      ' Issue a formfeed
  LPRINT FLUSH         ' flush the buffer
  LPRINT CLOSE     ' detach the printer
END IF
```

LPRINT FLUSH statement

LPRINT FLUSH statement

Purpose Flush any remaining print data to a printer device and signal the start of the print process.

Syntax `LPRINT FLUSH`

Remarks LPRINT FLUSH forces the operating system to flush any buffered data and begin printing. Use LPRINT FLUSH to ensure print data is submitted to the printer as soon as possible, rather than waiting for any timeout period to elapse first. Depending upon the printer and its drivers, printing may begin immediately, or it may be delayed until execution of an LPRINT CLOSE statement.

Typically, an LPRINT FLUSH statement is preceded with a FORMFEED statement, so ensure that the print job is ejected normally from the printer device.

See also LPRINT, LPRINT ATTACH, LPRINT CLOSE, LPRINT FORMFEED, LPRINT$, XPRINT, XPRINT ATTACH

Example

```
' Typical LPRINT printing strategy
ERRCLEAR
LPRINT ATTACH "LPT2" ' Use LPT2 device
IF ISTRUE ERR OR ISFALSE LEN(LPRINT$) THEN
  LPRINT "This is your line-printer talking"
  LPRINT FORMFEED      ' Issue a formfeed
  LPRINT FLUSH         ' flush the buffer
  LPRINT CLOSE     ' detach the printer
END IF
```

LPRINT FORMFEED statement

LPRINT FORMFEED statement

Purpose Send a formfeed (page eject) character to an attached printer device.

Syntax `LPRINT FORMFEED`

Remarks For direct connections, LPRINT FORMFEED sends a form-feed character (ASCII character 12, $FF, or CHR$(12)) to the attached line printer device, to ensure the current page will be ejected. For host-based connections, PowerBASIC signals to the printing subsystem to perform the page eject operation.

Typically, an LPRINT FORMFEED is performed before a LPRINT FLUSH and LPRINT CLOSE.

See also LPRINT, LPRINT ATTACH, LPRINT CLOSE, LPRINT FLUSH, LPRINT$, XPRINT, XPRINT ATTACH

Example

```
' Typical LPRINT printing strategy
ERRCLEAR
LPRINT ATTACH "LPT2" ' Use LPT2 device
IF ISTRUE ERR OR ISFALSE LEN(LPRINT$) THEN
  LPRINT "This is your line-printer talking"
  LPRINT FORMFEED      ' Issue a formfeed
  LPRINT FLUSH         ' flush the buffer
  LPRINT CLOSE     ' detach the printer
END IF
```

LPRINT$ function

LPRINT$ function

Purpose Return the name of the printer device used for

operations.

Syntax `device$ = LPRINT$`

Remarks LPRINT$ returns the name of the currently attached printer device used by the LPRINT statement. If there is no attached device, an empty

is returned.

LPRINT$ is primarily used to detect if an LPRINT ATTACH operation was successful.

See also LPRINT, LPRINT ATTACH, LPRINT CLOSE, LPRINT FLUSH, LPRINT FORMFEED, XPRINT, XPRINT ATTACH

Example

```
ERRCLEAR
LPRINT ATTACH "LPT3"
IF ERR <> 0 OR LPRINT$ = "" THEN PRINT "Printer connection failed"
```

LSET statement

LSET statement

Purpose Left-align a

within the space of another string or User-Defined Type.

Syntax `LSET [ABS] result_var = string_expression [USING ustring_expression]`

Remarks LSET left-aligns a string into the space of another string or variable of a User-Defined Type.

ABS If ABS is specified, or *ustring_expression* is null (empty), LSET leaves the padding positions unchanged from their original content, rather than replacing them with spaces.

USING If *string_expression* is shorter then *result_var*, LSET left-justifies *string_expression* within *result_var,* and pads remaining character positions on the right side using the first character in *ustring_expression* or spaces if not specified or is null (empty).

If *string_expression* is longer than *result_var*, LSET truncates *string_expression* from the right until it fits in *result_var*.

LSET can be used to assign the content of a User-Defined Type to a User-Defined Type variable of a different class, or assign a dynamic string to a User-Defined Type. For example:

```
LSET MyType = STRING$(LEN(MyType), 0)
LSET MyType = a$
```

RSET works similarly, but performs right-justification; CSET performs center-justification.

See also CSET, CSET$, GET, LET, LET (with Types), LSET$, PUT, RESET, RSET, RSET$, STRINSERT$, TYPE SET

Example

```
a$ = "SuperBASIC=SuperBASIC"
LSET ABS a$ = "PowerBASIC"
' result: "PowerBASIC=SuperBASIC"

LSET a$ = "PowerBASIC" USING "*"
' result: "PowerBASIC***********"
```

LSET$ function

LSET$ function

Purpose Return a

containing a left-justified (padded) string.

Syntax ***result_var* = LSET$(*string_expression*, *strlen&* [USING *ustring_expression*])**

Remarks LSET$ left-aligns the string *string_expression* into a string of *strlen&* characters.

USING If *ustring_expression* is null (empty) or is not specified, LSET$ pads *string_expression* with space characters. Otherwise, LSET$ pads the string with the first character of *ustring_expression*.

If *string_expression* is shorter then *strlen&*, LSET$ left-justifies *string_expression* within *result_var,* padding the right side as described above; otherwise, LSET$ returns the left-most *strlen&* bytes of *string_expression*.

See also CSET, CSET$, GET, LET, LSET, PUT, RESET, RSET, RSET$, STRINSERT$, TYPE SET

Example

```
a$ = LSET$("PowerBASIC", 20)
' result: "PowerBASIC          "

a$ = LSET$("PowerBASIC",20 USING "*")
' result: "PowerBASIC**********"
```

LTRIM$ function

LTRIM$ function

Purpose Return a copy of a

, with leading characters or strings removed.

Syntax ***x$* = LTRIM$(*MainString* [, [ANY] *MatchString*])**

Remarks *MainString* is the string expression from which to remove characters, and *MatchString* is the string expression containing the characters to remove.

If *MatchString* is not specified, LTRIM$ removes leading spaces. LTRIM$ returns a sub-string of *MainString*, from the first non-*MatchString* (or non-space) to the end of the string. If *MatchString* (or a space) is not present at the beginning of *MainString*, all of *MainString* is returned.

If the ANY keyword is included, *MatchString* specifies a list of single characters to be searched for individually. A match on any one of these as a leading character will cause the character to be removed from the result.

LTRIM$ is case sensitive.

See also CLIP$, EXTRACT$, INSTR, LEFT$, MID$, REMOVE$, REPLACE, RIGHT$, RTRIM$, SHRINK$, STRDELETE$, STRINSERT$, STRREVERSE$, TALLY, TRIM$, UNWRAP$, VERIFY

Example

```
A$ = "0123ABC3210"
A$ = LTRIM$(A$, ANY "0123456789")
```

Result

```
ABC3210
```

MACRO/END MACRO block

MACRO/END MACRO block

Purpose Define a single or multi-line text substitution block.

Syntax

Single line macro:

```
MACRO macroname [(prm1, prm2, ...)] = replacementtext
```

Multi-line macro:

```
MACRO macroname [(prm1, prm2, ...)]
  [MACROTEMP ident1 [, ident2, ...]]
  DIM ident1 AS type [, ident2 AS type, ...]]
  {replacementtext}
  [EXIT MACRO]
  {replacementtext}
END MACRO
```

Macro function:

```
MACRO FUNCTION macroname [(prm1, prm2, ...)]
  [MACROTEMP ident1 [, ident2, ...]
  DIM ident1 AS type [, ident2 AS type, ...]]
  {replacementtext}
  [EXIT MACRO]
  {replacementtext}
END MACRO = returnexpression
```

Remarks Macro is a powerful text substitution construct that may take a single-line or multi-line format. It generates absolutely no executable code unless it is referenced, and effectively allows the programmer to design a part of the PowerBASIC language to his/her own needs and requirements. For example, a simple single-line macro can allow PowerBASIC to emulate the CONST syntax used in Visual Basic - see the box-out below for more information.

A macro must always be defined before it is referenced, and the parameter count must always match the definition. When a macro is referenced, the occurrence of the name is replaced by the defined replacement text, expanded with parameter substitution. The first line of a MACRO definition is termed the macro prototype, and this line may not be split into multiple logical lines with the underscore (_) line continuation character. Likewise, the END MACRO = *returnexpression* may not be split with underscores either. A Macro also cannot end with a line continuation character.

Macros may be nested, and may forward-reference other macros. However, care should be exercised to avoid circular references.

A single-line macro or a macro function may be referenced at any source code position which, when expanded, will be syntactically correct (also see the Restrictions section below). Consider the following simplistic example:

```
MACRO concatenate(prm1,prm2) = prm1 & $SPC & prm2
' more code here
A$ = concatenate("Hello","World")
```

During compilation, PowerBASIC would internally expand this code to become:

```
A$ = "Hello" & $SPC & "World"
```

A multi-line macro, while more powerful in terms of coding, may be referenced only in the "statement" position, which is the first position on a line. That single reference is internally expanded into multiple lines of inline code to perform a complex task. For example:

```
MACRO Display6times(prm1)
  CALL Display(prm1) : CALL Display(prm1)
  CALL Display(prm1) : CALL Display(prm1)
  CALL Display(prm1) : CALL Display(prm1)
END MACRO
' more code here
Display6times("This is very cool...")
```

The single-line MACRO offers a cunning way to retain the CONST syntax used in MSBASIC and Visual Basic in your PowerBASIC code, while maintaining the low overhead advantage of PowerBASIC. For example:

```
MACRO CONST = MACRO
' more code here
CONST Version  = 1&
CONST AppTitle = "My Application"
' more code here
a$ = AppTitle & " v" & FORMAT$(Version)
```

During compilation, the CONST keyword is replaced by the MACRO keyword, dynamically creating a new macro that, in turn, defines a numeric or string literal. When the real macro name is referenced in the code, the literal is substituted directly.

MACROTEMP The MACROTEMP statement may be used to specify a list of one or more identifiers, each of which is automatically made unique to each expansion of a multi-line macro. This is done by internally appending the digits 0001, 0002, etc, to the identifier upon each expansion of the macro.

A text identifier may represent a variable, label, or any other word, which expands appropriately to avoid a duplicate name conflict in your code.

MACROTEMP just creates a symbol name. If this symbol is a variable name, the variable must still be formally declared with an appropriate DIM (or LOCAL) statement. For example:

```
MACRO CopyUntilNul(ptr1,ptr2)
  MACROTEMP LoopPoint, ByteVar
  DIM ByteVar AS BYTE
LoopPoint:
  ByteVar = @ptr1
  @ptr2 = ByteVar
  INCR ptr1
  INCR ptr2
  IF ByteVar <> 0 THEN LoopPoint
END MACRO
```

Using that MACRO definition, the code "CopyUntilNul(Source, Dest)" would expand to something like this:

```
DIM ByteVar0001 AS BYTE
LoopPoint0001:
  ByteVar0001 = @Source
  @Dest = ByteVar0001
  INCR Source
```

```
INCR Dest
IF ByteVar0001 <> 0 THEN LoopPoint0001
```

If the MACROTEMP statement were not used, serious naming conflicts would occur most any time that a macro was expanded more than once in a program. MACROTEMP statements may appear 0, 1, or more times in a macro definition, but they must always precede any other text in the macro.

MACROTEMP statements should be used with any label in a macro that may be expanded more than once in a program, and with any variable that should not be shared with any other expansion of the macro.

EXIT MACRO — EXIT MACRO may be used to terminate execution of code in the current macro expansion. It is functionally identical to the *imaginary* concept of GOTO END-MACRO.

END MACRO — A macro function block can return a value with the END MACRO = *returnexpression* statement.

Restrictions — A macro definition may contain replacement text up to approximately 4000 characters. Macros may specify up to 240 parameters, which may occupy up to approximately 2000 bytes total expanded space per macro.

Macro Function substitutions are limited to an expanded total of approximately 16000 characters per line of original source code.

Macro parameters are substituted directly, so whitespace characters in the passed macro parameters may cause unexpected problems if the expanded code is syntactically incorrect with the additional whitespace. For example, this can be important when specifying UDT variables as macro parameters. Consider the following code:

```
TYPE MyType
  lCount AS LONG
  szText AS ASCIIZ * 256
END TYPE

MACRO PresetUDT(u)
  u.lCount = 1
  u.szText = SPACE$(256)
END MACRO

FUNCTION PBMAIN
  DIM x AS MyType
  PresetUDT(x)
  PresetUDT(x )  ' This line causes an Error 526
END FUNCTION
```

In the code above, the second macro expansion fails to compile because the trailing space in the passed macro parameter becomes part of the expanded code. In this situation, this additional space character breaks the syntax of the UDT variable reference within the expanded macro, triggering a compile-time Error 526 ("Period not allowed"). If we examine how the two expanded macro statements would appear, the problem becomes immediately obvious:

```
x .lCount = 1
 ^
x .szText = SPACE$(256)
 ^
```

(Please note that the caret symbols (^) above have been added purely to illustrate the exact position of the problem)

When using single-line macros that contain numeric expressions, use parentheses around the macro body to guard against unexpected order of precedence problems when the macro is used within an expression. For example, consider the following macro and expansion:

```
MACRO Calculate(p1, p2, p3) = (p1 * p2) \ p3
' more code here
```

```
x = Calculate(a,b,c) ^ 3
```

When this macro is expanded, the expression would be calculated as follows:

```
x = (a * b) \ c ^ 3
```

However, if the macro body was enclosed in parentheses:

```
MACRO Calculate(p1, p2, p3) = ((p1 * p2) \ p3)
```

…then the expanded expression would be calculated thus:

```
x = ((a * b) \ c) ^ 3
```

MACRO prototypes (those beginning with the MACRO keyword) and END MACRO = *returnexpression* lines must be constructed on a single line of source code. That is, they may not be split across multiple lines of source code with line continuation characters, since these interfere with the text substitution process. For example, the following prototype is invalid:

```
MACRO FUNCTION MyMacro1(sParam1, sParam2, sParam3, sParam4)
```

If a macro expands directly to a Function call, the macro can be called using the SUB-style syntax, automatically discarding the function return value. For example:

```
MACRO sm(Msg) = SendMessage(a, Msg, b, c)
```

…can be called like this (if the return value is not required):

```
sm(x)
```

A macro cannot expand directly to a REMark, because REM and ' are processed before the macro is assigned. So, MACRO hello = REM winds up as an invalid, blank macro.

Finally, it should be noted that the Integrated Debugger appears to step over macro references as if they were conventional BASIC statements. This occurs because macro expansion takes place during the compilation process and the original source code is not affected or altered by the compile-time expansion.

See also EXIT, FUNCTION/END FUNCTION, METHOD, PROPERTY, SUB/END SUB

Example

```
' Single-line macro:
MACRO muldivide(p1, p2, p3) = ((p1 * p2) / p3)
' more code here
x = muldivide(3,3,2) + 10

' Multi-line macro and macro function example:
MACRO FUNCTION HowDidIGetHere
  MACROTEMP i, a
  DIM i AS LONG, a$
  FOR i = CALLSTKCOUNT TO 1 STEP -1
    A$ = A$ + CALLSTK$(i) + ", "
  NEXT
END MACRO = RTRIM$(A$, ANY ", ")

MACRO DisplayText(txt)
  #IF %DEF(%PB_CC32)
     PRINT txt
  #ELSE
     MSGBOX txt
  #ENDIF
END MACRO

SUB Testing2(r AS LONG,z AS ASCIIZ)
  DisplayText(HowDidIGetHere)
END SUB

SUB testing1(z AS ASCIIZ)
  DisplayText(HowDidIGetHere)
  CALL Testing2(1,z)
END SUB
```

```
FUNCTION PBMAIN
  DisplayText(HowDidIGetHere)
  CALL Testing1("This is a test")
END FUNCTION

' Useful Macro functions
MACRO Pi = 3.141592653589793##
MACRO DegreesToRadians(dpDegrees) = (dpDegrees * 0.0174532925199433##)
MACRO RadiansToDegrees(dpRadians) = (dpRadians * 57.29577951308232##)
```

MAK function

MAK function

Purpose Create an

value of a specified data type.

Syntax ***resultvar*** **= MAK(*datatype*, *lowderval*, *highorderval*)**

Remarks Create an integral class value of a specified data type (WORD, DWORD,

, INTEGER, LONG, QUAD) from a low-order and a high-order part.

The complements to this function are the HI and LO functions, which may be used to split a single 32-bit value into two 16-bit components.

Restrictions MAK supercedes the MAKWRD, MAKDWD, and MAKPTR functions. Those functions are no longer supported, so update your code to use the new syntax.

See also HI, LO

Example

```
dwResult = MAK(DWORD, x??, y??)
```

MAT statement

MAT statement

Purpose To simplify Matrix Algebra calculations.

Syntax

```
MAT a1() = CON              'Set all elements of a1() to one
MAT a1() = CON(expr)        'Set all elements of a1() to value of expr
MAT a1() = IDN              'Establish a1() as an identity matrix
MAT a1() = ZER              'Set all elements of a1() to zero
MAT a1() = a2() + a3()      'Addition
MAT a1() = a2()             'Assignment
MAT a1() = INV(a2())        'Inversion
MAT a1() = (expr) * a2()    'Scalar Multiplication
MAT a1() = a2() - a3()      'Subtraction
MAT a1() = a2() * a3()      'Multiplication
MAT a1() = TRN(a2())        'Transposition
```

Remarks Array names with the MAT statements may optionally include a set of empty parentheses. The following are both equally valid, but the inclusion of the parentheses improves clarity of the code:

```
MAT a1 = CON
MAT a1() = CON
```

MAT CON, IDN ZER + - = and TRN operations are valid with Byte, Word, Double-word, Integer, Long-integer, Quad-integer, Single-precision, Double-precision and Extended-precision arrays.

Matrix * and INV operations support all

types.

It is the programmer's responsibility to ensure that arrays used with MAT are of the appropriate size and type. All operations involving two or more arrays require that they be of exactly the same size and type, without exception. Failure to adhere causes undefined results. In the interest of execution speed, no error checking is performed at run-time.

Every scalar value denoted here as *'expr'* must be enclosed in parentheses. Although Matrix operations tend to imply a two-dimensional array, unless otherwise noted (such as with MAT IDN, *, TRN), MAT may be used with arrays of one to eight dimensions. It is permissible to specify one array for multiple MAT parameters.

Example

MAT *array1()* = IDN

This establishes *array1* as an identity matrix, with all diagonal elements as 1 and all others as zero. This produces undefined results if *array1* is not a "square" matrix.
MAT array1() = (expr) * array2()

Each element of *array2* is multiplied by the scalar value of the *expr*, then assigned to *array1*.

MAT array1() = TRN(array2())

Transposes the row and columns from *array2* to *array1*. Arrays must be equivalent: *array1*(5,2) and *array2*(2,5). Only a square matrix may be transposed to itself.

MAT array1() = INV(array2())

Inverts the array from *array2* to *array1*. Only a square matrix may be inverted. Proof: If *array1* is then multiplied by *array2,* the resulting "*array3*" will be equal to an Identify Matrix, (MAT *array3* = *array1* * *array2* ' *array3* should now be equal to "MAT array3 IDN").

MAT a() = b() * c()

Array multiplication occurs as follows:

```
' Row Column assumption:
'    array [a]l,n = [b]l,m * [c]m,n

FOR i = 1 TO l            ' Row    [a]l = Row    [b]l
  FOR j = 1 TO n          ' Column [a]n = Column [c]n
    a(i,j) = 0#           ' # if Double-precision
    FOR k = 1 TO m        ' Column [b]m = Row    [c]m
      a(i,j) = a(i,j) + b(l,k) * c(k,j)
    NEXT
  NEXT
NEXT
```

MAX function

MAX function

Purpose Return the argument with the largest (maximum) value.

Syntax

```
y  = MAX(arg [, arg] ...)
y& = MAX&(arg& [, arg&] ...)
y$ = MAX$(arg$ [, arg$] ...)
```

Remarks These functions take any number of arguments and return the argument with the largest (maximum) value. MAX handles arguments of any

type.

MAX& handles arguments which evaluate to Long-integers (MAX& is more efficient than MAX).

MAX$ handles

arguments.

If any arguments of MAX& are outside of the range of Long-integers, the result is

undefined. Any
arguments of MAX& will be rounded to Long-integers before the comparison begins.
MAX% is recognized as a valid synonym for MAX&.

See also CHOOSE, CHOOSE&, CHOOSE$, IIF, IIF&, IIF$, MIN, MIN&, MIN$, SWITCH, SWITCH&, SWITCH$

Example
```
x% = MAX&(A, B, C, D)
x$ = MAX$("abacadabra", "cad", A$, B$(4), C$+D$+LEFT$(E$,5))
x## = MAX(1.1@@, A%/B!, C#(x)^D, E##, SIN(F&))
```

MCASE$ function

MCASE$ function

Purpose Return a mixed case version of its
argument.

Syntax `s$ = MCASE$(string_expression [,ANSI | OEM])`

Remarks MCASE$ returns a string equivalent to *string_expression*, except that the first letter of each word is capitalized, while the remaining characters are forced to lowercase. A word is considered to be a consecutive series of letters. The optional ANSI or OEM parameter specifies whether the conversion is made using the ANSI charset for the system, or the original IBM OEM charset. If no charset is specified, PowerBASIC for Windows uses the system ANSI charset, while PB/CC uses the IBM OEM charset. Only "International" characters in the range of CHR$(128) to CHR$(255) are affected by this parameter.

The OEM charset is based upon the original IBM OEM charset to ensure compatibility with programs written for all previous versions of the PowerBASIC compiler.

See also LCASE$, UCASE$

Example
```
x$ = MCASE$("Cats aren't AL.WAYS good.")
```

Result
```
Cats Aren'T Al.Ways Good.
```

ME pseudo-variable

Keyword Template

Purpose

Syntax

Remarks

See also

Example

ME pseudo-variable

Purpose A pseudo object variable to reference the current object.

Syntax `ME.Method1(param)`

Remarks ME is a pseudo-variable, which PowerBASIC automatically defines in every Method and Property. It is treated as a reference to the current object. Using ME, it's possible to call any other Method or Property which is a member of the class: *var* = ME.*Method1*(*param*)

ME can also be assigned to an appropriate object variable, or used as a Sub/Function/Method/Property parameter.

See also CLASS, INTERFACE (Direct), INTERFACE (IDBind), METHOD, PROPERTY, What is an object, anyway?

MEMORY COPY statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

MEMORY statement New!

Purpose Copy, Swap, or Fill blocks of memory.

Syntax

```
MEMORY COPY Source&, Dest&, Count&
MEMORY SWAP Source&, Dest&, Count&
MEMORY FILL Dest&, Count&, BYTE|WORD|DWORD IntegralExpr
MEMORY FILL Dest&, Count&, StrgExpr
```

Remarks The MEMORY statement may be used to copy, swap, or fill a block of memory with very high efficiency. PowerBASIC will automatically take into account the possibility that the source and destination blocks overlap and avoid corruption from that fact.

In the first form, *Count&* bytes of memory at the address specified by *Source&* is copied to the address specified by *Dest&*. In the second form, *Count&* bytes of memory at the address specified by *Source&* is exchanged with the data at the address specified by *Dest&*.

In the third form, *Count&* bytes of memory at *Dest&* are filled with one or more copies of the BYTE, WORD, or DWORD value specified by the value of *IntegralExpr*.

In the fourth form, *Count&* bytes of memory at *Dest&* are filled with one or more copies of the string *StrgExpr*.

See also GLOBALMEM, PEEK$, POKE$, STRPTR, VARPTR

MEMORY FILL statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

MEMORY statement New!

Purpose Copy, Swap, or Fill blocks of memory.

Syntax

```
MEMORY COPY Source&, Dest&, Count&
```

```
MEMORY SWAP Source&, Dest&, Count&
MEMORY FILL Dest&, Count&, BYTE|WORD|DWORD IntegralExpr
MEMORY FILL Dest&, Count&, StrgExpr
```

Remarks The MEMORY statement may be used to copy, swap, or fill a block of memory with very high efficiency. PowerBASIC will automatically take into account the possibility that the source and destination blocks overlap and avoid corruption from that fact.

In the first form, *Count&* bytes of memory at the address specified by *Source&* is copied to the address specified by *Dest&*. In the second form, *Count&* bytes of memory at the address specified by *Source&* is exchanged with the data at the address specified by *Dest&*.

In the third form, *Count&* bytes of memory at *Dest&* are filled with one or more copies of the BYTE, WORD, or DWORD value specified by the value of *IntegralExpr*.

In the fourth form, *Count&* bytes of memory at *Dest&* are filled with one or more copies of the string *StrgExpr*.

See also GLOBALMEM, PEEK$, POKE$, STRPTR, VARPTR

MEMORY SWAP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

MEMORY statement New!

Purpose Copy, Swap, or Fill blocks of memory.

Syntax

```
MEMORY COPY Source&, Dest&, Count&
MEMORY SWAP Source&, Dest&, Count&
MEMORY FILL Dest&, Count&, BYTE|WORD|DWORD IntegralExpr
MEMORY FILL Dest&, Count&, StrgExpr
```

Remarks The MEMORY statement may be used to copy, swap, or fill a block of memory with very high efficiency. PowerBASIC will automatically take into account the possibility that the source and destination blocks overlap and avoid corruption from that fact.

In the first form, *Count&* bytes of memory at the address specified by *Source&* is copied to the address specified by *Dest&*. In the second form, *Count&* bytes of memory at the address specified by *Source&* is exchanged with the data at the address specified by *Dest&*.

In the third form, *Count&* bytes of memory at *Dest&* are filled with one or more copies of the BYTE, WORD, or DWORD value specified by the value of *IntegralExpr*.

In the fourth form, *Count&* bytes of memory at *Dest&* are filled with one or more copies of the string *StrgExpr*.

See also GLOBALMEM, PEEK$, POKE$, STRPTR, VARPTR

MENU ADD POPUP statement

MENU ADD POPUP statement IMPROVED

Purpose Add a popup child menu to an existing menu.

Syntax `MENU ADD POPUP, hMenu, txt$, hPopup [AS id], state& [, AT [BYCMD] position&]`

Remarks A popup menu is a small window that "pops up" when a menu item is highlighted. This allows nesting, and gives the user an opportunity to choose from "sub-menu" items.

hMenu Handle of the parent menu which holds the popup.

txt$ Text displayed in the parent menu. An ampersand (&) may be used in the

to make the following letter into a control accelerator (hot-key). The letter appears underscored to signify that it is an accelerator.

hPopup Handle of the child popup menu to be added.

id If the option AS ID is included, *id* is a unique numeric identifier for this popup menu. *id* may be used later with a BYCMD option to reference this popup. *id* is an integral numeric value in the range of -32768 to +32767.

state& The initial state of the menu item. It can be one of the following:

%MFS_DISABLED	Disable the item so that it cannot be selected.
%MFS_ENABLED	Enable the item so that it can be selected.

position& Indicates the position in the parent menu where the popup child menu is to be inserted. If the BYCMD option is used, the popup menu is inserted prior to the menu item ID specified by *position&*. Otherwise, the popup menu is inserted at the physical *position&* within the parent menu, where *position&* = 1 for the first position, *position&* = 2 for the second, and so on. If position is not specified then the popup menu is appended to the end of the menu.

See also Dynamic Dialog Tools, ACCEL ATTACH, Menus, MENU ADD STRING, MENU ATTACH, MENU CONTEXT, MENU DELETE, MENU DRAW BAR, MENU GET STATE, MENU GET TEXT, MENU NEW BAR, MENU NEW POPUP, MENU SET STATE, MENU SET TEXT

Example See Menu Example.

MENU ADD STRING statement

MENU ADD STRING statement

Purpose Add a

or separator to an existing menu.

Syntax `MENU ADD STRING, hMenu, txt$, id&, state& [, AT [BYCMD] position&] [, CALL callback]`

Remarks A string may contain an optional command accelerator key, and also describe an equivalent keyboard accelerator combination.

hMenu Handle of the parent menu to which the string should be added.

txt$* Text to display in the parent menu. An ampersand (&) may be used in the string to make the following letter into a command accelerator (hot-key). The letter is underscored to signify that it is an accelerator. To create a horizontal separator instead of a text string, set *txt$ = "-", *id&* = 0, *state&* = 0.

Keyboard accelerators, as described in the ACCEL ATTACH statement, can be indicated in the text of a menu item, for the reference of the user. To include a keyboard accelerator description in a menu string, separate it from the menu item text with a $TAB {CHR$(9)}

	character. For example: `MENU ADD STRING, hMenu, "Cu&t" & $TAB & "CTRL+X", id&, mstate&`
id&	The unique identifier for the menu item. When a menu item is selected, *id&* is sent to the parent dialog Callback Function to notify the dialog which option was selected.
state&	The initial state of the menu item. It can be one or more of the following, combined together with the OR operator to form a bitmask:

%MFS_CHECKED	Place a checkmark next to the item.
%MFS_DEFAULT	The default menu item, displayed in bold. Only one item may be the default.
%MFS_DISABLED	Disable the menu item so that it cannot be selected.
%MFS_ENABLED	Enable the menu item so that it can be selected.
%MFS_GRAYED	Disable the menu item so that it cannot be selected, and draw it in a "grayed" state to indicate this.
%MFS_HILITE	Highlight the menu item.
%MFS_UNCHECKED	Do not place a checkmark next to the item.
%MFS_UNHILITE	Item is not highlighted.

	A state value of zero (0) provides %mfs_enabled, %mfs_unchecked, and %mfs_unhilite.
position&	Optional position in the parent menu, where the menu item should be inserted. If the BYCMD option is used, the menu item is inserted prior to the menu item ID specified by *position&*. Otherwise, the menu item is inserted at the physical *position&* within the parent menu, where *position&* = 1 for the first position, *position&* = 2 for the second, and so on. If position is not specified then the popup menu is appended to the end of the menu.
callback	Optional name of a Callback Function that will be called when the menu item is selected. This callback will be ignored when used with MENU CONTEXT as it returns the id of the selected menu item.
Restrictions	The application must call the MENU DRAW BAR statement whenever a menu changes, whether or not the menu is in a displayed dialog.
See also	Dynamic Dialog Tools, ACCEL ATTACH, Menus, MENU ADD POPUP, MENU ATTACH, MENU CONTEXT, MENU DELETE, MENU DRAW BAR, MENU GET STATE, MENU GET TEXT, MENU NEW BAR, MENU NEW POPUP, MENU SET STATE, MENU SET TEXT
Example	See Menu Example.

MENU ATTACH statement

MENU ATTACH statement

Purpose	Attach a menu to a given dialog.
Syntax	`MENU ATTACH hMenu, hDlg`
Remarks	Attaches a menu to a dialog, replacing any existing menu. The dialog is redrawn to accommodate the new menu.
hMenu	Handle of the menu to be attached.

hDlg	Handle of the dialog which holds the menu.
See also	Dynamic Dialog Tools, ACCEL ATTACH, Menus, MENU ADD POPUP, MENU ADD STRING, MENU DELETE, MENU DRAW BAR, MENU GET STATE, MENU GET TEXT, MENU NEW BAR, MENU NEW POPUP, MENU SET STATE, MENU SET TEXT
Example	See Menu Example.

MENU CONTEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

MENU CONTEXT statement New!

Purpose	Create a floating context menu.
Syntax	`MENU CONTEXT hContext, x&, y&, flags& TO CmdVar`
Remarks	A context menu is a floating popup menu which is shown until the user makes a selection or dismisses it. It can appear anywhere on the screen.
hContext	Handle of a menu created with MENU NEW POPUP.
x&, y&	The parameters *x&* and *y&* specify the location of the context menu, in pixels, relative to the upper left corner of the desktop.
flags&	May be combined, as appropriate, to specify the characteristics of the context menu.

%TPM_LEFTBUTTON	Tracks the left button.
%TPM_RIGHTBUTTON	Tracks the right button.
%TPM_LEFTALIGN	Left side of the menu is aligned with *x&*.
%TPM_CENTERALIGN	Centers horizontally with *x&*.
%TPM_RIGHTALIGN	Right side of the menu is aligned with *x&*.
%TPM_TOPALIGN	Top of the menu is aligned with *y&*.
%TPM_VCENTERALIGN	Centers vertically with *y&*.
%TPM_BOTTOMALIGN	Bottom of the menu is aligned with *y&*.

CmdVar — Long integer variable where the id of the selected menu item is returned. If an optional callback is defined for a menu item with MENU ADD STRING it will be ignored when used with MENU CONTEXT.

See also — Dynamic Dialog Tools, Menus, MENU ADD STRING, MENU ADD POPUP, MENU NEW POPUP

Example

```
MENU NEW POPUP TO hPop&
MENU ADD STRING, hPop&, "one", 1, %mf_enabled
MENU ADD STRING, hPop&, "two", 2, %mf_enabled
MENU ADD STRING, hPop&, "three", 3, %mf_enabled
MENU CONTEXT hPop&, 500, 500, %tpm_leftbutton TO CommandVar&
```

MENU DELETE statement

MENU DELETE statement

Purpose — Delete a menu item from an existing menu.

Syntax — **MENU DELETE *hMenu*, [BYCMD] *position&***

Remarks — If the menu item is a popup child menu, the menu is destroyed and its memory is released.

hMenu — Handle of the menu holding the item you are deleting.

position& — Position of the item within the menu. If BYCMD is specified, *position&* refers to the unique menu identifier. Otherwise, *position&* is the position of the menu item, where *position&* = 1 for the first position, *position&* = 2 for the second, and so on.

See also — Dynamic Dialog Tools, Menus, MENU ADD POPUP, MENU ADD STRING, MENU ATTACH, MENU DRAW BAR, MENU GET STATE, MENU GET TEXT, MENU NEW BAR, MENU NEW POPUP, MENU SET STATE, MENU SET TEXT

MENU DRAW BAR statement

MENU DRAW BAR statement

Purpose — Redraw the menu bar for a given dialog.

Syntax — **MENU DRAW BAR *hDlg***

Remarks — This operation should be performed when a menu is altered dynamically after the dialog has been initially created, without regard to the visible state of the dialog.

hDlg — Handle of the dialog that owns the menu to be redrawn.

See also — Dynamic Dialog Tools, Menus, MENU ADD POPUP, MENU ADD STRING, MENU ATTACH, MENU DELETE, MENU GET STATE, MENU GET TEXT, MENU NEW BAR, MENU NEW POPUP, MENU SET STATE, MENU SET TEXT

MENU GET STATE statement

MENU GET STATE statement IMPROVED

Purpose — Return the state of a specified menu item.

Syntax — **MENU GET STATE *hMenu*, [BYCMD] *position&* TO *state&***

Remarks — Retrieves the menu flags associated with the specified menu item.

hMenu — Handle of the menu containing the item to examine.

position&	Position within the menu of the menu item to examine. If the BYCMD option is specified, *position&* specifies the unique menu item identifier of the item to examine. Otherwise, *position&* indicates the physical position of the menu item within the menu, where *position&* = 1 for the first position, *position&* = 2 for the second position, and so on.
state&	Long integer variable where the menu state will be placed. If the item does not exist, the result is -1. Otherwise the result is a bitmask containing one or more of the following, combined together with the OR operator to form the bitmask:

%MFS_CHECKED	Menu item has a checkmark next to it.
%MFS_DEFAULT	Menu item is the default item.
%MFS_DISABLED	Menu item is disabled and cannot be selected.
%MFS_ENABLED	Menu item is enabled and can be selected.
%MFS_GRAYED	Menu item is disabled and cannot be selected, and is drawn in a "grayed" state.
%MFS_HILITE	Menu item is highlighted.
%MFS_UNCHECKED	Menu item does not have a checkmark next to it.
%MFS_UNHILITE	Menu item is not highlighted.

See also Dynamic Dialog Tools, Menus, MENU ADD POPUP, MENU ADD STRING, MENU ATTACH, MENU DELETE, MENU DRAW BAR, MENU GET TEXT, MENU NEW BAR, MENU NEW POPUP, MENU SET STATE, MENU SET TEXT

MENU GET TEXT statement

MENU GET TEXT statement

Purpose	Return the text associated with a given menu item.
Syntax	**`MENU GET TEXT hMenu, [BYCMD] position& TO txt$`**
Remarks	Return the text displayed in the menu item identified by *position&*.
hMenu	Handle of the menu that contains the menu item to be examined.
position&	Position of the menu item to examine. If BYCMD is specified, *position&* refers to the unique menu item identifier of the item to examine. Otherwise, *position&* indicates the physical position of the menu item within the menu, where *position&* = 1 for the first position, *position&* = 2 for the second position, and so on.
txt$	variable where the text from the menu item will be placed.
See also	Dynamic Dialog Tools, Menus, MENU ADD POPUP, MENU ADD STRING, MENU ATTACH, MENU DELETE, MENU DRAW BAR, MENU GET STATE, MENU NEW BAR, MENU NEW POPUP, MENU SET STATE, MENU SET TEXT

MENU NEW BAR statement

MENU NEW BAR statement

Purpose	Create a new menu bar.
Syntax	**`MENU NEW BAR TO hMenu`**
Remarks	Items may be added to the menu using the MENU ADD POPUP and MENU ADD STRING statements.
hMenu	Double-word or Long-integer variable where the handle of the new menu bar will be placed.
See also	Dynamic Dialog Tools, Menus, MENU ADD POPUP, MENU ADD STRING,

MENU ATTACH, MENU DELETE, MENU DRAW BAR, MENU GET STATE, MENU GET TEXT, MENU NEW POPUP, MENU SET STATE, MENU SET TEXT

Example See Menu Example.

MENU NEW POPUP statement

MENU NEW POPUP statement

Purpose Create a new popup menu.

Syntax `MENU NEW POPUP TO hPopup`

Remarks Once created, items may be added to the popup menu using the MENU ADD POPUP and MENU ADD STRING statements.

hPopup Double-word or Long-integer variable where the handle of the new popup menu will be placed.

See also Dynamic Dialog Tools, Menus, MENU ADD POPUP, MENU ADD STRING, MENU ATTACH, MENU CONTEXT, MENU DELETE, MENU DRAW BAR, MENU GET STATE, MENU GET TEXT, MENU NEW BAR, MENU SET STATE, MENU SET TEXT

Example See Menu Example.

MENU SET STATE statement

MENU SET STATE statement IMPROVED

Purpose Set the state of a specified menu item.

Syntax `MENU SET STATE hMenu, [BYCMD] position&, state&`

Remarks Change the state of the menu item identified by *position&*.

hMenu Double-word or Long-integer variable containing the handle of the menu that contains the item to change.

position& Position within the menu, of the menu item to be changed. If the BYCMD option is specified, *position&* refers to the unique menu item identifier of the item. Otherwise, *position&* indicates the physical position of the menu item within the menu, where *position&* = 1 for the first position, *position&* = 2 for the second position, and so on.

state& The new state of the menu item. This must be one or more of the following items, combined together with the OR operator to form a bitmask:

%MFS_CHECKED	Place a checkmark next to the item.
%MFS_DEFAULT	The default menu item, displayed in bold. Only one item may be the default.
%MFS_DISABLED	Disable the menu item so that it cannot be selected.
%MFS_ENABLED	Enable the menu item so that it can be selected.
%MFS_GRAYED	Disable the menu item so that it cannot be selected, and draw it in a "grayed" state to indicate this.
%MFS_HILITE	Highlight the menu item.
%MFS_UNCHECKED	Removes any checkmark next to the item.
%MFS_UNHILITE	Removes the highlight from the item.

See also Dynamic Dialog Tools, Menus, MENU ADD POPUP, MENU ADD STRING, MENU ATTACH, MENU CONTEXT, MENU DELETE, MENU DRAW BAR,

MENU GET STATE, MENU GET TEXT, MENU NEW BAR, MENU NEW POPUP, MENU SET TEXT

MENU SET TEXT statement

MENU SET TEXT statement

Purpose Set the text of a menu item.

Syntax **MENU SET TEXT *hMenu*, [BYCMD] *position&*, *txt$***

Remarks Set the text of the menu item identified by *position&*.

hMenu Handle of the menu that contains the menu item to change.

position& Position within the menu, of the menu item to be changed. If the BYCMD option is used, *position&* specifies the unique menu item identifier of the item to change. Otherwise, *position&* indicates the physical position of the menu item within the menu, where *position&* = 1 for the first position, *position&* = 2 for the second position, and so on.

txt$ The new text for the menu item.

See also Dynamic Dialog Tools, Menus, MENU ADD POPUP, MENU ADD STRING, MENU ATTACH, MENU CONTEXT, MENU DELETE, MENU DRAW BAR, MENU GET STATE, MENU GET TEXT, MENU NEW BAR, MENU NEW POPUP, MENU SET STATE

METHOD / END METHOD statements

Keyword Template

Purpose

Syntax

Remarks

See also

Example

METHOD/END METHOD statements IMPROVED

Purpose Define a METHOD procedure within a class.

Syntax

```
[CLASS|OVERRIDE] METHOD name [<DispID>] [ALIAS "altname"] (var AS type...)
[THREADSAFE] [AS type]
  [statements]
  METHOD = expression
END METHOD
```

Remarks METHOD/END METHOD is used to define a METHOD procedure within a class. Standard methods can only be called through a virtual function table on a valid object.

A METHOD is a block of code, very similar to a user-defined function. Optionally, it can return a value, like a FUNCTION, or merely act as a subroutine, like a SUB. If the optional "AS type" is included, the method returns a value set by "*Method=expr*", or defaults to a return value of zero (0) or nul

, depending upon the type. METHOD parameters may be any variable type, including VARIANT variables. Methods may be called using any of the five following forms:

```
DIM ObjVar AS MyInterface
LET ObjVar  = NEWCOM Prgid$
1. ObjVar.Method1(param)
2. CALL ObjVar.Method1(param)
3. ObjVar.Method1(param) TO var
4. CALL ObjVar.Method1(param) TO var
5. var = ObjVar.Method1(param)
```

Forms 1 and 2 assume that the Method does not return a value, or you simply wish to discard it. Forms 3, 4, and 5 require that the Method return a value compatible with the type of variable specified as *var*. Parentheses enclosing parameters are optional in forms 1 and 3.

Methods may be declared (using AS *type*...) to return a string, any of the

types, a specific class of object variable (AS MyClass), a Variant, or a user defined Type.

> **Type Libraries only support the following data types: BYTE, WORD, DWORD, INTEGER, LONG, QUAD, SINGLE, DOUBLE, CURRENCY, OBJECT, STRING, and VARIANT. If any Methods or Properties use data types not supported by Type Libraries, you will receive a Error 581 - Type Library creation error, when using the #COM TLIB ON metastatement.**

In addition to the explicit return value which you declare, all Methods and Properties on an IAutomation or IDispatch interface have another "Hidden Return Value", which is cryptically named hResult. While the name would imply a handle for a result, it's really not a handle at all, but just a long integer value, used to indicate success or failure of the Method. After calling a Method or Property, you can retrieve the hResult value with the PowerBASIC function OBJRESULT. The most significant bit of the value is known as the severity bit. That bit is 0 (value is positive) for success, or 1 (value is negative) for failure. The remaining bits are used to convey error codes and additional status information. If you call any object Method/Property (either Dispatch or Direct), and the severity bit of hResult is set, PowerBASIC generates Run-Time error 99: Object error. When you create a Method or Property, PowerBASIC automatically returns an hResult of zero, which implies success. You can return a non-zero hResult value by executing a METHOD OBJRESULT = *expr* within a Method, or PROPERTY OBJRESULT = *expr* within a Property.

Class Methods

A CLASS METHOD is one which is private to the class in which it is located. That is, it may only be called from a METHOD or PROPERTY in the same class. The CLASS METHOD must be located within a CLASS block, but outside of any INTERFACE blocks. This shows it is a direct member of the class, rather than a member of an interface.

```
CLASS MyClass
  INSTANCE MyVar AS LONG

  CLASS METHOD MyClassMethod(BYVAL param AS LONG) AS STRING
    METHOD = "My" + STR$(param + MyVar)
  END METHOD

  INTERFACE MyInterface
    INHERIT IUNKNOWN
    METHOD MyMethod()
      Result$ = ME.MyClassMethod(66)
    END METHOD
  END INTERFACE
END CLASS
```

In the above example, MyClassMethod() is a CLASS METHOD, and is always accessed using the pseudo-object ME (in this case ME.MyClassMethod). Class methods are never accessible from outside a class, nor are they ever described or published in a type library.

By definition, there is no reason to have a private PROPERTY, so PowerBASIC does not offer a CLASS PROPERTY structure.

Constructors and Destructors

There are two special class methods which you may optionally add to a class. They meet a very specific need: automatic initialization when an object is created, and cleanup when an object is destroyed. Technically, they are known as constructor and destructor methods, and can perform almost any functionality needed by your object: initialization of variables, reading/writing data to/from disk, etc. You do not call these methods directly from your code. If they are present in your class, PowerBASIC automatically calls them each time an object of that class is created or destroyed. If you choose to use them, these special class methods must be named CREATE and DESTROY. They may take no parameters, and may not return a result. They are defined at the class level, so they may never appear within an INTERFACE definition.

```
CLASS MyClass
  INSTANCE MyVar AS LONG

  CLASS METHOD CREATE()
    ' Do initialization
  END METHOD

  CLASS METHOD Destroy()
    ' Do cleanup
  END METHOD

  INTERFACE MyInterface
    INHERIT IUNKNOWN
    METHOD MyMethod()
      ' Do things
    END METHOD
  END INTERFACE
END CLASS
```

As displayed above, CREATE and DESTROY must be placed at the class level, but outside of any interface block. You should note that it's not possible to name any standard method (one that's accessible through an interface) as CREATE or DESTROY. That's just to help you remember the rules for a constructor or destructor. However, you may use these names as needed to describe a method external to your program.

A very important caution: You must never create an object of the current class in a CREATE method. To do so will cause CREATE to be executed again and again until all available memory is consumed. This is a fatal error, from which recovery is impossible.

Override Methods

You can add to, or replace, the functionality of a particular method or property of an inherited base class by coding a replacement which is preceded by the word OVERRIDE. The overriding method must have the same name and signature (parameters, return value, etc.) as the one it replaces.

Dispatch ID

Every method and property in a dual interface needs a positive, long integer value to identify it. That integer value is known as a DispID (Dispatch ID), and it's used internally by COM services to call the correct function on a Dispatch interface. You can optionally specify a particular DispID by enclosing it in angle brackets immediately following the Method/Property name:

```
METHOD  MethodOne <76> ()
```

If you don't specify a DispID, PowerBASIC will assign a random value for you. This is fine for internal objects, but may cause a failure for published COM objects, as the DispID could change each time you compile your program. It is particularly important that you specify a DispID for each Method/Property in a COM Event Interface.

BYREF and BYVAL attributes

Just like a SUB or FUNCTION, PowerBASIC uses

parameters as the default form, unless you specify a override. Either key word can be placed before the parameter name, along with IN, OUT, and INOUT, as described later.

BYVAL	A copy of the data value is placed on the stack as a parameter. The copy is destroyed when the METHOD ends. BYVAL parameters default to an IN parameter, if no explicit direction is specified.
BYREF	A pointer to the data is placed on the stack as a parameter. If the data is a variable, any changes to the parameter are passed back to the caller in the variable. If the data is an expression, it is destroyed when the METHOD ends. BYREF parameters default to an INOUT parameter, if no explicit direction is specified.

Direction attributes

METHOD parameters may also specify the direction in which data is passed between the caller and callee:

IN	Data is passed from the caller to the METHOD. Generally speaking, you'll find that almost all IN parameters are passed BYVAL, and that is highly recommended. However, it is possible to pass them BYREF if necessary.
OUT	Data is passed from the METHOD back to the caller. All OUT parameters must be passed BYREF.
INOUT	Data is passed from the caller to the METHOD, and results are returned to the caller in the same parameter. All INOUT parameters must be passed BYREF.

In many cases, the direction of a parameter can be inferred directly from the BYVAL/BYREF attribute (BYVAL=IN, BYREF=OUT). However, we recommend that you include the direction attribute as an added means of self-documentation. Each METHOD parameter name may be preceded by one of BYVAL/BYREF, and one of IN/OUT/INOUT, in any sequence.

You should note an interesting rule of COM objects: **IN parameters are read-only. They may not be altered.**

IN parameters are considered by COM rules to be "constant" which may not be altered, because they are values which are not returned to the caller. However, since this is not a rule normally applied to a standard SUB or FUNCTION, it can allow programming bugs which are most difficult to find and correct. For this reason, PowerBASIC automatically protects you from this issue with no action needed on your part. When writing METHOD or PROPERTY code in PowerBASIC, you may freely assign new values to BYVAL/IN parameters. They will simply be discarded when the METHOD exits. Of course, not every programming language protects you in this way, so you must use caution if you create a COM METHOD in another compiler.

Using OPTIONAL/OPT

METHOD statements may specify one or more parameters as optional by preceding the parameter with either the keyword

(or the abbreviation OPT). When a parameter is declared optional, all subsequent parameters in the declaration are optional as well, whether or not they specify an explicit OPTIONAL or OPT directive.

VARIANT variables are particularly well suited for use as an optional parameter. If the calling code omits an optional VARIANT parameter, (BYVAL or BYREF), PowerBASIC (and most other compilers) substitute a variant of type %VT_ERROR which contains an error value of %DISP_E_PARAMNOTFOUND (&H80020004). In this case, you can check for this value directly, or use the ISMISSING function to determine whether the parameter was physically passed or not.

When optional parameters (other than VARIANT) are omitted from the calling code, the stack area normally reserved for those parameters is zero-filled.

If the parameter is defined as a BYVAL parameter, it will have the value zero. For TYPE or UNION variables passed BYVAL, the compiler will pass a string of binary zeroes of length SIZEOF(*Type_or_union_var*).

If the parameter is defined as a BYREF parameter, VARPTR(*Varname*) will equal zero; when this is true, any attempt to use *Varname* in your code will result in a General Protection Fault or memory corruption. You should use the ISMISSING() function first to determine whether it is safe to access the parameter.

THREADSAFE Option Descriptor

If you include the option THREADSAFE, PowerBASIC automatically establishes a semaphore which allows only one

to execute it at a time. Others must wait until the first thread exits the THREADSAFE procedure before they are allowed to begin.

See also #COM, CLASS, INSTANCE, INTERFACE (Direct), ISMISSING, Just what is COM?, ME, PROPERTY, What is an object, anyway?

METRICS function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

METRICS function New!

Purpose Retrieves information or dimensions of system elements.

Syntax `MetricVar = METRICS(MetricName)`

Remarks Returns information about the particular system metric specified by the parameter *MetricName*. All dimensions are specified in pixels. For example:

```
MetricVar& = METRICS(Scroll.Horz)
```

The above example retrieves the height (in pixels) of a horizontal scrollbar, and assigns it to the variable *MetricVar&*.

MetricName

MetricName	**Description**
BORDER.X	The width of a window border.
BORDER.Y	The height of a window border.
CAPTION	The height of a normal caption area.
EDGE.X	The width of a 3-D border.
EDGE.Y	The height of a 3-D border.
FRAME.FIXED.X	The thickness of the horizontal frame of a window which is fixed

	size (one which cannot be resized).
FRAME.FIXED.Y	The thickness of the vertical frame of a window which is fixed size (one which cannot be resized).
FRAME.RESIZE.X	The thickness of the horizontal frame of a window which can be resized.
FRAME.RESIZE.Y	The thickness of the vertical frame of a window which can be resized.
ICON.X	The default width of an icon.
ICON.Y	The default height of an icon.
ICONSPACE.X	The width of a grid cell for items in large icon view.
ICONSPACE.Y	The height of a grid cell for items in large icon view.
MAXIMIZED.X	The width of a maximized top-level window.
MAXIMIZED.Y	The height of a maximized top-level window.
MENUBAR	The height of a single-line menu bar.
MINIMUM.X	The minimum width of a window.
MINIMUM.Y	The minimum height of a window.
SCROLL.HORZ	The height of a horizontal scrollbar.
SCROLL.VERT	The width of a vertical scrollbar.

MID$ function

MID$ function IMPROVED

Purpose Returns a part of a

.

Syntax

```
s$ = MID$(StringExpr, Start& [, Count&])
s$ = MID$(StringExpr, Start& TO End&)
```

Remarks The MID$ function returns a part of a string expression. The first form tells the number of characters to extract, while the second form tells the start and end position instead. Both forms provide the same functionality, so the choice is just a matter of programmer convenience.

Start& and *End&* are positions in the string, starting with 1 as the first character. *Count&* tells the number of characters to extract. For example, both of the following examples return "wer".

```
a$ = MID$("PowerBASIC", 3, 3)
a$ = MID$("PowerBASIC", 3 TO 5)
```

If *Count&* is omitted, or there aren't enough characters in *StringExpr*, all remaining characters are returned. If there are no characters at the *Start&* position, an empty string is returned.

If *Start&* or *End&* are negative, the positions are counted backwards from the end of the string (-1 is the last character). If *Count&* is negative, it is interpreted as LEN(*string_expression*)-ABS(*Count&*).

See also EXTRACT$, INSTR, LEFT$, LTRIM$, MID$ statement, RIGHT$, RTRIM$, SPLIT, TALLY, TRIM$, VERIFY

Example

```
a$ = MID$("PowerBASIC", 4, 2)    ' returns "er"
a$ = MID$("PowerBASIC", 4)       ' returns "erBASIC"
a$ = MID$("PowerBASIC", 20)      ' returns a null string
a$ = MID$("1234567890",3,-4)     ' returns "345678"
a$ = MID$("abcde", -3, 2)        ' returns "cd"
a$ = MID$("PowerBASIC", 4 TO 6)  ' returns "erB"
a$ = MID$("PowerBASIC", 4 TO 99) ' returns "erBASIC"
```

MID$ statement

MID$ statement IMPROVED

Purpose Replace characters in a variable.

Syntax

```
MID$(StringVar, Start& [, Count&]) = replacement
MID$(StringVar, Start& TO End&      = replacement
```

Remarks The MID$ statement replaces characters in a string variable. The first form tells the number of characters to replace, while the second form tells the start and end position instead. Both forms provide the same functionality, so the choice is just a matter of programmer convenience.

Start& and *End&* are positions in the string, starting with 1 as the first character. *Count&* tells the number of characters to replace.

If *Count&* is omitted, or there aren't enough characters in *StringVar*, all remaining characters are replaced. If there are no characters at the *Start&* position, no operation is performed.

If *Start&* or *End&* are negative, the positions are counted backwards from the end of the string (-1 is the last character). If *Count&* is negative, it is interpreted as LEN(*string_expression*)-ABS(*Count&*).

The replacement will never extend past the end of *StringVar*. In other words, MID$ cannot alter the length of a string.

Restrictions If *Start&* evaluates to a position outside of the string on either side, or if *Start&* is zero, no operation is performed.

See also BUILD$, INSTR, LTRIM$, MID$ function, REMOVE$, REPLACE, RTRIM$, TALLY, TRIM$, VERIFY

Example

```
DummyString$ = "1234567890"
FOR M = 1 TO 10
  TestString$ = DummyString$
  MID$(TestString$,1,M) = "PowerBASIC"
NEXT M
```

Result

```
P234567890
Po34567890
Pow4567890
Powe567890
 ...
PowerBAS90
PowerBASI0
PowerBASIC
```

MIN function

MIN function

Purpose Return the argument with the smallest (minimum) value.

Syntax

```
y  = MIN(arg, arg [, arg] ...)
y& = MIN&(arg&, arg& [, arg&] ...)
y$ = MIN$(arg$, arg$ [, arg$] ...)
```

Remarks These functions take any number of arguments and return the argument with the smallest (minimum) value. MIN handles arguments of any type.

MIN& handles arguments that evaluate to Integers and Long-integers (MIN& is more efficient than MIN).

MIN$ handles

arguments.

If any arguments of MIN& are outside of the range of Long-integers, the result is undefined. Any

arguments of MIN& will be rounded to Long-integers before the comparison begins.

MIN% is recognized as a valid synonym for MIN&.

See also CHOOSE, CHOOSE&, CHOOSE$, IIF, IIF&, IIF$, MAX, MAX&, MAX$, SWITCH, SWITCH&, SWITCH$

Example

```
x& = MIN&(A, B, C, D)
x$ = MIN$("abacadabra","cad", A$, B$(4), C$ + D$ + LEFT$(E$,5))
x## = MIN(1.1@@, A%/B!, C#(x)^D, E##, SIN(F&))
```

MKBYT$ function

MKBYT$, MKCUR$, MKCUX$, MKD$, MKDWD$, MKE$, MKI$, MKL$, MKQ$, MKS$ and MKWRD$ functions

Purpose Converts a

value into an ANSI .

Syntax

```
AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)
```

Remarks The MKx functions return the binary representations of a number as a set of bytes in an ANSI string. Do not confuse these functions with the STR$ or FORMAT$ functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or UDT which consist of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CV*x* functions are complementary to the MK*x* functions. They convert the binary representation in a string to an actual numeric value:

Function	Converts to	From
MKBYT$	1-byte string	Byte
MKCUR$	8-byte string	Currency
MKCUX$	8-byte string	Extended-currency
MKD$	8-byte string	Double-precision
MKDWD$	4-byte string	Double-word
MKE$	10-byte string	Extended-precision
MKI$	2-byte string	Integer

MKL$	4-byte string	Long-integer
MKQ$	8-byte string	Quad-integer
MKS$	4-byte string	Single-precision
MKWRD$	2-byte string	Word

See also CVI and associated functions

MKCUR$ function

MKBYT$, MKCUR$, MKCUX$, MKD$, MKDWD$, MKE$, MKI$, MKL$, MKQ$, MKS$ and MKWRD$ functions

Purpose Converts a value into an ANSI .

Syntax

```
AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)
```

Remarks The MKx functions return the binary representations of a number as a set of bytes in an ANSI string. Do not confuse these functions with the STR$ or FORMAT$ functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or UDT which consist of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CV*x* functions are complementary to the MK*x* functions. They convert the binary representation in a string to an actual numeric value:

Function	Converts to	From
MKBYT$	1-byte string	Byte
MKCUR$	8-byte string	Currency
MKCUX$	8-byte string	Extended-currency
MKD$	8-byte string	Double-precision
MKDWD$	4-byte string	Double-word
MKE$	10-byte string	Extended-precision
MKI$	2-byte string	Integer
MKL$	4-byte string	Long-integer
MKQ$	8-byte string	Quad-integer
MKS$	4-byte string	Single-precision
MKWRD$	2-byte string	Word

See also CVI and associated functions

MKCUX$ function

MKBYT$, MKCUR$, MKCUX$, MKD$, MKDWD$, MKE$, MKI$, MKL$, MKQ$, MKS$ and MKWRD$ functions

Purpose Converts a

value into an ANSI .

Syntax

```
AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)
```

Remarks The MKx functions return the binary representations of a number as a set of bytes in an ANSI string. Do not confuse these functions with the STR$ or FORMAT$ functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or UDT which consist of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CV*x* functions are complementary to the MK*x* functions. They convert the binary representation in a string to an actual numeric value:

Function	Converts to	From
MKBYT$	1-byte string	Byte
MKCUR$	8-byte string	Currency
MKCUX$	8-byte string	Extended-currency
MKD$	8-byte string	Double-precision
MKDWD$	4-byte string	Double-word
MKE$	10-byte string	Extended-precision
MKI$	2-byte string	Integer
MKL$	4-byte string	Long-integer
MKQ$	8-byte string	Quad-integer
MKS$	4-byte string	Single-precision
MKWRD$	2-byte string	Word

See also CVI and associated functions

MKD$ function

MKBYT$, MKCUR$, MKCUX$, MKD$, MKDWD$, MKE$, MKI$, MKL$, MKQ$, MKS$ and MKWRD$ functions

Purpose Converts a

value into an ANSI .

Syntax

```
AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)
```

Remarks

The MKx functions return the binary representations of a number as a set of bytes in an ANSI string. Do not confuse these functions with the STR$ or FORMAT$ functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or UDT which consist of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CV*x* functions are complementary to the MK*x* functions. They convert the binary representation in a string to an actual numeric value:

Function	Converts to	From
MKBYT$	1-byte string	Byte
MKCUR$	8-byte string	Currency
MKCUX$	8-byte string	Extended-currency
MKD$	8-byte string	Double-precision
MKDWD$	4-byte string	Double-word
MKE$	10-byte string	Extended-precision
MKI$	2-byte string	Integer
MKL$	4-byte string	Long-integer
MKQ$	8-byte string	Quad-integer
MKS$	4-byte string	Single-precision
MKWRD$	2-byte string	Word

See also CVI and associated functions

MKDIR statement

MKDIR statement

Purpose Create a subdirectory/folder (like the DOS MKDIR command).

Syntax **MKDIR** ***path$***

Remarks

path$ is a string expression describing the directory to be created.

MKDIR (make directory) creates the subdirectory specified by *path$*. If you try to create a directory that already exists, a run-time Error 75 occurs ("Path/file access error"). If *path$* includes an parent folder that does not exist, a run-time Error 76 occurs ("Path not found").

MKDIR can use Long File Names (LFNs).

See also CHDIR, RMDIR

Example

```
MKDIR "C:\Program Files\Company\Application Data"
```

MKDWD$ function

MKBYT$, MKCUR$, MKCUX$, MKD$, MKDWD$, MKE$, MKI$, MKL$, MKQ$, MKS$ and MKWRD$ functions

Purpose Converts a

value into an ANSI .

Syntax

```
AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)
```

Remarks The MKx functions return the binary representations of a number as a set of bytes in an ANSI string. Do not confuse these functions with the STR$ or FORMAT$ functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or UDT which consist of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CV*x* functions are complementary to the MK*x* functions. They convert the binary representation in a string to an actual numeric value:

Function	Converts to	From
MKBYT$	1-byte string	Byte
MKCUR$	8-byte string	Currency
MKCUX$	8-byte string	Extended-currency
MKD$	8-byte string	Double-precision
MKDWD$	4-byte string	Double-word
MKE$	10-byte string	Extended-precision
MKI$	2-byte string	Integer
MKL$	4-byte string	Long-integer
MKQ$	8-byte string	Quad-integer
MKS$	4-byte string	Single-precision
MKWRD$	2-byte string	Word

See also CVI and associated functions

MKE$ function

MKBYT$, MKCUR$, MKCUX$, MKD$, MKDWD$, MKE$, MKI$, MKL$, MKQ$, MKS$ and MKWRD$ functions

Purpose Converts a

value into an ANSI .

Syntax

```
AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)
```

Remarks

The MKx functions return the binary representations of a number as a set of bytes in an ANSI string. Do not confuse these functions with the STR$ or FORMAT$ functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or UDT which consist of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CV*x* functions are complementary to the MK*x* functions. They convert the binary representation in a string to an actual numeric value:

Function	Converts to	From
MKBYT$	1-byte string	Byte
MKCUR$	8-byte string	Currency
MKCUX$	8-byte string	Extended-currency
MKD$	8-byte string	Double-precision
MKDWD$	4-byte string	Double-word
MKE$	10-byte string	Extended-precision
MKI$	2-byte string	Integer
MKL$	4-byte string	Long-integer
MKQ$	8-byte string	Quad-integer
MKS$	4-byte string	Single-precision
MKWRD$	2-byte string	Word

See also

CVI and associated functions

MKI$ function

MKBYT$, MKCUR$, MKCUX$, MKD$, MKDWD$, MKE$, MKI$, MKL$, MKQ$, MKS$ and MKWRD$ functions

Purpose

Converts a

value into an ANSI .

Syntax

```
AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
```

```
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)
```

Remarks

The MKx functions return the binary representations of a number as a set of bytes in an ANSI string. Do not confuse these functions with the STR$ or FORMAT$ functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or UDT which consist of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CV*x* functions are complementary to the MK*x* functions. They convert the binary representation in a string to an actual numeric value:

Function	Converts to	From
MKBYT$	1-byte string	Byte
MKCUR$	8-byte string	Currency
MKCUX$	8-byte string	Extended-currency
MKD$	8-byte string	Double-precision
MKDWD$	4-byte string	Double-word
MKE$	10-byte string	Extended-precision
MKI$	2-byte string	Integer
MKL$	4-byte string	Long-integer
MKQ$	8-byte string	Quad-integer
MKS$	4-byte string	Single-precision
MKWRD$	2-byte string	Word

See also

CVI and associated functions

MKL$ function

MKBYT$, MKCUR$, MKCUX$, MKD$, MKDWD$, MKE$, MKI$, MKL$, MKQ$, MKS$ and MKWRD$ functions

Purpose

Converts a

value into an ANSI .

Syntax

```
AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)
```

Remarks

The MKx functions return the binary representations of a number as a set of bytes in an ANSI string. Do not confuse these functions with the STR$ or FORMAT$ functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or UDT which consist of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CV*x* functions are complementary to the MK*x* functions. They convert the binary representation in a string to an actual numeric value:

Function	Converts to	From
MKBYT$	1-byte string	Byte
MKCUR$	8-byte string	Currency
MKCUX$	8-byte string	Extended-currency
MKD$	8-byte string	Double-precision
MKDWD$	4-byte string	Double-word
MKE$	10-byte string	Extended-precision
MKI$	2-byte string	Integer
MKL$	4-byte string	Long-integer
MKQ$	8-byte string	Quad-integer
MKS$	4-byte string	Single-precision
MKWRD$	2-byte string	Word

See also CVI and associated functions

MKQ$ function

MKBYT$, MKCUR$, MKCUX$, MKD$, MKDWD$, MKE$, MKI$, MKL$, MKQ$, MKS$ and MKWRD$ functions

Purpose Converts a

value into an ANSI .

Syntax

```
AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)
```

Remarks The MKx functions return the binary representations of a number as a set of bytes in an ANSI string. Do not confuse these functions with the STR$ or FORMAT$ functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or UDT which consist of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CV*x* functions are complementary to the MK*x* functions. They convert the binary representation in a string to an actual numeric value:

Function	Converts to	From
MKBYT$	1-byte string	Byte
MKCUR$	8-byte string	Currency
MKCUX$	8-byte string	Extended-currency
MKD$	8-byte string	Double-precision
MKDWD$	4-byte string	Double-word
MKE$	10-byte string	Extended-precision
MKI$	2-byte string	Integer

MKL$	4-byte string	Long-integer
MKQ$	8-byte string	Quad-integer
MKS$	4-byte string	Single-precision
MKWRD$	2-byte string	Word

See also CVI and associated functions

MKS$ function

MKBYT$, MKCUR$, MKCUX$, MKD$, MKDWD$, MKE$, MKI$, MKL$, MKQ$, MKS$ and MKWRD$ functions

Purpose Converts a
value into an ANSI .

Syntax

```
AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)
```

Remarks The MKx functions return the binary representations of a number as a set of bytes in an ANSI string. Do not confuse these functions with the STR$ or FORMAT$ functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or UDT which consist of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CV*x* functions are complementary to the MK*x* functions. They convert the binary representation in a string to an actual numeric value:

Function	Converts to	From
MKBYT$	1-byte string	Byte
MKCUR$	8-byte string	Currency
MKCUX$	8-byte string	Extended-currency
MKD$	8-byte string	Double-precision
MKDWD$	4-byte string	Double-word
MKE$	10-byte string	Extended-precision
MKI$	2-byte string	Integer
MKL$	4-byte string	Long-integer
MKQ$	8-byte string	Quad-integer
MKS$	4-byte string	Single-precision
MKWRD$	2-byte string	Word

See also CVI and associated functions

MKWRD$ function

MKBYT$, MKCUR$, MKCUX$, MKD$, MKDWD$, MKE$, MKI$, MKL$, MKQ$, MKS$ and MKWRD$ functions

Purpose Converts a

value into an ANSI .

Syntax

```
AnsiStringVar$ = MKBYT$(byte_expr)
AnsiStringVar$ = MKCUR$(currency_expr)
AnsiStringVar$ = MKCUX$(extended_currency_expr)
AnsiStringVar$ = MKD$(double_precision_expr)
AnsiStringVar$ = MKDWD$(double_word_expr)
AnsiStringVar$ = MKE$(extended_precision_expr)
AnsiStringVar$ = MKI$(integer_expr)
AnsiStringVar$ = MKL$(long_integer_expr)
AnsiStringVar$ = MKQ$(quad_integer_expr)
AnsiStringVar$ = MKS$(single_precision_expr)
AnsiStringVar$ = MKWRD$(word_expr)
```

Remarks The MKx functions return the binary representations of a number as a set of bytes in an ANSI string. Do not confuse these functions with the STR$ or FORMAT$ functions, which return a printable string.

In all but the most extreme cases, the returned string should only be stored as an ANSI string or UDT which consist of single bytes. WIDE (Unicode) strings consist of a series of 2-byte words which will generally yield undefined results.

The CV*x* functions are complementary to the MK*x* functions. They convert the binary representation in a string to an actual numeric value:

Function	Converts to	From
MKBYT$	1-byte string	Byte
MKCUR$	8-byte string	Currency
MKCUX$	8-byte string	Extended-currency
MKD$	8-byte string	Double-precision
MKDWD$	4-byte string	Double-word
MKE$	10-byte string	Extended-precision
MKI$	2-byte string	Integer
MKL$	4-byte string	Long-integer
MKQ$	8-byte string	Quad-integer
MKS$	4-byte string	Single-precision
MKWRD$	2-byte string	Word

See also CVI and associated functions

MOD operator

MOD operator

Purpose Return the remainder of the division between two numbers.

Syntax ***p MOD q***

Remarks The MOD operator divides the two operands, *p* and *q*, and returns the remainder of that division. The result of the initial division is truncated to an

value, before the remainder is calculated. See the example below.
The remainder may be a
value. MOD is often considered to complement integral division.

See Also [LET]

Example

```
lResult1& = 10& MOD 3&   ' Returns 1&
fResult2! = 13! MOD 2.7! ' Returns 2.2!

iStack&   = 1023&
HiStack& = iStack& \ 256&  ' Returns 3&
LoStack& = iStack& MOD 256 ' Returns 255&

' c! and d! are calculated equivalently
a! = 13
b! = 2.7
c! = a! MOD b!
d! = a! - FIX(a! / b!) * b!

CurrentLine = 1
WHILE CurrentLine < Lines
  PrintLine txt$(CurrentLine)
  IF (CurrentLine MOD 55) = 0 THEN DoFormFeed
  INCR CurrentLine
WEND
```

MONTHNAME$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

MONTHNAME$ function New!

Purpose Converts a Month number to the associated name.

Syntax `s$ = MONTHNAME$(MonthNumber&)`

Remarks The MONTHNAME$ function converts a Month number into a
representing its associated name. The argument must be in the range of 1 through 12, representing the names January, February, etc.

See also [DATE$], [DAYNAME$], [POWERTIME]

MOUSEPTR statement

MOUSEPTR statement

Purpose Change the mouse pointer (cursor) to a new shape.

Syntax `MOUSEPTR style [TO var&]`

Remarks If the optional TO clause is included, the handle of the previous cursor is assigned to *var&*. If the operation fails, the value zero is assigned to *var&*. Normally, the Long integer or DWORD value style should be in the range of 1 through 13 to choose one of the stock cursor shapes as follows:

style&	**Definition**
0	Hide mouse pointer **
1	Arrow
2	Cross
3	I-Beam
4	Arrow
5	Sizing pointer (all directions)
6	Sizing pointer (NE-SW diagonal)
7	Sizing pointer (vertical)
8	Sizing pointer (NW-SE diagonal)
9	Sizing pointer (horizontal)
10	Up arrow
11	Hourglass ("Busy" or "Wait" pointer)
12	No mouse pointer
13	App Starting (arrow with an hourglass)

** If *style&* = 0 then the OS may restore the cursor if it is moved.

If style is outside the range 0 through 13, it must contain a valid handle to a cursor, such as the value which was returned by a prior invocation of MOUSEPTR. This allows the programmer to restore a previous cursor style.

The mouse pointer is only changed for dialogs and windows in your application. If the mouse pointer is moved over another application or the desktop, the pointer will change to the default for that application/process. In GUI applications, MOUSEPTR can be useful in %WM_SETCURSOR message handler routines that override the default cursor handling.

MSGBOX function

MSGBOX function

Purpose Display a message box containing a text

and an optional title, using one or more styles, and returning the button selected by the user.

Syntax ***lResult&* = MSGBOX(*txt$* [, [*style&*], *title$*])**

Remarks The MSGBOX function is comprised of the following elements:

txt$ Indicates the text to display within the message box.

style& Optional parameter which determines the appearance of the message box. Some styles may be combined (OR'ed together) to specify the button and icon displayed in the message box. If style& is omitted, PowerBASIC substitutes %MB_OK. The following styles are defined in WIN32API.INC, in the form of numeric equates:

%MB_OK	Display OK button (default)
%MB_OKCANCEL	Display OK and Cancel buttons
%MB_ABORTRETRYIGNORE	Display Abort, Retry and Ignore
%MB_YESNOCANCEL	Display Yes, No and Cancel
%MB_YESNO	Display Yes and No buttons
%MB_RETRYCANCEL	Display Retry and Cancel buttons

%MB_ICONERROR	Display Error icon (stop sign)
%MB_ICONINFORMATION	Display Information icon ("i")
%MB_ICONQUESTION	Display Query icon (question mark)
%MB_ICONWARNING	Display Warning icon (exclamation)
%MB_DEFBUTTON1	Default to 1st button (default)
%MB_DEFBUTTON2	Default to 2nd button
%MB_DEFBUTTON3	Default to 3rd button
%MB_APPLMODAL	Application Modal - Despite the name, the user can continue to interact with other dialogs without dismissing the MSGBOX. (default)
%MB_SYSTEMMODAL	System Modal - Operates identically to % MB_APPLMODAL, except the MSGBOX is given the %WS_EX_TOPMOST style so that it remains above all other windows and dialogs.
%MB_TASKMODAL	Task Modal - All top-level windows belonging to the current application are disabled until the MSGBOX is dismissed. %MB_TASKMODAL is commonly used to display a truly modal MSGBOX.

title$* Optional title to be displayed in the caption of the message box. If *title$ is not specified, "PowerBASIC" is used automatically.

lResult& Identifies the Button selected by the user. This will be equal to one of the following equates:

%IDOK	OK button
%IDCANCEL	Cancel button
%IDABORT	Abort button
%IDRETRY	Retry button
%IDIGNORE	Ignore button
%IDYES	Yes button
%IDNO	No button

Additional styles may be found in WIN32API.INC in the section prefixed with %MB_. If you are not interested in which button the user selects, use a MSGBOX statement rather than a MSGBOX function.

A question mark may be used as an abbreviation for the MSGBOX statement.

Restrictions Strings displayed by the MSGBOX function are displayed only up to the first $NUL character, if any.

See also INPUTBOX$, MSGBOX statement, TXT pseudo-object

Example

```
lResult& = MSGBOX("Overwrite registry file?", %MB_OKCANCEL OR %
MB_DEFBUTTON2 _
             OR %MB_TASKMODAL, "Critical Warning")
```

MSGBOX statement

MSGBOX statement

Purpose Display a message box containing a text
 and optional title, using one or more styles.

Syntax

```
MSGBOX txt$ [, [style%], title$]
? txt$ [, [style%], title$]
```

Remarks The MSGBOX statement comprises the following elements:

txt$ Text to display within the message box.

style& Optional parameter which determines the appearance of the message box. Some styles may be combined (OR'ed together) to specify the button and icon displayed in the message box. If *style&* is omitted, PowerBASIC substitutes %MB_OK. The following are some of the more common styles used with the MSGBOX statement (also see the MSGBOX function for more information):

%MB_OK	Display OK button (default)
%MB_ICONERROR	Display Error icon (stop sign)
%MB_ICONINFORMATION	Display Information icon ("i")
%MB_ICONWARNING	Display Warning icon (exclamation)
%MB_APPLMODAL	Application Modal - Despite the name, the user can continue to interact with other dialogs without dismissing the MSGBOX. (default)
%MB_SYSTEMMODAL	System Modal - Operates identically to % MB_APPLMODAL, except the MSGBOX is given the %WS_EX_TOPMOST style so that it remains above all other windows and dialogs.
%MB_TASKMODAL	Task Modal - All top-level windows belonging to the current application are disabled until the MSGBOX is dismissed. %MB_TASKMODAL is commonly used to display a truly modal MSGBOX.

Additional styles may be found in WIN32API.INC, in the section prefixed with %MB_. If you are interested in which button the user selects, use a MSGBOX function rather than a MSGBOX statement.

title$* Determines the title to be displayed in the caption of the message box. If *title$ is not specified, "PowerBASIC" is used automatically.

The MSGBOX statement may be represented by the query (?) character as a shortcut. This is similar to the behavior in the PowerBASIC Console Compiler (PB/CC), where the query character is recognized as a synonym for the PRINT statement. This can simplify the creation of certain test code, since the query character provides similar functionality in both compilers.

Restrictions Strings displayed by the MSGBOX function are displayed only up to the first $NUL character, if any.

See also INPUTBOX$, MSGBOX function, TXT pseudo-object

Example

```
MSGBOX "Got here, hit OK to continue",, "Title of subroutine 123"
MSGBOX "Current value of X% is: " & STR$(x%)
MSGBOX "Paused, click OK to continue!"
MSGBOX "Click OK to reboot the universe…", %MB_TASKMODAL OR %MB_ICONERROR,
"Reality has crashed!"
```

MYBASE pseudo-variable

Keyword Template

Purpose

Syntax

Remarks

See also

Example

MYBASE pseudo-variable

Purpose A pseudo object variable to reference the inherited parent object.

Syntax `MYBASE.Method1(param)`

Remarks MYBASE is a pseudo-variable, which PowerBASIC automatically defines in every Method and Property on an inherited interface. It is treated as a reference to the original, inherited object. Using MYBASE, it's possible to call the original Methods and Properties so you can modify or build upon them in the derived interface.

MYBASE may not be assigned to an object variable, nor may it be used as a Sub/Function/Method/Property parameter.

See also CLASS, INTERFACE (Direct), INTERFACE (IDBind), ME, METHOD, PROPERTY, What is an object, anyway?, What is inheritance?

NAME statement

NAME statement

Purpose Rename a file or a directory (like the DOS REN command).

Syntax `NAME filespec1$ AS filespec2$`

Remarks The NAME statement comprises the following elements:

filespec1$* The current name of a file or directory. The file must not be currently opened or locked. *filespec1$ may be either a Short File Name (SFN) or a Long File Name (LFN).

filespec2$ The desired name of the file or directory, and may use Long File Name (LFN) naming conventions.

Each filespec may contain drive and path specifications as well as a file or directory name.

If *filespec1* does not exist, run-time Error 53 ("File not found") occurs. If *filespec2* already exists, run-time Error 58 occurs ("File already exists"). If *filespec1* has been opened or locked by your application and not closed, an Error 51 can occur ("Internal system error"). You should never rename a file that has been opened by your code and not (yet) closed.

Restrictions It is possible to move a file from one directory, drive, or partition, to another. It is not possible to move directories between drives or partitions. Wildcard characters are not permitted in the file names.

Example

```
OldName$ = "MYFILE.EXE"
NewName$ = "YOURFILE.EXE"
NAME OldName$ AS NewName$
```

NEXT statement

FOR/NEXT statements

Purpose Define a loop of program statements whose execution is controlled by an automatically incrementing or decrementing counter.

Syntax

```
FOR Counter = start TO stop [STEP increment]
  [statements]
  [EXIT FOR]
  [statements]
  [ITERATE FOR]
  [statements]
NEXT [Counter]
```

Remarks *Counter* is a numeric variable serving as the loop counter.

start is a numeric expression specifying the value initially assigned to *Counter*.

stop is a numeric expression giving the value that *Counter* must reach for the loop to be terminated.

increment is an optional numeric expression defining the amount by which *Counter* is incremented with each loop execution. If not specified, *increment* defaults to 1.

Note that *increment* must be the same data type or in the same range as *Counter*. For example:

```
FOR x?? = 50 TO 1 STEP -1
```

will fail because -1 is not within the range of an unsigned Word variable.

When a FOR statement is encountered, *start* is assigned to *Counter,* and *Counter* is tested to see if it is greater than (or, for negative *increment*, less than) *stop*. If not, the statements within the FOR/NEXT loop are executed, *increment* is added to *Counter*, and *Counter* again tested against *stop*. The statements in the loop are executed repeatedly until the test fails, at which time control passes to the statement immediately following the NEXT.

If *increment* is equal to the maximum value of a variable class (255 for a byte, 32767 for an Integer, 65535 for a Word, etc), the compiler will generate an error. If *step* is zero, an infinite loop can be created.

When using

values with FOR/NEXT, be sure to allow for round-off errors when mixing numbers of different precision. Using constants or variables of the same type throughout will help solve this problem:

```
FOR n# = 1.0 TO 1.5 STEP 0.1
  x$ = STR$(n#)
NEXT n#
```

executes 5 times and returns:

```
1
1.10000000149012
1.20000000298023
1.30000000447035
1.40000000596046
```

while:

```
FOR n@ = 1.0@ TO 1.5@ STEP 0.1@
  x$ = STR$(n@)
NEXT n@
```

executes 6 times and returns:

```
1
1.1
1.2
1.3
1.4
1.5
```

FOR/NEXT loops run fastest when *Counter* is a Long-integer variable, and *start* and *increment* are Long-integer constants. The value of *Counter* is available like any other variable within the loop. It is wise to avoid explicitly modifying the value of *Counter* within the loop. If you need to exit the loop prematurely, use an EXIT FOR statement. Keep range considerations in mind. For example, if *Counter* is an Integer variable, you may not use the maximum value for an Integer for *stop*, as *Counter* would be incremented outside the Integer range at the end of the loop.

The body of the loop is skipped altogether if the initial value of *Counter* is greater than *stop* (or, for a negative *increment*, if *Counter* is less than *stop*).

FOR/NEXT loops can be nested within other FOR/NEXT loops. Be sure to use unique counter variables. Note that PowerBASIC allows the *Counter* in the NEXT keyword simply as a comment, which is ignored. For example, the following will compile, even though the counter variables are "crossed":

```
FOR n = 1 TO 10
  FOR m = 1 TO 20
    .
    .
    .
  NEXT n
NEXT m
```

You can omit the counter variable in the NEXT statement altogether. For example:

```
FOR n = 1 TO 10
  .
  .
  .
NEXT
```

If a NEXT is encountered without a corresponding FOR (or vice versa), a compile-time error is generated.

> **Previous version of PowerBASIC supported a single NEXT statement used with multiple nested FOR/NEXT loops, such as NEXT c, b, a. This is no longer supported and you will need to update your code to use multiple NEXT statements.**

In certain situations, previous versions of PowerBASIC optimized FOR/NEXT loops to count down instead of up for improved execution speed. This optimization could cause the counter variable to contain a value which was not expected when execution of the loop was complete. This optimization has been improved so that the counter variable value is always correct upon loop completion, even if EXIT FOR was used to force an early termination.

Although the compiler does not care about such things, it is considered good programming practice to indent the statements between FOR and NEXT by two or three spaces to set off the structure of the loop.

For additional performance, use a REGISTER variable for the loop counter variable.

Restrictions The counter variable must be a simple numeric scalar variable, such as LOCAL, STATIC, GLOBAL, or REGISTER. This aids in maintaining high performance levels for a simple loop structure. Variables which require multiple operations to access are specifically disallowed: THREADED, INSTANCE,

Parameters, POINTER Targets, and ARRAY.

See also #OPTIMIZE, #REGISTER, DO/LOOP, EXIT, FOR EACH/NEXT, ITERATE, WHILE/WEND, REGISTER

NOT operator

NOT operator

Purpose The NOT operator works as a bitwise arithmetic operator.

Syntax `NOT p`

Remarks PowerBASIC's NOT operator returns the one's-complement of an

expression. When dealing with the absolute values 0 and -1, the NOT operator "reverses" the two values, performing a Boolean-like operation.

PowerBASIC accepts any non-zero value as a logical TRUE value; therefore, subtle logic problems can arise in a program when the NOT operator is used to perform Boolean logic tests with operand values that are not limited to just 0 and -1.

Consider the following two test conditions:

```
test1 = 0          ' test1 is FALSE (zero)
IF NOT test1 THEN  ' TRUE (-1 is non-zero)

test2 = 1          ' test2 is TRUE (1 is non-zero)
IF NOT test2 THEN  ' still TRUE (-2 is non-zero)
```

Because NOT performs a bitwise operation on *test2*, it does not reverse the logical TRUE/FALSE value of *test2*, rather, it returns -2 (the one's-complement of 1) and this is evaluated as a logical TRUE value.

In cases where a proper logical (Boolean) evaluation is required, and the operand may be a value other than 0 and -1, the ISFALSE operator should be used in place of the NOT operator:

```
test3 = 1             ' test3 is TRUE (non-zero)
IF ISFALSE test3 THEN ' ISFALSE detects test3 is
[statements]          ' TRUE so the IF test fails
```

The two's-complement of a value can be obtained with the following algorithm:

```
y = (NOT x) + 1
Using NOT as a logical operator
```

NOT returns 0 (FALSE) if *and only if* its operand is *exactly* -1 (TRUE). Generally, you should use the ISFALSE operator instead of NOT, when you are testing for logical falsity.

Truth table

x	NOT x
0	-1
-1	0

Using NOT as a bitwise arithmetic operator

NOT performs a one's-complement or bit reversal of each bit in an integral-class value. Here is a sample:

```
x% = NOT 16383%  ' Result is -16384
```

```
NOT        0011 1111 1111 1111  (&H3FFF)
           1100 0000 0000 0000  (&HC000)
MSB                             LSB (bit 0)
```

See also Arithmetic Operators, AND, EQV, IMP, ISFALSE, ISTRUE, OR, Short-circuit evaluation, XOR

NUL$ function

NUL$ function

Purpose Return a

consisting of a specified number of $NUL (CHR$(0)) characters.

Syntax `sResult$ = NUL$(count)`

Remarks NUL$ returns a *count* character string of $NUL characters.

See also CHR$, REPEAT$, SPACE$, STRING$

OBJACTIVE function

OBJACTIVE function

Purpose Return TRUE/FALSE as an indication of the running state of an initialized COM object (EXE based).

Syntax `lResult& = OBJACTIVE(prgid$)`

Remarks OBJACTIVE can provide information that may prove useful in determining whether to use the NEWCOM or GETCOM options with the LET (with Objects) statement. OBJACTIVE may only be used on COM objects that are in EXE format, not DLL/OCX/etc. In the latter case, OBJACTIVE returns FALSE (0).

*prgid$* The registered program ID string for the COM object. For example, "Word.Application.8", or a version-independent program ID such as "Word.Application". A valid program ID string can be obtained from a 16-byte class ID string using the PROGID$ function, or derived from a 38 character GUID string using PROGID$ and GUID$.

See also DIM, CLSID$, GUID$, GUIDTXT$, INTERFACE (Direct), INTERFACE (IDBind), ISNOTHING, ISOBJECT, Just what is COM?, LET (with Objects), OBJECT, OBJEQUAL, OBJPTR, OBJRESULT, PROGID$, What is a COM component?

Example

```
' Create a reference to the MSWORD object
LOCAL oWord AS IDISPATCH  ' use late-binding
LOCAL i     AS LONG

IF OBJACTIVE("Word.Application") THEN
  ' Word is already active, use the existing instance
  oWord = GETCOM "Word.Application"
ELSE
  ' Word is not active, create a new instance
  oWord = NEWCOM "Word.Application"
END IF
' Set MS Word to a normal visible state
i = 0
OBJECT LET oWord.WindowState = i
' more code here
```

OBJECT statement

OBJECT statement

Purpose Communicate with a COM object through the dispatch interface.

Syntax

```
OBJECT GET interface.member[.member.] [([[paramname =] param1 [, ...]])]
TO ResultVar
OBJECT LET interface.member[.member.] [([[paramname =] param1 [, ...]])] =
ValueVar
OBJECT SET interface.member[.member.] [([[paramname =] param1 [, ...]])] =
ValueVar
OBJECT CALL interface.member[.member.] [([[paramname =] param1 [, ...]])]
[TO ResultVar]
OBJECT RAISEEVENT [interface.]member[([[paramname =] param1 [, ...]])]
```

Remarks There are five general forms of the OBJECT statement which are used to communicate through a Dispatch interface to an object.

OBJECT GET	Retrieve or read the value of an Interface member Property. This is similar to retrieving the value of a variable.
OBJECT LET	Assign or write a value to an Interface member Property. This is similar to assigning a value to a variable.
OBJECT SET	Assign or write a value to an Interface member Property that contains a reference to an object. For example, a reference to another Interface.
OBJECT CALL	Call or execute a member Method of an Interface. This is equivalent to calling a Sub or Function.
OBJECT RAISEEVENT	Call or execute a member Method of a Dispatch event Interface. Because the Dispatch event interface is pre-defined, you are not required to specify the interface name in this form

of the statement. However, including it aids in self-documentation of your program. If your program is using a Direct, V-Table event handler you should use the RAISEEVENT statement instead. See the EVENT SOURCE statement for an OBJECT RAISEEVENT example.

All parameters, return values, and assignment values must be in the form of COM-compatible variables. Literals and expressions are not allowed. COM-compatible variables include BYTE, WORD, DWORD, INTEGER, LONG, QUAD, SINGLE, DOUBLE, CURRENCY,

, and VARIANT. You should use caution passing string data since COM Objects require that unicode format be used. When string data is contained in a VARIANT variable, conversion to/from unicode is automatic, and no intervention is needed from the programmer. However, if you pass data in a dynamic string variable, you must use the ACODE$() and UCODE$() functions to convert the data to an appropriate format. For this reason, we recommend that string data be passed using VARIANT variables.

Dispatch OBJECT Method calls may be bound at run-time using late binding, which requires no declaration of Properties and Methods. However, for this very reason, the validity of these references can not be verified by PowerBASIC at the time the program is compiled.

The OBJECT statement can use both positional and named parameters, but you should keep in mind that not all COM Dispatch Servers support named parameters. Positional parameters are universally supported.

A positional parameter is simply a variable containing an appropriate value. It is identified by its position in the parameter list, just as in a traditional SUB or FUNCTION. A named parameter consists of a parameter identifier (a name), an equal (=) sign, and a variable containing an appropriate value. Positional parameters must precede any and all named parameters, but named parameters may be specified in any sequence.

Each time you call a Method or Property using the OBJECT statement, a status code is returned in a hidden parameter to indicate the success or failure of the operation. You can retrieve information about this status code with the OBJRESULT function, and also by using the IDISPINFO Dispatch Information Object. If the failure was severe, then a PowerBASIC error 99 (Object Error) is also generated and the ERR system variable is set. You can find more information about these items by referring to OBJRESULT, IDISPINFO, and ERR. This information can be very useful for both debugging and handling run-time errors.

Restrictions

All parameters, return values, and assignment values must be in the form of COM-compatible variables. Use of the wrong member mode (GET/LET/SET/CALL/RAISEEVENT) can sometimes result in unexpected and fatal run-time errors. So, it's usually prudent to test the result code in OBJRESULT after every OBJECT statement.

See also

ACODE$, DIM, CLASS, CLSID$, EVENT SOURCE, IDISPINFO, GUID$, GUIDTXT$, ID Binding, INTERFACE (Direct), INTERFACE (IDBind), ISINTERFACE, ISNOTHING, ISOBJECT, Just what is COM?, Late Binding, LET (with Objects), METHOD, OBJACTIVE, OBJPTR, OBJRESULT, PROGID$, PROPERTY, UCODE$, What is an object, anyway?, What is DISPATCH?

Example

```
' Assumes Interface definitions have been
' declared for the Microsoft Agent Control
LOCAL AgentCtrlEx  AS IAgentCtlEx
LOCAL  StartX      AS LONG
LOCAL  StartY      AS LONG
LOCAL  CharW       AS LONG
LOCAL  CharH       AS LONG
LOCAL  Connected   AS LONG
LOCAL  AgentName   AS STRING
```

```
LOCAL   AgentFile   AS STRING

' Create a new instance of the COM Object
AgentCtrlEx = NEWCOM $PROGID_Agent2
IF ISFALSE(ISOBJECT(AgentCtrlEx)) THEN EXIT FUNCTION

' Set the connected property
Connected = 1
OBJECT LET AgentCtrlEx.Connected = Connected

' Load the Merlin Agent Character
AgentName = UCODE$("Merlin")
AgentFile = UCODE$("Merlin.acs")
OBJECT CALL AgentCtrlEx.Characters.Load(AgentName, AgentFile)

' Display the Merlin Agent Character on the screen
OBJECT CALL AgentCtrlEx.Characters.Character(AgentName).Show

' Find the center of the screen for the Character Agent
OBJECT GET AgentCtrlEx.Characters.Character(AgentName).Width  TO CharW
OBJECT GET AgentCtrlEx.Characters.Character(AgentName).Height TO CharH
DESKTOP GET CLIENT TO StartX, StartY
StartX = (StartX - CharW)\2
StartY = (StartY - CharH)\2

' Move the Character to the center of the screen
OBJECT CALL AgentCtrlEx.Characters.Character(AgentName).MoveTo(StartX,
StartY)
' more code here
```

OBJEQUAL function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

OBJEQUAL function New!

Purpose Check if object variables refer to the same object.

Syntax `Result = OBJEQUAL(ObjectVar1, ObjectVar2)`

Remarks Compares two object variables to determine if they refer to the same object. It returns true (-1) if both refer to the same object (or both refer to NOTHING); otherwise it returns false (0).

If the two object variables refer to the same class, but not the same specific object, false (0) is returned.

See also BITSE

OBJPTR function

OBJPTR function

Purpose Return an object pointer contained in the specified object variable.

Syntax `ObjectPointer??? = OBJPTR(objectvar)`

Remarks OBJPTR returns the object pointer as a Double-word (DWORD) value.

See also DIM, CLSID$, GUID$, GUIDTXT$, INTERFACE (Direct), INTERFACE (IDBind), ISINTERFACE, ISNOTHING, ISOBJECT, LET (with Objects), OBJECT, OBJACTIVE, OBJEQUAL, OBJRESULT, PROGID$, What is an object, anyway?

OBJRESULT function

OBJRESULT function

Purpose Returns a status code (hResult) to describe the success or failure of the most recent METHOD or PROPERTY procedure.

Syntax `lResult& = OBJRESULT`

Remarks An Automation procedure is a METHOD or PROPERTY on an IAUTOMATION, IDISPATCH, or DUAL interface. By definition, an Automation procedure always returns a hidden result code which is cryptically called an hResult. OBJRESULT the most recent hResult generated by the program, and can be used to identify the success or failure of an operation.

If an Automation procedure fails with a severe error, the ERR system variable is set to an appropriate PowerBASIC error code. This is usually Error 99 ("Object error"). In such cases, you can use the OBJRESULT function to return the result (hResult&) of the last run-time OBJECT statement or direct METHOD/PROPERTY reference.

Numeric equates for most OBJRESULT errors can be found in the WIN32API.INC file, and are mostly prefixed with %E_, %CO_, %OLE_, and %DISP_. The following list includes the most common codes that may be returned by a direct call of a Method or Property:

```
%S_OK                    = &H0
%S_FALSE                 = &H1
%E_UNEXPECTED            = &H8000FFFF&
%E_NOTIMPL               = &H80004001&
%E_NOINTERFACE           = &H80004002&
%E_POINTER               = &H80004003&
%E_ABORT                 = &H80004004&
%E_FAIL                  = &H80004005&
%E_ACCESSDENIED          = &H80070005&
%E_HANDLE                = &H80070006&
%E_OUTOFMEMORY           = &H8007000E&
%E_INVALIDARG            = &H80070057&
```

This list tells the most common status codes which may be returned by a DISPATCH call using the OBJECT statement:

```
%S_OK                    = &H0
%DISP_E_ARRAYISLOCKED    = &H8002000D
%DISP_E_BADINDEX:        = &H8002000B
%DISP_E_BADPARAMCOUNT    = &H8002000E
%DISP_E_BADVARTYPE       = &H80020008
%DISP_E_EXCEPTION        = &H80020009
%DISP_E_MEMBERNOTFOUND   = &H80020003
%DISP_E_NONAMEDARGS      = &H80020007
%DISP_E_OVERFLOW         = &H8002000A
```

```
%DISP_E_PARAMNOTFOUND     = &H80020004
%DISP_E_TYPEMISMATCH      = &H80020005
%DISP_E_UNKNOWNINTERFACE = &H80020001
%DISP_E_UNKNOWNLCID       = &H8002000C
%DISP_E_UNKNOWNNAME       = &H80020006
%DISP_E_PARAMNOTOPTIONAL = &H8002000F
```

If the status code %DISP_E_EXCEPTION is returned, you can use the IDISPINFO object to secure much additional information about the status. This includes a more specific error code, a description, help file information, etc. If the status code %DISP_E_PARAMNOTFOUND or %DISP_E_TYPEMISMATCH, you can use IDISPINFO.PARAM to determine which parameter actually caused the problem. Please refer to the IDISPINFO section for more details.

As can be seen from the above lists, a large numeric status code can be cryptic. However, you can translate the OBJRESULT code into a descriptive message using the OBJRESULT$ function. This can be most helpful, especially during application development and debugging.

Restrictions Methods and Properties on a custom interface (a direct interface based upon IUnknown rather than IDispatch) do not support OLE Automation, and do not return an OBJRESULT (hResult).

See also DIM, CLASS, CLSID$, IDISPINFO, GUID$, GUIDTXT$, INTERFACE (Direct), INTERFACE (IDBind), ISINTERFACE, ISNOTHING, ISOBJECT, LET (with Objects), METHOD, PROPERTY, OBJECT, OBJACTIVE, OBJEQUAL, OBJPTR, OBJRESULT$, PROGID$, What is an hResult?, What is an object, anyway?

OBJRESULT$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

OBJRESULT$ function

Purpose Returns a string which describes an OBJRESULT (hResult) code.

Syntax ***text$*** **= OBJRESULT$([*nexp&*])**

Remarks This function returns a text

which describes the hResult code specified by *nexp&*. If the parameter *nexp&* is omitted, it is replaced by the most recent OBJRESULT value. That is, OBJRESULT$() is identical to OBJRESULT$(OBJRESULT).

See also DIM, CLASS, CLSID$, IDISPINFO, GUID$, GUIDTXT$, INTERFACE (Direct), INTERFACE (IDBind), ISINTERFACE, ISNOTHING, ISOBJECT, LET (with Objects), METHOD, PROPERTY, OBJECT, OBJACTIVE, OBJPTR, OBJRESULT, PROGID$, What is an hResult?, What is an object, anyway?

OCT$ function

OCT$ function IMPROVED

Purpose Convert an integral value to an octal

.

Syntax `s$ = OCT$(IntVal [, Digits, LeadSpaces, TrailSpaces])`

Remarks *IntVal* is a

expression in the range of a 64-bit Quad Integer (-9223372036854775808 to +9223372036854775807). Any fractional part of the value is rounded. The result string is always formatted as an integral number using all the significant digits in *IntVal*. It is never expressed in scientific notation.

If *Digits* is 0 (or not given), no leading characters will be added to the numeric field. If *Digits* is a positive number greater than 0, the result string will be prepended with leading zeros to achieve the desired length. If *Digits* is a negative number, leading spaces are added to reach the absolute length. *Digits* may be in the range of -22 to +22.

LeadSpaces specifies additional leading spaces to be prepended, regardless of the length of the numeric portion of the string.

TrailSpaces specifies additional trailing spaces to be appended to the end of the string.

See also BIN$, DEC$, FORMAT$, HEX$, STR$, TRIM$, USING$, VAL

OemToChr$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

OemToChr$ function New!

Purpose Translates a byte

of OEM characters into ANSI/WIDE characters.

Syntax
```
a$ = OemToChr$(OemExpr$)
a$$ = OemToChr$(GRAPHIC, OemExpr$)
```

Remarks *OemExpr$* contains a series of byte (8-bit) characters in OEM format. OemToChr$ translates it into either ANSI multi-byte equivalent characters or WIDE (16-bit) Unicode characters, depending upon the context of the source code. PowerBASIC will always choose the correct form with no intervention needed by the programmer. Control codes, CHR$(0) to CHR$(31) and CHR$(127), are handled uniquely, as they are normally considered to be non-printing characters. By default, they are just copied, without any translation.

GRAPHIC If the option GRAPHIC is included, it indicates you want to convert control codes into the codes which will display the graphic symbols defined in the original IBM OEM character set. Most of these codes are only available as wide Unicode characters.

See also ChrToOem$, ChrToUtf8$, Utf8ToChr$

ON ERROR statement

ON ERROR statement

Purpose Specify an error handling routine; enable or disable error trapping.

Syntax

```
ON ERROR GOTO {label | line_number}
ON ERROR RESUME NEXT
ON ERROR GOTO 0
```

Remarks *label* or *line_number* identifies the first line of the error trapping routine. Once error handling has been turned on with this statement, all run-time errors result in a jump to your error handling code. When the error handler begins execution, additional error trapping is temporarily suspended. When your error handling is complete, you must use the RESUME statement (any form) to continue execution. RESUME reactivates the temporary suspension of error trapping.

You must use additional care when you trap an error within a GOSUB block of code, because a RETURN address has been saved on the system stack. If you use a form of RESUME which re-enters the GOSUB block, a RETURN will still be executed later, and the stack will be balanced. However, if RESUME <Label> or RESUME FLUSH redirects execution elsewhere, you must use RETURN FLUSH to remove the return address from the stack.

To disable error trapping, use ON ERROR GOTO 0 or ON ERROR RESUME NEXT. You can use this technique if an error occurs for which you have not defined a recovery path; you can also choose to display the contents of ERR or ERRCLEAR at this time.

The default for error trapping is disabled. If an error occurs while error trapping is disabled, the error code is placed into the ERR system variable, and execution continues. Errors can still be trapped by checking the value of the ERR or ERRCLEAR variable with

ERR THEN or SELECT CASE ERR statements.

Error trapping is local to each Sub, Function, Method, and Property. PowerBASIC does not support global error trapping.

Numeric errors such as Divide-by-zero, Overflow and Underflow are not trapped. Array out-of-bounds and null-pointer trapping are only enabled if #DEBUG ERROR ON is used.

If you're running a program with error trapping turned off, a run-time error may cause a General Protection Fault (GPF). A GPF cannot be trapped with ON ERROR.

It is not possible to branch to an error handler from within an expression. The compiler tests for an error only after the statement is completed. This means that a statement such as:

```
ON ERROR GOTO ErrorHandlerLabel
IF GETATTR(sFile) THEN
  ' Do something
END IF
```

will generate an Error 53 when *sFile* does not exist, but will not branch to the *ErrorHandlerLabel*. This is because the GETATTR(*sFile*) is an expression in the IF/ END IF block. You could do a

```
ON ERROR GOTO ErrorHandlerLabel
a& = GETATTR(sFile)f
IF a& THEN
  ' Do something
END IF
```

which will branch to the *ErrorHandlerLabel* if *sFile* does not exists. You could also check the value of the ERR variable or use a TRY/ END TRY block to see if an error occurred when checking for errors that occur during an expression.

See also #DEBUG DISPLAY, #DEBUG ERROR, ERR, ERRCLEAR, ERROR, Error Overview, ERROR$, Errors and Error Trapping, RESUME

ON GOSUB statement

ON GOSUB statement

Purpose Call one of several subroutines according to the value of a numeric expression.

Syntax **ON *n* GOSUB {*label* | *line_number*} [, {*label* | *line_number*}] ...**

Remarks *n* is a numeric expression ranging from 1 to 255, and each *label* or *line number* identifies a statement to branch to. When this statement is encountered, the *n*th label in the list is branched to; for example, if *n* equals 4, the fourth label in the list receives control. If *n* is less than one or greater than the number of labels, no branch occurs, and PowerBASIC continues execution with the statement immediately following the ON GOSUB statement.

Each subroutine should end with RETURN, which causes execution to resume with the statement immediately following the ON GOSUB statement. ON GOSUB can only branch to labels or line numbers that have the same scope as the ON GOSUB statement.

The SELECT and IF blocks also perform multiple branching and are more flexible than ON GOSUB.

Note that ON GOSUB (and ON GOTO) have been internally optimized to produce greater run-time performance than was possible with previous versions of PowerBASIC.

See also GOSUB, FUNCTION/END FUNCTION, IF block, METHOD, ON GOTO, PROPERTY, RETURN, SELECT, SUB/END SUB

Example

```
FOR I& = 1 TO 3
  ON I& GOSUB OneHandler, TwoHandler, ThreeHandler
NEXT I&

OneHandler:
  Message$ = "Handler number" + STR$(I&)
  RETURN

TwoHandler:
  Message$ = "Handler number" + STR$(I&)
  RETURN

ThreeHandler:
  Message$ = "Handler number" + STR$(I&)
  RETURN
```

Result

```
Handler number 1
Handler number 2
Handler number 3
```

ON GOTO statement

ON GOTO statement

Purpose Send program flow to one of several possible destinations based on the value of a expression.

Syntax **ON *n* GOTO {*label* | *line_number*} [, {*label* | *line_number*}] ...**

Remarks *n* is a numeric expression ranging from 1 to 255, and *label* or *line_number* identifies a statement in the program to branch to. The *n*th label is branched to; for example, if *n* equals 4, the fourth label in the list receives control. If *n* is less than one or greater than the number of labels in the list, program execution continues with the statement that immediately follows the ON GOTO statement.

ON GOTO behaves exactly like ON GOSUB, except that it performs a GOTO rather than a GOSUB. This means that the program retains no memory of where the branch originated. ON GOTO can only branch to labels or line numbers that have the same scope as the ON GOTO statement.

The SELECT and IF blocks also perform multiple branching, and are more flexible than ON GOTO. See the GOTO entry for a discussion of ways to avoid using GOTOs in your programs.

Note that ON GOTO (and ON GOSUB) have been internally optimized to produce greater run-time performance than was possible with previous versions of PowerBASIC.

See also GOTO, IF block, ON GOSUB, SELECT

Example

```
SUB MainEx
  FOR I& = 1 TO 3
    ON I& GOTO OneHandler, TwoHandler, ThreeHandler
    Back:
  NEXT I&
  EXIT SUB

OneHandler:
  Message$ = "Handler number" + STR$(I&)
  GOTO Back

TwoHandler:
  Message$ = "Handler number" + STR$(I&)
  GOTO Back

ThreeHandler:
  Message$ = "Handler number" + STR$(I&)
  GOTO Back
END SUB
```

Result

```
Handler number 1
Handler number 2
Handler number 3
```

OPEN statement

OPEN statement IMPROVED

Purpose Prepare a file or device for reading or writing.

Syntax

```
OPEN filespec [FOR mode] [ACCESS access] [LOCK lock] AS _
    [#] filenum& [LEN = record_size] [BASE = base] [CHR = ANSI|WIDE]
OPEN HANDLE filehandle [FOR mode] [ACCESS access] [LOCK lock] AS _
    [#] filenum& [LEN = record_size] [BASE = base] [CHR = ANSI|WIDE]
```

Remarks The main function of OPEN is to associate a file number (*filenum&*) with a file or physical device and to prepare that device for reading and/or writing. This file number is then used, rather than its name, in every statement that refers to the file. The FREEFILE function can be used to determine the next unused file number, or you can pick one yourself. An OPEN statement is usually balanced by a matching CLOSE statement. The OPEN statement comprises the following elements:

filespec A string expression specifying the name of the file to be opened, and may optionally include a drive and/or path specification. *filespec* may be either a Short File Name (SFN) or a Long File Name (LFN). *filespec* has a limit of 259 characters (%MAX_PATH - 1), although the file name portion of *filespec* may be no more than 255 characters (%MAX_FNAME - 1).

mode Specifies the file organization and style of access (sequential, random access, or binary) for reading, writing (or both), or appending. If *mode* is not specified, the default is RANDOM access.

Mode	File type	Action
`INPUT`	Sequential	Read from
`OUTPUT`	Sequential	Write to
`APPEND`	Sequential	Append to
`BINARY`	Binary	Reading or writing
`RANDOM`	Random	Reading or writing (default)

access Specifies the type of access this process will have to the file. By default, the file may be written to and read from.

Access	Description
`READ`	Only read operations allowed
`WRITE`	Only write operations allowed
`READ WRITE`	Both read and write operations allowed (default)

Note that APPEND mode requires READ/WRITE access.

lock Specifies the type of access other processes will have to the file. If a LOCK clause is not specified in the OPEN statement, the default LOCK READ WRITE mode is applied. This mode ensures exclusive access to the file, and enables PowerBASIC to optimize its internal buffering for utmost I/O performance. If other processes or threads are to be permitted WRITE access to the file (LOCK SHARED or LOCK READ), internal buffering is disabled. Whilst performance may be marginally lower, it ensures that data read from the file is completely up-to-date.

Lock	Description
`SHARED`	Both read and write operations allowed
`WRITE`	Prevent write operations
`READ`	Prevent read operations
`READ WRITE`	Neither read nor write operations allowed (default)

To open a text file for OUTPUT and allow other processes to only read the file, use the following:

```
OPEN "MYFILE.TXT" FOR OUTPUT LOCK WRITE AS #1
```

It is possible for an application to open more than one copy of a given file at the same time. In this case, each OPEN statement must use a unique file number, and LOCK READ WRITE mode should not be used.

filenum& A unique integer value identifying the file, in the range 1 to 32767. Typically, this value is obtained from the FREEFILE function.

record_size Specifies the size of each record of a random access file. The default record length is 128 if not specified. If *record_size* is specified for a sequential file, it instructs PowerBASIC to use internal buffering to improve I/O performance. A random access file is limited to 32768 bytes per record, to ensure consistent behavior across all Win32 platforms.

base Specifies the number of the first record in a random access file, or the number of the first byte in a sequential or binary file. It can be either zero (0) or one (1). The default value for *base* is 1, if not specified.

Chr Specifies the character mode for this file: ANSI or WIDE (Unicode). Since sequential files consist of text alone, the selected mode is enforced by PowerBASIC. All data read or written to the file is automatically forced to the selected mode, regardless of the type of variables or expressions used. With binary or random files, this specification has no effect, but it may be included in your code for self-documentation purposes.

ANSI characters in the U.S. range of CHR$(0) to CHR$(127) are known as ASCII, and are always represented by a single byte. International ANSI characters in the range of CHR$(128) to CHR$(255) may be followed by one or more additional bytes in order to accurately represent non-U.S. characters. The exact definition of these characters depends upon the character set in use. WIDE characters are always represented by two bytes per character. If the Chr option is not specified, the default mode is ANSI.

HANDLE — The HANDLE option allows you to access files that have already been opened by another process, DLL, or API function. The *filehandle* specified here must be a valid Win32 operating system file handle.

When PowerBASIC closes a file opened with OPEN HANDLE, the Win32 handle is simply detached from the internal PowerBASIC handle table. The file is not physically closed since PowerBASIC did not originally open it. In PowerBASIC, the FILEATTR function can be used to obtain the operating system file handle for a file opened with the OPEN statement.

Restrictions — Attempting to OPEN a file for INPUT that does not exist causes a run-time Error 53 ("File not found"). Attempting to open a file that is locked can result in either an Error 70 ("Permission denied"), or an Error 75 ("Path/file access error").

Similarly, attempting to OPEN a file using a file number that is already in use will result in a run-time Error 55 ("File is already open "). For this reason, programs that use hard-coded file numbers should take special care to close files before the file number is used again. In addition, code that may be used by more than one thread should use FREEFILE and avoid hard-coded file numbers.

If you try to open a nonexistent file for OUTPUT, APPEND, RANDOM, or BINARY operations, a new file is automatically created. For this reason, files on Read-only network drives may only be opened in INPUT mode.

See also — CLOSE, FILEATTR, FILENAME$, FILESCAN, FREEFILE, TCP OPEN, UDP OPEN

Example — This program is divided into five procedures. The difference between each procedure is the mode in which the file is opened, and the way the data in the file is manipulated:

```
SUB SequentialOutput
  ' The file is opened for sequential output,
  ' and some data is written to it.  If the file
  ' exists, it is over-written.
  OPEN "OPEN.DTA" FOR OUTPUT AS #1
  IntegerVar% = 12345
  TempStr$ = "History is made at night."
  WRITE #1, TempStr$, IntegerVar%*2, TempStr$, IntegerVar% \ 2
  CLOSE #1
END SUB  ' end procedure Sequential Output

SUB SequentialAppend
  ' The file is opened for sequential output, and
  ' data in this case is added to the end of file.
  ' If the file does not exist, it is created.
  OPEN "OPEN.DTA" FOR APPEND AS #1
  IntegerVar% = 32123
  TempStr$ = "I am not a number!"
  WRITE #1, TempStr$, IntegerVar% * 0.2
  CLOSE #1
END SUB  ' end procedure Sequential Append

SUB SequentialInput
  ' The file is opened for sequential input,
  ' and data is read from the file.
  DIM a$
  OPEN "OPEN.DTA" FOR INPUT AS #1
  LINE INPUT #1, TempStr$
  TempStr$ = ""
  WHILE ISFALSE EOF(1)  ' check if at end of file
    LINE INPUT #1, a$
    TempStr$ = TempStr$ + a$
  WEND
  CLOSE #1
END SUB  ' end procedure SequentialInput
```

```
SUB BinaryIO
  ' The file is opened for binary I/O. Data is
  ' read 'using GET$. SEEK explicitly moves the
  ' file pointer to 'the end of file, and the
  ' same data is written back to 'the file.
  OPEN "OPEN.DTA" FOR BINARY AS #1
  TempStr$ = ""
  WHILE ISFALSE EOF(1)
    GET$ #1, 1, Char$
    TempStr$ = TempStr$ + Char$
  WEND
  SEEK #1, LOF(1)
  FOR I& = 1 TO LEN(TempStr$)
    PUT$ #1, MID$(TempStr$,I&,1)
  NEXT I&
  CLOSE 1
END SUB  ' end procedure BinaryIO

SUB RandomIO
  ' Open file for random I/O.  GET and PUT read
  ' and write the data.
  OPEN "OPEN.DTA" FOR RANDOM AS #1 LEN = 1
  TempStr$ = ""
  TempSize& = LOF(1)  ' save file size
  ' using GET, read in the entire file
  FOR I& = 1 TO TempSize&
    GET #1, I&, Char$
    TempStr$ = TempStr$ + Char$
  NEXT I&
  ' PUT copies the data in reverse into the
  ' random access file.
  SEEK #1, 1
  FOR I& = TempSize& TO 1 STEP -1
    LSET Char$ = MID$(TempStr$,I&,1)
    PUT #1,, Char$
  NEXT I&
  CLOSE #1
END SUB  ' end procedure RandomIO
```

OPTION EXPLICIT statement

OPTION EXPLICIT statement

Purpose Force explicit declaration of all variables.

Syntax `OPTION EXPLICIT`

Remarks Using OPTION EXPLICIT in a program has the same effect as using the #DIM ALL metastatement. That is, it requires that all variables be declared before they are used.

When this option is used, the compiler generates a compile-time error if a variable or array is used without being explicitly declared.

See also #DIM

OR operator

OR operator

Purpose The OR operator works as both a logical and a bitwise arithmetic operator.

Syntax ***p* OR *q***

Remarks

Using OR as a logical operator

OR returns TRUE (non-zero) if and only if either or both of its operands is TRUE. Here is OR's truth table:

Truth table

x	y	x OR y
T	T	T
T	F	T
F	T	T
F	F	F

Using OR as a bitwise arithmetic operator

An OR mask sets selected bits of an

value without affecting the other bits. To set the most significant 2 bits in &H9700, use OR with a mask of &HC000; that is, the mask contains all 0s, except for the bit positions you wish to force to 1:

```
          1001 0111 0000 0000 = &H9700
OR        1100 0000 0000 0000 = &HC000 (the mask)
---------------------------------------------------
          1101 0111 0000 0000 = &HD700 (result)

MSB                                 LSB (bit 0)
```

See also Arithmetic Operators, AND, EQV, IMP, ISFALSE, ISTRUE, LET, NOT, XOR

PARSE statement

PARSE statement

Purpose Parse an entire

and extract all delimited fields into an array.

Syntax **PARSE *start$*, *target$()* [, {[ANY] *delim$* | BINARY}]**

Remarks PARSE parses the entire string or string expression specified by *start$*, assigning each delimited sub-string to successive elements of *target$*. The array specified by *target$* may be a dynamic string array, a fixed-length string array, or a nul-terminated string array.

The field delimiter is defined by *delim$*, which may be one or more characters long. To be valid, the entire delimiter must match exactly, but the delimiter itself is never assigned as a part of the delimited field.

If *delim$* is not specified or is null (zero-length), standard comma-delimited (optionally quoted) fields are presumed. In this case only, the following parsing rules apply. If a standard field is enclosed in optional quotes, they are removed. If any characters appear between a quoted field and the next comma delimiter, they are discarded. If no leading quote is found, any leading or trailing blank spaces are trimmed before the field is returned.

ANY If the ANY option is chosen, each appearance of any single character comprising *delim$* is considered a valid delimiter.

BINARY The BINARY option presumes that the *string_expr* was created with the JOIN$/BINARY function, or its equivalent, which creates a string as a binary image or in the PowerBASIC and/or Visual Basic packed string format: If a string is shorter than 65535 bytes, it starts with a 2-byte length WORD followed by the string data. Otherwise it will start a 2-byte value of 65535, followed by a DWORD indicating the string length, then finally the string data itself.

It is usually advantageous to dimension *target$* to the correct size with the use of the PARSECOUNT function. The PARSE statement is typically much more efficient, as a whole, than repeated use of the PARSE$ function when it is necessary to parse an entire string expression.

The JOIN$ function is the natural complement to the PARSE statement.

See also JOIN$, PARSE$, PARSECOUNT, PATHNAME$, PATHSCAN$

Example

```
a$ = "Trevor, Bob, Bruce, Dan, Simon, Jenny"
DIM b$(1 TO PARSECOUNT(a$))
PARSE a$, b$()
ARRAY SORT b$()
```

Result

```
b$(1) = "Bob"
b$(2) = "Bruce"
b$(3) = "Dan"
b$(4) = "Jenny"
b$(5) = "Simon"
b$(6) = "Trevor"
```

PARSE$ function

PARSE$ function

Purpose Return a delimited field from a string expression.

Syntax `a$ = PARSE$(string_expr [, {[ANY] string_delimiter | BINARY}], index&)`

Remarks PARSE$ uses the following parameters:

string_expr The

to parse. If *string_expr* is empty (a null string) or contains no delimiter character(s), the string is considered to contain exactly one field. In this case, PARSE$ will return *string_expr*.

string_delimiter Contains delimiter character(s). A delimiter is a character, list of characters, or string, that is used to mark the end of a field in *string_expr*. For example, if you consider a sentence to be a list of words, the delimiter between the works is a space (or perhaps punctuation). Text files typically consist of lines that are delimited by CR/LF ($CRLF or CHR$(13,10)) characters; a database file may consist of items separated by commas; etc. A delimiter is not considered part of a field, but as the divider between fields, so the delimiter is never returned by PARSE$.

If *delim$* is not specified or is null (zero-length), standard comma-delimited (optionally quoted) fields are presumed. In this case only, the following parsing rules apply. If a standard field is enclosed in optional quotes, they are removed. If any characters appear between a quoted field and the next comma delimiter, they are discarded. If no leading quote is found, any leading or trailing blank spaces are trimmed before the field is returned.

Delimiters are case-sensitive, so capitalization may be a consideration.

ANY If the ANY keyword is used, *string_delimiter* contains a set of characters, any of which may act as a delimiter character. If the ANY keyword is omitted, the entire *string_delimiter* string acts as a single delimiter.

BINARY The BINARY option presumes that *string_expr* was created with the JOIN$/BINARY function, or its equivalent, which creates a string as a binary image or in the PowerBASIC and/or Visual Basic packed string format: If a string is shorter than 65535 bytes, it starts with a 2-byte length WORD followed by the string data. Otherwise it will start a 2-byte value of 65535, followed by a DWORD indicating the string length, then finally the string data itself.

index& An

variable or expression that specifies the delimited field number to return. The first field is 1, and so on up to the maximum number of fields contained in *string_expr*, which may be determined with the PARSECOUNT function. If *index&* is negative, *string_expr* is parsed from right to left. In this case, *index&* = -1 returns the last field in *string_expr*, -2 returns the second to last, etc. If *index&* evaluates to zero, or is outside of the actual field count, an empty string is returned.

See also JOIN$, PARSE, PARSECOUNT, PATHNAME$, PATHSCAN$

Example

```
a$ = PARSE$("one,two,three", 2)   ' returns "two"
a$ = PARSE$("one;two,three", 2)   ' returns "three"
a$ = PARSE$("one",2)              ' returns ""
a$ = PARSE$("xyz",1)              ' returns "xyz"
a$ = PARSE$("xx1x","x",3)         ' returns "1"
a$ = PARSE$("1;2,3", ANY ",;", 2) ' returns "2"
```

PARSECOUNT function

PARSECOUNT function

Purpose Return the count of delimited strings in a string expression.

Syntax ***x&*** **= PARSECOUNT(*string_expr* [, {[ANY] *string_delimiter* | BINARY}])**

Remarks PARSECOUNT uses the same rules as PARSE$ in the determination of fields within *string_expr*. Individual fields within *string_expr* are evaluated, and the tally of the fields forms the result value.

It is important to note that PARSECOUNT may only be used with string data which contains variable length sub-fields, each of which is separated by a delimiter. To determine the count of fixed length data, divide the *StringExpr* length by the sub-field length. If this function is used with fixed length data, the results are undefined.

string_expr This is the

to examine and parse. If *StringExpr* is empty (a null string) or contains no delimiter character(s), the string is considered to contain exactly one sub-field. In this case, PARSECOUNT returns the value 1.

string_delimiter This defines one or more characters to use as a delimiter. To be valid, the entire delimiter must match exactly, but the delimiter itself is never returned as part of the field.

If *string_delimiter* is not specified, or contains an empty string, special rules apply. The delimiter is assumed to be a comma. Fields may optionally be enclosed in quotes, and are ignored before the result string is returned. Any characters that appear between a quote mark and the next comma delimiter character are discarded. If no leading quote is found, any leading or trailing quotes are trimmed before the result string is returned.

ANY If the ANY keyword is used, string_delimiter contains a set of characters, any of which may act as a delimiter character. If the ANY keyword is omitted, the entire string_delimiter string acts as a single delimiter.

BINARY The BINARY option returns the number of sub-fields and presumes that *StringExpr* was created with the JOIN$/BINARY function, or its equivalent, which creates a string in the PowerBASIC and/or Visual Basic packed string format: If a string is shorter than 65535 bytes, it starts with a 2-byte length WORD followed by the string data. Otherwise it will start with a 2-byte value of 65535, followed by a DWORD indicating the string length, then the actual string data.

See also JOIN$, PARSE, PARSE$, PATHNAME$, PATHSCAN$

Example

```
a& = PARSECOUNT("one,two,three")    ' returns 3
a& = PARSECOUNT("one;two,three")    ' returns 2
a& = PARSECOUNT("")                 ' returns 1
a& = PARSECOUNT("xx1x","x")         ' returns 4
a& = PARSECOUNT("1;2,3", ANY ",;") ' returns 3
```

PATHNAME$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PATHNAME$ function IMPROVED

Purpose Parse a path/file name to extract component parts

Syntax ***fil$*** **= PATHNAME$(*director*, *filespec$*)**

Remarks The PATHNAME$ function evaluates a text path/file text name, and returns a requested part of the name. The functionality is strictly one of

parsing alone. No attempt is made to find the file on disk. If you wish to scan for a particular file on disk, you should use the companion function PATHSCAN$.

director This is one of the following words which is used to specify the requested part:

FULL	Returns the full path/file name, just as given in the *filespec$* parameter. This is really a non-operation, but is included for symmetry with the companion function PATHSCAN$.
PATH	Returns the path portion of the path/file name. That is the text up to and including the last backslash (\) or colon (:).
NAME	Return the name portion of the path/file name. That is the text to the right of the last backslash (\) or colon (:), ending just before the last period (.).
EXTN	Returns the extension portion of the path/file name. That is the last period (.) in the string plus the text to the right of it.
NAME X	Returns the NAME and the EXTN parts combined.

filespec$ A path/file name which does not necessarily exist on disk.

See also DIR$, EXE, PATHSCAN$, PARSE, PARSE$, PARSECOUNT

Example

```
PATHNAME$(PATH,  "C:\PB\XXX.TXT") ' returns  "C:\PB\"
PATHNAME$(NAME,  "C:\PB\XXX.TXT") ' returns  "XXX"
PATHNAME$(NAMEX, "C:\PB\XXX.TXT") ' returns  "XXX.TXT"
PATHNAME$(EXTN,  "C:\PB\XXX.TXT") ' returns  ".TXT"
```

PATHSCAN$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PATHSCAN$ function

Purpose Find a file on disk and return the path and/or file name parts.

Syntax `fil$ = PATHSCAN$(director, filespec$[, pathspec$])`

Remarks The PATHSCAN$ function scans specified directories to find a particular file. If the file is found, it returns either the full path/file name, or a selected part of it. If the file is not found, a nul (zero-length)

is returned. If you wish to simply parse a text file name, without regard to its validation on disk, you should use the companion function PATHNAME$.

director This is one of the following words which is used to specify the requested part:

FULL	Return the full drive/path/file name.
PATH	Return the path portion of the path/file name. That is the text up to and including the last backslash (\).
NAME	Return the name portion of the path/file name. That is the text to the right of the last backslash (\), ending just before the last period (.) in the string.
EXTN	Return the extension portion of the path/file name. That is the last period (.) in the string plus the text to the right of it.
NAMEX	Return the NAME and the EXTN parts combined.

filespec$ A file name which is expected to exist on disk. It must not be an ambiguous name -- that is, it may not include a query (?) or an asterisk (*) character.

*pathspec$* An optional path string which includes one or more paths to be searched to find filespec$. If multiple path names are included in this string, they must each be separated by a semicolon (;) delimiter. If pathspec$ is not given, or it is a nul (zero-length) string, the following directories are searched:

1. The directory from which the application was loaded.
2. The current directory.
3. The Windows System32 directory.
4. The Windows System16 directory.
5. The Windows directory.
6. The directories in the PATH environment variable.

See also DIR$, EXE, PATHNAME$, PARSE, PARSE$, PARSECOUNT

Example The following information assumes that the file named "MyFile.txt" currently exists in the directory "C:\PB".

```
f$ = "MyFile.txt" : p$ = "C:\MyDir;C:\PB"

PATHSCAN$(FULL, f$, p$) ' returns  "C:\PB\MyFile.txt"
PATHSCAN$(PATH, f$, p$) ' returns  "C:\PB\"
PATHSCAN$(NAME, f$, p$) ' returns  "MyFile"
PATHSCAN$(EXTN, f$, p$) ' returns  ".txt"
PATHSCAN$(NAMEX,f$, p$) ' returns  "MyFile.txt"
```

PBLIBMAIN function

PBLIBMAIN function

Purpose PBLIBMAIN performs a similar task to DLLMAIN and LIBMAIN, except that PBLIBMAIN takes no parameters.

> **In 32-bit Windows, PBLIBMAIN is called each time a DLL is loaded or unloaded by an application or process, and (usually) if a thread is started and stopped. Your code should never call PBLIBMAIN.**

Syntax
```
FUNCTION PBLIBMAIN [()] [AS LONG]
```

Remarks See LIBMAIN / DLLMAIN for more information.

See also DLLMAIN, LIBMAIN, PBMAIN, THREAD CREATE, WINMAIN

PBMAIN function

PBMAIN function

Purpose PBMAIN is a user-defined function called by Windows to begin running an executable application. Every PowerBASIC executable (EXE) must contain either a PBMAIN or a WINMAIN function.

Syntax
```
FUNCTION PBMAIN [()] [AS LONG]
```

Remarks Either a PBMAIN or WINMAIN function is required in every PowerBASIC application (.EXE). If you use PBMAIN, no parameters are passed, and you cannot directly obtain the instance handle of your application or the pointer to any command-line parameters.

However, you can use COMMAND$ to get the command-line passed to your program, and the GetModuleHandle API function to get the application instance handle.

Return The return value of PBMAIN has an effective range of 0 to 255. Batch files may act on the result through the IF [NOT] ERRORLEVEL batch command.

Restrictions DLLs created with PowerBASIC should contain a DLLMAIN, LIBMAIN, or PBLIBMAIN function instead of PBMAIN/WINMAIN.

See also COMMAND$, DLLMAIN, LIBMAIN, PBLIBMAIN, WINMAIN

Example
```
#COMPILE EXE
FUNCTION PBMAIN
  MSGBOX "This is my program!"
  'Return an error level of 15
  FUNCTION = 15 ' or you can use PBMAIN = 15
END FUNCTION
```

PEEK function

PEEK, PEEK$, and PEEK$$ functions IMPROVED

Purpose Returns a byte or sequence of bytes at a specified memory location.

Syntax
```
numvar  = PEEK([datatype,] address???)
ansivar = PEEK$([STRINGZ,] address???, count&)
widevar = PEEK$$([WSTRINGZ,] address???, count&)
```

Remarks The PEEK functions and complementary POKE statements are low-level methods of accessing individual bytes in memory. The data is retrieved from memory, starting at the specified 32-bit *address???*.

PEEK retrieves a

value starting at a specified memory address.

PEEK$ retrieves *count&* consecutive bytes and returns them as a

. If STRINGZ (or ASCIIZ) is specified, PEEK$ reads successive characters from memory, up to the specified size, until a terminating $NUL (CHR$(0)) byte is found. Since STRINGZ strings must contain a terminating $NUL, the maximum length of the returned string is 1 character less than *count&*.

PEEK$$ retrieves *count&* consecutive 2-byte wide characters, and returns them as a wide character string. If WSTRINGZ is specified, PEEK$$ reads successive characters from memory, up to the specified size, until a terminating $NUL (CHR$(0)) character is found. Since WSTRINGZ strings must contain a terminating $NUL, the maximum length of the returned string is 1 character less than *count&*.

Contrary to intuitive notions, PEEK and POKE execute at the same high performance levels as pointer variables. They offer an excellent alternative to pointers in many situations.

datatype The numeric data type to retrieve, which may be any one of BYTE, WORD, DWORD, INTEGER, LONG, QUAD, SINGLE, DOUBLE, EXT, CUR, CUX. If a data type is not specified, BYTE is assumed.

address??? A valid 32-bit memory address specifying the location in memory where data retrieval should begin.

count& A numeric expression that specifies the number of consecutive characters to be read from memory.

Restrictions If *address???* (or any memory in the range covered by *count&*) references an invalid address (memory that is not allocated to the application), Windows will generate a General Protection Fault (GPF) and terminate the application. GPFs cannot be trapped with an ON ERROR error handler.

See also , POKE, STRPTR, VARPTR

Example One common application for PEEK$ and POKE$ is to perform fast array and memory block copy operations by simply copying the entire block of memory which contains the array data, rather than storing each element individually with an assignment statement:

```
Elements& = 2000  ' 2000 elements in each array
DIM OriginalArray%(1 TO Elements&)
DIM NewArray%(1 TO Elements&)

'Method 1: assign each element individually
FOR Index& = 1 TO Elements&
  NewArray%(Index&) = OriginalArray%(Index&)
NEXT Index&

'Method 2: block copy with PEEK$ and POKE$ (faster)
Source&   = VARPTR(OriginalArray%(1))
Dest&     = VARPTR(NewArray%(1))
ArrayLen& = Elements& * 2     'byte length of array
POKE$ Dest&, PEEK$(Source&, ArrayLen&)  'copy block
```

PEEK$ function

PEEK, PEEK$, and PEEK$$ functions IMPROVED

Purpose Returns a byte or sequence of bytes at a specified memory location.

Syntax

```
numvar  = PEEK([datatype,] address???)
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widevar = PEEK$$([WSTRINGZ,] address???, count&)
```

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PEEK$$ retrieves *count&* consecutive 2-byte wide characters, and returns them as a wide character string. If WSTRINGZ is specified, PEEK$$ reads successive characters from memory, up to the specified size, until a terminating $NUL (CHR$(0)) character is found. Since WSTRINGZ strings must contain a terminating $NUL, the maximum length of the returned string is 1 character less than *count&*.

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PEEK$$ function

PEEK, PEEK$, and PEEK$$ functions IMPROVED

Purpose Returns a byte or sequence of bytes at a specified memory location.

Syntax

```
numvar  = PEEK([datatype,] address???)
ansivar = PEEK$([STRINGZ,] address???, count&)
widevar = PEEK$$([WSTRINGZ,] address???, count&)
```

Remarks

The PEEK functions and complementary POKE statements are low-level methods of accessing individual bytes in memory. The data is retrieved from memory, starting at the specified 32-bit *address???*.

PEEK retrieves a

value starting at a specified memory address.

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PEEK$$ retrieves *count&* consecutive 2-byte wide characters, and returns them as a wide character string. If WSTRINGZ is specified, PEEK$$ reads successive characters from memory, up to the specified size, until a terminating $NUL (CHR$(0)) character is found. Since WSTRINGZ strings must contain a terminating $NUL, the maximum length of the returned string is 1 character less than *count&*.

Contrary to intuitive notions, PEEK and POKE execute at the same high performance levels as pointer variables. They offer an excellent alternative to pointers in many situations.

datatype

The numeric data type to retrieve, which may be any one of BYTE, WORD, DWORD, INTEGER, LONG, QUAD, SINGLE, DOUBLE, EXT, CUR, CUX. If a data type is not specified, BYTE is assumed.

address???

A valid 32-bit memory address specifying the location in memory where data retrieval should begin.

count&

A numeric expression that specifies the number of consecutive characters to be read from memory.

Restrictions

If *address???* (or any memory in the range covered by *count&*) references an invalid address (memory that is not allocated to the application), Windows will generate a General Protection Fault (GPF) and terminate the application. GPFs cannot be trapped with an ON ERROR error handler.

See also

, POKE, STRPTR, VARPTR

Example

One common application for PEEK$ and POKE$ is to perform fast array and memory block copy operations by simply copying the entire block of memory which contains the array data, rather than storing each element individually with an assignment statement:

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```

PLAY WAVE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PLAY statement New!

Purpose Play a sound under program control.

Syntax

```
PLAY WAVE  ResourceID$  [,descriptors...]  [TO ResultVar&]
PLAY WAVE END
```

Remarks The PLAY statement allows you to play a previously created WAVE resource or WAVE file. It's generally advantageous to use the resource form. Access is typically faster and the need for extra files is reduced. The first form of PLAY WAVE starts the sound, while PLAY WAVE END stops any waveform sound which is currently playing.

ResourceID$ is a string expression which tells either the Resource ID of the waveform data, or the disk file where it can be found. If the resource ID is numeric, just precede the number with #, such as "#12345". If the Resource ID contains a period, it is presumed to be the name of a disk file. Otherwise, an attempt is made to load it from a resource -- if not found, it is then presumed to be a disk file. If the waveform data cannot be found, an error 53 (File Not Found) is generated.

If you include the optional TO clause, a success value is assigned to the *ResultVar&*. If the operation succeeds, the value True (non-zero) is assigned. If it fails, the value False (zero) is assigned.

The default method is to play the waveform data in the background. That is, the Play statement returns immediately so the application can execute other code while the sound is playing.

By default, the new sound takes precedence over any other sound currently playing. When PLAY WAVE is executed, any other sound playing is stopped immediately. The new sound is played to replace it. This default methodology can be altered with options described later.

The optional descriptor words (one or more) may be added to control the way in which the sound is played. The descriptors available are:

Loop	The sound is played repeatedly in the background. It plays forever, until PLAY WAVE END is executed, or the program terminates.
NoStop	If another sound is playing, the new sound is discarded and not played. The value False (zero) is returned to the *ResultVar&* to let you know that the operation failed. You can try again to play the new sound at your convenience.
Synch	The sound plays in synchronous mode, commonly known as the foreground. The application waits for the sound to complete before continuing execution of other code. The sound and the code are synchronized.
YieldMS(*TimeOut&*)	If another sound is playing, the new sound yields and allows the first sound to complete. The numeric expression *TimeOut&* tells the maximum number of milliseconds (approximate) to wait before giving up. If the Timeout period expires and the first sound is still playing,

the new sound is aborted. If the Timeout period is zero (0), the program will wait an unlimited amount of time for the first sound to finish. The maximum *TimeOut&* permitted is one hour.

See also #RESOURCE

PLAY WAVE END statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PLAY statement New!

Purpose Play a sound under program control.

Syntax

```
PLAY WAVE  ResourceID$  [,descriptors...]  [TO ResultVar&]
PLAY WAVE END
```

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See also #RESOURCE

POKE statement

POKE, POKE$, and POKE$$ statements

Purpose Store a byte or sequence of bytes at a specified memory location.

Syntax

```
POKE   [DataType,] Address???, DataValue [, DataValue...]
POKE$  [STRINGZ,]  Address???, StringExpr
POKE$$ [WSTRINGZ,] Address???, StringExpr
```

Remarks The POKE statements and complementary PEEK functions are low-level methods of accessing individual bytes in memory. The data is stored to memory starting at the specified 32-bit address.

In its classic form, the POKE statement stores a single byte (8 bits) whose value ranges from 0 to 255. In its enhanced form, POKE provides the functionality of a dynamic pointer: the *DataType* parameter specifies the data type and hence the size of the target data to write to the target memory address. *DataType* can be any one of BYTE, WORD, DWORD, INTEGER, LONG, QUAD, SINGLE, DOUBLE, EXT, CUR, CUX. If a *DataType* is not specified, BYTE is assumed. If you specify more than one *DataValue*, they are stored in successive memory locations.

POKE$ stores the bytes of *StringExpr* in consecutive bytes of memory. If STRINGZ (or ASCIIZ) is specified, POKE$ writes successive characters to memory, up to the specified size, until a terminating $NUL byte is found in the source string. If no $NUL is found in the string, one is automatically appended. It is the programmer's responsibility to ensure that POKE$ does not overrun the target memory area to avoid data corruption or protection faults.

POKE$$ stores the characters of *StringExpr* as consecutive 2-byte words of memory. If WSTRINGZ is specified, POKE$$ writes successive wide characters, up to the specified size, until a terminating $NUL is found in the source string. If no $NUL is found in the string, one is automatically added. It is the programmer's responsibility to ensure that POKE$$ does not overrun the target memory area to avoid data corruption or protection faults.

Contrarary to intuitive notions, PEEK and POKE execute at the same high performance levels as pointer variables. They offer an excellent alternative to pointers in many situations.

Address??? A valid 32-bit memory address specifying the location in memory where data storage should begin.

Datavalue The data value to be stored at *Address???*.

StringExpr A string constant, literal or expression that specifies the sequence of characters to be stored in memory, starting at by *Address???*.

Restrictions If POKE attempts to access memory that is not allocated to the application, Windows will generate a General Protection Fault (GPF) and terminate the application. GPFs cannot be trapped.

See also GLOBALMEM ALLOC, MEMORY,
, PEEK, STRPTR, VARPTR

POKE$ statement

POKE, POKE$, and POKE$$ statements

Purpose Store a byte or sequence of bytes at a specified memory location.

Syntax

```
POKE   [DataType,] Address???, DataValue [, DataValue...]
POKE$  [STRINGZ,]  Address???, StringExpr
POKE$$ [WSTRINGZ,] Address???, StringExpr
```

Remarks The POKE statements and complementary PEEK functions are low-level methods of accessing individual bytes in memory. The data is stored to memory starting at the specified 32-bit address.

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See also GLOBALMEM ALLOC, MEMORY,
, PEEK, STRPTR, VARPTR

POKE$$ statement

POKE, POKE$, and POKE$$ statements

Purpose Store a byte or sequence of bytes at a specified memory location.

Syntax

```
POKE   [DataType,] Address???, DataValue [, DataValue...]
POKE$  [STRINGZ,]  Address???, StringExpr
POKE$$ [WSTRINGZ,] Address???, StringExpr
```

Remarks The POKE statements and complementary PEEK functions are low-level methods of accessing individual bytes in memory. The data is stored to memory starting at the specified 32-bit address.

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POKE$ stores the bytes of *StringExpr* in consecutive bytes of memory. If STRINGZ (or ASCIIZ) is specified, POKE$ writes successive characters to memory, up to the specified size, until a terminating $NUL byte is found in the source string. If no $NUL is found in the string, one is automatically appended. It is the programmer's responsibility to ensure that POKE$ does not overrun the target memory area to avoid data corruption or protection faults.

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Restrictions If POKE attempts to access memory that is not allocated to the application, Windows will generate a General Protection Fault (GPF) and terminate the application. GPFs cannot be trapped.

See also GLOBALMEM ALLOC, MEMORY,

, PEEK, STRPTR, VARPTR

POWERARRAY Object

Keyword Template

Purpose

Syntax

Remarks

See also

Example

POWERARRAY Object New!

Purpose

The PowerArray object encapsulates the Windows SAFEARRAY structure. Each object contains exactly one SAFEARRAY, and allows you to read, write, and manipulate the elements easily.

The SAFEARRAY is generally considered to be the lowest common denominator of arrays. It's not as fast as a standard PowerBASIC array, but it serves an excellent purpose: It's a "standard" form of array data which can be used to transfer data between programs, modules, and even DLLs created with different versions of the compiler. Other than the possibility of added data types, we do not expect to see the internal format to change in the foreseeable future.

A SAFEARRAY is frequently contained in a VARIANT variable. However, you'll usually find that the array is referenced and identified by a 32-bit pointer to its array descriptor.

Remarks

All array operations are executed with METHOD and PROPERTY invocations on a PowerArray object. When you create or examine a PowerArray, the specific data type is identified by the following VT codes. All of them are predefined in the compiler. VT codes numbered above 200 are unique to PowerBASIC. Other programming languages will not recognize them, giving undefined results.

```
%vt_i2          = 2        %vt_ui4          = 19
%vt_i4          = 3        %vt_i8           = 20
%vt_r4          = 4        %vt_int          = 22
%vt_r8          = 5        %vt_uint         = 23
%vt_cy          = 6        %vt_ptr          = 26
%vt_date        = 7        %vt_userdefined  = 29
%vt_bstr        = 8        %vt_filetime     = 64
%vt_dispatch    = 9        %vt_astr         = 201
%vt_bool        = 11       %vt_stringfix    = 203
%vt_variant     = 12       %vt_wstringfix   = 204
%vt_unknown     = 13       %vt_stringz      = 205
%vt_decimal     = 14       %vt_wstringz     = 206
%vt_i1          = 16       %vt_type         = 211
%vt_ui1         = 17       %vt_ext          = 221
%vt_ui2         = 18       %vt_curx         = 222
```

The array dimensions are stated at the time the array is created by executing the DIM method. The ByRef *Bounds* parameter refers to a PowerBounds UDT which is predefined in the compiler. *Bound* is a PowerBOUND UDT for use with RedimPreserve. It is also predefined in the compiler.

```
TYPE PowerBounds                 TYPE PowerBound
  Elements1 AS LONG                Elements AS LONG
  LowBound1 AS LONG                LowBound AS LONG
  Elements2 AS LONG              END TYPE
  LowBound2 AS LONG
  Elements3 AS LONG
  LowBound3 AS LONG
  Elements4 AS LONG
  LowBound4 AS LONG
END TYPE
```

This class is named PowerArray, and the interface is named IPowerArray. If any of the following operations should fail, the OBJRESULT function will return a non-zero result rather than %S_OK (zero).

IPowerArray Methods/Properties

METHOD ARRAYBASE () AS DWORD <1>

This method returns the address of the first element of the array.

METHOD ARRAYDESC () AS DWORD <2>

This method returns the address of the SAFEARRAY descriptor.

PROPERTY GET ARRAYINFO () AS WString <3>

You can attach a wide text string to an array for informational or documentation. This Get Property retrieves the info string, if one is present.

PROPERTY SET ARRAYINFO () = *WString* <3>

You can attach a wide text string to an array for informational or documentation. This Set Property assigns a wide dynamic string to the array.

METHOD CLONE (PowerArray) <4>

The parameter PowerArray is another object of the same class as this object, which is PowerArray. An exact duplicate of the SafeArray in the parameter is created, and stored in this object.

METHOD COPYFROMVARIANT (ByRef *Variant*) <5>

An exact copy is made of the SafeArray contained in the parameter *Variant*. The array copy is stored in this PowerArray object.

METHOD COPYTOVARIANT (ByRef *Variant*) <6>

An exact copy is made of the SafeArray in this object. The array copy is stored in the parameter *Variant*. Only arrays of data items which are Automation compatible may be stored in a Variant. Data types which are PowerBASIC-Specific cannot be copied.

METHOD DIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <9>

Dimensions (creates) a new array. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD ERASE () <10>

The contained array is destroyed and the object is then considered empty.

**METHOD ELEMENTPTR (ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*)
AS LONG <11>**

Calculates and retrieves the address of the data element specified by the *Index* parameter(s).

METHOD ELEMENTSIZE () <12>

Retrieves the storage size (in bytes) of each data element of the array.

METHOD LBOUND (*Subscript&*) AS LONG <13>

Retrieves the lower bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD LOCK () <14>

Increments the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

METHOD MOVEFROMVARIANT (ByRef *Variant*) <17>

Transfers ownership of the SafeArray contained in the *variant* parameter to this PowerArray object. The variant is then changed to %vt_empty.

METHOD MOVETOVARIANT (ByRef *Variant*) <18>

Transfers ownership of the SafeArray contained in this PowerArray object to the *variant* parameter. The PowerArray object is then changed to empty.

METHOD REDIM (ByVal *VT&*, ByVal *Subscripts&*, ByRef *Bounds*, OPTIONAL ByVal *SIZE*) <19>

REDIM allows the SafeArray to be erased and re-dimensioned to a new size. It is really just a shortcut for the two-step process of ERASE, followed by DIM. The *VT&* parameter is specified by one of the %VT values listed in remarks. *Subscripts&* is the number of dimensions (1 to 4), *Bounds* is a PowerBounds UDT which is prefilled with the lower bound and size of each dimension. The optional parameter *SIZE* tells the size (in bytes) of each element. *SIZE* is only used with %vt_stringfix, %vt_wstringfix, %vt_stringz, %vt_wstringz, and %vt_type.

METHOD REDIMPRESERVE (ByRef *Bound*) <20>

REDIMPRESERVE allows the least significant (rightmost) bound to be changed to a new size. The remaining data items in the array are preserved. *Bound* is a PowerBound UDT which is prefilled with the lower bound and size of the dimension to be changed.

METHOD RESET () <21>

All elements in the SafeArray are set back to their initial, default value. Numerics are set to zero, strings to zero-length, variants to %vt_empty, and object variables are set to nothing. The array memory is not deallocated.

METHOD SUBSCRIPTS () <22>

Retrieves the number of dimensions (subscripts) for this array.

METHOD UBOUND (*Subscript&*) AS LONG <23>

Retrieves the upper bound number for the dimension specified by the *Subscript&* parameter. The first subscript is 1, the second is 2, etc.

METHOD UNLOCK () <24>

Decrements the lock count of the SAFEARRAY. Locks can be nested, but there must be an equal number of Unlocks executed.

**METHOD VALUEGET (ByRef *GetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <25>**

Calculates and retrieves the value of the array element specified by the *Index* parameter(s). This value is then assigned to the *GetVar* variable. It is the programmer's responsibility to ensure that the type of *GetVar* matches the type of the array precisely.

**METHOD VALUESET (ByRef *SetVar*, ByVal *Index1&*, Opt ByVal *Index2&*, _
Opt ByVal *Index3&*, Opt ByVal *Index4&*) AS LONG <26>**

Assigns the value of the *SetVar* variable to the array element specified by the *Index* parameter(s). It is the programmer's responsibility to ensure that the type of *SetVar* matches the type of the array precisely.

METHOD VALUETYPE () <27>

Retrieves the %VT code which describes the data contained in this array. The %VT codes are listed in the Remark section above.

See Also ARRAY ASSIGN, ARRAY DELETE, ARRAY INSERT, ARRAY SCAN, ARRAY SORT, DIM, LBOUND, REDIM, UBOUND

POWERTIME object

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PowerTime Object New!

Purpose

A PowerTime Object contains a date and time value, allowing easy calculations. The internal representation emulates the Windows FILETIME structure as a quad-integer. This value represents the number of 100-nanosecond intervals since January 1, 1601. A nanosecond is one-billionth of a second.

You create a PowerTime object the same way you create other objects, but using a predefined internal class and a predefined internal interface.

```
LOCAL MyTime AS IPowerTime
LET MyTime = CLASS "PowerTime"
```

Once you have created a PowerTime object, you can manipulate it using the member methods. The IPowerTime interface is DUAL -- member methods may be referenced using either Direct or Dispatch form.

Remarks

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

An immediate use for the PowerTime Object is the built-in numeric equate %PB_COMPILETIME. Each time you compile your program, this equate is filled with the current date and time of the compilation in PowerTime binary format. You can use the PowerTIME Class to convert it to a text equivalent for use in your application.

```
LOCAL Built AS IPowerTime
LET Built = CLASS "PowerTime"
Built.FileTime = %PB_COMPILETIME
MSGBOX  Built.DateString
MSGBOX  Built.TimeString
```

POWERTIME Methods

AddDays <1> (ByVal *Days&*)

Adds the specified number of days to the value of this object. You can subtract days by using a negative number.

AddHours <2> (ByVal *Hours&*)

Adds the specified number of hours to the value of this object. You can subtract hours by using a negative number.

AddMinutes <3> (ByVal *Minutes&*)

Adds the specified number of minutes to the value of this object. You can subtract minutes by using a negative number.

AddMonths <4> (ByVal *Months&*)

Adds the specified number of months to the value of this object. You can subtract months by using a negative number.

AddMSeconds <5> (ByVal *Milliseconds&*)

Adds the specified number of milliseconds to the value of this object. You can subtract milliseconds by using a negative number.

AddSeconds <6> (ByVal *Seconds&*)

Adds the specified number of seconds to the value of this object. You can subtract seconds by using a negative number.

AddTicks <7> (ByVal *Ticks&*)

Adds the specified number of ticks to the value of this object. You can subtract ticks by using a negative number.

AddYears <8> (ByVal *Years&*)

Adds the specified number of years to the value of this object. You can subtract years by using a negative number.

DateDiff <11> (*PowerTime, Sign&, Years&, Months&, Days&*)

The date part of the internal PowerTime object is compared to the date part of the specified external PowerTime object. The time-of-day part of each is ignored. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. *Sign&* is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

DateString <12> (OPT ByVal *LCID&*) AS String

Returns the Date component of the PowerTime object expressed as a

. The date is formatted for the locale, based upon the *LCID&* parameter. If LCID& is zero, or not given, the default LCID for the user is substituted.

DateStringLong <13> (OPT ByVal *LCID&*) AS WString

Returns the Date component of the PowerTime object, expressed as a string, with a full alphabetic month name. The date is formatted for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

Day <15> () AS Long

Returns the Day component of the PowerTime object. It is a

value in the range of 1-31.

DayOfWeek <16> () AS Long

Returns the Day-of-Week component of the PowerTime object. It is a numeric value in the range of 0-6 (representing Sunday through Saturday).

DayOfWeekString <17> (OPT ByVal *LCID&*) AS WString

Returns the Day-of-Week name of the PowerTime object, expressed as a string (Sunday, Monday...). The day name is appropriate for the locale, based upon the *LCID&* parameter. If *LCID&* is zero, or not given, the default LCID for the user is substituted.

DaysInMonth <18> () AS Long

Returns the number of days which comprise the month of the date of the PowerTime object. This is a numeric value in the range of 28-31.

PROPERTY GET FileTime <20> () AS Quad

Returns a Quad-Integer value of the PowerTime object as a FileTime.

PROPERTY SET FileTime <20> (ByVal *FileTime&&*)

The FileTime Quad-Integer value specified by the parameter is assigned as the PowerTime object value.

Hour <21> () as Long

Returns the Hour component of the PowerTime object. It is a numeric value in the range of 0-23.

IsLeapYear <22> () as Long

Returns true/false (-1/0) to tell if the PowerTime object year is a leap year.

Minute <23> () as Long

Returns the Minute component of the PowerTime object. This is a numeric value in the range of 0-59.

Month <24> () as Long

Returns the Month component of the PowerTime object. This is a numeric value in the range of 1-12.

MonthString <25> () AS String

Returns the Month component of the PowerTime object, expressed as a string (January, February...).

MSecond <26> () as Long

Returns the millisecond component of the PowerTime object. This is a numeric value in the range of 0-999.

NewDate <27> (ByVal *Year&*, Opt ByVal *Month&*, Opt ByVal

***Day&*)**

The date component of the PowerTime object is assigned a new value based upon the specified parameters. The time component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

NewTime <28> (ByVal *Hour&*, Opt ByVal *Min&*, Opt ByVal *Sec&*, Opt ByVal *MSec&*, Opt ByVal *Tick&*)

The time component of the PowerTime object is assigned a new value based upon the specified parameters. The date component is unchanged. If parameters are invalid, an appropriate error code is returned in OBJRESULT.

Now <29> ()

The current local date and time on this computer is assigned to this PowerTime object.

NowUTC <30> ()

The current Coordinated Universal date and time (UTC) is assigned to this PowerTime object.

Second <31> () as Long

Returns the Second component of the PowerTime object. This is a numeric value in the range of 0-59.

Tick <32> () as Long

Returns the Tick component of the PowerTime object. This is a numeric value in the range of 0-999.

TimeDiff <33> (*PowerTime*, *Sign&*, *Days&*, OPT *Hours&*, OPT *Minutes&*, OPT *Seconds&*, OPT *MSeconds&&*, OPT *Ticks&&*)

The internal PowerTime object is compared to the specified external PowerTime object. The difference is assigned to the parameter variables you provide. *Sign&* is -1 if the internal value is smaller. *Sign&* is 0 if the values are equal. Sign is +1 if the internal value is larger. The other parameters tell the difference as positive integer values. If you wish to return the time difference in units smaller than days, fill the unwanted parameters with BYVAL 0 and they will be ignored. For example:

```
ThisObject.TimeDiff(ThatObject, Sign&, BYVAL 0, BYVAL 0, Minutes&)
```

In the above, if the difference was precisely one day, the value 1440 would be assigned to *Minutes&* (24 hours * 60 minutes). If parameters are invalid, an appropriate error code is returned in OBJRESULT.

TimeString <34> () AS String

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm AM/PM.

TimeString24 <35> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm in 24-hour notation.

TimeStringFull <36> () AS WString

Returns the Time component of the PowerTime object expressed as a string. The time is formatted as hh:mm:ss.mmm in 24-hour notation.

Today <38> ()

The current local date on this computer is assigned to this PowerTime object. This is suitable for applications that work with dates only.

ToLocalTime <39> ()

The PowerTime object is converted to local time. It is assumed that the previous value was in Coordinated Universal Time (UTC).

ToUTC <40> ()

The PowerTime object is converted to Coordinated Universal Time (UTC). It is assumed that previous value was in local time.

Year <42> () as Long

Returns the Year component of the PowerTime object as a numeric value.

See also DATE$, DAYNAME$, MONTHNAME$, TIME$

PREFIX/END PREFIX statements

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PREFIX/END PREFIX statements New!

Purpose Executes a series of statements, each of which utilizes pre-defined source code.

Syntax

```
PREFIX "source code"
  [additional statements]
END PREFIX
```

Remarks PREFIX/END PREFIX statements enclose a set of statements, each of which has the same specified "*source code*" prepended. The "*source code*" (in languages which support it) is usually required to be the name of an object variable. However, in PowerBASIC, this definition has been expanded greatly to allow virtually any code to be used. This reduces repetitive typing and reduces the risk of typing errors. For example:

PREFIX/END PREFIX	Compiles as:

`PREFIX "MyObject."`
`  Init(xx)`
`  Sleep(2)`
`END PREFIX`
	`MyObject.Init(xx)`
	`MyObject.Sleep(2)`

`PREFIX "MyStruc."`
`  Height = 220`
`  Width  = 345`
`  Color  = %Blue`
 	
`END PREFIX`
	`MyStruc.Height = 220`
	`MyStruc.Width  = 345`
	`MyStruc.Color  = %Blue`

`PREFIX "ASM "`
`  Mov  Eax, Ebx`
`  Mov  Ecx, &H14`
`  IMul Eax, Esi`
`END PREFIX`
	`ASM Mov  Eax, Ebx`
	`ASM Mov  Ecx, &H14`
	`ASM IMul Eax, Esi`

If the "source code" prefix refers to an object variable or a UDT structure variable, be sure it ends with a period (.) to reference members of that item. Otherwise, be sure it contains whole words. Just as with macros and line continuations, you cannot put half a word on one line, and half a word on another. For example, the following code is illegal and will generate an exception:

```
PREFIX "PRI"
  NT #1, "Hello World"
END PREFIX
```

PREFIX/END PREFIX structures may not be nested.

See Also ASM ALIGN

PRINT# statement

PRINT# statement

Purpose Write data to a device or sequential file.

Syntax

```
PRINT # fNum&
PRINT # fNum&, [ExpList] [SPC(n)] [TAB(n)] [,] [;] [...]
PRINT # fNum&, array$()
```

Remarks The first form of the PRINT# statement (with or without a trailing comma) outputs a blank line to the file (i.e. a CR/LF only).

The second form of the PRINT# statement has the following parts, which may occur in any order and quantity, within a single PRINT# statement:

fNum& Number used in an OPEN statement to open a sequential file. It can be any numeric expression that evaluates to the number of an open file. Note that the Number symbol (#) preceding *fNum&* is not optional.

ExpList and/or string expression(s) to be written to the file.

SPC(n) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in the PRINT statement, for example, between expressions. Values of *n* less than 1 are ignored.

TAB(n) An optional function used to tab to the *n*th column before printing *ExpList*. Multiple use of the TAB argument is permitted in the PRINT, for example, to position arguments in columns. Values of *n* less than 1 are ignored.

{;|,} Character that determines the position of the next character printed. A semicolon (;) means the next character is printed immediately after the last character; a comma (,) means the next character is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of a PRINT# statement is a semicolon or comma, PRINT# will not append the (default) CR/LF byte pair to the data as it is written to the file. For example:

```
PRINT #1, "Hello";
PRINT #1, " world!"
```

...produces the contiguous string "Hello world!" in the disk file.

If you omit all arguments, the PRINT# statement prints a blank line in the file (i.e., a CR/LF pair only), but you must include the comma after the file number. Because PRINT# writes an image of the data to the file, you must delimit the data so it is printed correctly. If you use commas as delimiters, PRINT# also writes the blanks between print fields to the file. Also, remember that spacing of data displayed on a text screen using monospaced characters may not work well when the data is redisplayed in a graphical environment using proportionally spaced characters.

If you are not careful, you can waste a lot of disk space with unnecessary spaces, or worse, put fields so close together that you cannot tell them apart when they are later input with INPUT#. For example:

```
PRINT #1,1,2,3
```

sends:

```
1             2             3
```

to file #1. Because of the 14-column print zones between characters, superfluous spaces are sent to the file. On the other hand:

```
PRINT #1,1;2;3
```

sends:

```
1 2 3
```

to the file, and you cannot read the separate numeric values from this record because INPUT# requires commas as delimiters. The best way to delimit fields is to put a comma between each field, like so:

```
PRINT #1, 1 "," 2 "," 3
```

which writes:

```
1, 2, 3
```

to the file, and wastes the least possible space and is easy to read with an INPUT# statement. The WRITE# statement delimits fields with commas automatically.

PRINT# is advantageous when writing a single

or on each line in a file. Use PRINT# followed by a comma but no arguments to write a blank line (carriage return/linefeed) to a file:

```
PRINT #1,   'writes a blank line to file #1
```

array$() When PRINT# specifies an array name with empty parentheses, the entire array is written to the disk file as text strings, with each element delimited by a CR/LF ($CRLF or CHR$(13,10)). Numeric arrays are converted to the ASCII text equivalent.

Restrictions Arrays of User-Defined Types (UDTs) may not be used with the array form of the PRINT# statement.

See also GET, GET$, GET$$, INPUT#, LINE INPUT#, PUT, PUT$, PUT$$, WRITE#

Example

```
' Classic PRINT# statement example
SUB MakeFile
  ' opens a sequential file for output. Using PRINT #,
  ' it writes lines of different data types to the file.
  x& = FREEFILE
  OPEN "INPUT#.DTA" FOR OUTPUT AS #x&
  StringVariable$ = "I'll be back."
  IntegerVar% = 1000
  FloatingPoint! = 30000.12
  ' Write a line of text to the sequential file.
  PRINT #x&, StringVariable$
  PRINT #x&, IntegerVar%
  PRINT #x&, FloatingPoint!
  CLOSE #x&  ' close file variable
END SUB ' end procedure MakeFile

SUB ReadFile
  ' Opens a sequential file for input. Using INPUT #,
  ' reads lines of different types of data from the file.
  x& = FREEFILE
  OPEN "INPUT#.DTA" FOR INPUT AS #x&
  RESET StringVariable$
  RESET IntegerVar%
  RESET FloatingPoint!
  ' Read a line of text from the sequential file.
  INPUT #x&, StringVariable$
  INPUT #x&, IntegerVar%
  INPUT #x&, FloatingPoint!
  CLOSE #x&  ' close file variable
END SUB ' end procedure ReadFile

' Array mode PRINT# statement example
a$ = "Trevor, Bob, Bruce, Dave, Simon, Jenny"
DIM b$(1 TO PARSECOUNT(a$))
PARSE a$, b$()
ARRAY SORT b$()
```

```
OPEN "filename.txt" FOR OUTPUT AS #1
PRINT #1, b$()
CLOSE #1
```

PRINTER$ function

PRINTER$ function

Purpose Retrieve printer names and printer port names.

Syntax `device$ = PRINTER$([NAME | PORT], printernum&)`

Remarks printernum& specifies the printer number, from 1 to PRINTERCOUNT. If the NAME option is specified in the first position, the printer name is returned. If the PORT option is specified instead, the port name (e.g., LPT1) is returned.

See also LPRINT ATTACH, PRINTERCOUNT, XPRINT ATTACH

PRINTERCOUNT function

PRINTERCOUNT function

Purpose Retrieve the number of available (installed) printers.

Syntax `ncPrinters& = PRINTERCOUNT`

See also LPRINT ATTACH, PRINTER$, XPRINT ATTACH

Example

```
FUNCTION PBMAIN
  LOCAL ix AS LONG, sPrinters AS STRING
  FOR ix = 1 TO PRINTERCOUNT
    sPrinters = sPrinters & PRINTER$(NAME, ix) & $CRLF
  NEXT
  MSGBOX sPrinters
END FUNCTION
```

PROCESS GET PRIORITY statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PROCESS GET PRIORITY statement

Purpose Retrieve the Priority Value for the current process.

Syntax `PROCESS GET PRIORITY TO lResult&`

Remarks PROCESS GET PRIORITY retrieves the priority value for the current process. The retrieved priority value is assigned to the long or dword variable designated by *lResult&*.

The process priority value is one of the following:

%IDLE_PRIORITY_CLASS = &H00000040

Indicates a process whose
run only when the system is idle and are preempted by the threads of any process running in a higher priority class. An example is a screen saver. The idle priority class is inherited by child processes.

%NORMAL_PRIORITY_CLASS = &H00000020

Indicates a normal process with no special scheduling needs.

%HIGH_PRIORITY_CLASS = &H00000080

Indicates a process that performs time-critical tasks that must be executed immediately for it to run correctly. The threads of a high-priority class process preempt the threads of normal or idle priority class processes. An example is Windows Task List, which must respond quickly when called by the user, regardless of the load on the operating system. Use extreme care when using the high-priority class, because a high-priority class CPU-bound application can use nearly all available cycles.

%REALTIME_PRIORITY_CLASS = &H00000100

Indicates a process that has the highest possible priority. The threads of a real-time priority class process preempt the threads of all other processes, including operating system processes performing important tasks. For example, a real-time process that executes for more than a very brief interval can cause disk caches not to flush or cause the mouse to be unresponsive.

See also PROCESS SET PRIORITY, THREAD GET PRIORITY, THREAD SET PRIORITY

PROCESS SET PRIORITY statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PROCESS SET PRIORITY statement

Purpose Sets the Priority Value for the current process.

Syntax `PROCESS SET PRIORITY Priority&`

Remarks PROCESS SET PRIORITY assigns a new priority value to the current process.

The process priority value must be one of the following:

%IDLE_PRIORITY_CLASS = &H00000040

Indicates a process whose
run only when the system is idle and are preempted by the threads of any process running in a higher priority class. An example is a screen saver. The idle priority class is inherited by child processes.

%NORMAL_PRIORITY_CLASS = &H00000020

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Indicates a process that performs time-critical tasks that must be executed immediately for it to run correctly. The threads of a high-priority class process preempt the threads of normal or idle priority class processes. An example is Windows Task List, which must respond quickly when called by the user, regardless of the load on the operating system. Use extreme care when using the high-priority class, because a high-priority class CPU-bound application can use nearly all available cycles.

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See also PROCESS GET PRIORITY, THREAD GET PRIORITY, THREAD SET PRIORITY

PROFILE statement

PROFILE statement

Purpose Capture a profile report detailing total execution times of the Subs , Functions, Methods, and Properties in a program and write it to a disk file.

Syntax `PROFILE diskfilename$`

Remarks At the time the PROFILE statement is executed, a standard sequential file of the specified file name *diskfilename$* is created. For the best results in executable files, the PROFILE statement should be the last statement executed in the PBMAIN/WINMAIN function.

The profile report contains a list of every procedure within the same module (EXE or DLL), the number of times it was called, and the total elapsed time (in milliseconds) spent executing all instances of the procedure. These statistics appear in the disk file in that specific order on each line:

```
<Procedure Name>,  <Call Count>,  <Time mSec>
```

The profile report only describes procedures that physically reside within the module (EXE or DLL) where the PROFILE statement is located. Procedures in an external EXE or DLL are not profiled individually; however, the time taken to call other procedures and DLL/API functions is included in the accumulated execution time of the calling procedure.

It is highly recommended that you close all other applications when profiling a PowerBASIC application. When an application is being profiled, PowerBASIC must generate a considerable amount of extra code to gather all of the needed information. This extra code is generated whenever a valid PROFILE statement appears in your program, regardless of whether it is actually executed.

For final production code, use the #TOOLS OFF metastatement is used to ensure the highest performance levels.

Interpreting a profile report

The execution time of nested procedures needs to be understood in order to obtain a clear "picture" of the execution times. For example, consider the following results:

Procedure	***calls***	***time***
MySubA,	1,	11016
MySubB,	100,	10014

At first glance, these results may suggest a "bottleneck" in *MySubA* since it took *MySubA* 11016 milliseconds to execute just one call, whereas the average time for *MySubB* was only about 100 milliseconds per call (10014 mSec / 100 calls = 100.14 mSec).

However, if *MySubB* is actually **called by** *MySubA*, the results need to be assessed differently. For example, we could say: "*MySubB took 10014 milliseconds of the 11016* *milliseconds of the time spent in MySubA*". Or to put it another way: "*Of the 11016 milliseconds MySubA took to execute, 10014 milliseconds of that time was spent executing MySubB*".

Interpolating these results, it can be easily calculated that the code in *MySubA* only took 1002 milliseconds to run, yet this blossomed to 11016 milliseconds because of its dependence on *MySubB*.

Therefore, improving the performance of *MySubB* would clearly improve the overall speed of *MySubA*, and the profile results of both functions would be improved accordingly.

Restrictions

Profiling is "enabled" when the first procedure that contains a PROFILE statement begins execution. All procedures *subsequently* executed from within that procedure are profiled.

It is not possible to profile the actual PBMAIN or WINMAIN functions. If a PROFILE statement occurs within PBMAIN/WINMAIN, all procedures that are called from PBMAIN/LIBMAIN are profiled normally.

Therefore, if PBMAIN/WINMAIN contains code that requires profiling, simply rename the function and create a new PBMAIN/WINMAIN function that immediately calls the renamed function and then executes a PROFILE statement. See the example below.

For application code with nested and lengthy procedure calls, adding up the total number of milliseconds in the last column of a PROFILE disk file will usually produce a number that is far larger than the actual time it took your program to execute.

The time resolution of the profile report is limited by the *Quantum* supported by the operating system (Win95/98 is 54 mSec, and WinNT/2000/XP is 10 mSec), and can be influenced by any other applications which run concurrently. Nonetheless, PROFILE can offer a great insight as to which code may be consuming the most CPU time, and where optimization efforts should be concentrated.

See also

#TOOLS, CALLSTK, CALLSTK$, CALLSTKCOUNT, FUNCNAME$, TRACE

Example

```
SUB B1
  SLEEP 1000
END SUB

SUB A1
  SLEEP 250
  CALL B1
END SUB

FUNCTION PBMAIN
  CALL A1
  PROFILE "Profile Results.txt"    ' Profile at end
END FUNCTION
```

Result

```
 A1,                     1,                      1252
 B1,                     1,                      1002
 PBMAIN,                 1,                      0
```

PROGID$ function

PROGID$ function

Purpose

Return the unique alphanumeric PROGID

(text) associated with a unique CLSID string of a COM object or component. A COM object/component must include an alphanumeric PROGID string in order to be used by PowerBASIC (and Visual Basic).

Syntax

`a$ = PROGID$(ClassID$)`

Remarks

A PROGID string is the unique alphanumeric text name associated with a given COM object/component. For example, "Word.Application.8".

You convert the 16-byte (128-bit) binary class ID of a COM object/component into a PROGID string with the PROGID$ function.

PROGID$ takes the (16-byte) binary string *ClassID$* representing the GUID or UUID of a COM object/component, and examines the system registry in order to determine the PROGID string associated with the *ClassID$* string. ClassID$ may be a dynamic string or fixed-length string of at least 16 bytes, or (typically) a GUID variable.

If the *ClassID$* cannot be found, or any error occurs in the lookup process, PROGID$ will not set the ERR system variable, but will return an empty string.

PROGID$ is the complement to the CLSID$ function. Using these two functions together, it is possible to extract the precise capitalization of the PROGID from the system registry. See the example below.

See also DIM, CLSID$, GUID$, GUIDTXT$, INTERFACE (Direct), INTERFACE (IDBind), ISINTERFACE, ISNOTHING, ISOBJECT, Just what is COM?, LET (with Objects), METHOD, OBJECT, OBJACTIVE, OBJPTR, OBJRESULT, PROPERTY, What is an object, anyway?

Example

```
DIM MSWordClassID AS GUID
MSWordClassID = CLSID$("Word.Application")
IF TRIM$(MSWordClassID, $NUL) <> "" THEN
  'Success getting the CLSID$ of MSWord
  a$ = PROGID$(MSWordClassID)
  'a$ now contains "Word.Application.8"
  b$ = GUIDTXT$(MSWordClassID)
  'b$ holds "{000209FF-0000-0000-C000-000000000046}"
END IF
```

PROGRESSBAR GET POS statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PROGRESSBAR statement

Purpose Manipulate a PROGRESSBAR control. A ProgressBar is a rectangle that is gradually filled, left to right, as some work progresses.

Syntax

```
PROGRESSBAR GET POS hDlg, id& TO datav&
PROGRESSBAR GET RANGE hDlg, id& TO LoDatav&, HiDatav&
PROGRESSBAR SET POS hDlg, id&, position&
PROGRESSBAR SET RANGE hDlg, id&, lolimit&, hilimit&
PROGRESSBAR SET STEP hDlg, id&, stepval&
PROGRESSBAR STEP hDlg, id& [,incramt&]
```

hDlg Handle of the dialog that owns the ProgressBar.

id& The control identifier assigned with CONTROL ADD PROGRESSBAR.

Remarks In each of the following samples and descriptions, the PROGRESSBAR control that is the subject of the statement is identified by the handle of the dialog that owns the

ProgressBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD PROGRESSBAR. To alter the color of the bar or the background, use CONTROL SET COLOR.

PROGRESSBAR GET POS *hDlg, id&* TO *datav&*

The current position of the ProgressBar is retrieved and assigned to the variable designated by *datav&*.

PROGRESSBAR GET RANGE *hDlg, id&* TO *LoDatav&, HiDatav&*

The current range of the ProgressBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ProgressBar creation, the default range is 0 to 100.

PROGRESSBAR SET POS *hDlg, id&, position&*

The current position of the ProgressBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

PROGRESSBAR SET RANGE *hDlg, id&, lolimit&, hilimit&*

The range for the ProgressBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

PROGRESSBAR SET STEP *hDlg, id&, step&*

The default increment value to be used by PROGRESSBAR STEP is specified by the *stepval&* parameter.

PROGRESSBAR STEP *hDlg, id&* [*,incramt&*]

The ProgressBar is "stepped". The current position is advanced by the step increment, and the bar is redrawn to reflect the new position. If the optional *incramt&* expression is included, the position is advanced by that amount instead. The default step increment is 10, and the default range is from 0 to 100.

See also Dynamic Dialog Tools, CONTROL ADD PROGRESSBAR, CONTROL SET COLOR, CONTROL SET FONT

PROGRESSBAR GET RANGE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PROGRESSBAR statement

Purpose Manipulate a PROGRESSBAR control. A ProgressBar is a rectangle that is gradually filled, left to right, as some work progresses.

Syntax

```
PROGRESSBAR GET POS hDlg, id& TO datav&
PROGRESSBAR GET RANGE hDlg, id& TO LoDatav&, HiDatav&
PROGRESSBAR SET POS hDlg, id&, position&
PROGRESSBAR SET RANGE hDlg, id&, lolimit&, hilimit&
```

PROGRESSBAR SET STEP ***hDlg, id&, stepval&***
PROGRESSBAR STEP ***hDlg, id&*** **[,*incramt&*]**

hDlg Handle of the dialog that owns the ProgressBar.

id& The control identifier assigned with CONTROL ADD PROGRESSBAR.

Remarks In each of the following samples and descriptions, the PROGRESSBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ProgressBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD PROGRESSBAR. To alter the color of the bar or the background, use CONTROL SET COLOR.

PROGRESSBAR GET POS *hDlg, id&* TO *datav&*

The current position of the ProgressBar is retrieved and assigned to the variable designated by *datav&*.

PROGRESSBAR GET RANGE *hDlg, id&* TO *LoDatav&, HiDatav&*

The current range of the ProgressBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ProgressBar creation, the default range is 0 to 100.

PROGRESSBAR SET POS *hDlg, id&, position&*

The current position of the ProgressBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

PROGRESSBAR SET RANGE *hDlg, id&, lolimit&, hilimit&*

The range for the ProgressBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

PROGRESSBAR SET STEP *hDlg, id&, step&*

The default increment value to be used by PROGRESSBAR STEP is specified by the *stepval&* parameter.

PROGRESSBAR STEP *hDlg, id&* [,*incramt&*]

The ProgressBar is "stepped". The current position is advanced by the step increment, and the bar is redrawn to reflect the new position. If the optional *incramt&* expression is included, the position is advanced by that amount instead. The default step increment is 10, and the default range is from 0 to 100.

See also Dynamic Dialog Tools, CONTROL ADD PROGRESSBAR, CONTROL SET COLOR, CONTROL SET FONT

PROGRESSBAR SET POS statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PROGRESSBAR statement

Purpose Manipulate a PROGRESSBAR control. A ProgressBar is a rectangle that is gradually filled, left to right, as some work progresses.

Syntax

```
PROGRESSBAR GET POS hDlg, id& TO datav&
PROGRESSBAR GET RANGE hDlg, id& TO LoDatav&, HiDatav&
PROGRESSBAR SET POS hDlg, id&, position&
PROGRESSBAR SET RANGE hDlg, id&, lolimit&, hilimit&
PROGRESSBAR SET STEP hDlg, id&, stepval&
PROGRESSBAR STEP hDlg, id& [,incramt&]
```

hDlg Handle of the dialog that owns the ProgressBar.

id& The control identifier assigned with CONTROL ADD PROGRESSBAR.

Remarks In each of the following samples and descriptions, the PROGRESSBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ProgressBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD PROGRESSBAR. To alter the color of the bar or the background, use CONTROL SET COLOR.

PROGRESSBAR GET POS *hDlg, id&* TO *datav&*

The current position of the ProgressBar is retrieved and assigned to the variable designated by *datav&*.

PROGRESSBAR GET RANGE *hDlg, id&* TO *LoDatav&, HiDatav&*

The current range of the ProgressBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ProgressBar creation, the default range is 0 to 100.

PROGRESSBAR SET POS *hDlg, id&, position&*

The current position of the ProgressBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

PROGRESSBAR SET RANGE *hDlg, id&, lolimit&, hilimit&*

The range for the ProgressBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

PROGRESSBAR SET STEP *hDlg, id&, step&*

The default increment value to be used by PROGRESSBAR STEP is specified by the *stepval&* parameter.

PROGRESSBAR STEP *hDlg, id&* [,*incramt&*]

The ProgressBar is "stepped". The current position is advanced by the step increment, and the bar is redrawn to reflect the new position. If the optional *incramt&* expression is included, the position is advanced by that amount instead. The default step increment is 10, and the default range is from 0 to 100.

See also Dynamic Dialog Tools, CONTROL ADD PROGRESSBAR, CONTROL SET COLOR, CONTROL SET FONT

PROGRESSBAR SET RANGE statement

Keyword Template

Purpose

Syntax
Remarks
See also
Example

PROGRESSBAR statement

Purpose Manipulate a PROGRESSBAR control. A ProgressBar is a rectangle that is gradually filled, left to right, as some work progresses.

Syntax

```
PROGRESSBAR GET POS hDlg, id& TO datav&
PROGRESSBAR GET RANGE hDlg, id& TO LoDatav&, HiDatav&
PROGRESSBAR SET POS hDlg, id&, position&
PROGRESSBAR SET RANGE hDlg, id&, lolimit&, hilimit&
PROGRESSBAR SET STEP hDlg, id&, stepval&
PROGRESSBAR STEP hDlg, id& [,incramt&]
```

hDlg Handle of the dialog that owns the ProgressBar.

id& The control identifier assigned with CONTROL ADD PROGRESSBAR.

Remarks In each of the following samples and descriptions, the PROGRESSBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ProgressBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD PROGRESSBAR. To alter the color of the bar or the background, use CONTROL SET COLOR.

PROGRESSBAR GET POS *hDlg*, *id&* TO *datav&*

The current position of the ProgressBar is retrieved and assigned to the variable designated by *datav&*.

PROGRESSBAR GET RANGE *hDlg*, *id&* TO *LoDatav&*, *HiDatav&*

The current range of the ProgressBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ProgressBar creation, the default range is 0 to 100.

PROGRESSBAR SET POS *hDlg*, *id&*, *position&*

The current position of the ProgressBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

PROGRESSBAR SET RANGE *hDlg*, *id&*, *lolimit&*, *hilimit&*

The range for the ProgressBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

PROGRESSBAR SET STEP *hDlg*, *id&*, *step&*

The default increment value to be used by PROGRESSBAR STEP is specified by the *stepval&* parameter.

PROGRESSBAR STEP *hDlg*, *id&* [,*incramt&*]

The ProgressBar is "stepped". The current position is advanced by the step increment, and the bar is redrawn to reflect the new position. If the optional *incramt&* expression is included, the position is advanced by that amount instead. The default step increment is 10, and the default range is from 0 to 100.

See also Dynamic Dialog Tools, CONTROL ADD PROGRESSBAR, CONTROL SET COLOR, CONTROL SET FONT

PROGRESSBAR SET STEP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PROGRESSBAR statement

Purpose Manipulate a PROGRESSBAR control. A ProgressBar is a rectangle that is gradually filled, left to right, as some work progresses.

Syntax

```
PROGRESSBAR GET POS hDlg, id& TO datav&
PROGRESSBAR GET RANGE hDlg, id& TO LoDatav&, HiDatav&
PROGRESSBAR SET POS hDlg, id&, position&
PROGRESSBAR SET RANGE hDlg, id&, lolimit&, hilimit&
PROGRESSBAR SET STEP hDlg, id&, stepval&
PROGRESSBAR STEP hDlg, id& [,incramt&]
```

hDlg Handle of the dialog that owns the ProgressBar.

id& The control identifier assigned with CONTROL ADD PROGRESSBAR.

Remarks In each of the following samples and descriptions, the PROGRESSBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ProgressBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD PROGRESSBAR. To alter the color of the bar or the background, use CONTROL SET COLOR.

PROGRESSBAR GET POS *hDlg, id&* TO *datav&*

The current position of the ProgressBar is retrieved and assigned to the variable designated by *datav&*.

PROGRESSBAR GET RANGE *hDlg, id&* TO *LoDatav&, HiDatav&*

The current range of the ProgressBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ProgressBar creation, the default range is 0 to 100.

PROGRESSBAR SET POS *hDlg, id&, position&*

The current position of the ProgressBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

PROGRESSBAR SET RANGE *hDlg, id&, lolimit&, hilimit&*

The range for the ProgressBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

PROGRESSBAR SET STEP *hDlg, id&, step&*

The default increment value to be used by PROGRESSBAR STEP is specified by the *stepval&* parameter.

PROGRESSBAR STEP *hDlg, id&* [,*incramt&*]

The ProgressBar is "stepped". The current position is advanced by the step increment, and the bar is redrawn to reflect the new position. If the optional *incramt&* expression is included, the position is advanced by that amount instead. The default step increment is 10, and the default range is from 0 to 100.

See also Dynamic Dialog Tools, CONTROL ADD PROGRESSBAR, CONTROL SET COLOR, CONTROL SET FONT

PROGRESSBAR STEP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PROGRESSBAR statement

Purpose Manipulate a PROGRESSBAR control. A ProgressBar is a rectangle that is gradually filled, left to right, as some work progresses.

Syntax

```
PROGRESSBAR GET POS hDlg, id& TO datav&
PROGRESSBAR GET RANGE hDlg, id& TO LoDatav&, HiDatav&
PROGRESSBAR SET POS hDlg, id&, position&
PROGRESSBAR SET RANGE hDlg, id&, lolimit&, hilimit&
PROGRESSBAR SET STEP hDlg, id&, stepval&
PROGRESSBAR STEP hDlg, id& [,incramt&]
```

hDlg Handle of the dialog that owns the ProgressBar.

id& The control identifier assigned with CONTROL ADD PROGRESSBAR.

Remarks In each of the following samples and descriptions, the PROGRESSBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ProgressBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD PROGRESSBAR. To alter the color of the bar or the background, use CONTROL SET COLOR.

PROGRESSBAR GET POS *hDlg, id&* TO *datav&*

The current position of the ProgressBar is retrieved and assigned to the variable designated by *datav&*.

PROGRESSBAR GET RANGE *hDlg, id&* TO *LoDatav&, HiDatav&*

The current range of the ProgressBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ProgressBar creation, the default range is 0 to 100.

PROGRESSBAR SET POS *hDlg, id&, position&*

The current position of the ProgressBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

PROGRESSBAR SET RANGE *hDlg, id&, lolimit&, hilimit&*

The range for the ProgressBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

PROGRESSBAR SET STEP *hDlg*, *id&*, *step&*

The default increment value to be used by PROGRESSBAR STEP is specified by the *stepval&* parameter.

PROGRESSBAR STEP *hDlg*, *id&* [,*incramt&*]

The ProgressBar is "stepped". The current position is advanced by the step increment, and the bar is redrawn to reflect the new position. If the optional *incramt&* expression is included, the position is advanced by that amount instead. The default step increment is 10, and the default range is from 0 to 100.

See also Dynamic Dialog Tools, CONTROL ADD PROGRESSBAR, CONTROL SET COLOR, CONTROL SET FONT

PROPERTY / END PROPERTY statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PROPERTY/END PROPERTY statements IMPROVED

Purpose Define a PROPERTY procedure within a class.

Syntax

```
[OVERRIDE] PROPERTY GET|SET name [<DispID>] [ALIAS "altname"] (var AS
type...) [THREADSAFE] [AS type]
  [statements]
  PROPERTY = expression
END PROPERTY
```

Remarks PROPERTY/END PROPERTY is used to define a PROPERTY procedure within a class. Properties can only be called through a virtual function table on an active object. A PROPERTY is a special type of METHOD, which is only used to set or retrieve data in an object. While the work of a PROPERTY could readily be accomplished with a standard METHOD, this distinction is convenient to emphasize the concept of encapsulation of instance data within an object. There are two forms of PROPERTY procedures: PROPERTY GET and PROPERTY SET. As implied by the names, the first form is used to retrieve a data value from the object, while the second form is used to assign a value. Properties must be defined within a CLASS Block, and may only be declared within a DECLARE CLASS Block. Properties are defined:

```
PROPERTY GET name [ALIAS "altname"] (BYVAL var AS type...) [THREADSAFE]
AS type
  [statements]
  PROPERTY = expression
END PROPERTY

PROPERTY SET name [ALIAS "altname"] (BYVAL var AS type...) [THREADSAFE]
  [statements]
  variable = value
END PROPERTY
```

When you use PROPERTY SET, the value to be assigned is passed to the right of an equal sign, just like a normal assignment to a variable:

Properties can only be called through a virtual function table on an active object. Property parameters may be of any variable type.

```
ObjVar.Prop1 = NewValue
```

A PROPERTY may be considered "Read-Only" or "Write-Only" by simply omitting one of the two definitions. However, if both GET and SET forms are defined for a particular property, all parameters and the property data type must be identical in both forms, and they must be paired. That is, the PROPERTY SET must immediately follow the PROPERTY GET.

Property parameters may be of any variable type.

You can access a PROPERTY GET with:

```
DIM ObjVar AS MyInterface
LET ObjVar  = NEWCOM Prgid$
1. ObjVar.Prop1(param) TO var
2. CALL ObjVar.Prop1(param) TO var
3. var = ObjVar.Prop1(param)
```

You can access a PROPERTY SET with:

```
DIM ObjVar AS MyInterface
LET ObjVar  = NEWCOM Prgid$
1. ObjVar.Prop1(param) = expr
2. CALL ObjVar.Prop1(param) = expr
```

Note that the choice of Property procedure is syntax directed. In other words, depending upon the way you use the name, PowerBASIC will automatically decide whether the GET or SET PROPERTY should be called.

In every Method and Property, PowerBASIC automatically defines a pseudo-variable named ME, which is treated as a reference to the current object. Using ME, it's possible to call any other Method or Property which is a member of the class: *var* = ME.*Method1*(*param*)

Methods may be declared (using AS *type*...) to return a

, any of the types, a specific class of object variable (AS MyClass), a Variant, or a user defined Type.

Type Libraries only support the following data types: BYTE, WORD, DWORD, INTEGER, LONG, QUAD, SINGLE, DOUBLE, CURRENCY, OBJECT, STRING, and VARIANT. If any Methods or Properties use data types not supported by Type Libraries, you will receive a Error 581 - Type Library creation error, when using the #COM TLIB ON metastatement.

In addition to the explicit return value which you declare, all COM Methods and Properties have another "Hidden Return Value", which is cryptically named hResult. While the name would imply a handle for a result, it's really not a handle at all, but just a long integer value, used to indicate success or failure of the Method. After calling a Method or Property, you can retrieve the hResult value with the PowerBASIC function OBJRESULT. The most significant bit of the value is known as the severity bit. That bit is 0 (value is positive) for success, or 1 (value is negative) for failure. The remaining bits are used to convey error codes and additional status information. If you call any object Method/Property (either Dispatch or Direct), and the severity bit in the returned hResult is set, PowerBASIC generates Run-Time error 99: Object error. When you create a Method or Property, PowerBASIC automatically returns an hResult of zero, which implies success. You can return a non-zero hResult value by executing a METHOD OBJRESULT = *expr* within a Method, or PROPERTY OBJRESULT = *expr* within a Property.

Every method and property in a dual interface needs a positive, long integer value to identify it. That integer value is known as a *DispID* (Dispatch ID), and it's used internally by COM services to call the correct function on a Dispatch interface. You can optionally specify particular *DispID* by enclosing it in angle brackets immediately following the

Method/Property name:

```
METHOD  MethodOne <76> ()
```

If you don't specify a *DispID*, PowerBASIC will assign a random value for you. This is fine for internal objects, but may cause a failure for published COM objects, as the *DispID* could change each time you compile your program. It is particularly important that you specify a *DispID* for each Method/Property in a COM Event Interface.

Override Properties

You can add to, or replace, the functionality of a particular method or property of an inherited base class by coding a replacement which is preceded by the word OVERRIDE. The overriding method must have the same name and signature (parameters, return value, etc.) as the one it replaces.

BYREF and BYVAL parameters

BYVAL	A copy of the data value is placed on the stack as a parameter. The copy is destroyed when the PROPERTY ends. BYVAL parameters default to an IN attribute, if no explicit direction is specified.
BYREF	A pointer to the data is placed on the stack as a parameter. This option may not be used with an internal PROPERTY parameter.

Direction attributes

PROPERTY parameters also specify the direction in which data is passed between the caller and callee:

IN	Data is passed from the caller to the PROPERTY. Generally speaking, you'll find that almost all IN parameters are passed BYVAL, and that is highly recommended. However, it is possible to pass them BYREF if necessary.
OUT	Data is passed from the PROPERTY back to the caller. All OUT parameters must be passed BYREF.
INOUT	Data is passed from the caller to the PROPERTY, and results are returned to the caller in the same parameter. All INOUT parameters must be passed BYREF.

In many cases, the direction of a parameter can be inferred directly from the BYVAL/BYREF attribute (BYVAL=IN, BYREF=OUT). However, we recommend that you include the direction attribute as an added means of self-documentation. Each METHOD parameter name may be preceded by one of BYVAL/BYREF, and one of IN/OUT/INOUT, in any sequence.

You should note an interesting rule of COM objects: **IN parameters are read-only. They may not be altered.**

IN parameters are considered by COM rules to be "constant" which may not be altered, because they are values which are not returned to the caller. However, since this is not a rule normally applied to a standard SUB or FUNCTION, it can allow programming bugs which are most difficult to find and correct. For this reason, PowerBASIC automatically protects you from this issue with no action needed on your part. When writing METHOD or PROPERTY code in PowerBASIC, you may freely assign new values to BYVAL/IN parameters. They will simply be discarded when the METHOD exits. Of course, not every programming language protects you in this way, so you must use caution if you create a COM METHOD in another compiler.

Using OPTIONAL/OPT

PROPERTY statements may specify one or more parameters as optional by preceding the parameter with either the keyword

(or the abbreviation OPT). When a parameter is declared optional, all subsequent parameters in the declaration are optional as well, whether or not they specify an explicit OPTIONAL or OPT directive.

VARIANT variables are particularly well suited for use as an optional parameter. If the calling code omits an optional VARIANT parameter, (BYVAL or BYREF), PowerBASIC (and most other compilers) substitute a variant of type %VT_ERROR which contains an error value of %DISP_E_PARAMNOTFOUND (&H80020004). In this case, you can check for this value directly, or use the ISMISSING function to determine whether the parameter was physically passed or not.

When optional parameters (other than VARIANT) are omitted from the calling code, the stack area normally reserved for those parameters is zero-filled.

If the parameter is defined as a BYVAL parameter, it will have the value zero. For TYPE or UNION variables passed BYVAL, the compiler will pass a string of binary zeroes of length SIZEOF(*Type_or_union_var*).

If the parameter is defined as a BYREF parameter, VARPTR(*Varname*) will equal zero; when this is true, any attempt to use *Varname* in your code will result in a General Protection Fault or memory corruption. You should use the ISMISSING() function first to determine whether it is safe to access the parameter.

THREADSAFE Option Descriptor

If you include the option THREADSAFE, PowerBASIC automatically establishes a semaphore which allows only one

to execute it at a time. Others must wait until the first thread exits the THREADSAFE procedure before they are allowed to begin.

See also #COM, CLASS, INSTANCE, INTERFACE (Direct), INTERFACE (IDBind), ISINTERFACE, ISNOTHING, ISMISSING, ISOBJECT, Just what is COM?, LET (with Objects), ME, METHOD, OBJACTIVE, OBJPTR, OBJRESULT, What is an object, anyway?

Example

```
CLASS cMyClass
  INSTANCE Value AS LONG

  INTERFACE iMyClass
    INHERIT IDISPATCH

    PROPERTY GET Value <1> AS LONG
      PROPERTY = Value
    END PROPERTY

    PROPERTY SET Value <1> (BYVAL NewValue AS LONG)
      Value = NewValue
    END PROPERTY

  END INTERFACE
END CLASS
```

PUT statement

PUT statement

Purpose Write a record to a random-access file or a variable/array to a binary file.

Syntax

```
Random-Access and Binary files:
PUT [#] FileNum&, [RecPos], [ABS] Var
PUT [#] FileNum& [, RecPos]
Binary files:
PUT [#] FileNum&, [RecPos], Arr()
```

Remarks If a

	variable is specified as *Var*, the CHR mode of the variable determines whether the data is written as ANSI or WIDE characters. That is, ANSI string variables are always written as 1-byte characters, while WIDE string variables are written as 2-byte WIDE characters. The data is always written to the file in the same format as it appears in the variable.
FileNum&	The file number under which the file was opened.
RecPos	Identifies the position in the file to write the data. If *RecPos* is greater than the number of existing records or bytes in the file, the file is extended to the appropriate length, and the record is written at the specified position. **For random access files,** *RecPos* is the record to be written, in the range 1 to (2^63)-1. If *RecPos* is omitted, the next record in sequence (following the one specified by the most recent GET, PUT or SEEK) is written. If the file was only just opened, the first record is written. **For binary files**, *RecPos* is the starting byte position where *VarName* should be written. The default byte position is 1, unless the BASE = 0 clause was used in the OPEN statement. *RecPos* may be no larger than 2^63-1. *RecPos* is optional. If it is omitted, PowerBASIC uses the current file pointer position.

Var	The name of a variable to write to the file. *VarName* can specify a simple variable, an element in an array, or a variable of User-Defined Type (UDT).
	
	When writing a dynamic string to a random access file, PUT writes a 2-byte descriptor containing the string's length, before the actual string data. This descriptor reduces the available space in a record by two bytes. The descriptor is written as a WORD value. If *Var* contains more characters than record, *Var* is truncated at record length less two bytes, and the descriptor is written to reflect the truncated string size.
	
	When writing a dynamic string to a binary file, PUT only writes the actual string data: no length descriptor is written.
	
	PUT is complementary to GET; it writes one record to a file. It is possible to PUT to records out of contiguous order, as in:
	
	`PUT #1, 1, MyVar`
	`PUT #1, 100, MyVar`
	
	which creates a random-access file 100 records long. The data in records 2 through 99, however, are undefined until you explicitly PUT something there. PUT writes the contents of *Var* to the specified record or byte positions.

(no *VarName*)	When the second form of PUT is used (without a *VarName* source string), PUT writes the data from an internal buffer into the file at the point where the file pointer indicates. This data must first be assigned to the file buffer using FIELD string variables.
ABS	When PUT is used to write a dynamic string to a random file, it normally precedes the actual data with a two-byte binary length Word to define the number of valid bytes in the record. If you precede the variable name with ABS (i.e., PUT #1, , ABS x$), no length Word is written: only the actual data, subject to the defined random record length. This offers greater compatibility with the actual operation of other versions of BASIC, such as PowerBASIC for DOS. **The record length in a random access file is limited to 32768 bytes, in order to ensure consistent behavior across all Win32 platforms.**
Arr()	When PUT is used on a binary file, the entire array specified by *Arr()* is written to the file. With dynamic strings, the file is written in the PowerBASIC and/or VB packed string format. If the string is shorter than 65535 bytes, a 2-byte length Word is followed by the string data. Otherwise, a 2-byte value of 65535 is followed by a length Double-word (DWORD), then finally the string data. With other data types, the entire data area is written as a single block.In either case, it is presumed the file will be read with the complementary GET Array statement.
See also	CSET, CSET$, FIELD, GET, GET$, GET$$, LOF, LSET, PUT$, PUT$$, RSET, SETEOF,

TYPE, WRITE#

Example

```
' Random-access PUT example
TYPE TestRec
  uName   AS STRING * 10
  uNumber AS INTEGER
END TYPE

DIM Rec AS TestRec, Record AS QUAD

OPEN "RANDOM.DTA" FOR RANDOM AS #1 LEN = LEN(TestRec)

FOR Record = 1 TO 100
  Rec.uName = "Joe" + STR$(Record)
  Rec.uNumber = Record
  PUT #1,Record, Rec
NEXT Record

CLOSE #1

' Binary PUT Array example
DIM TheData$(1 TO count&)
TheData$(1) = "text"
' Assign more array values...
OPEN "Data file to write.dat" FOR BINARY AS #1
PUT #1, 1, TheData$()
CLOSE #1
```

PUT$ statement

PUT$ statement IMPROVED

Purpose Writes an ANSI

to a file opened in binary mode.

Syntax **PUT$ [#] *filenum&, StrgExpr***

Remarks PUT$ first evaluates the string expression. If it results in a WIDE Unicode string, it is converted to ANSI byte characters. PUT$ then writes the ANSI string to the file specified by *FileNum&* at the current file pointer position. GET$, PUT$, and SEEK provide a low-level alternative to sequential and random-access file processing techniques, allowing you to deal with files on a byte by byte basis.

File *filenum&* must have been opened in binary mode. Bytes are written starting at the current file pointer position, which can be set with the SEEK statement. When the file is first opened, the pointer is at the beginning of the file (position 1, by default, unless BASE=0 was specified in the OPEN statement). After PUT$, the file pointer position is automatically advanced to the point which immediately follows the just written data. You can use

to retrieve or change the file pointer position.

Filenum& The file number under which the file was opened.

StrgExpr A string expression which is written to the file.

See also GET, GET$, GET$$, OPEN, PUT, PUT$$, SEEK function, SEEK statement, SETEOF, WRITE#

Example

```
' Open a binary file and write the alphabet to it
OPEN "SEEK.DTA" FOR BINARY AS #1 BASE = 1
FOR I& = ASC("A") TO ASC("Z")   ' 65 TO 90
  PUT$ #1, CHR$(I&)
```

```
NEXT
CLOSE #1
```

PUT$$ statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

PUT$$ statement New!

Purpose Writes a WIDE Unicode

to a file opened in binary mode.

Syntax **PUT$$ [#] *filenum&, StrgExpr***

Remarks PUT$$ first evaluates the string expression. If it results in an ANSI string, it is converted to WIDE Unicode characters. PUT$$ then writes the WIDE string to the file specified by *FileNum&* at the current file pointer position. GET$$ and PUT$$ provide a low-level alternative to sequential and random-access file processing techniques, allowing you to deal with files on a character by character basis.

File *filenum&* must have been opened in binary mode. Characters are written starting at the current file pointer position, which can be set with the SEEK statement. When the file is first opened, the pointer is at the beginning of the file (position 1, by default, unless BASE=0 was specified in the OPEN statement). After PUT$$, the file pointer position is automatically advanced to the point which immediately follows the just written data. You can use

to retrieve or change the file pointer position.

Filenum& The file number under which the file was opened.

StrgExpr A string expression which is written to the file.

See also GET, GET$, GET$$, OPEN, PUT, PUT$, SEEK function, SEEK statement, SETEOF, WRITE#

RAISEEVENT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

RAISEEVENT statement

Purpose Call Event Handler code.

Syntax `RAISEEVENT ObjVar.Method()`

Remarks The RAISEEVENT statement is used to call event handler code from an Event Source. RAISEEVENT may only appear within a class which declares the Event Source interface. The concept of RAISEEVENT is very similar to the CALL statement, but it may only be used to execute event procedures:

```
RaiseEvent Status.Progress(10) ' advise the code is 10% done
```

It should be noted that RAISEEVENT does not reference an object variable at all, because it calls any and all Direct, V-Table event handlers which are currently subscribed to these events. Instead, it references the interface name (in this case "Status"), followed by the name of the Event Method to be executed (in this case "Progress"). If your program is using a Dispatch event handler you should use the OBJECT RAISEEVENT statement instead.

See also CLASS, EVENT SOURCE. EVENTS, INTERFACE (Direct), INTERFACE (IDBind), Just what is COM?, EVENTS, OBJECT RAISEEVENT, What is an object, anyway?, What are Connection Points?

Example See the EVENT SOURCE statement for an example of RAISEEVENT.

RANDOMIZE statement

RANDOMIZE statement

Purpose Seed the random number generator.

Syntax `RANDOMIZE [number]`

Remarks *number* is a seed value that may be any

type. If *number* is not specified, the value returned by the TIMER function is used.

Values returned by the random number generator (RND) depend on an initial seed value. For a given seed value, RND always returns the same sequence of values, yielding a predictable pseudo-random number sequence. Thus, any program that depends on RND will run exactly the same way each time unless a different seed is given.

The default seed can be duplicated with the following statement:

```
RANDOMIZE CVS(CHR$(255,255,255,255))
```

Note that each thread has its own, independent random number seed.

See also RND, TIMER

Example

```
' Seed generator and get 5 random values
RANDOMIZE 1.5!
FOR I& = 1 TO 5
  Table(I&) = RND(1,100)
NEXT I&

' Reseeding with the same starting value
' means you get the same sequence of values!
RANDOMIZE 1.5!
FOR I& = 1 TO 5
  Table(I&) = RND(1,100)
NEXT I&

' Now reseed from the TIMER and we get
' a completely different set of values:
RANDOMIZE TIMER
FOR I& = 1 TO 5
  Table(I&) = RND(1,100)
NEXT I&
```

READ$ function

READ$ function

Purpose Retrieve data from a local DATA list.

Syntax ***value$*** **= READ$(*n%*)**

Remarks The READ$ function is used to retrieve a specified string data item from a local DATA list, and returns the data in string format. READ$ offers a simple technique for random-access of local DATA.

n% An expression, constant, or variable, which specifies an index position in the local DATA list. *n%* = 1 for the first data item, *n%* = 2 for the second, and so on. READ$ accesses the DATA statements in the order in which they appear in the source program, from left to right.

If *n%* is greater than DATACOUNT, READ$ returns an empty string, but no run-time error occurs.

*value$* READ$ places the DATA string into *value$.*

If the target DATA statement is enclosed in quotes, READ$ preserves any leading or trailing spaces that it may contain; otherwise, READ$ trims leading and trailing spaces and returns a trimmed string. See DATA for more information on data item formatting.

If numeric data needs to be stored in DATA statements and retrieved with READ$, the VAL function can be used to convert the return values from READ$ into numeric values.

Restrictions There is a limit of 64 Kilobytes and 16384 separate data items per Sub, Function, Method, or Property, and it is not possible to read DATA from outside of the scope of current procedure. Restrictions apply to using colon and underscore characters in DATA statements - see DATA for more information.

See also DATA, DATACOUNT

Example

```
' The following returns the day of the week string.
FUNCTION WeekDayName$(BYVAL DayNum%)
  IF DayNum% < 1 OR DayNum% > DATACOUNT THEN
    WeekDayName$ = ""
  ELSE
    WeekDayName$ = READ$(DayNum%)
  END IF
  DATA Sun, Mon, Tue, Wed, Thu, Fri, Sat
END FUNCTION
```

REDIM statement

REDIM statement

Purpose Used at the to declare dynamic array variables and allocate, deallocate, or reallocate storage space.

Syntax **REDIM [PRESERVE] *array*([*subscripts*]) [AS *type*] [AT *address*] [, ...]**

Remarks The REDIM statement allows dynamic arrays (including string arrays) to be erased and re-dimensioned. It is really just a shortcut for the two-step process ERASE *x*(), followed by DIM *x*(). REDIM uses the same basic syntax as the DIM statement.

array is the name of the array, and *subscripts* is either a group of single integers (one per dimension of a particular array), or a group of ranges (REDIM arr1(5 TO 25, 1 TO 4, 3 TO 8)), separated by commas.

AS *type* — The AS *type* clause is optional, but recommended for the purposes of clarity.

AT *address* — The AT *address* clause indicates the array is to be an absolute array. Absolute arrays are not reset by the REDIM statement, nor are they reset when the Sub/Function/Method/Property exits, but they can be reset with the RESET statement. See the discussion in the DIM topic for more information on absolute arrays.

PRESERVE — The PRESERVE keyword tells the compiler to preserve the values of all existing elements in the array. For example, if you REDIM PRESERVE an array with 10 elements to 20 elements, the first 10 elements will retain their original value. The remaining 10 elements will be initialized to zero (or null/empty in the case of a string array). If the array is resized to be smaller, the specified number of elements is preserved, and the remaining elements are discarded. **When PRESERVE is specified, you can resize only the upper boundary of the last (outer) dimension of the array**. Arrays of only one dimension can always be resized.

In a procedure, you can use REDIM to re-dimension an array that was passed as an argument. That is, when the complete array was passed to the procedure:

```
CALL RemoveDuplicates( CustomerNames$() )
' more code here
SUB RemoveDuplicates( a$() )
  ' Remove duplicate array values
  REDIM PRESERVE a$(1 TO NewCount&)
END SUB
```

REDIM may also be used to alter the size of Static, Global, and Instance arrays.

When used with no subscript parameters, REDIM will erase all contents of an array and deallocate the memory used:

```
REDIM xyz&()  ' Equivalent to ERASE xyz&()
```

Restrictions — **When PRESERVE is specified, *only the upper bound of the last (outer) dimension may be redefined.***

When a REDIM statement is executed, the location of the array elements always moves in memory; however, the array's *Descriptor* location (VARPTR(*arrayname*()) will remain fixed at the original location. When using REDIM, your code must be sure to refresh any pointers that target the array data memory locations (STRPTR(*arrayname*(*subscript*)) for dynamic string arrays, and VARPTR(*arrayname*(*subscript*)) for all other array types).

While PowerBASIC supports lower boundary values that are non-zero, PowerBASIC generates the most efficient code if the lower boundary parameter is omitted (i.e., the array uses the default lower boundary of zero).

See also — ARRAYATTR, DIM, ERASE, RESET

Example

```
DIM MyData(40), Names$(100)
REDIM MyData(5 TO 50), Names$(10)
```

REGEXPR statement

REGEXPR statement

Purpose — Scan a

for a matching "wildcard" or regular expression.

Syntax — **REGEXPR *mask$* IN *target$* [AT *start&*] TO *iPos&* [, *iLen&*]**

Remarks — REGEXPR scans *target$* for a matching expression specified in *mask$*. If found, it returns the position of the match in the *iPos&* variable (indexed to the first character position), and optionally, the length of the matching expression in *iLen&*.

If a match is made, the *iPos&* and *iLen&* results can be immediately used with subsequent string operations such as MID$ to extract the matched portion of *target$*, and/or to continue the search through the remainder of *target$*. If no matching expression is found, both *iPos&* (and *iLen&* if specified) are set to zero.

If specified, the search begins at the character position *target&* in *target*$; however, *start&* must be between 1 and the length of *target$*. If *start&* is less than 1, the *start&* parameter is ignored.

While it is possible for more than one match to be found in a particular target string, REGEXPR first selects one or more matches which start at the leftmost possible position, then returns the longest of those. Use the \s special escape operator to force a match on the shortest match (see below).

The ^ and $ operators match on both the actual string start/end, or the previous/next embedded line-delimiter characters (CHR$(13,10) or $CRLF) in *target$*. This enables REGEXPR to treat the *target$* string as containing a set of "logical lines" of text. In this situation, the *start&* character position plays a crucial role in identifying which logical delimited line that should be examined by REGEXPR.

By default, search expressions are assumed to be case-insensitive, so capitalization is ignored.

mask$* The regular (*wildcard*) expression specified in *mask$ may contain a combination of standard text characters and/or the *metacharacters* which are defined as follows:

Char	Definition
.	**(period)** Matches any character, *except* the end-of-line.
^	(caret) Matches the actual beginning-of-line position or the preceding line-delimiter character pair (CHR$(13,10) or $CRLF), as taken from the *start&* character position. The line-delimiter characters themselves are not included in the *iLen&* result. (also see [^] below for usage within a character class definition).
$	**(dollar)** Matches the end-of-line position, which may be either the first line-delimiter character pair (CHR$(13,10) or $CRLF) that is encountered in the search to the right of the *start&* position, or the actual end of the *target*$ string, whichever occurs first. The line-delimiter characters themselves are not included in the *iLen&* result.
|	**(stile)** Specifies alternation (the OR operator), so that an expression on either side can match. Precedence is from left-to-right, as encountered in the expression.
?	**(question mark)** Specifies that zero or one match of the preceding sub-pattern is allowed. Cannot be used with a Tag.
+	**(plus)** Specifies that one or more matches of the preceding sub-pattern are allowed. Cannot be used with a Tag.
*	(asterisk) Specifies that zero or more matches of the preceding sub-pattern are allowed. Cannot be used with a Tag.

Character classes

[ ] **(square brackets)** Identifies a user-defined class of characters, any of which will match: [abc] will match a, b, or c. Only three special metacharacters are recognized within a class definition, the caret ^ for complemented characters, the hyphen - for a range of characters, or one of the following \ backslash escape sequences:

\\ \- \] \e \f \n \q \r \t \v \x##

Any other use of a backslash within a class definition yields an undefined operation that should be avoided.

[-] **(hyphen)** The hyphen identifies a range of characters to match. For example, [a-f] will match a, b, c, d, e, or f.

Characters in an individual range must occur in the natural order as they appear in the character set. For example, [f-a] will match nothing.

Lists of characters, and one or more ranges of characters, may be intermixed in a single class definition. The start and end of a range may be specified by a literal character, or one of the \ backslash escape sequences:

\\ \- \] \e \f \n \q \r \t \v \x##

Any other use of a backslash within a class definition yields an undefined operation.

Multiple ranges in a class are valid. For example, [a-d2-5] matches a, b, c, d, 2, 3, 4, or 5.

When the hyphen is escaped, it is treated as a literal. For example, [a\-c] is a list, not a range, and matches a, -, or c due to the \ backslash escape sequence.

[^] **(caret)** When the caret appears as the first item in a class definition, it identifies a complemented class of characters, which will not match. For example, [^abc] matches any character *except* a, b, or c.

A range can also be specified for the complemented class. For example, [^a-z] matches any character except a through z.

A caret located in any position other than the first is treated as a literal character.

Tags/sub-patterns

( ) **(parentheses)** Parentheses are used to match a Tag, or sub-pattern, within the full search pattern, and remember the match. The matched sub-pattern can be retrieved later in the mask (or in a replace operation with REGREPL), with \01 through \99, based upon the left-to-right position of the opening parentheses.

Parentheses may also be used to force precedence of evaluation with the alternation operator. For example, "(Begin)|(End)File" would match either "BeginFile" or "EndFile", but without the Tag designations, "Begin|EndFile" would only match either "BeginndFile" or "BegiEndFile".

Escaped characters

\ **(backslash)**. The escape operator (single-character quote). The following character will be treated as a literal value rather than being interpreted as a special character. Note that the character following the backslash must actually be a special character, as follows:

\b **A word boundary**. The start or end of a word, where a word is defined as one or more characters that include an alphabetic character (A-Z or a-z), a numeric character (0-9), and an underscore. For example, "abc_123" is considered a single word and "abc-123" is considered two words.

\c **Case-sensitive search**. Without the \c operator, the default is to ignore case when matching. Unlike some other implementations of regular expressions, case-insensitivity is recognized in all operations, even a range of characters such as "[6-Z]". The \c operator may appear at any position in the mask.

\e **Escape character**: CHR$(27) or $ESC.

\f **Formfeed character:** CHR$(12) or $FF.

\n **Linefeed (or new-line) character:** CHR$(10) or $LF.

\q **Double-quote mark ("):** CHR$(34) or $DQ. \q is included for ease of inclusion within a literal string. For example: "\qHello\q".

\r **Carriage-return character:** CHR$(13) or $CR.

\s	**Shortest match character:** The \s flag causes the shortest matching string to be returned, rather than the longest (the default). For example, when searching for the mask "abc.*abc" in "abcdabcabc", the default setting would return position 1 and length 10. With the \s switch set, it returns position 1 and length 7. This option may cause a slight increase in processing time. The \s flag must appear at the beginning of the mask string.
\t	**Horizontal tab character:** CHR$(9) or $TAB.
\v	**Vertical tab character:** CHR$(11) or $VT.
\x##	**Hex character code:** Indicates that an ASCII code follows, given by two hexadecimal digits. For example, \xFF = CHR$(&HFF) (which is equivalent to CHR$(255)). XX must be in the range 0 through 255.

Restrictions To maximize performance, avoid overuse of the *, + and ? metacharacters.

See also REGREPL, Online Regular Expression Tester

Example

```
a$ = "please send email to support@powerbasic.com"
b$ = "([a-z0-9._/+-]+)(@[a-z0-9.-]+)"
REGEXPR b$ IN a$ TO position&, length&
email_address$ = MID$(a$, position&, length&)

a$ = "Amount owed: $42.75 and is overdue!"
b$ = "\$[0-9.,]+"
REGEXPR b$ IN a$ TO position&, length&
amount$ = MID$(a$, position&, length&)

a$ = "Open 24 Hours"
b$ = "[^a-z ]+"
REGEXPR b$ IN a$ TO position&, length&
hours$ = MID$(a$, position&, length&)

a$ = "Line 1" + $CRLF + "Line 2" + $CRLF
b$ = "([0-9])$"
RESET position& : RESET length&
DO
  position& = position& + length&
  REGEXPR b$ IN a$ AT position& TO _
      position&, length&
  c$ = "Match at " + STR$(position&)
LOOP WHILE position&
```

REGISTER statement

REGISTER statement

Purpose To define Register variables, which are local to a Sub, Function, Method, or Property. The REGISTER statement provides an optimization hint to the compiler.

Syntax `REGISTER variable [AS type] [, variable [AS type]]`

Remarks The REGISTER statement is used to define certain local variables as Register variables - that is, variables which are stored directly in specific CPU registers, rather than in application memory. Since data in a CPU register can be accessed much faster, and with less code, Register variables are valuable optimization tools.

Register variables are always local to the procedure where they appear. In the current version of PowerBASIC, there may be up to two integral-class variables (Word/Dword/Integer/Long) and up to four Extended-precision floats. It is possible that future versions of the compiler will change these limits, so you may declare an unlimited number of them. Any "extra" Register variables are automatically reclassified as locals during compilation.

The REGISTER statement allows you to choose which variables will be classified as Register variables. If you do not make the choice in a particular procedure, the compiler will attempt to choose for you. By default, the compiler will always assign any integral-class local variables available. Extended-precision float variables will be automatically assigned only in Functions that contain no external Function calls.

Integral class Register variables are most efficient for variables that are updated or used often, such as For/Next loop counter variables, and variables that are used repeatedly as array indexes.

Floating-point Register variables should generally be chosen with a bit more caution, since the compiler must generate code to save and restore them to conventional memory around each call to a procedure. In some rather rare cases, it is possible that floating-point Register variables could actually reduce execution speed. However, they are extremely valuable with intensive floating-point calculations in Functions that have few references to other procedures.

Due to the design of FPUs (floating point units), and the instruction sets available, the first float register variable declared in your program has far more optimization possibilities than the others do. Use care in choosing the variable which is used most within floating-point expressions (that is, on the right side of the '=' assignment operator), in order to gain the greatest advantage in execution speed. Also, remember it is typically valuable to assign floating-point constants to Register variables when they are used in repetitive or intensive calculations.

You must use care with Inline Assembler floating-point opcodes in Functions that enable Register variables. Floating-point Register variables may occupy up to four of the FPU registers, so you must limit your use of the x87 registers to the remaining four. Further, floating-point Register variables may never be referenced by name from Inline Assembler code, as the compiler cannot always track the register locations with absolute certainty.

Restrictions

VARPTR cannot be used on a Register variable.

PowerBASIC transparently prevents the *automatic* register conversion of the variable used in the TO clause of the DIALOG SHOW MODAL and DIALOG SHOW MODELESS statements. If the target variable is *explicitly* declared as a register variable, PowerBASIC raises a compile-time Error 491 ("Invalid register variable"). This is necessary as the result values stored in such variables may be assigned from the context of other procedures, and this may only occur with a memory variable.

See also

#REGISTER, Optimizing your code

Example

```
SUB ReindexDatabase() AS LONG
  #REGISTER NONE    ' I'll choose my own register vars.
  REGISTER i AS LONG
  REGISTER fVar AS EXT
  ' do something
END FUNCTION
```

REGREPL statement

REGREPL statement

Purpose

Scan a

for a matching "wildcard" or regular expression, and replace it with a new value.

Syntax

REGREPL *mask$* IN *target$* WITH *repl$* [AT *start&*] TO *iPos&*, *newtarget$*

Remarks

REGREPL scans *target$* for a matching regular expression specified in *mask$*. If a match is made, REGREPL replaces the matched text with the contents of *repl$*, and assigns the new text to *newtarget$*. Additionally, REGREPL sets *iPos&* to reflect the character position immediately following the matched text in *newtarget$*, so the operation can be repeated, if desired.

If no matching expression is found, *iPos&* will be set to zero, and *newtarget$* receives a direct copy of *target$*. In either case, *target$* remains unchanged.

mask$ may contain literal characters and *metacharacters* (wildcards) to form the regular expression, and *repl$* may only contain literal characters and tags specified by \##. Each tag from \01 through \99 is replaced by the text actually matched for that tag. \00 is replaced by the entire matched text.

If specified, the search begins at the character position *start&* in *target$*; however, *start&* must be between 1 and the length of *target$*. If *start&* is less than 1, the *start&* parameter is ignored.

While it is possible for more than one match to be found in a particular target string, REGREPL first selects one or more matches which start at the leftmost possible position, then returns the longest of those. Use the \s special escape operator to force a match on the shortest match (see below).

The ^ and $ operators match on both the actual string start/end, or the previous/next embedded line-delimiter characters (CHR$(13,10) or $CRLF) in *target$*. This enables REGREPL to treat the *target$* string as containing a set of "logical lines" of text. In this situation, the *start&* character position plays a crucial role in identifying which logical delimited line that should be examined by REGREPL.

By default, search expressions are assumed to be case-insensitive, so capitalization is ignored.

mask$* The regular (*wildcard*) expression specified in *mask$ may contain a combination of standard text characters and/or the *metacharacters* which are defined as follows:

Char	Definition
.	**(period)** Matches any character, *except* the end-of-line.
^	**(caret)** Matches the actual beginning-of-line position or the preceding line-delimiter character pair (CHR$(13,10) or $CRLF), as taken from the *start&* character position. The line-delimiter characters themselves are not replaced by *repl$*. (also see [^] below for usage within a character class definition).
$	**(dollar)** Matches the end-of-line position, which may be the either the first line-delimiter character pair (CHR$(13,10) or $CRLF) that is encountered in the search to the right of the *start&* position, or the actual end of the *target$* string, whichever occurs first. The line-delimiter characters themselves are not replaced by *repl$*.
|	**(stile)** Specifies alternation (the OR operator), so that an expression on either side can match. Precedence is from left-to-right, as encountered in the expression.
?	**(question mark)** Specifies that zero or one match of the preceding sub-pattern is allowed. Cannot be used with a Tag.
+	**(plus)** Specifies that one or more matches of the preceding sub-pattern are allowed. Cannot be used with a Tag.
*	**(asterisk)** Specifies that zero or more matches of the preceding sub-pattern are allowed. Cannot be used with a Tag.
Character classes	
[ ]	**(square brackets)** Identifies a user-defined

class of characters, any of which will match: [abc] will match a, b, or c. Only three special metacharacters are recognized within a class definition, the caret (^) for complemented characters, the hyphen (-) for a range of characters, or one of the following \ backslash escape sequences:

\\ \- \] \e \f \n \q \r \t \v \x##

Any other use of a backslash within a class definition yields an undefined operation that should be avoided.

[-]	**(hyphen)** The hyphen identifies a range of characters to match. For example, [a-f] will match a, b, c, d, e, or f. Characters in an individual range must occur in the natural order as they appear in the character set. For example, [f-a] will match nothing. Lists of characters, and one or more ranges of characters, may be intermixed in a single class definition. The start and end of a range may be specified by a literal character, or one of the \ backslash escape sequences: \\ \- \] \e \f \n \q \r \t \v \x## Any other use of a backslash within a class definition yields an undefined operation. Multiple ranges in a class are valid. For example, [a-d2-5] matches a, b, c, d, 2, 3, 4, or 5. When the hyphen is escaped, it is treated as a literal. For example, [a\-c] is a list, not a range, and matches a, -, or c due to the \ backslash escape sequence.
[^]	**(caret)** When the caret appears as the first item in a class definition, it identifies a complemented class of characters, which will not match. For example, [^abc] matches any character *except* a, b, or c. A range can also be specified for the complemented class. For example, [^a-z] matches any character except a through z. A caret located in any position other than the first is treated as a literal character.

Tags/sub-patterns

( )	**(parentheses)** Parentheses are used to match a Tag, or sub-pattern, within the full search pattern, and remember the match. The matched sub-pattern can be retrieved later in the mask, or in a replace operation, with \01 through \99, based upon the left-to-right position of the opening parentheses. Parentheses may also be used to force precedence of evaluation with the alternation operator. For example, "(Begin)|(End)File" would match either "BeginFile" or "EndFile", but without the

	Tag designations, "Begin|EndFile" would only match either "BeginndFile" or "BegiEndFile". Note: Parentheses may not be used with ? + * as any match repetition could cause the tag value to be ambiguous. To match repeated expressions, use parentheses followed by \01*.

Escaped characters

\	(backslash). The escape operator (single-character quote). The following character will be treated as a literal value rather than being interpreted as a special character. Note that the character following the backslash must actually be a special character, as follows:
\b	**A word boundary**. The start or end of a word, where a word is defined as one or more characters that include an alphabetic character (A-Z or a-z), a numeric character (0-9), and an underscore. For example, "abc_123" is considered a single word and "abc-123" is considered two words.
\c	**Case-sensitive search**. Without the \c operator, the default is to ignore case when matching. Unlike some other implementations of regular expressions, case-insensitivity is recognized in all operations, even a range of characters such as "[6-Z]". The \c operator may appear at any position in the mask.
\e	**Escape character:** CHR$(27) or $ESC.
\f	**Formfeed character:** CHR$(12) or $FF.
\n	**Linefeed (or newline) character:** CHR$(10) or $LF.
\q	**Double-quote mark ("):** CHR$(34) or $DQ. \q is included for ease of inclusion within a literal string. For example: "\qHello\q".
\r	**Carriage-return character:** CHR$(13) or $CR.
\s	**Shortest match character:** The \s flag causes the shortest matching string to be returned, rather than the longest (the default). For example, when searching for the mask "abc.*abc" in "abcdabcabc", the default setting would return position 1 and length 10. With the \s switch set, it returns position 1 and length 7. This option may cause a slight increase in processing time. The \S flag must appear at the beginning of the mask string.
\t	**Horizontal tab character:** CHR$(9) or $TAB.
\v	**Vertical tab character:** CHR$(11) or $VT.
\x##	**Hex character code:** Indicates that an ASCII code follows, given by two hexadecimal digits. For example, \xFF = CHR$(&HFF) (which is equivalent to

	CHR$(255)). XX must be in the range 0 through 255.
\##	**Tag number:** Evaluated as the characters matched by tag number ## (where ## is in the range 01 through 99, in decimal). Tags are implicitly numbered from 01 through 99, based upon the left-to-right position of the left parenthesis. "(…)w\01" would match "abcwabc" or "456w456".

Tags cannot be forward-referenced - that is, if a reference is made to any Tag that is not yet defined, a non-match is presumed.

Restrictions To maximize performance, avoid overuse of the *, + and ? metacharacters.

See also REGEXPR

Example

```
#COMPILE EXE
FUNCTION PBMAIN
  a$ = "please email support@powerbasic.com"
  b$ = "([a-z0-9._/+-]+)(@[a-z0-9.-]+)"
  c$ = "sales\02"
  REGREPL b$ IN a$ WITH c$ TO position&, d$
  ' d$ -> "please email sales@powerbasic.com"

  a$ = "Line 1" + $CRLF + "Line 2" + $CRLF
  b$ = "([0-9])$"
  c$ = "\01.0"
  position& = 1
  DO
    REGREPL b$ IN a$ WITH c$ AT position& TO position&, a$
  LOOP WHILE position&
  ' a$ -> " Line 1.0" + $CRLF + "Line 2.0" + $CRLF
END FUNCTION
```

REM statement

REM statement

Purpose Indicate that the remainder of a line in source code files is to be regarded as a Remark or Comment, and excluded from the compiled code.

Syntax

```
REM comment text
' comment text
; comment in an Inline Assembler statement
```

Remarks The PowerBASIC compiler ignores Remarks; they do not take up space in your generated code, so use them abundantly - useful comments greatly increase the readability and maintainability of source code.

Comment text is any sequence of characters. A comment can appear on a line with other statements, but it must be the last thing on that line, and a colon must precede it. For example, the assignment below will not be compiled or executed because the compiler cannot tell where the comment ends and the statement begins:

```
REM now add the numbers: a = b + c
```

The following works:

```
a = b + c : REM now add the numbers
```

The apostrophe (') is an alternate form of REM. When you use an apostrophe, you do not need a colon to separate the remark from the other statements on the same line.

When using the Inline Assembler, use the semi-colon (;) to indicate that the remainder of the line should be ignored. An apostrophe (') can still be used for comments, however.

In addition, the compiler treats text that appears after the line continuation character as a remark. However, we still recommend that such comments are preceded by a REM or an apostrophe (') symbol to clearly distinguish remarks from the actual code. For example:

```
DECLARE FUNCTION Call32& _   The prototype
  LIB "CALL32.DLL" _ The DLL name
  ALIAS "Call32" _    ' The exported name
  (Param1 AS ANY, _  ' 1st parameter
  BYVAL id&) ' 2nd parameter
```

For situations where a large section of code needs to be REMmed out (yet preserved within the source code file), it is often easier to enclose the code with #IF 0/#ENDIF metastatements. For example:

```
#IF 0                ' Exclude the following lines
  Code and text in between the #IF 0 and #ENDIF
  metastatements is ignored by the compiler.
  DIM a$(1 TO 1000) ' This line is ignored too.
  INCR x&           ' As is this line!
#ENDIF
```

Since the #IF expression evaluates to false (zero), this forces the compiler to exclude the enclosed block of code from the compilation process, in exactly the same way as if a REM statement had been prefixed to each line.

See also Long Lines

Example

```
x% = 10          : REM This is a comment
y% = 20          ' This is another form of comment
! MOV EAX,"ABCD" ; An Inline Assembler comment
```

REMAIN$ function

REMAIN$ function

Purpose Return the portion of a

following the first occurrence of a character or group of characters.

Syntax `a$ = REMAIN$([Start,] MainStr, [ANY] MatchStr)`

Remarks REMAIN$ is a complement to the EXTRACT$ function. *MainStr* is searched for the string specified in *MatchStr*. If found, all characters after *MatchStr* are returned. If *MatchStr* is not present in *MainStr*, or either string parameter is nul, then a nul (zero-length) is returned.

Start is an optional starting position to begin searching. If Start is not specified, position 1 will be used. If *Start* is zero, a nul string is returned. If *Start* is negative, the starting position is counted from right to left: if -1, the search begins at the last character; if -2, the second to last, and so forth.

If the ANY keyword is included, *MatchStr* specifies a list of single characters to be searched for individually. A match on any one of them will cause the operation to be performed up to that character.

See also EXTRACT$, LEFT$, LTRIM$, MID$, REMOVE$, REPLACE, RIGHT$, RTRIM$, TALLY, TRIM$, VERIFY

Example

```
a$ = REMAIN$("I think, therefore I am hungry", ",")
Result  " therefore I am hungry"
```

REMOVE$ function

REMOVE$ function

Purpose Return a copy of a

with characters or strings removed.

Syntax `x$ = REMOVE$(MainString, [ANY] MatchString)`

Remarks The REMOVE$ function has the following parts:

MainString The string expression from which to remove characters.

MatchString The string expression to remove all occurrences of. If *MatchString* is not present in *MainString*, all of *MainString* is returned intact.

ANY If the ANY keyword is included, *MatchString* specifies a list of single characters to be searched for individually, a match on any one of which will cause that character to be removed from the result.

Restrictions REMOVE is case-sensitive.

See also CLIP$, EXTRACT$, INSTR, LTRIM$, MID$, REPLACE, RETAIN$, RIGHT$, RTRIM$, SHRINK$, TALLY, TRIM$, UNWRAP$, VERIFY

Example

```
' The following returns "aadabra",
' removing the string "bac"
x$ = REMOVE$("abacadabra", "bac")

' The following returns "dr",
' removing all "b", "a", and "c"
x$ = REMOVE$("abacadabra", ANY "bac")
```

REPEAT$ function

REPEAT$ function

Purpose Return a

consisting of multiple copies of the specified string.

Syntax `s$ = REPEAT$(count&, string_expr)`

Remarks The REPEAT$ function has the following parts:

count& Is an

expression, constant or variable, specifying the number of copies of *string_expr* to be included in the result. REPEAT$ is very similar to STRING$ (which makes multiple copies of a single character).

string_expr The string to be duplicated.

See also BUILD$, CHR$, GUID$, NUL$, SPACE$, STRING$

Example `x$ = REPEAT$(5, "<*> ")`

Result `<*> <*> <*> <*> <*>`

REPLACE statement

REPLACE statement

Purpose Within a specified

, replace all occurrences of one string with another string.

Syntax `REPLACE [ANY] MatchString WITH NewString IN MainString`

Remarks The REPLACE statement replaces all occurrences of *MatchString* in *MainString* with *NewString.* The replacement can cause *MainString* to grow or condense in size. *MainString* must be a string variable; *MatchString* and *NewString* may be string expressions. REPLACE is case-sensitive. When a match is found, the scan for the next match begins at the position immediately following the prior match.

ANY — If you use the ANY option, within *MainString*, each occurrence of each character in *MatchString* will be replaced with the corresponding character in *NewString*. In this case, *MatchString* and *NewString* must be the same length, because there is a one-to-one correspondence between their characters.

See also — EXTRACT$, INSTR, LTRIM$, MID$, REMOVE$, RETAIN$, RIGHT$, RTRIM$, SHRINK$, TALLY, TRIM$, UNWRAP$, VERIFY

Example

```
A$ = "abacadabra"
'now replace "bac" with "----bac----"
REPLACE "bac" WITH "----bac----" IN A$

A$ = "abacadabra"
'now replace all "b", "a", and "c" with "*"
REPLACE ANY "bac" WITH "***" IN A$
```

RESET statement

RESET statement

Purpose — Set a scalar (non-array) variable, Variant, User-Defined Type, individual array element (or an entire array) to zero or null/empty. RESET does not deallocate the actual memory used (with the exception of dynamic string array data, which is automatically deallocated).

Syntax

```
RESET variable [, ...]
RESET array() [, ...]
RESET array(index) [, ...]
```

Remarks — If *variable* is numeric, it is set to zero. If *variable* is a dynamic string, it is set to null (""; an empty string). If *variable* is a nul-terminated string, the first byte is set to nul ($NUL). If *variable* is a fixed-length string or User-Defined Type/Union, all bytes in *variable* are set to nul, or CHR$(0). If *variable* is a Variant, it is cleared and set to data type %VT_EMPTY.

If *array()* is

, all elements are set to zero; otherwise all elements are set to zero/null. If an array *index* value is specified within the parentheses, just that array element is set to zero/null, as if it were a scalar (non-array) variable.

RESET also works with *absolute arrays*, clearing the contents to zeroes or empty strings. For more information on absolute arrays, please refer to the DIM statement.

See also — ARRAYATTR, DIM, ERASE, LET, LET (with Types), LET (with Variants), REDIM

RESOURCE$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

RESOURCE$ function New!

Purpose Returns predefined resource data.

Syntax
```
r$  = RESOURCE$(RCDATA, ResID)
s$$ = RESOURCE$(STRING, ResID%)
```

Remarks You can embed data into your EXE or DLL with the #RESOURCE metastatement. While the data can be represented in several different data types, two are designed to be retrieved directly for your own purposes: RCDATA and STRING. In both cases, this data is returned as a variable-length string so you can manipulate it and use it as you wish. The specific resource you wish to retrieve is specified by the *ResID*. If the ID you request is not present, a nul (zero-length) string is returned.

RCDATA This resource contains raw data of any type. It is always stored byte-by-byte, just as it was originally created at the time of compilation. Generally speaking, this type of data should be assigned to an ANSI string variable so no Unicode conversions are performed. The *ResID* which identifies this resource may be a numeric value between 0 and 65535, or an alphanumeric label which is passed to the function as a string expression (string literal, variable, etc.)

STRING This resource contains predefined strings in a string table. Each string is identified by a resource ID number in the range of 0 to 65535. This number is used as the *ResID%* to determine which string will be retrieved. Because of the format in which Windows stores the strings in tables, only integral numeric ID's may be used. All resource strings are saved internally in wide Unicode format.

See also #RESOURCE

RESUME statement

RESUME statement IMPROVED

Purpose Restart program execution after error handling with ON ERROR GOTO.

Syntax
```
RESUME
RESUME NEXT
RESUME FLUSH
RESUME <Label>
```

Remarks The RESUME statement is used to continue execution of a program after a run-time error has been trapped and processed with an ON ERROR handler. RESUME (in any form) tells PowerBASIC that error processing has been completed, and it is now time to continue normal execution of the programming. Whenever an error is trapped and processed by ON ERROR GOTO, execution of a matching RESUME is mandatory.

RESUME

If the first form of RESUME is used (without any modifier), the statement which generated the error is executed again and program flow continues normally. Be certain that you've corrected the condition which generated the error in the first place before you do this!

RESUME NEXT

If you execute RESUME NEXT, program execution continues on the line immediately following the one which generated the error. Program flow continues normally after that. Be certain that your error handler did whatever was necessary to substitute new actions to replace what was expected from the code which errored.

RESUME FLUSH

If you execute RESUME FLUSH, there is no transfer of control to a different line.

Program execution simply continues on the line immediately following the RESUME FLUSH.

RESUME <*Label*>

If a label is specified, program execution continues at the specified label location. The label must be "local"; that is, it must be located within the same procedure as the RESUME.

Restrictions ON ERROR and RESUME may not be used within a TRY/END TRY block or a FASTPROC procedure.

See also ERL, ERR, ERROR, Error Overview, ERROR$, Error Trapping, ON ERROR

Example See the examples in Error Trapping.

RESUME FLUSH statement

RESUME statement IMPROVED

Purpose Restart program execution after error handling with ON ERROR GOTO.

Syntax

```
RESUME
RESUME NEXT
RESUME FLUSH
RESUME <Label>
```

Remarks The RESUME statement is used to continue execution of a program after a run-time error has been trapped and processed with an ON ERROR handler. RESUME (in any form) tells PowerBASIC that error processing has been completed, and it is now time to continue normal execution of the programming. Whenever an error is trapped and processed by ON ERROR GOTO, execution of a matching RESUME is mandatory.

RESUME

If the first form of RESUME is used (without any modifier), the statement which generated the error is executed again and program flow continues normally. Be certain that you've corrected the condition which generated the error in the first place before you do this!

RESUME NEXT

If you execute RESUME NEXT, program execution continues on the line immediately following the one which generated the error. Program flow continues normally after that. Be certain that your error handler did whatever was necessary to substitute new actions to replace what was expected from the code which errored.

RESUME FLUSH

If you execute RESUME FLUSH, there is no transfer of control to a different line. Program execution simply continues on the line immediately following the RESUME FLUSH.

RESUME <*Label*>

If a label is specified, program execution continues at the specified label location. The label must be "local"; that is, it must be located within the same procedure as the RESUME.

Restrictions ON ERROR and RESUME may not be used within a TRY/END TRY block or a FASTPROC procedure.

See also ERL, ERR, ERROR, Error Overview, ERROR$, Error Trapping, ON ERROR

Example See the examples in Error Trapping.

RESUME NEXT statement

RESUME statement IMPROVED

Purpose Restart program execution after error handling with ON ERROR GOTO.

Syntax

```
RESUME
RESUME NEXT
RESUME FLUSH
RESUME <Label>
```

Remarks The RESUME statement is used to continue execution of a program after a run-time error has been trapped and processed with an ON ERROR handler. RESUME (in any form) tells PowerBASIC that error processing has been completed, and it is now time to continue normal execution of the programming. Whenever an error is trapped and processed by ON ERROR GOTO, execution of a matching RESUME is mandatory.

RESUME

If the first form of RESUME is used (without any modifier), the statement which generated the error is executed again and program flow continues normally. Be certain that you've corrected the condition which generated the error in the first place before you do this!

RESUME NEXT

If you execute RESUME NEXT, program execution continues on the line immediately following the one which generated the error. Program flow continues normally after that. Be certain that your error handler did whatever was necessary to substitute new actions to replace what was expected from the code which errored.

RESUME FLUSH

If you execute RESUME FLUSH, there is no transfer of control to a different line. Program execution simply continues on the line immediately following the RESUME FLUSH.

RESUME <*Label*>

If a label is specified, program execution continues at the specified label location. The label must be "local"; that is, it must be located within the same procedure as the RESUME.

Restrictions ON ERROR and RESUME may not be used within a TRY/END TRY block or a FASTPROC procedure.

See also ERL, ERR, ERROR, Error Overview, ERROR$, Error Trapping, ON ERROR

Example See the examples in Error Trapping.

RESUME <Label> statement

RESUME statement IMPROVED

Purpose Restart program execution after error handling with ON ERROR GOTO.

Syntax

```
RESUME
RESUME NEXT
RESUME FLUSH
RESUME <Label>
```

Remarks The RESUME statement is used to continue execution of a program after a run-time error has been trapped and processed with an ON ERROR handler. RESUME (in any form) tells PowerBASIC that error processing has been completed, and it is now time to continue normal execution of the programming. Whenever an error is trapped and processed by ON ERROR GOTO, execution of a matching RESUME is mandatory.

RESUME

If the first form of RESUME is used (without any modifier), the statement which generated the error is executed again and program flow continues normally. Be certain that you've corrected the condition which generated the error in the first place before you do this!

RESUME NEXT

If you execute RESUME NEXT, program execution continues on the line immediately following the one which generated the error. Program flow continues normally after that. Be certain that your error handler did whatever was necessary to substitute new actions to replace what was expected from the code which errored.

RESUME FLUSH

If you execute RESUME FLUSH, there is no transfer of control to a different line. Program execution simply continues on the line immediately following the RESUME FLUSH.

RESUME <*Label*>

If a label is specified, program execution continues at the specified label location. The label must be "local"; that is, it must be located within the same procedure as the RESUME.

Restrictions ON ERROR and RESUME may not be used within a TRY/END TRY block or a FASTPROC procedure.

See also ERL, ERR, ERROR, Error Overview, ERROR$, Error Trapping, ON ERROR

Example See the examples in Error Trapping.

RETAIN$ function

RETAIN$ function

Purpose Return a

containing only the characters contained in a specified match string. All other characters are removed..

Syntax `sResult$ = RETAIN$(mainstr$, [ANY] matchstr$)`

Remarks RETAIN$ returns a string consisting of zero or more copies of the complete expression *matchstr$* which are found in *mainstr$*. All other characters are removed.

ANY If the ANY option is included, *matchstr$* specifies a list of single characters to be retained, if they are found in *mainstr$*.

Restrictions If *matchstr$* is an empty string, RETAIN$ returns an empty string.

See also EXTRACT$, REMAIN$, REMOVE$, REPLACE

Example

```
a$ ="<p>1234567890<ak;lk;l>1234567890</p>"
b$ = RETAIN$(a$, ANY "<;/p>")
c$ = RETAIN$(a$, ANY "0123456789")
```

Result

```
b$ contains "<p><;;></p>"
c$ contains "12345678901234567890"
```

RETURN statement

RETURN statement IMPROVED

Purpose Return from a (GOSUB) subroutine to its caller.

Syntax
```
RETURN
RETURN FLUSH
```

Remarks RETURN terminates the execution of a subroutine, and passes control to the statement directly following the calling GOSUB statement.

RETURN FLUSH removes the most recent return address from the system stack and program flow continues normally after the RETURN FLUSH.

Performing either form of RETURN without a corresponding GOSUB can cause unpredictable behavior and difficult-to-track errors. This includes the possibility of a General Protection Fault (GPF).

See also CALL, GOSUB, GOTO, ON ERROR, SUB/END SUB

Example See the example in GOSUB.

RETURN FLUSH statement

RETURN statement IMPROVED

Purpose Return from a (GOSUB) subroutine to its caller.

Syntax
```
RETURN
RETURN FLUSH
```

Remarks RETURN terminates the execution of a subroutine, and passes control to the statement directly following the calling GOSUB statement.

RETURN FLUSH removes the most recent return address from the system stack and program flow continues normally after the RETURN FLUSH.

Performing either form of RETURN without a corresponding GOSUB can cause unpredictable behavior and difficult-to-track errors. This includes the possibility of a General Protection Fault (GPF).

See also CALL, GOSUB, GOTO, ON ERROR, SUB/END SUB

Example See the example in GOSUB.

RGB function

RGB function

Purpose Create an RGB color value from 3 primary color values or from a BGR value.

Syntax
```
result& = RGB(red&, green&, blue&)
result& = RGB(bgrexpr&)
```

Remarks An RGB value is a long integer value in the range of 0 to &H00FFFFFF. It is used to specify a very precise color to various PowerBASIC functions and Windows API functions. The lowest three bytes of the value each specify the intensity of a primary color which combine to form the resultant color. Byte 1 (lowest) represents the red component, byte 2 the green, and byte 3 the blue. They can each take on a value in the range of 0 to 255. Byte 4 (highest) is always 0. When used with 3 parameters, the RGB() function creates an RGB value from the three component values.

Some Windows API functions, namely those which reference Device Independent Bitmaps (DIB), require that the colors be specified in the reverse sequence (Blue-Green-Red instead of Red-Green-Blue). In order to maximize performance and execution speed, PowerBASIC statements and functions which reference these structures also use the BGR format. These include GRAPHIC GET BITS and GRAPHIC SET BITS.

When used with one parameter, this function translates a BGR value to its RGB equivalent by swapping the first byte with the third byte, and returning the result.

For example, the BGR value of red is &HFF0000. RGB() translates it to &H0000FF. Calling BGR() with that value converts it back to &HFF0000.

See also Built In RGB Color Equates, BGR

RIGHT$ function

RIGHT$ function

Purpose Return the rightmost *n* characters of a

.

Syntax ***s$*** **= RIGHT$(*string_expression, n&*)**

Remarks If *n&* is positive, RIGHT$ returns the indicated number of characters from the string, starting from the right and working left. If *n&* greater than the length of string_expression, all of string_expression is returned.

If *n&* is 0, RIGHT$ returns an empty string. If *n&* is negative, it is interpreted as (LEN(*string_expression*) - ABS(*n&*)). For example, RIGHT$("1234567890", -2) returns "34567890".

See also EXTRACT$, INSTR, LEFT$, LTRIM$, MID$, REMOVE$, REPLACE, RTRIM$, SPLIT, TALLY, TRIM$, VERIFY

Example

```
' Demonstrate LEFT$ and RIGHT$ functions
DIM aString$, x$, n AS LONG
aString$ = "ABCDEFGHIJKLMNOP"
FOR n = 1 TO 14 STEP 2
  x$ = LEFT$(aString, n) + SPACE$(28 - n * 2) + RIGHT$(aString, n)
NEXT n
```

RMDIR statement

RMDIR statement

Purpose Delete a disk directory (like the DOS RMDIR command).

Syntax **RMDIR *path***

Remarks *path* is a directory path, which may include a drive specification. RMDIR deletes the directory indicated by *path*.

This statement works like the DOS "RMDIR" or "RD" commands. As with the DOS commands, the *path* must specify a valid, empty directory, other than the default (current) directory. Otherwise, a run-time Error 75 occurs ("Path/file access error").

RMDIR can use Long File Names (LFNs).

See also CHDIR, KILL, MKDIR

Example

```
DirectoryName$ = "\TEMP"
RMDIR DirectoryName$
```

RND function

RND function

Purpose Return a random number.

Syntax

```
y = RND
y = RND(a, b)
y = RND(numeric_expression)
```

Remarks Floating point mode: RND returns a random value that is less than 1, but greater than or equal to 0. Numbers generated by RND aren't really random, but are the result of applying a pseudo-random transformation algorithm to a starting ("seed") value. Given the same seed, PowerBASIC's RND algorithm always produces the same sequence of "random" numbers. The pseudo-random value is calculated internally as a single precision value, but returned as an extended precision representation so it can be readily used in any situation.

Integral Range mode: RND(*a*, *b*) returns a Long-integer in the range of *a* to *b* inclusive. *a* and *b* can each be a numeric literal or a numeric expression that evaluates within the range of a Long-integer (-2,147,483,648 to 2,147,483,647).

Special effects mode: When used with a single numeric expression argument, the value returned by RND depends on the optional numeric value you supply as the argument, as follows:

With no argument, or with a positive argument, RND generates the next number in sequence based on the initial seed value. With an argument of 0, RND repeats the last number generated. A negative argument causes the random number generator to be re-seeded, so subsequent uses of RND with no argument or with a positive argument result in a new sequence of values.

Do not use 0 or negative value arguments in special effects mode unless you are looking for the special effects those argument values produce.

The random number generator can be reset back to the default seed using the following statement:

```
RANDOMIZE CVS(CHR$(255,255,255,255))
```

Note that each thread has its own, independent random number seed. See the discussion under RANDOMIZE for additional information on seeding the random number generator.

Example See the example under RANDOMIZE.

ROTATE statement

ROTATE statement

Purpose Rotate the bits in an variable.

Syntax

```
ROTATE {LEFT | RIGHT} ivar, count
```

Remarks *ivar* must be one of the integral-class variable types: Byte, Word, Integer, Double-word, Long-integer, or Quad-integer. *count* is the number of bits by which to rotate *ivar*. ROTATE rotates all the bits in *ivar* without special regard to the sign bit of a signed integral-class variable.

See also BIT function, BIT statement, BITS, SHIFT

Example

```
i? = 221            ' binary: 1 1 0 1 1 1 0 1
ROTATE RIGHT i?, 1  ' binary: 1 1 1 0 1 1 1 0
```

ROUND function

ROUND function

Purpose Round a numeric value to a specified number of decimal places.

Syntax `x = ROUND(numeric_expression, n)`

Remarks *n* is an

expression specifying the number of decimal places required in the result. ROUND is especially useful in cases where you have a variable in Single, Double, or Extended-precision, and you want to put it into a Currency variable or display it, rounded to a specific number of decimal places.

Rounding is done according to the "banker's rounding" principle: if the fractional digit being rounded off is exactly five, with no trailing digits, the number is rounded to the nearest even number. This provides better results, on average, than the simple "round up at five" approach.

```
A% = ROUND(0.5, 0)            ' 0
A% = ROUND(1.5, 0)            ' 2
A% = ROUND(2.5, 0)            ' 2
A% = ROUND(2.51, 0)           ' 3
```

See also CEIL, FIX, FORMAT$, INT, USING$

RSET statement

RSET statement

Purpose Right justify a

into the space of a string variable or User-Defined Type.

Syntax `RSET [ABS] result_var = string_expression [USING ustring_expression]`

Remarks RSET right-aligns a string within the space of another string, or within a variable of a User-Defined Type (UDT).

ABS If ABS is specified, or *ustring_expression* is null (empty), RSET leaves the padding positions unchanged from their original content, rather than replacing them with spaces.

USING If *string_expression* is shorter then *result_var*, RSET right-justifies *string_expression* within *result_var,* and pads remaining character positions on the left side using the first character in *ustring_expression* or spaces if not specified or is null (empty).

If *string_expression* is longer than *result_var*, RSET truncates *string_expression* from the right until it fits in *result_var*.

RSET can be used to assign the content of a User-Defined Type to a User-Defined Type variable of a different class, or assign a dynamic string to a User-Defined Type. For example:

```
RSET MyUDT = STRING$(LEN(MyUDT), 0)
RSET MyUDT = b$
```

LSET works in a similar manner, but left-aligns *string_expression*; CSET performs center-justification.

See also CSET, CSET$, GET, LET, LET (with Types), LSET, LSET$, PUT, RESET, RSET$, STRINSERT$, TYPE SET

Example

```
a$ = SPACE$(20)
RSET a$ = "Right-align"
' result "         Right-align"
```

```
RSET a$ = "Right-align" USING "*"
' result "*********Right-align"
```

RSET$ function

RSET$ function

Purpose Return a

containing a right-justified (padded) string.

Syntax `a$ = RSET$(string_expression, strlen& [USING ustring_expression])`

Remarks RSET$ right-aligns the string *string_expression* into a string of *strlen&* characters.

USING If *ustring_expression* is null (empty) or is not specified, RSET$ pads *string_expression* with space characters. Otherwise, RSET$ pads the string with the first character of *ustring_expression*.

If *string_expression* is shorter then *strlen&*, RSET$ right-justifies *string_expression* within the assigned string variable (*a$*), padding the left side as described above; otherwise, RSET$ returns the left-most *strlen&* bytes of *string_expression*.

See also CSET, CSET$, GET, LET, LSET, LSET$, PUT, RESET, RSET, STRINSERT$, TYPE SET

Example

```
a$ = RSET$("PowerBASIC", 20)
' result: "          PowerBASIC"

a$ = RSET$("PowerBASIC",20 USING "*")
' result: "**********PowerBASIC"
```

RTRIM$ function

RTRIM$ function

Purpose Return a copy of a

with trailing characters or strings removed.

Syntax `x$ = RTRIM$(MainString [, [ANY] MatchString])`

Remarks *MainString* is the string expression from which to remove characters, and *MatchString* is the string expression specifying the characters that should be removed from the right hand side of *MainString*.

If *MatchString* is not specified, RTRIM$ removes trailing spaces. RTRIM$ returns a sub-string of *MainString*, from the beginning of the string to the character preceding the consecutive occurrences of *MatchString* (or space), which continues to the end of the original string. If *MatchString* (or a space) is not present at the end of *MainString*, all of *MainString* is returned.

RTRIM$ is case-sensitive.

ANY If the ANY keyword is included, *MatchString* specifies a list of single characters to be searched for individually - a match on any one of which as a trailing character will cause the character to be removed from the result.

See also CLIP$, EXTRACT$, INSTR, LEFT$, LTRIM$, MID$, REMOVE$, REPLACE, RIGHT$, STRDELETE$, STRINSERT$, STRREVERSE$, TALLY, TRIM$, VERIFY

Example

```
' returns "abacadabra" (match on spaces)
x$ = RTRIM$("abacadabra   ")

' returns "abacadabra   " (no match on " cad")
x$ = RTRIM$("abacadabra   ", " cad")
```

```
' returns "abacadabr" (match on " " and "a")
x$ = RTRIM$("abacadabra   ", ANY " cad")
```

SCROLLBAR GET PAGESIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

SCROLLBAR statement

Purpose Manipulate a SCROLLBAR control. A ScrollBar is a control that allows the user to scroll a data object to bring into view portions of the object that extend beyond the borders of the window.

Syntax

```
SCROLLBAR GET PAGESIZE hDlg, id& TO datav&
SCROLLBAR GET POS hDlg, id& TO datav&
SCROLLBAR GET RANGE hDlg&, id& TO LoDatav&, HiDatav&
SCROLLBAR GET TRACKPOS hDlg, id& TO datav&
SCROLLBAR SET PAGESIZE hDlg, id&, pagesize&
SCROLLBAR SET POS hDlg, id&, position&
SCROLLBAR SET RANGE hDlg, id&, lolimit&, hilimit&
```

hDlg Handle of the dialog that owns the ScrollBar.

id& The control identifier assigned with CONTROL ADD SCROLLBAR.

Remarks In each of the following samples and descriptions, the SCROLLBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ScrollBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD SCROLLBAR. To alter the color of the bar or the background, use CONTROL SET COLOR.

SCROLLBAR GET PAGESIZE *hDlg*, *id&* TO *datav&*

The current page size of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default page size is 10.

SCROLLBAR GET POS *hDlg*, *id&* TO *datav&*

The current position of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default position is 0.

SCROLLBAR GET RANGE *hDlg*, *id&* TO *LoDatav&*, *HiDatav&*

The current range of the ScrollBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ScrollBar creation, the default ScrollBar range is 0 to 100.

SCROLLBAR GET TRACKPOS *hDlg*, *id&* TO *datav&*

The current position of the scroll box, being dragged by the user, is retrieved and assigned to the variable designated by *datav&*. This is normally read while responding to the %SB_THUMBPOSITION or the %SB_THUMBTRACK messages. The TRACKPOS is then used to move the scroll position with SCROLLBAR SET POS.

SCROLLBAR SET PAGESIZE *hDlg, id&, pagesize&*

The current page size of the ScrollBar is set to the value of the parameter *pagesize&*, and the bar is redrawn to reflect the new position.

SCROLLBAR SET POS *hDlg, id&, position&*

The current position of the ScrollBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

SCROLLBAR SET RANGE *hDlg, id&, lolimit&, hilimit&*

The range for the ScrollBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

See also Dynamic Dialog Tools, CONTROL ADD SCROLLBAR, CONTROL SET COLOR

SCROLLBAR GET POS statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

SCROLLBAR statement

Purpose Manipulate a SCROLLBAR control. A ScrollBar is a control that allows the user to scroll a data object to bring into view portions of the object that extend beyond the borders of the window.

Syntax

```
SCROLLBAR GET PAGESIZE hDlg, id& TO datav&
SCROLLBAR GET POS hDlg, id& TO datav&
SCROLLBAR GET RANGE hDlg&, id& TO LoDatav&, HiDatav&
SCROLLBAR GET TRACKPOS hDlg, id& TO datav&
SCROLLBAR SET PAGESIZE hDlg, id&, pagesize&
SCROLLBAR SET POS hDlg, id&, position&
SCROLLBAR SET RANGE hDlg, id&, lolimit&, hilimit&
```

hDlg Handle of the dialog that owns the ScrollBar.

id& The control identifier assigned with CONTROL ADD SCROLLBAR.

Remarks In each of the following samples and descriptions, the SCROLLBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ScrollBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD SCROLLBAR. To alter the color of the bar or the background, use CONTROL SET COLOR.

SCROLLBAR GET PAGESIZE *hDlg, id&* TO *datav&*

The current page size of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default page size is 10.

SCROLLBAR GET POS *hDlg, id&* TO *datav&*

The current position of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default position is 0.

SCROLLBAR GET RANGE *hDlg, id&* TO *LoDatav&, HiDatav&*

The current range of the ScrollBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ScrollBar creation, the default ScrollBar range is 0 to 100.

SCROLLBAR GET TRACKPOS *hDlg, id&* TO *datav&*

The current position of the scroll box, being dragged by the user, is retrieved and assigned to the variable designated by *datav&*. This is normally read while responding to the %SB_THUMBPOSITION or the %SB_THUMBTRACK messages. The TRACKPOS is then used to move the scroll position with SCROLLBAR SET POS.

SCROLLBAR SET PAGESIZE *hDlg, id&, pagesize&*

The current page size of the ScrollBar is set to the value of the parameter *pagesize&*, and the bar is redrawn to reflect the new position.

SCROLLBAR SET POS *hDlg, id&, position&*

The current position of the ScrollBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

SCROLLBAR SET RANGE *hDlg, id&, lolimit&, hilimit&*

The range for the ScrollBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

See also Dynamic Dialog Tools, CONTROL ADD SCROLLBAR, CONTROL SET COLOR

SCROLLBAR GET RANGE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

SCROLLBAR statement

Purpose Manipulate a SCROLLBAR control. A ScrollBar is a control that allows the user to scroll a data object to bring into view portions of the object that extend beyond the borders of the window.

Syntax

```
SCROLLBAR GET PAGESIZE hDlg, id& TO datav&
SCROLLBAR GET POS hDlg, id& TO datav&
SCROLLBAR GET RANGE hDlg&, id& TO LoDatav&, HiDatav&
SCROLLBAR GET TRACKPOS hDlg, id& TO datav&
SCROLLBAR SET PAGESIZE hDlg, id&, pagesize&
SCROLLBAR SET POS hDlg, id&, position&
SCROLLBAR SET RANGE hDlg, id&, lolimit&, hilimit&
```

hDlg Handle of the dialog that owns the ScrollBar.

id& The control identifier assigned with CONTROL ADD SCROLLBAR.

Remarks In each of the following samples and descriptions, the SCROLLBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ScrollBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD SCROLLBAR. To alter the color of the bar or the background, use CONTROL SET COLOR.

SCROLLBAR GET PAGESIZE *hDlg*, *id&* TO *datav&*

The current page size of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default page size is 10.

SCROLLBAR GET POS *hDlg*, *id&* TO *datav&*

The current position of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default position is 0.

SCROLLBAR GET RANGE *hDlg*, *id&* TO *LoDatav&*, *HiDatav&*

The current range of the ScrollBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ScrollBar creation, the default ScrollBar range is 0 to 100.

SCROLLBAR GET TRACKPOS *hDlg*, *id&* TO *datav&*

The current position of the scroll box, being dragged by the user, is retrieved and assigned to the variable designated by *datav&*. This is normally read while responding to the %SB_THUMBPOSITION or the %SB_THUMBTRACK messages. The TRACKPOS is then used to move the scroll position with SCROLLBAR SET POS.

SCROLLBAR SET PAGESIZE *hDlg*, *id&*, *pagesize&*

The current page size of the ScrollBar is set to the value of the parameter *pagesize&*, and the bar is redrawn to reflect the new position.

SCROLLBAR SET POS *hDlg*, *id&*, *position&*

The current position of the ScrollBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

SCROLLBAR SET RANGE *hDlg*, *id&*, *lolimit&*, *hilimit&*

The range for the ScrollBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

See also Dynamic Dialog Tools, CONTROL ADD SCROLLBAR, CONTROL SET COLOR

SCROLLBAR GET TRACKPOS statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

SCROLLBAR statement

Purpose Manipulate a SCROLLBAR control. A ScrollBar is a control that allows the user to scroll a data object to bring into view portions of the object that extend beyond the borders of the window.

Syntax

```
SCROLLBAR GET PAGESIZE hDlg, id& TO datav&
SCROLLBAR GET POS hDlg, id& TO datav&
SCROLLBAR GET RANGE hDlg&, id& TO LoDatav&, HiDatav&
SCROLLBAR GET TRACKPOS hDlg, id& TO datav&
SCROLLBAR SET PAGESIZE hDlg, id&, pagesize&
SCROLLBAR SET POS hDlg, id&, position&
SCROLLBAR SET RANGE hDlg, id&, lolimit&, hilimit&
```

hDlg Handle of the dialog that owns the ScrollBar.

id& The control identifier assigned with CONTROL ADD SCROLLBAR.

Remarks In each of the following samples and descriptions, the SCROLLBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ScrollBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD SCROLLBAR. To alter the color of the bar or the background, use CONTROL SET COLOR.

SCROLLBAR GET PAGESIZE *hDlg, id&* TO *datav&*

The current page size of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default page size is 10.

SCROLLBAR GET POS *hDlg, id&* TO *datav&*

The current position of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default position is 0.

SCROLLBAR GET RANGE *hDlg, id&* TO *LoDatav&, HiDatav&*

The current range of the ScrollBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ScrollBar creation, the default ScrollBar range is 0 to 100.

SCROLLBAR GET TRACKPOS *hDlg, id&* TO *datav&*

The current position of the scroll box, being dragged by the user, is retrieved and assigned to the variable designated by *datav&*. This is normally read while responding to the %SB_THUMBPOSITION or the %SB_THUMBTRACK messages. The TRACKPOS is then used to move the scroll position with SCROLLBAR SET POS.

SCROLLBAR SET PAGESIZE *hDlg, id&, pagesize&*

The current page size of the ScrollBar is set to the value of the parameter *pagesize&*, and the bar is redrawn to reflect the new position.

SCROLLBAR SET POS *hDlg, id&, position&*

The current position of the ScrollBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

SCROLLBAR SET RANGE *hDlg, id&, lolimit&, hilimit&*

The range for the ScrollBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

See also Dynamic Dialog Tools, CONTROL ADD SCROLLBAR, CONTROL SET COLOR

SCROLLBAR SET PAGESIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

SCROLLBAR statement

Purpose Manipulate a SCROLLBAR control. A ScrollBar is a control that allows the user to scroll a data object to bring into view portions of the object that extend beyond the borders of the window.

Syntax

```
SCROLLBAR GET PAGESIZE hDlg, id& TO datav&
SCROLLBAR GET POS hDlg, id& TO datav&
SCROLLBAR GET RANGE hDlg&, id& TO LoDatav&, HiDatav&
SCROLLBAR GET TRACKPOS hDlg, id& TO datav&
SCROLLBAR SET PAGESIZE hDlg, id&, pagesize&
SCROLLBAR SET POS hDlg, id&, position&
SCROLLBAR SET RANGE hDlg, id&, lolimit&, hilimit&
```

hDlg Handle of the dialog that owns the ScrollBar.

id& The control identifier assigned with CONTROL ADD SCROLLBAR.

Remarks In each of the following samples and descriptions, the SCROLLBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ScrollBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD SCROLLBAR. To alter the color of the bar or the background, use CONTROL SET COLOR.

SCROLLBAR GET PAGESIZE *hDlg, id&* TO *datav&*

The current page size of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default page size is 10.

SCROLLBAR GET POS *hDlg, id&* TO *datav&*

The current position of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default position is 0.

SCROLLBAR GET RANGE *hDlg, id&* TO *LoDatav&, HiDatav&*

The current range of the ScrollBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ScrollBar creation, the default ScrollBar range is 0 to 100.

SCROLLBAR GET TRACKPOS *hDlg, id&* TO *datav&*

The current position of the scroll box, being dragged by the user, is retrieved and assigned to the variable designated by *datav&*. This is normally read while responding to the %SB_THUMBPOSITION or the %SB_THUMBTRACK messages. The TRACKPOS is then used to move the scroll position with SCROLLBAR SET POS.

SCROLLBAR SET PAGESIZE *hDlg, id&, pagesize&*

The current page size of the ScrollBar is set to the value of the parameter *pagesize&*, and the bar is redrawn to reflect the new position.

SCROLLBAR SET POS *hDlg, id&, position&*

The current position of the ScrollBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

SCROLLBAR SET RANGE *hDlg*, *id&*, *lolimit&*, *hilimit&*

The range for the ScrollBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

See also Dynamic Dialog Tools, CONTROL ADD SCROLLBAR, CONTROL SET COLOR

SCROLLBAR SET POS statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

SCROLLBAR statement

Purpose Manipulate a SCROLLBAR control. A ScrollBar is a control that allows the user to scroll a data object to bring into view portions of the object that extend beyond the borders of the window.

Syntax

```
SCROLLBAR GET PAGESIZE hDlg, id& TO datav&
SCROLLBAR GET POS hDlg, id& TO datav&
SCROLLBAR GET RANGE hDlg&, id& TO LoDatav&, HiDatav&
SCROLLBAR GET TRACKPOS hDlg, id& TO datav&
SCROLLBAR SET PAGESIZE hDlg, id&, pagesize&
SCROLLBAR SET POS hDlg, id&, position&
SCROLLBAR SET RANGE hDlg, id&, lolimit&, hilimit&
```

hDlg Handle of the dialog that owns the ScrollBar.

id& The control identifier assigned with CONTROL ADD SCROLLBAR.

Remarks In each of the following samples and descriptions, the SCROLLBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ScrollBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD SCROLLBAR. To alter the color of the bar or the background, use CONTROL SET COLOR.

SCROLLBAR GET PAGESIZE *hDlg*, *id&* TO *datav&*

The current page size of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default page size is 10.

SCROLLBAR GET POS *hDlg*, *id&* TO *datav&*

The current position of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default position is 0.

SCROLLBAR GET RANGE *hDlg*, *id&* TO *LoDatav&*, *HiDatav&*

The current range of the ScrollBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ScrollBar creation, the default ScrollBar range is 0 to 100.

SCROLLBAR GET TRACKPOS *hDlg, id&* TO *datav&*

The current position of the scroll box, being dragged by the user, is retrieved and assigned to the variable designated by *datav&*. This is normally read while responding to the %SB_THUMBPOSITION or the %SB_THUMBTRACK messages. The TRACKPOS is then used to move the scroll position with SCROLLBAR SET POS.

SCROLLBAR SET PAGESIZE *hDlg, id&, pagesize&*

The current page size of the ScrollBar is set to the value of the parameter *pagesize&*, and the bar is redrawn to reflect the new position.

SCROLLBAR SET POS *hDlg, id&, position&*

The current position of the ScrollBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

SCROLLBAR SET RANGE *hDlg, id&, lolimit&, hilimit&*

The range for the ScrollBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

See also Dynamic Dialog Tools, CONTROL ADD SCROLLBAR, CONTROL SET COLOR

SCROLLBAR SET RANGE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

SCROLLBAR statement

Purpose Manipulate a SCROLLBAR control. A ScrollBar is a control that allows the user to scroll a data object to bring into view portions of the object that extend beyond the borders of the window.

Syntax

```
SCROLLBAR GET PAGESIZE hDlg, id& TO datav&
SCROLLBAR GET POS hDlg, id& TO datav&
SCROLLBAR GET RANGE hDlg&, id& TO LoDatav&, HiDatav&
SCROLLBAR GET TRACKPOS hDlg, id& TO datav&
SCROLLBAR SET PAGESIZE hDlg, id&, pagesize&
SCROLLBAR SET POS hDlg, id&, position&
SCROLLBAR SET RANGE hDlg, id&, lolimit&, hilimit&
```

hDlg Handle of the dialog that owns the ScrollBar.

id& The control identifier assigned with CONTROL ADD SCROLLBAR.

Remarks In each of the following samples and descriptions, the SCROLLBAR control that is the subject of the statement is identified by the handle of the dialog that owns the ScrollBar (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD SCROLLBAR. To alter the color of the bar or the background, use CONTROL SET COLOR.

SCROLLBAR GET PAGESIZE *hDlg, id&* TO *datav&*

The current page size of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default page size is 10.

SCROLLBAR GET POS *hDlg, id&* TO *datav&*

The current position of the ScrollBar is retrieved and assigned to the variable designated by *datav&*. Upon ScrollBar creation, the default position is 0.

SCROLLBAR GET RANGE *hDlg, id&* TO *LoDatav&, HiDatav&*

The current range of the ScrollBar is retrieved and assigned to the variables designated by *LoDatav&* and *HiDatav&*. Upon ScrollBar creation, the default ScrollBar range is 0 to 100.

SCROLLBAR GET TRACKPOS *hDlg, id&* TO *datav&*

The current position of the scroll box, being dragged by the user, is retrieved and assigned to the variable designated by *datav&*. This is normally read while responding to the %SB_THUMBPOSITION or the %SB_THUMBTRACK messages. The TRACKPOS is then used to move the scroll position with SCROLLBAR SET POS.

SCROLLBAR SET PAGESIZE *hDlg, id&, pagesize&*

The current page size of the ScrollBar is set to the value of the parameter *pagesize&*, and the bar is redrawn to reflect the new position.

SCROLLBAR SET POS *hDlg, id&, position&*

The current position of the ScrollBar is set to the value of the parameter *position&*, and the bar is redrawn to reflect the new position.

SCROLLBAR SET RANGE *hDlg, id&, lolimit&, hilimit&*

The range for the ScrollBar is specified to be from *lolimit&* to *hilimit&*. If *lolimit&* is greater than *hilimit&*, the results are undefined.

See also Dynamic Dialog Tools, CONTROL ADD SCROLLBAR, CONTROL SET COLOR

SEEK function

SEEK function

Purpose Return the location within a file where the next I/O operation will take place.

Syntax ***position&&* = SEEK([#] *filenum&*)**

Remarks If file *filenum&* was opened in random-access mode, SEEK returns the record number of the next record to be written or read as a Quad-integer (64-bit) value. If the file was opened in any other mode, SEEK returns the byte position of the next byte to be written or read, as a Quad-integer (64-bit) value. The Number symbol (#) is optional, but recommended for clarity.

The beginning byte position (for binary and sequential files) or record position (for random-access files) may be 0 or 1, depending on the BASE option used when the file was initially Opened. The default, if no BASE is specified, is a starting position of 1.

PowerBASIC recommends using the SEEK function over the (more complex) LOC function used in prior versions of PowerBASIC. LOC remains supported for compatibility with older versions of BASIC, but it is likely that LOC may be removed in future versions of PowerBASIC.

See also EOF, FILEATTR, GET$, GET$$, LOC, LOF, OPEN, PUT$, PUT$$, SEEK statement

Example

```
RANDOMIZE TIMER
OPEN "OUTPUT.TXT" FOR OUTPUT AS #1
PRINT #1, STRING$(RND * 80, RND * 255);
position&& = SEEK(1)
CLOSE #1
```

SEEK statement

SEEK statement

Purpose Set the position in a file for the next input or output operation.

Syntax **SEEK [#]** ***filenum&, position&&***

Remarks SEEK sets the file pointer position of file *filenum&* to *position&&*. *position&&* is a Quad-integer variable, constant, or expression.

The next GET$ or PUT$ performed on the file *filenum&* will occur *position&&* bytes (or records) deep into the file. If file *filenum&* was opened in binary or sequential mode, *position&&* indicates the new file position in bytes; for random-access files, *position* is in records.

The first byte position (for binary and sequential files) or record position (for random-access files) may be 0 or 1, depending on the BASE option used when the file was initially Opened. If no BASE was specified, the default position is 1.

Use the SEEK function to determine a binary file's current pointer position, and LOF to determine its length. Seeking past the end of a file does not produce an error, but no data can be read from beyond the true end of the file.

See also EOF, FILEATTR, GET$, GET$$, LOC, LOF, OPEN, PUT$, PUT$$, SEEK function, SETEOF

Example

```
SUB CreateFile
  ' Open a binary file and writes 75 chars to it.
  LOCAL I&
  OPEN "SEEK.DTA" FOR BINARY AS #1
  FOR I& = 48 TO 122
    PUT$ 1, CHR$(I&)
  NEXT I&
END SUB

FUNCTION ReadIt$(Start&&, qSize&&)
  ' SEEK to the correct position in the file,
  ' which was previously opened in the CreateFile SUB.
  SEEK 1, Start&&
  I&& = 1
  TempStr$ = ""
  ' Read in the indicated data - don't read past end of file.
  WHILE (ISFALSE EOF(1)) AND (I&& <= qSize&&)
    GET$ 1, 1, Char$
    TempStr$ = TempStr$ + Char$
    INCR I&&
  WEND
  ReadIt$ = TempStr$    ' assign function's result
END FUNCTION
```

SELECT CASE/END SELECT block

SELECT CASE/END SELECT block IMPROVED

Purpose Control program flow based on the value of an expression.

Syntax

```
SELECT CASE [AS] [LONG | CONST | CONST$ | CONST$$] expression
CASE [IS] testlist
  [statements]
[CASE [IS] testlist
  [statements]]
[CASE ELSE
  [statements]]
END SELECT
```

Remarks *testlist* is one or more tests, separated by commas, to be performed on *expression*. *expression* can be either

or .

When a SELECT statement is encountered, *expression* is evaluated using the *testlist* in the first CASE clause. If the evaluation is FALSE, the evaluation is repeated using the next *testlist*. As soon as an evaluation is TRUE (non-zero), the statements following that CASE clause are executed, up to the next CASE clause.

Execution then passes to the statement following the END SELECT statement. If none of the evaluations is TRUE, the statements following the optional CASE ELSE clause are executed.

The tests that may be performed by a CASE clause include: equality, inequality, greater than, less than, and range ("from-to") testing. The SELECT CASE block can do string or numeric tests, but these cannot be interchanged.

Examples of numeric CASE clause tests include:

```
SELECT CASE numeric_expression
  CASE > b         ' relational; is expression > b?
  CASE 14          ' equality (= is assumed); is expression equal to
14?
  CASE b TO 99     ' range; is expression between the value of the
                   ' variable b and 99 (inclusive)?
  CASE 14, b       ' two equality tests; is expression equal to
                   ' 14 or equal to b?
  CASE 25 TO 99,14 ' combination range and equality;  is expression
                   ' between 25 and 99  (inclusive) or equal to 14?
```

Examples of string CASE clause tests include:

```
SELECT CASE string_expression
  CASE > b$           ' relational; is expression > b$?
  CASE "X"            ' equality (= is assumed); is expression equal
                      ' to "X"?
  CASE "A" TO "C"     ' range; is expression between "A" and
                      ' "C"(inclusive)?
  CASE "Y", b$        ' two equality tests; is expression equal to
                      ' "Y" or equal to b$?
  CASE "A" TO "C","Q" ' combination range and equality; is expression
                      ' between "A" and "C"  (inclusive) or equal
                      ' to "Q"?
```

When a CASE clause contains multiple tests separated by commas, a logical OR is performed. That is, if any one (or more) of the tests is TRUE, the entire clause is deemed to be TRUE.

Use EXIT SELECT to jump out of a SELECT block prematurely.

PowerBASIC now offers four optional modifiers to provide highly optimized code generation for specific circumstances. By default, numeric expressions are evaluated either as

values (to offer the widest range of compatibility for any possible circumstance) or as (for example, if PowerBASIC can establish that all case clauses are integer class values, etc). Further, string expressions are evaluated dynamically to allow virtually any data. However, if limits on the type *and* range of the data used for CASE comparison are restricted, performance can be dramatically enhanced with the LONG, CONST, CONST$, or CONST$$ clauses.

AS LONG — In this case, the controlling expression and the CASE expressions must evaluate in the range of a Long-integer. Each of these expressions are calculated dynamically, so all of the normal operators are still available. Performance is enhanced by the integral class of code generation, rather than floating-point. For example, DWORD values are treated as Long-integer values, so &H0FFFFFFFF??? and -1& would be considered equal values. This can help eliminate the need to use functions such as BITS when performing comparisons between signed and unsigned values.

AS CONST — In this case, the controlling expression must evaluate in the range of a Long-integer. However, each of the case values must be strictly specified by a numeric literal (or numeric equate) in the range of a Long-integer. Multiple case values may be given (CASE 2,3,7), but operators and ranges of values are not allowed. CASE ELSE is permitted. Performance is enhanced by the internal creation of a vector jump table, one entry for each number from the smallest to the largest case value.

While this form of the structure offers the utmost performance possible, the execution speed must be carefully weighed against the increased program size, particularly when using sparse case values. For example, with just two CASE values of 2 and 1000, the generated jump table would need 999 table entries (3996 bytes in size). The largest allowed jump table for this form is approximately 3200 entries (12K bytes). If exceeded, an Error 402 is generated ("Statement too long/complex").

AS CONST$ — In this case, the controlling expression must evaluate to an ANSI string of length zero through 255 bytes. However, each of the case values must be strictly specified by a string literal (a quoted ANSI string, or an ANSI string equate). Multiple case values may be given (CASE "a","Bob",$value), but operators and ranges of values are not allowed. Performance is enhanced by the internal creation of a vectored scan table, eight bytes for each case value specified.

AS CONST$$ — In this case, the controlling expression must evaluate to a WIDE (Unicode) string of length zero through 127 characters. However, each of the case values must be strictly specified by a string literal (a quoted wide string, or a wide string equate). Multiple case values may be given (CASE "a"$$,"Bob"$$,$$value), but operators and ranges of values are not allowed. Performance is enhanced by the internal creation of a vectored scan table, eight bytes for each case value specified.

See also — CHOOSE, CHOOSE&, CHOOSE$, EXIT SELECT, IF, IF block, IIF, IIF&, IIF$, MAX, MAX&, MAX$, MIN, MIN&, MIN$, ON GOTO, ON GOSUB, SWITCH, SWITCH&, SWITCH$

Example

```
DIM Dwrd AS DWORD
DIM Lint AS LONG

Dwrd = &H0FFFFFFFF???
Lint = -1&

SELECT CASE Lint
  CASE Dwrd
    a$ = "A Match!"
  CASE ELSE
    a$ = "*No Match"
END SELECT

SELECT CASE AS LONG Lint
  CASE Dwrd
    a$ = "*A Match!"
  CASE ELSE
    a$ = "No Match"
```

```
END SELECT

SELECT CASE AS CONST Dwrd
  CASE -1&
    a$ = "*A Match!"
  CASE 0
    a$ = "No Match"
END SELECT
```

Result

```
*No Match
*A Match!
*A Match!
```

SETATTR statement

SETATTR statement

Purpose Set the file system attribute(s) of a disk file or directory.

Syntax **SETATTR *filespec$, attribute***

Remarks *filespec$* specifies a filename (optionally including a drive letter and directory path). *attribute* is a standard operating system attribute code:

Attribute	Description	Equate
0	Normal	%NORMAL
1	Read-only	%READONLY
2	Hidden	%HIDDEN
4	System	%SYSTEM
32	Archived	%ARCHIVE

The attribute code of a given file or directory may be constructed from a combination of individual attribute values. For example, if you use an *attribute* of 0, *filespec$* will be a regular file: not read-only, not hidden, not system, and not archived.

See also DIR$, FILEATTR, GETATTR

Example

```
Files$ = "MYTEST.DAT"
SETATTR Files$, %HIDDEN + %SYSTEM
IF ISFALSE ERR THEN a$ = Files$ + " has been hidden!"
```

SETEOF statement

SETEOF statement

Purpose Truncate or extend an open file to its current file pointer (read/write) position.

Syntax **SETEOF [#] *filenum&***

Remarks SETEOF will truncate or extend an open file to its current file pointer (read/write) position, which may be set explicitly with the SEEK statement.

Unlike 16-bit Windows and DOS BASIC, Win32 will not truncate a file if you simply write an empty string to it, so the SETEOF statement is provided to cater for this need.

See also CLOSE, FILEATTR, FLUSH, OPEN, SEEK function, SEEK statement

Example

```
FUNCTION PBMAIN
  OPEN "Temp.dat" FOR BINARY AS #1 BASE = 1
  A$ = SPACE$(50)
  PUT$ #1, A$
  ' File is now 50 bytes
  SEEK #1, 15
  ' Move to the 15th byte and truncate there
```

```
  SETEOF #1
  ' File is now 14 bytes
  CLOSE #1
END FUNCTION
```

SGN function

SGN function

Purpose Return the sign of a numeric expression.

Syntax `y = SGN(numeric_expression)`

Remarks If *numeric_expression* is positive, SGN returns 1. If *numeric_expression* is zero, SGN returns 0. If *numeric_expression* is negative, SGN returns -1.

In conjunction with the ON GOTO and ON GOSUB statements, SGN can produce a FORTRAN-like three-way branch:

```
ON SGN(balance) + 2 GOTO InTheRed, BreakingEven, InTheMoney
```

See also ABS, IF, ON GOSUB, ON GOTO, SELECT

Example

```
' ON SGN value, GOSUB appropriate subroutine
ON SGN (value) + 2 GOSUB Minus, Zero, Plus
' more code here
Minus:
x$ = "The product is negative" : RETURN
Zero:
x$ = "The product is zero"     : RETURN
Plus:
x$ = "The product is positive" : RETURN
```

SHELL function

SHELL function

Purpose Run an executable program asynchronously (as a separate process), while execution of the original application continues uninterrupted.

Syntax `ProcessId??? = SHELL([HANDLES,] CmdString [, WndStyle])`

Remarks The SHELL function has the following parts:

CmdString The name of the program to execute ("child process"), along with and any required arguments or command-line switches.

WndStyle A number corresponding to the style of the window in which the child process is to be executed. If *WndStyle* is omitted, the program is opened *normal with focus*, the same as *WndStyle* = 1.

The following table identifies the values for *WndStyle* and the resulting style of window:

WndStyle	Window style
0	Hide window
1	Normal with focus (default)
2	Minimized with focus
3	Maximized with focus
4	Normal without focus
6	Minimized without focus

SHELL returns the *process id* of the child process. The process id is a 32-bit LONG or DWORD value that identifies the child process, if it's a 32-bit or 64-bit process. If the process id is zero, the child process is not a 32-bit or 64-bit process, or an error occurred.

Use ERR to detect the success of the SHELL function. The HANDLES option allows the child process to inherit the file handles opened by your program. This affects only Windows handles, not PowerBASIC file identifiers. It is an advanced option, for those who know it works and why they need it.

Restrictions Child processes run asynchronously, or independently of the program that SHELLs. So, the child process is, probably, still running after control returns from SHELL to your program. Also, if your program ends before the child process, the child process will continue to run.

To use internal DOS commands like DIR and COPY, you must run the DOS command processor, passing the DOS command as a parameter. See the example below.

If the program name in *CmdString* does not include an explicit path, Windows will search for the file in the following paths: the directory where the current program is located, the default directory, the 32-bit Windows system directory, the 16-bit Windows system directory, the Windows directory, and any directories listed in the PATH environment variable.

See also ERR, SHELL statement

Example

```
pid??? = SHELL(MyApp$,1)
pid??? = SHELL(ENVIRON$("COMSPEC") + " /C DIR *.* > filename.txt")
```

SHELL statement

SHELL statement

Purpose Run an executable program synchronously. The SHELLing thread of the calling program is suspended until the SHELLed program ends.

Syntax **SHELL [HANDLES,]** ***CmdString*** **[,** ***WndStyle*****, EXIT TO** ***exitcode&*****]**

Remarks The SHELL statement has the following parts:

HANDLES This option, if present, allows the child process to inherit (and access) the Windows file handles of all open files in the parent process. These are not PowerBASIC file numbers, but system file handles and you must use OPEN HANDLE to access them.

CmdString The name of the program to execute ("child process"), along with and any required arguments or command-line switches.

WndStyle A number corresponding to the style of the window in which the program is to be executed. If *WndStyle* is omitted, the program is opened *normal with focus*, the same as *WndStyle* = 1.

The following table identifies the values for *WndStyle* and the resulting style of window:

WndStyle	Window style
0	Hide window
1	Normal with focus (default)
2	Minimized with focus
3	Maximized with focus
4	Normal without focus
6	Minimized without focus

Use ERR to detect the success of the SHELL function. The HANDLES option allows the child process to inherit the file handles opened by your program. This affects only Windows handles, not PowerBASIC file identifiers. It is an advanced option, for those who know it works and why they need it.

exitcode& The exit code of the child process (the value returned by the WinMain function) is assigned to the long integer variable specified by *exitcode&*.

Restrictions The SHELL statement executes the child process synchronously. That is, SHELL will not return control to your program until the child program finishes.

To use internal DOS commands like DIR and COPY, you must run the DOS command processor, passing the DOS command as a parameter. See the example below.

If the program name in *CmdString* does not include an explicit path, Windows will search for the file in the following paths: the directory where the current program is located, the default directory, the 32-bit Windows system directory, the 16-bit Windows system directory, the Windows directory, and any directories listed in the PATH environment variable.

If the SHELL statement is not executed successfully, an appropriate error is generated. The ERR function can be used to detect it.

See also ERR, SHELL function

Example

```
SHELL MyApp$,1, EXIT TO exitvar&
SHELL ENVIRON$("COMSPEC") + " /C DIR *.* > filename.txt"
```

SHIFT statement

SHIFT statement

Purpose Shift the bits in an variable.

Syntax **SHIFT [SIGNED] {LEFT | RIGHT}** ***ivar, countexpr***

Remarks *ivar* must be one of the integral-class variable types: Byte, Word, Integer, Double-word, Long-integer, or Quad-integer. *countexpr* is an integral-class expression specifying the number of bits by which to shift *ivar*.

SHIFT shifts all the bits in *ivar* without special regard to the sign bit of a signed integral-class variable.

SIGNED — The SIGNED option shifts everything, but does not allow the sign (positive or negative) of the value to change.

LEFT | RIGHT — The LEFT or RIGHT option determines the direction of the bit SHIFT operation. SHIFT LEFT shifts the bits toward the high-order end of *ivar*, and SHIFT RIGHT shifts bits toward the low-order end of *ivar*.

See also AND, BIT function, BIT statement, BITS functions, NOT, OR, ROTATE, XOR

Example

```
DIM i AS BYTE
n = 221
SHIFT LEFT n, 1          ' binary 1 1 0 1 1 1 0 1
' n = 186                ' binary 1 0 1 1 1 0 1 0

n = 221
SHIFT RIGHT n, 1         ' binary 1 1 0 1 1 1 0 1
' n = 110                ' binary 0 1 1 0 1 1 1 0

n = 221
SHIFT SIGNED RIGHT n, 1  ' binary 1 1 0 1 1 1 0 1
n = 238                  ' binary 1 1 1 0 1 1 1 0
```

SHRINK$ function

Keyword Template

Purpose

Syntax

Remarks
See also
Example

SHRINK$ function New!

Purpose Shrink a

to use a consistent single character delimiter.

Syntax

```
NewString$ = SHRINK$(OldString$)
NewString$ = SHRINK$(OldString$, Mask$)
```

Remarks The purpose of this function is to create a string with consecutive data items (words) separated by a consistent single character. This makes it very straightforward to parse the results as needed.

In the first form, all leading spaces and trailing spaces are removed entirely. All occurrences of two or more spaces are changed to a single space. Therefore, the new string returned consists of zero or more words, each separated by a single space character.

In the second form, *Mask$* defines one or more delimiter characters to shrink. All leading and trailing mask characters are removed entirely. All occurrences of one or more mask characters are replaced with the first character of *Mask$*. Therefore, the new string returned consists of zero or more words, each separated by the character found in the first position of *Mask$*.

WhiteSpace is generally defined as the four common non-printing characters: Space, Tab, Carriage-Return, and Line-Feed. This is pre-defined in PowerBASIC as string equates for your convenience. The ANSI version is named $WHITESPACE, while the WIDE version is $$WHITESPACE. This equate is particularly well suited to be used as *Mask$* in this function.

See also CLIP$, INSTR, LTRIM$, REMOVE$, REPLACE, RTRIM$, TRIM$, UNWRAP$

SIN function

SIN function

Purpose Return the sine of its argument.

Syntax

```
y = SIN(numeric_expression)
```

Remarks *numeric_expression* is an angle specified in radians. SIN returns an Extended-precision value between -1 and +1.

To convert radians to degrees, multiply by 57.29577951308232##. To convert degrees to radians, multiply by 0.0174532925199433##. For more information on radians, see the ATN function.

The Inverse Sine (ARCSIN) of a value can be calculated as follows:

```
ArcSin = ATN(Value / SQR(1 - Value * Value))
```

The Hyperbolic Sine (SINH) of a value can also be calculated:

```
SinH = (EXP(Value) - EXP(-Value)) / 2
```

The Inverse Hyperbolic Sine (ARCSINH) of a value can also be calculated:

```
ArcSinH = LOG(Value + SQR(Value * Value + 1))

' Useful Macro functions
MACRO Pi = 3.141592653589793##
MACRO DegreesToRadians(dpDegrees) = (dpDegrees * 0.0174532925199433##)
```

```
MACRO RadiansToDegrees(dpRadians) = (dpRadians * 57.29577951308232##)
```

See also ATN, COS, TAN

Example

```
pi## = 3.141592653589793##
FOR I& = 0 TO 360 STEP 45
  x$ = "The Sine of " + FORMAT$(I&,"* 0") + _
    " degrees =" + FORMAT$(SIN(pi## / 180 * _
    I&),"* 0.00")
NEXT I&
```

Result

```
The Sine of   0 degrees =  0.00
The Sine of  45 degrees =  0.71
The Sine of  90 degrees =  1.00
The Sine of 135 degrees =  0.71
The Sine of 180 degrees =  0.00
The Sine of 225 degrees = -0.71
The Sine of 270 degrees = -1.00
The Sine of 315 degrees = -0.71
The Sine of 360 degrees =  0.00
```

SIZEOF function

SIZEOF function

Purpose Return the total or physical length of any PowerBASIC variable.

Syntax ***x&*** **= SIZEOF(*target*)**

Remarks Particularly useful for determining the maximum length of a fixed-length string, nul-terminated string, or User-Defined Type. It provides similar functionality to LEN, which returns the current length of a data item.

target can be the name of any variable type (fixed-length string, nul-terminated string, User-Defined Type (UDT) variable or definition, etc).

When measuring the size of a padded (aligned) UDT variable or definition with the SIZEOF (or LEN) statement, the measured length includes any padding that was added to the structure. For example, the following UDT structure:

```
TYPE LengthTestType DWORD
  a AS INTEGER
END TYPE
' more code here
DIM abc AS LengthTestType
x& = SIZEOF(abc) ' or use SIZEOF(LengthTestType)
```

Returns a length of 4 bytes in *x&*, since the UDT was padded with 2 additional bytes to enforce DWORD alignment. Note that the SIZEOF of individual UDT members returns the true size of the member without regard to padding or alignment. In the previous example, SIZEOF(abc.a) returns 2.

When used on a dynamic (variable length) string, SIZEOF returns 4, which is the size of the string handle. To obtain the length of the string data in the dynamic string, use the LEN function. SIZEOF also returns 4 for pointer variables, since a pointer is always stored as a DWORD.

Pointers

When used with a dereferenced pointer (i.e., SIZEOF(@p), SIZEOF returns the size of the pointer target variable type, as defined in the DIM *x* AS *y* PTR [* *pSize*] statement.

For example, with a dynamic string pointer, SIZEOF returns 4. If the pointer target is a fixed-length string, UDT, Union, or nul-terminated string, SIZEOF returns the size of the target data structure. However, if the pointer is declared to reference an nul-terminated with no specific target size (i.e., DIM *a* AS STRINGZ PTR), SIZEOF returns 0.

Likewise, if SIZEOF is used on a

STRINGZ string that does not have an explicit length specification, SIZEOF will also return 0. For example:

```
SUB ProcessData(BYREF szText AS STRINGZ)
  ' Within this Sub, SIZEOF(szText) will return 0 because there is no
explicit length specification
```

See also CHRBYTES, DIM, LEN

Example

```
DIM Strval AS STRINGZ * 10
Strval = "test"
' SIZEOF(Strval) = 10, LEN(Strval) = 4

DIM Intval AS QUAD
Intval = 1
' SIZEOF(Intval) = 8, LEN(Strval) = 8

DIM CustName AS STRING
CustName = "Fred Dagg"
' SIZEOF(CustName) = 4, LEN(CustName) = 9

UNION Arrs
  m1(1 TO 1024) AS BYTE
END UNION
DIM p1 AS STRING PTR
DIM p2 AS STRING PTR * 1024
DIM p3 AS Arrs PTR
DIM p4 AS STRINGZ PTR
DIM p5 AS STRINGZ PTR * 64
' Results of SIZEOF on these pointers:
' SIZEOF(p1) = 4, SIZEOF(@p1) = 4
' SIZEOF(p2) = 4, SIZEOF(@p2) = 1024
' SIZEOF(p3) = 4, SIZEOF(@p3) = 1024
' SIZEOF(p4) = 4, SIZEOF(@p4) = 0
' SIZEOF(p5) = 4, SIZEOF(@p5) = 64
' SIZEOF(Arrs) = 1024
```

SLEEP statement

SLEEP statement

Purpose Pause the current thread of the application for a specified number of milliseconds (*mSec*), allowing other processes (or threads) to continue.

Syntax `SLEEP m&`

Remarks *m&* is the number of milliseconds (1 millisecond = 1/1000th of a second) to pause the application. Only the current

pauses. If other threads are present, they will continue to execute. During the SLEEP period, all time-slices for the current thread are given to other threads and processes.

If *m&* is zero, the remainder of the current time-slice is relinquished. If there are no other threads of equal priority, execution continues immediately.

The time-slice duration (also known as the Quantum) can vary from version to version of Windows, ranging from 20 mSec to 120 mSec. Therefore, the Quantum can affect the performance of applications when SLEEP 0 is overused. That is, excessive use of SLEEP 0 can cause an application to cede much of its available processor time, causing a significant drop in application performance.

When code is running in a tight loop, it is quite possible to use up 100% of the available

CPU time, so the occasional use of SLEEP 0 within a tight loop is often beneficial to overall performance of the target PC. For example, it may not be necessary to use SLEEP 0 for *every* iteration of a loop, but every second or third instead.

See also THREAD CREATE, TIMER

Example

```
' Pause for 5 seconds
SLEEP 5000

' Release time-slice every 256 iterations
FOR x& = 0 TO &H0FFFFFFFF&
  ' code goes here
  IF x& MOD 256 = 0 THEN SLEEP 0
NEXT x&
```

SPACE$ function

SPACE$ function

Purpose Return a

consisting of a specified number of spaces.

Syntax ***s$*** **= SPACE$(*numeric_expression*)**

Remarks *numeric_expression* is a non-negative expression that specifies how many spaces the function is to return. SPACE$ can be useful for formatting or prefilling strings.

See also BUILD$, CHR$, CSET, CSET$, LSET, NUL$, REPEAT$, RSET, STRING$

Example

```
A$ = SPACE$(1000000) ' fill A$ with 1000000 spaces
```

SPLIT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

SPLIT statement New!

Purpose Splits a

into two parts.

Syntax **SPLIT [WORD] *MainStr*, *Part1Len* TO *Part1Var*, *Part2Var***

Remarks *MainStr* is separated into two parts, which are then assigned to the two string variables specified by *Part1Var* and *Part2Var*. *Part1Len* is a

expression which specifies the number of characters to be assigned to Part1, while the remaining characters are assigned to Part2.

WORD If the WORD option is included, PowerBASIC guarantees that Part1 will not end on a partial word. This may require that *Part1Len* is adjusted to a smaller value. In that case, *Part2Var* would be assigned these characters to compensate. Depending upon the nature of the operation, it may be necessary to remove leading spaces from *Part2Var*.

See also GRAPHIC SPLIT, LTRIM$, XPRINT SPLIT

SQR function

SQR function

Purpose Return the square root of its argument.

Syntax ***y*** **= SQR(*numeric_expression*)**

Remarks *numeric_expression* must be greater than or equal to zero. SQR calculates square roots using an optimized algorithm. That is, y = SQR(x) takes less time to execute than y = x^0.5.

Attempting to take the square root of a negative number does not produce any run-time errors, but the results of such an operation are undefined.

SQR returns an Extended-precision result.

See also EXP, EXP2, EXP10, LOG, LOG2, LOG10

STATIC statement

STATIC statement

Purpose Declare static variables inside a Sub, Function, Method, or Property. Static variables retain their values as long as the program is running.

Syntax

STATIC *variable*[()] [AS *type*] [, *variable*[()]]
STATIC *variable*[()] [, *variable*[()]] [, ...] AS *type*

Remarks The STATIC statement is valid only inside a procedure. Static variables retain their values even after the procedure ends. A static variable is local to its procedure, and can have the same name as other variables in other parts of the program without conflict.

To declare an array as a static variable, use an empty set of parentheses in the variable list: You can then use the DIM statement to dimension the array.

```
STATIC MyArray%()
STATIC StringArray() AS STRING
```

The STATIC statement may, optionally, accept a list of variables, all of which are defined by the type descriptor keyword that follows them. For example:

```
STATIC aaa, bbb, ccc AS INTEGER
STATIC vptr, aptr() AS LONG PTR
```

Restrictions DEF*type* has no effect on variables defined by a STATIC statement.

See also DIM, GLOBAL, LOCAL, THREADED

Example

```
#COMPILE EXE
#DIM ALL
#INCLUDE "WIN32API.INC"

DECLARE SUB DoMessage ()

FUNCTION PBMAIN
  DIM z%
  FOR z% = 1 TO 5
    DoMessage
  NEXT z%
END FUNCTION

SUB DoMessage ()
```

```
    STATIC x AS INTEGER
    STATIC Message() AS ASCIIZ * 256
    DIM Message(1 TO 5) AS STATIC ASCIIZ * 256

    INCR x       'add one to x
    Message(x) = "X =" + STR$(x)

    #IF %DEF(%PB_CC32)
      PRINT Message(x)
    #ELSE
      MSGBOX Message(x)
    #ENDIF
  END SUB
```

STATUSBAR SET PARTS statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STATUSBAR statement

Purpose Manipulate a STATUSBAR control. A StatusBar is a horizontal window, typically at the bottom of a dialog client area, which displays various kinds of status information. It can be divided into parts to display multiple items.

Syntax
`STATUSBAR SET PARTS hDlg, id&, x& [,x&...]`
`STATUSBAR SET TEXT hDlg, id&, item&, style&, text$`

hDlg Handle of the dialog that owns the status bar.

id& The control identifier assigned with CONTROL ADD STATUSBAR.

item& Position of data on the STATUSBAR. First item=1, second=2...

style& Style bits which specify the appearance of the status bar.

text$ A string expression passed as a parameter.

Remarks In each of the following samples and descriptions, the STATUSBAR control which is the subject of the statement is identified by the handle of the dialog that owns the STATUSBAR (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD STATUSBAR.

The value *item&* refers to the position of the text data item on the STATUSBAR, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

STATUSBAR SET PARTS *hDlg*, *id&*, *x&* [,*x&*...]

The STATUSBAR control is partitioned into as many as 32 sections, each of which can be used to display some particular status data to the user. The statement contains from 1 to 32 width parameters (*x&*), which specify the pixel or dialog unit size of that section. You can use a very large number for the last parameter to signify that the section should extend all the way to the right side of the window.

```
STATUSBAR SET PARTS hDlg, id&, 50, 50, 9999
```

For example, the above statement would create a status bar with 2 sections of 50 pixels each, and a third section of the remaining width.

STATUSBAR SET TEXT *hDlg*, *id&*, *item&*, *style&*, *text$*

The text for the data item specified by *item&* is replaced with the new text in *text$*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The status bar style value can be the default value of zero (0), or one of the other style values formed as a bitmask:

Zero (0) default	Text with a border to appear lower than the window.
%SBT_NOBORDERS	The text is drawn without any borders.
%SBT_POPOUT	Text with a border to appear higher than the window.

See also Dynamic Dialog Tools, CONTROL ADD STATUSBAR, CONTROL SET FONT

STATUSBAR SET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STATUSBAR statement

Purpose Manipulate a STATUSBAR control. A StatusBar is a horizontal window, typically at the bottom of a dialog client area, which displays various kinds of status information. It can be divided into parts to display multiple items.

Syntax

```
STATUSBAR SET PARTS hDlg, id&, x& [,x&...]
STATUSBAR SET TEXT hDlg, id&, item&, style&, text$
```

hDlg Handle of the dialog that owns the status bar.

id& The control identifier assigned with CONTROL ADD STATUSBAR.

item& Position of data on the STATUSBAR. First item=1, second=2...

style& Style bits which specify the appearance of the status bar.

text$ A string expression passed as a parameter.

Remarks In each of the following samples and descriptions, the STATUSBAR control which is the subject of the statement is identified by the handle of the dialog that owns the STATUSBAR (*hDlg*), and the unique control identifier you gave it upon creation in CONTROL ADD STATUSBAR.

The value *item&* refers to the position of the text data item on the STATUSBAR, and is always indexed to one. The first string is position 1, the second is position 2, and so forth.

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STATUSBAR SET TEXT *hDlg*, *id&*, *item&*, *style&*, *text$*

The text for the data item specified by *item&* is replaced with the new text in *text$*. The value of *item&* = 1 for the first item, 2 for the second item, etc. The status bar style value can be the default value of zero (0), or one of the other style values formed as a bitmask:

Zero (0) default	Text with a border to appear lower than the window.
%SBT_NOBORDERS	The text is drawn without any borders.
%SBT_POPOUT	Text with a border to appear higher than the window.

See also Dynamic Dialog Tools, CONTROL ADD STATUSBAR, CONTROL SET FONT

STR$ function

STR$ function

Purpose Return the

representation of a number in printable form.

Syntax `s$ = STR$(numeric_expression [, digits])`

Remarks STR$ returns the string form of a

variable or expression in printable text form. *digits* is an optional expression specifying the maximum total number of digits to appear in the result. If *numeric_expression* is greater than or equal to zero, STR$ adds a leading space character; if *numeric_expression* is less than zero, STR$ adds a leading negation (minus) character.

For example, STR$(14) returns a three-character string, of which the first character is a space, and the second and third are the ASCII characters "1" and "4". LTRIM$ can be used to remove leading space characters.

digits specifies the maximum number of significant digits (1 to 18) desired in the result.

STR$ can also be used to convert numeric values with more than 16 significant digits (i.e., Extended-precision floating-point and Quad-integers) to a printable form. For example:

```
a## = 2.0/3.0
x$ = STR$(a##,18)
```

returns 0.666666666666666667.

The complementary function is VAL, which takes a string argument and returns the numeric equivalent. Thus, *number* = VAL(STR$(*number*)).

An integer-class numeric value may also be converted to a string with the FORMAT$ and USING$ functions; however, FORMAT$ can easily return a string that is free from leading space characters. For example, x$ = FORMAT$(a&).

See also BIN$, FORMAT$, HEX$, LTRIM$, OCT$, ROUND, USING$, VAL

Example

```
x$ = STR$(-1,5)
x$ = STR$(5/3,2)
x$ = STR$(5/3,8)
x$ = STR$(100000## / 3##, 18)
```

Result

```
-1
 1.7
 1.6666667
 33333.3333333333333
```

STRDELETE$ function

STRDELETE$ function

Purpose Delete a specified number of characters from a string expression.

Syntax `s$ = STRDELETE$(string_expression, start&, count&)`

Remarks Returns a

based on copying *string_expression*, but with *count&* characters deleted starting at position *start&*. The first character in the string is position 1, etc.

See also CLIP$, STRINSERT$, STRREVERSE$

Example `a$ = STRDELETE$("PowerBASIC", 4, 2)`

Result `PowBASIC`

STRING$ function

STRING$/STRING$$ function IMPROVED

Purpose Return a

consisting of multiple copies of the specified character.

Syntax

```
s$  = STRING$(Count&, Character%)
s$  = STRING$(Count&, Character$)
s$$ = STRING$$(Count&, Character%)
s$$ = STRING$$(Count&, Character$$)
```

Remarks This function creates a string which consists of multiple copies of a particular character. The STRING$() form creates a string of ANSI (1-byte) characters, or codes in the range of 0 to 255. The STRING$$() form of the function creates a string of WIDE (2-byte) characters, or codes in the range of 0 to 65535.

Generally speaking, PowerBASIC handles ANSI/WIDE conversions for you, automatically and transparently. However, there are just a few functions (CHR$, PEEK$, POKE$, STRING$, etc) which are ambiguous, by definition, and require that the programmer choose the appropriate result type (ANSI or WIDE). Use STRING$ for ANSI results, or use STRING$$ for Unicode results. In the remainder of these remarks, STRING$ is used to represent both STRING$ and STRING$$.

STRING$ with a

argument returns a string of *Count&* copies of the character with the Character Code of *Character%*. STRING$ with a string argument returns a string of *Count&* copies of the first character in *Character$* or *Character$$*.

The following functions all return a string of 8 spaces:

```
A$ = STRING$(8, 32)
A$ = STRING$(8, " ")
A$ = STRING$(8, $SPC)
A$ = SPACE$(8)
A$ = REPEAT$(8, " ")
A$ = REPEAT$(8, $SPC)
```

Use REPEAT$ to make multiple copies of a multiple-character string, and SPACE$ to return a string of space characters.

See also ASC, BUILD$, CHR$, NUL$, REPEAT$, SPACE$

STRING$$ function

STRING$/STRING$$ function IMPROVED

Purpose Return a

consisting of multiple copies of the specified character.

Syntax

```
s$  = STRING$(Count&, Character%)
s$  = STRING$(Count&, Character$)
s$$ = STRING$$(Count&, Character%)
s$$ = STRING$$(Count&, Character$$)
```

Remarks This function creates a string which consists of multiple copies of a particular character. The STRING$() form creates a string of ANSI (1-byte) characters, or codes in the range of 0 to 255. The STRING$$() form of the function creates a string of WIDE (2-byte) characters, or codes in the range of 0 to 65535.

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```
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A$ = REPEAT$(8, " ")
A$ = REPEAT$(8, $SPC)
```

Use REPEAT$ to make multiple copies of a multiple-character string, and SPACE$ to return a string of space characters.

See also ASC, BUILD$, CHR$, NUL$, REPEAT$, SPACE$

STRINSERT$ function

STRINSERT$ function

Purpose Insert a

at a specified position within another string expression.

Syntax `s$ = STRINSERT$(MainStr$, NewStr$, position&)`

Remarks Returns a string consisting of the string expression *MainStr$*, with the string expression *NewStr$* inserted at *position&*. If *position&* is greater than the length of *MainStr$*, *NewStr$* is appended to *MainStr$*. The first character in the string is position 1, etc.

See also BUILD$, CLIP$, CSET, CSET$, LSET, RSET, STRDELETE$, STRREVERSE$, WRAP$

Example `a$ = STRINSERT$("PowerBASIC", "ful", 6)`

Result `PowerfulBASIC`

STRINGBUILDER Object

Keyword Template

Purpose

Syntax

Remarks

See also

Example

STRINGBUILDER Object New!

Purpose

The StringBuilder object offers the ability to concatenate many sections at a very high level of performance. The speed of execution is particularly noticeable when the concatenation is performed in many separate operations over a period of time. If all of the string sections are known and available at once, the use of the BUILD$() function could be a better choice. However, both options offer a very large boost as compared to the standard concatenation operators (& or +). In addition to concatenation, the StringBuilder Class also offers a few additional string operations to assist in building the string.

Remarks

There are two forms of the StringBuilder object, one for ANSI strings, and one for WIDE (Unicode) strings. While they could have been combined into a single hybrid object, that would have added additional overhead not acceptable for PowerBASIC. To concatenate ANSI strings, use the StringBuilderA class and the IStringBuilderA interface. To concatenate WIDE (Unicode) strings, use the StringBuilderW class and the IStringBuilderW interface. The methods and mode of operation are identical for both forms.

If you choose the ANSI form, parameter strings must be ANSI, and result strings will be ANSI. With the WIDE (Unicode) form, parameter strings must be wide, and result strings will be wide. Keep those requirements in mind when reviewing the following method definitions. The Dispatch ID (DispID) for each member method is displayed within angle brackets.

When you create a StringBuilder object, a dynamic string buffer is created to hold the target string. If you know the size of the result string (or even an approximation), it's usually prudent to use the CAPACITY method first, to establish a size at least as large as the final string. If it's not known, PowerBASIC will try to make appropriate decisions for you. Once the object is created, the ADD method is used to append string sections as many times as necessary. Finally, the STRING method is used to extract the combined items.

StringBuilder Methods/Properties

ADD (*PowerString$*) **Method<1>**

The *PowerString$* parameter is appended to the string held in the StringBuilder object. If the internal string buffer overflows, PowerBASIC will automatically extend it to an appropriate size. If a necessary buffer extension fails, an HResult of E_OUTOFMEMORY (&H8007000E) is returned, and an Object Error (99) is generated.

CAPACITY () AS Long **Get Property<2>**

The size of the internal string buffer is retrieved and returned to the caller. The size is the number of characters which can be stored without further expansion.

CAPACITY () = Long **Set Property<2>**

The internal string buffer is expanded to the number of characters specified by the Long

Integer. If the new capacity is smaller or equal to the current capacity, no operation is performed.

CHAR (*Index&*) AS Long **Get Property<3>**

The numeric character code of the character at the position *Index&* is retrieved and returned to the caller. Index&=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, the value -1 is returned.

CHAR (*Index&*) = Long **Set Property<3>**

The character at the position *Index&* is changed to that specified by the Long Integer character code. *Index&*=1 for the first character, 2 for the second, etc.

CLEAR **Method<4>**

All data in the object is erased.

DELETE (*Index&, Count&*) **Method<5>**

Count& characters are removed starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc.

INSERT (*PowerString$, Index&*) **Method<6>**

The *PowerString$* parameter is inserted in the string starting at the position given by *Index&*. *Index&*=1 for the first character, 2 for the second, etc. If *Index&* is beyond the current length of the string, no operation is performed.

LEN () AS Long **Method<7>**

The number of characters currently stored in the object is returned as a long integer value.

STRING AS String **Method<8>**

The string stored in the object is returned to the caller. This string will contain LEN characters.

See also BUILD$, CHR$, CSET, CSET$, JOIN$, LSET, LSET$, REPEAT$, RSET, RSET$, STRING$, STRINSERT$, WRAP$

STRPTR function

STRPTR function

Purpose Return the 32-bit DWORD address of the memory block used to store the data held by a dynamic (variable length) string.

Syntax ***xPtr* = STRPTR(*StringVar*)**

Remarks *StringVar* is the name of a string variable. STRPTR returns the 32-bit address in memory, where the contents of *StringVar* are stored.

Note that STRPTR differs from VARPTR. When used with a string variable, VARPTR returns the address of the string's *handle*, while STRPTR returns the address of the actual string *data*. Similarly, a STRING POINTER (or STRING PTR) is a pointer to a string handle - this important distinction should be recognized when working with the VARPTR and STRPTR operations.

STRPTR may not be used with fixed-length or nul-terminated strings, because they do not use string handles. Use VARPTR with fixed-length and nul-terminated strings.

When a dynamic string content is changed, the address of the string data will also change, but the string handle will remain in the same location. Therefore, it is important that your code refresh any pointers that target the string data memory locations directly.

See also CODEPTR, POKE$, PEEK$, VARPTR

Example

```
DIM x AS ASCIIZ PTR, A$
A$ = "PowerBASIC"
x = STRPTR(A$)    ' address of the string data
Message$ = A$     ' returns A$
Message$ = @x     ' returns A$ as the target of x
```

```
A$ = "The power of BASIC!"
x = STRPTR(A$)    ' Update string pointer address
Message$ = @x     ' returns the target of x
```

Result As the code above runs, Message$ is assigned the following strings:

```
PowerBASIC
PowerBASIC
The power of BASIC!
```

STRREVERSE$ function

STRREVERSE$ function

Purpose Reverse the contents of a

expression.

Syntax ***s$*** **= STRREVERSE$(*MainStr$*)**

Remarks Reverses the contents of *MainStr$* and returns the result.

See also STRDELETE$, STRINSERT$

Example `a$ = STRREVERSE$("PowerBASIC")`

Result `CISABrewoP`

SUB/END SUB statements

SUB/END SUB statements IMPROVED

Purpose Define a Sub code section.

Syntax

```
SUB ProcName [ALIAS "AliasName"] [(arguments)] <Descriptors>
  [statements]
END SUB
```

Remarks All executable code must reside in a Sub, Function. Method, Property, or FastProc block. Subs may not be nested. That is, you cannot define a code block (Sub, Function, Method, FastProc, Property) inside another code block.

SUB and END SUB define a subroutine-like block of statements called a procedure (or subprogram), which is invoked with the CALL statement, and may be passed parameters by value or by reference. A Sub may also be invoked without the use of the CALL statement. If the CALL word is omitted, the parentheses around the arguments list must also be omitted.

Previous versions of PowerBASIC required that you create an explicit DECLARE statement if you wished to execute a SUB or FUNCTION which did not physically precede the reference to it. This extra work is no longer required, as PowerBASIC resolves all forward references to internal procedures automatically.

DECLARE statements for a Sub/Function imported from a DLL must still precede any reference to the procedure.

ProcName The name of the Sub. *ProcName* must be unique: no other variable, Function, Sub, Method, Property, FastProc or label can share it.

ALIAS String literal that identifies a case-sensitive alternative name for the sub. This lets you export a Sub by a different unique name. This can be useful if you want to abbreviate a long name, provide a more descriptive name, or if the exported name needs to contain characters that are illegal in PowerBASIC. *AliasName* is the routines actual name as it appears in the export table, and *ProcName* is the title that you can use in PowerBASIC. For example:

```
SUB ShortName ALIAS "LongProcName" () EXPORT STATIC
```

The ALIAS clause is very important when exporting procedures. Omitting the ALIAS clause or incorrectly capitalizing the alias name are common causes of "Missing Export" errors. Please refer to the DECLARE topic for more information.

Descriptors

You may optionally add one or more descriptor words (Export, Common, Private, ThreadSafe, Local, Static, BDecl, CDecl, SDecl) to provide specific functionality. They may be added to the SUB as a comma delimited list. You should note that some of them are mutually exclusive.

EXPORT This descriptor identifies a Sub or Function which may be accessed between Dynamic Link Libraries (DLLs), and/or the main executable which links them. If a procedure is not marked EXPORT, it is hidden from these other modules. The EXPORT attribute may be added to a Sub/Function defined elsewhere, by specifying EXPORT in a DECLARE statement. EXPORT can even be added to a Sub/Function in an SLL with a DECLARE in the host module.

COMMON A COMMON Sub/Function is one which may be referenced by and between linked unit modules (Host or SLL). If you DECLARE a Common Sub or Function which is not present in this module, it is presumed to be found in a separate linked module (Host or SLL).

PRIVATE A PRIVATE Sub/Function is one which may only be accessed from within the current PowerBASIC program or library. Even if not specified, this is the default mode of operation.

THREADSAFE With the THREADSAFE option, PowerBASIC automatically establishes a semaphore which allows only one

to execute the Sub/Function at a time. Other callers must wait until the first thread exits the THREADSAFE procedure before they are allowed to begin.

LOCAL This descriptor specifies that all undeclared variables in a sub are LOCAL. This is the default condition if neither LOCAL nor STATIC is specified.

Local variables and arrays variables are automatically deallocated when the procedure terminates. LOCAL scalar variables (except dynamic strings) are stored on the stack, and visible only within the sub.

STATIC This descriptor specifies that all undeclared variables in a sub are STATIC. Static variables retain their values as long as the program is running. They are visible only within the sub.

BDECL Specifies that the declared procedure uses the legacy BASIC/Pascal calling convention. Parameters are pushed on the stack from left to right, and the called procedure is responsible for removing them. BDECL should only be used when necessary to match outside modules.

CDECL Specifies that the declared procedure uses the C calling convention. Parameters are pushed on the stack from right to left, and the calling code is responsible for removing them. CDECL should only be used when necessary to match outside modules.

SDECL This is the default convention, and should be used whenever possible. SDECL (and its synonym STDCALL), specifies the "Standard Calling Convention" for Windows. Parameters are pushed on the stack from right to left, and the called procedure is responsible for removing them.

Passing Parameters

Arguments An optional, comma-delimited sequence of formal parameters. The parameters used in the arguments list serve only to define the Function; they have no relationship to other variables in the calling code with the same name.

Normally, PowerBASIC passes parameters to a Sub either by reference (BYREF) or by value (BYVAL). If you do not need to modify the parameters (true in many cases), you can speed up your calls by passing the parameters by value using the BYVAL keyword.

You can clarify that a parameter is passed by reference by using the optional BYREF keyword.

The type of the parameter is specified either by appending a type-specifier character to the name or by using an AS clause. For example:

```
SUB Test(A AS INTEGER) ' integer passed by reference
SUB Test(A%)           ' integer passed by reference
SUB Test(BYREF A%)     ' integer passed by reference
SUB Test(BYVAL A%)     ' integer passed by value
```

Parameter Restrictions

PowerBASIC compilers have a limit of 32 parameters per Sub. To pass more than 32 parameters to a FUNCTION, construct a User-Defined Type (UDT) and pass the UDT by reference (BYREF) instead.

Pointer Parameters

When a Sub definition specifies either a BYREF parameter or a pointer variable parameter, the calling code may freely pass a BYVAL DWORD or a Pointer instead. Pointer variable parameters must always be declared as BYVAL parameters.

```
' Integer Pointer (passed by value)
SUB Test(BYVAL A AS INTEGER PTR)
  @A = 56
END SUB
```

Additional information on BYVAL/BYREF/BYCOPY parameter passing can be found in the CALL statement topic.

Using OPTIONAL/OPT

SUB statements may specify one or more parameters as optional by preceding the parameter with either the keyword OPTIONAL or OPT. Optional parameters are only allowed with CDECL or SDECL calling conventions, not BDECL.

When a parameter is declared optional, all subsequent parameters in the declaration are optional as well, whether or not they specify an explicit OPTIONAL or OPT directive. The following two lines are equivalent, with both second and third parameters being optional:

```
SUB sABC(a&, OPTIONAL BYVAL b&, OPTIONAL BYVAL c&)
SUB sABC(a&, OPT BYVAL b&, BYVAL c&)
```

VARIANT variables are particularly well suited for use as an optional parameter. If the calling code omits an optional VARIANT parameter, (BYVAL or BYREF), PowerBASIC (and most other compilers) substitute a variant of type VT_ERROR which contains an error value of %DISP_E_PARAMNOTFOUND (&H80020004). In this case, you can check for this value directly, or use the ISMISSING() function to determine whether the parameter was physically passed or not.

When optional parameters (other than a VARIANT) are omitted in the calling code, the stack area normally reserved for those parameters is zero-filled. This allows you to test if an optional parameter was passed or not.

If the parameter is defined as a BYVAL parameter, it will have the value zero. For TYPE or UNION variables passed BYVAL, the compiler will pass a string of binary zeroes of length SIZEOF(*Type*_or_*union_var*).

If the parameter is defined as a BYREF parameter, VARPTR (*varname*) will equal zero; when this is true, any attempt to use *varname* in your code will result in Error #9 (null pointer); failure to detect this error using error-trapping may result in a General Protection Fault or memory corruption. You should use the ISMISSING() function first to determine whether it is safe to access the parameter.

Because the FUNCTION, SUB, FASTPROC, METHOD, or PROPERTY being called does not know how many parameters are being passed at the time it is called, you should pass the number of parameters as one of the required parameters in the list.

Variables within Subs

LOCAL variables are created within the procedure stack frame. If a LOCAL variable exceeds the amount of stack space available, it may become necessary to use a STATIC or GLOBAL variable instead. For example, creating a LOCAL nul-terminated or LOCAL fixed-length string that is very large (say, approaching 1 MB) can trigger a General Protection Fault (GPF) because it may overrun the stack frame.

Procedure definitions and program flow

The position of procedure definitions is mostly immaterial. They are usually grouped together in one region of the source code, but you cannot nest procedure definitions. That is, you cannot define a procedure within another procedure (although a procedure definition can contain calls to other procedures). Unlike subroutines (see GOSUB), program execution cannot accidentally "fall into" a procedure, even if it is located before the PBMAIN or WINMAIN Function in your code. For example:

```
 #COMPILE EXE
SUB DisplayInfo(a$)
  ' Code goes here
END SUB
...
FUNCTION PBMAIN
   ' Main program code goes here
END FUNCTION
```

When this program is executed, the code in DisplayInfo is only executed if the procedure is explicitly called, even though it is located earlier in the source code file. Procedure definitions should be treated like isolated islands of code; do not jump in or out of them with GOTO, GOSUB or RETURN. Within a procedure block, such statements are legal.

See also CALL, DECLARE, EXIT SUB, FASTPROC, FUNCNAME$, FUNCTION/END FUNCTION, GLOBAL, GOSUB, ISMISSING, LOCAL, RETURN, STATIC

Example

```
SUB TestProcedure(I%, L&, S!, D#, E##, A())
  ' Code to process parameters
END SUB           ' end procedure TestProcedure

DIM MyArray(20)   ' declare array of numbers
IntegerVar% = 1
LongInt&    = 2
SinglePre!  = 3
DoublePre#  = 4
MyArray(3)  = 5
CALL TestProcedure(IntegerVar%, LongInt&, SinglePre!, DoublePre#,
IntegerVar%^2, MyArray())
```

SWAP statement

SWAP statement

Purpose Exchange the values of two variables of the same

.

Syntax `SWAP var1, var2`

Remarks var1 and var2 are two variables of the same type. If you try to swap variables of differing types (for example,

and , or Single-precision and Double-precision), a compile-time Error 482 occurs ("Data type mismatch").

SWAP is handy because a simple trading of values in two consecutive assignment statements does not get the job done:

```
a = b
b = a
```

By the time you make the second assignment, variable *a* does not contain the value it used to. To do this without the SWAP statement requires a temporary variable and a third assignment:

```
temp = a
a = b
b = temp
```

SWAP *can* be used to swap the *target* values of pointers. In addition, SWAP can also be used to swap the values of pointers themselves.

SWITCH function

SWITCH function

Purpose

Return one of a series of values based upon a TRUE/FALSE evaluation of a corresponding series of expressions.

Syntax

```
var  = SWITCH(expr1, val1 [[, expr2, val2], ...])
var& = SWITCH&(expr1, val1& [[, expr2, val2&], ...])
var$ = SWITCH$(expr1, val1$ [[, expr2, val2$], ...])
```

Remarks

SWITCH expects values of any

type. SWITCH& expects values optimized for Long-integer type. SWITCH$ expects values of type.

If *expr1* evaluates TRUE, *val1* is returned, if *expr2* evaluates TRUE, *val2* is returned, etc.

Each control expression in the series is evaluated as a typical PowerBASIC Boolean expression, which offers short-circuit expression evaluation as needed. To force a bitwise evaluation of an expression, enclose it in parentheses. The value parameters may be expressions, literals or variables of the appropriate data type for the SWITCH function in use.

SWITCH returns the matching value parameter from the first TRUE evaluation of the control expressions, evaluated from left to right in the list. Therefore, it would be wise to place the most likely selections at the front of the SWITCH list to achieve the utmost efficiency. If no expressions evaluate to TRUE, then zero (0) is returned.

Restrictions

Contrary to the implementation in some other languages, only the chosen value (one of *val1*, *val2*, *val3...)* is evaluated at run-time; the other value parameters are not. This ensures optimum execution speed, as well as the elimination of unanticipated side effects.

See also

CHOOSE, IF, IIF, SELECT

Example

```
' SWITCH with simple expressions
A$ = SWITCH$(x%=1, "Bob", x%=20, "Bruce", x% > 20, "Dan", x% < 1,
"Nobody!")

' SWITCH with complex expressions
FUNCTION z(i&) AS LONG
  INCR i&
  FUNCTION = i&
END FUNCTION

FUNCTION PBMAIN
  x& = -1
  Choice& = SWITCH&(z(x&), 1, z(x&), 2, z(x&), 3)
  ' Choice& will equal 2
END FUNCTION
```

TAB$ function

TAB$ function

Purpose Return a

with embedded TAB ($TAB) characters expanded with spaces to a given tab stop.

Syntax `sResult$ = TAB$(strtotab$, tabstop&)`

Remarks All TAB (CHR$(9) or $TAB) characters in *strtotab$* are replaced with spaces to pad the resulting string to the tab stop position specified in *tabstop&*. *strtotab$* and *tabstop&* may be variables, literals, or expressions.

Restrictions If the tab stop specified in *tabstop&* is less than 1 or greater than 256, the original string is returned unchanged.

See also PARSE$, REPLACE

Example

```
a$ = "Hello" & $TAB & "World" & $TAB & _
  "From PB, Inc."
b$ = TAB$(a$,8)
```

Result `b$ contains "Hello   World   From PB, Inc."`

TAB DELETE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TAB statement IMPROVED

Purpose A Tab Control is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

Syntax

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
Function Form:
CountVar&   = TAB(COUNT,  hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar&   = TAB(IMAGE,  hDlg, ID&, PageNum&)
```

```
PageNumVar& = TAB(PAGE,   PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$    = TAB$(TEXT,  hDlg, ID&, PageNum&)
```

hDlg Handle of the dialog that owns the Tab Control.

id& The control identifier assigned with CONTROL ADD TAB.

Remarks In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (hDlg), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

TAB DELETE *hDlg, ID&, PageNum&*

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

TAB GET COUNT *hDlg, id&* TO *CountVar&*

The number of pages in the TAB Control is retrieved, and assigned to the long integer variable specified by *CountVar&*.

TAB GET DIALOG *hDlg, ID&, PageNum&* TO *PageDlgVar&*

The handle of the child dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

TAB GET IMAGE *hDlg, ID&, PageNum&* TO *ImageVar&*

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

TAB GET PAGE *PageDlg* TO *PageNumVar&*

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process CallBack messages for Tab Page Dialogs. If you also need Parent and ID information, you can use WINDOW GET.

TAB GET SELECT *hDlg, id&* TO *SelectVar&*

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

TAB GET TEXT *hDlg, ID&, PageNum&* TO *TextVar$*

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar$*.

TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text$* [CALL *CallBack*] TO *PageDlgVar&*

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached IMAGELIST, based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by PageDlgVar&.

TAB RESET *hDlg, id&*

All pages in the specified Tab Control are deleted.

TAB SELECT *hDlg, ID&, PageNum&*

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

TAB SET IMAGE *hDlg, ID&, PageNum&, Image&*

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

TAB SET IMAGELIST *hDlg, ID&, hLst*

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

TAB SET TEXT *hDlg, ID&, PageNum&, Text$*

The text in the parameter *Text$* is displayed on the tab of the page specified by *PageNum&*.

See also Dynamic Dialog Tools, CONTROL ADD TAB, CONTROL SET FONT, IMAGELIST

TAB GET COUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TAB statement IMPROVED

Purpose A Tab Control is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

Syntax

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
```

```
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
Function Form:
CountVar&    = TAB(COUNT,  hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar&    = TAB(IMAGE,  hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE,   PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$     = TAB$(TEXT,  hDlg, ID&, PageNum&)
```

hDlg Handle of the dialog that owns the Tab Control.

id& The control identifier assigned with CONTROL ADD TAB.

Remarks In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (hDlg), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

TAB DELETE *hDlg, ID&, PageNum&*

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

TAB GET COUNT *hDlg, id&* TO *CountVar&*

The number of pages in the TAB Control is retrieved, and assigned to the long integer variable specified by *CountVar&*.

TAB GET DIALOG *hDlg, ID&, PageNum&* TO *PageDlgVar&*

The handle of the child dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

TAB GET IMAGE *hDlg, ID&, PageNum&* TO *ImageVar&*

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

TAB GET PAGE *PageDlg* TO *PageNumVar&*

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process CallBack messages for Tab Page Dialogs. If you also need Parent and ID information, you can use WINDOW GET.

TAB GET SELECT *hDlg, id&* TO *SelectVar&*

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

TAB GET TEXT *hDlg, ID&, PageNum&* TO *TextVar$*

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar$*.

TAB INSERT PAGE *hDlg*, *ID&*, *PageNum&*, *Image&*, *Text$* [CALL *CallBack*] TO *PageDlgVar&*

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached IMAGELIST, based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by PageDlgVar&.

TAB RESET *hDlg*, *id&*

All pages in the specified Tab Control are deleted.

TAB SELECT *hDlg*, *ID&*, *PageNum&*

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

TAB SET IMAGE *hDlg*, *ID&*, *PageNum&*, *Image&*

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

TAB SET IMAGELIST *hDlg*, *ID&*, *hLst*

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

TAB SET TEXT *hDlg*, *ID&*, *PageNum&*, *Text$*

The text in the parameter *Text$* is displayed on the tab of the page specified by *PageNum&*.

See also Dynamic Dialog Tools, CONTROL ADD TAB, CONTROL SET FONT, IMAGELIST

TAB GET DIALOG statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TAB statement IMPROVED

Purpose A Tab Control is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

Syntax

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
```

TAB GET DIALOG *hDlg*, *ID&*, *PageNum&* TO *PageDlgVar&*
TAB GET IMAGE *hDlg*, *ID&*, *PageNum&* TO *ImageVar&*
TAB GET PAGE *PageDlg* TO *PageNumVar&*
TAB GET SELECT *hDlg*, *ID&* TO *PageNumVar&*
TAB GET TEXT *hDlg*, *ID&*, *PageNum&* TO *TextVar$*
TAB INSERT PAGE *hDlg*, *ID&*, *PageNum&*, *Image&*, *Text$* [CALL *CallBack*] TO *PageDlgVar&*
TAB RESET *hDlg*, *ID&*
TAB SELECT *hDlg*, *ID&*, *PageNum&*
TAB SET IMAGE *hDlg*, *ID&*, *PageNum&*, *Image&*
TAB SET IMAGELIST *hDlg*, *ID&*, *hLst*
TAB SET TEXT *hDlg*, *ID&*, *PageNum&*, *Text$*

Function Form:

```
CountVar&   = TAB(COUNT,  hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar&   = TAB(IMAGE,  hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE,   PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$    = TAB$(TEXT,  hDlg, ID&, PageNum&)
```

hDlg Handle of the dialog that owns the Tab Control.

id& The control identifier assigned with CONTROL ADD TAB.

Remarks In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (hDlg), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

TAB DELETE *hDlg, ID&, PageNum&*

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

TAB GET COUNT *hDlg, id&* TO *CountVar&*

The number of pages in the TAB Control is retrieved, and assigned to the long integer variable specified by *CountVar&*.

TAB GET DIALOG *hDlg, ID&, PageNum&* TO *PageDlgVar&*

The handle of the child dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

TAB GET IMAGE *hDlg, ID&, PageNum&* TO *ImageVar&*

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

TAB GET PAGE *PageDlg* TO *PageNumVar&*

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process CallBack messages for Tab Page Dialogs. If you also need Parent and ID information, you can use WINDOW GET.

TAB GET SELECT *hDlg, id&* TO *SelectVar&*

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

TAB GET TEXT *hDlg, ID&, PageNum&* TO *TextVar$*

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar$*.

TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text$* [CALL *CallBack*] TO *PageDlgVar&*

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached IMAGELIST, based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by PageDlgVar&.

TAB RESET *hDlg, id&*

All pages in the specified Tab Control are deleted.

TAB SELECT *hDlg, ID&, PageNum&*

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

TAB SET IMAGE *hDlg, ID&, PageNum&, Image&*

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

TAB SET IMAGELIST *hDlg, ID&, hLst*

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

TAB SET TEXT *hDlg, ID&, PageNum&, Text$*

The text in the parameter *Text$* is displayed on the tab of the page specified by *PageNum&*.

See also Dynamic Dialog Tools, CONTROL ADD TAB, CONTROL SET FONT, IMAGELIST

TAB GET IMAGE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TAB statement IMPROVED

Purpose

A Tab Control is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

Syntax

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

```
Function Form:
CountVar&   = TAB(COUNT,  hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar&   = TAB(IMAGE,  hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE,   PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$    = TAB$(TEXT,  hDlg, ID&, PageNum&)
```

hDlg — Handle of the dialog that owns the Tab Control.

id& — The control identifier assigned with CONTROL ADD TAB.

Remarks

In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (hDlg), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

TAB DELETE *hDlg, ID&, PageNum&*

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

TAB GET COUNT *hDlg, id&* TO *CountVar&*

The number of pages in the TAB Control is retrieved, and assigned to the long integer variable specified by *CountVar&*.

TAB GET DIALOG *hDlg, ID&, PageNum&* TO *PageDlgVar&*

The handle of the child dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

TAB GET IMAGE *hDlg, ID&, PageNum&* TO *ImageVar&*

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

TAB GET PAGE *PageDlg* TO *PageNumVar&*

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process CallBack messages for Tab Page Dialogs. If you also need Parent and ID information, you can use WINDOW GET.

TAB GET SELECT *hDlg, id&* TO *SelectVar&*

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

TAB GET TEXT *hDlg*, *ID&*, *PageNum&* TO *TextVar$*

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar$*.

TAB INSERT PAGE *hDlg*, *ID&*, *PageNum&*, *Image&*, *Text$* [CALL *CallBack*] TO *PageDlgVar&*

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached IMAGELIST, based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by PageDlgVar&.

TAB RESET *hDlg, id&*

All pages in the specified Tab Control are deleted.

TAB SELECT *hDlg*, *ID&*, *PageNum&*

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

TAB SET IMAGE *hDlg*, *ID&*, *PageNum&*, *Image&*

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

TAB SET IMAGELIST *hDlg*, *ID&*, *hLst*

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

TAB SET TEXT *hDlg*, *ID&*, *PageNum&*, *Text$*

The text in the parameter *Text$* is displayed on the tab of the page specified by *PageNum&*.

See also Dynamic Dialog Tools, CONTROL ADD TAB, CONTROL SET FONT, IMAGELIST

TAB GET PAGE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TAB statement IMPROVED

Purpose

A Tab Control is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

Syntax

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

```
Function Form:
CountVar&    = TAB(COUNT,  hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar&    = TAB(IMAGE,  hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE,    PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$     = TAB$(TEXT,  hDlg, ID&, PageNum&)
```

hDlg — Handle of the dialog that owns the Tab Control.

id& — The control identifier assigned with CONTROL ADD TAB.

Remarks

In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (hDlg), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

TAB DELETE *hDlg*, *ID&*, *PageNum&*

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

TAB GET COUNT *hDlg*, *id&* TO *CountVar&*

The number of pages in the TAB Control is retrieved, and assigned to the long integer variable specified by *CountVar&*.

TAB GET DIALOG *hDlg*, *ID&*, *PageNum&* TO *PageDlgVar&*

The handle of the child dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

TAB GET IMAGE *hDlg, ID&, PageNum&* TO *ImageVar&*

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

TAB GET PAGE *PageDlg* TO *PageNumVar&*

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process CallBack messages for Tab Page Dialogs. If you also need Parent and ID information, you can use WINDOW GET.

TAB GET SELECT *hDlg, id&* TO *SelectVar&*

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

TAB GET TEXT *hDlg, ID&, PageNum&* TO *TextVar$*

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar$*.

TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text$* [CALL *CallBack*] TO *PageDlgVar&*

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached IMAGELIST, based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by PageDlgVar&.

TAB RESET *hDlg, id&*

All pages in the specified Tab Control are deleted.

TAB SELECT *hDlg, ID&, PageNum&*

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

TAB SET IMAGE *hDlg, ID&, PageNum&, Image&*

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

TAB SET IMAGELIST *hDlg, ID&, hLst*

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

TAB SET TEXT *hDlg, ID&, PageNum&, Text$*

The text in the parameter *Text$* is displayed on the tab of the page specified by

PageNum&.

See also [Dynamic Dialog Tools], [CONTROL ADD TAB], [CONTROL SET FONT], [IMAGELIST]

TAB GET SELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TAB statement IMPROVED

Purpose

A Tab Control is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

Syntax

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

```
Function Form:
CountVar&   = TAB(COUNT,  hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar&   = TAB(IMAGE,  hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE,   PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$    = TAB$(TEXT,  hDlg, ID&, PageNum&)
```

hDlg Handle of the dialog that owns the Tab Control.

id& The control identifier assigned with CONTROL ADD TAB.

Remarks

In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (hDlg), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

TAB DELETE *hDlg, ID&, PageNum&*

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

TAB GET COUNT *hDlg, id&* TO *CountVar&*

The number of pages in the TAB Control is retrieved, and assigned to the long integer variable specified by *CountVar&*.

TAB GET DIALOG *hDlg, ID&, PageNum&* TO *PageDlgVar&*

The handle of the child dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

TAB GET IMAGE *hDlg, ID&, PageNum&* TO *ImageVar&*

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

TAB GET PAGE *PageDlg* TO *PageNumVar&*

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process CallBack messages for Tab Page Dialogs. If you also need Parent and ID information, you can use WINDOW GET.

TAB GET SELECT *hDlg, id&* TO *SelectVar&*

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

TAB GET TEXT *hDlg, ID&, PageNum&* TO *TextVar$*

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar$*.

TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text$* [CALL *CallBack*] TO *PageDlgVar&*

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached IMAGELIST, based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by PageDlgVar&.

TAB RESET *hDlg, id&*

All pages in the specified Tab Control are deleted.

TAB SELECT *hDlg, ID&, PageNum&*

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

TAB SET IMAGE *hDlg, ID&, PageNum&, Image&*

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

TAB SET IMAGELIST *hDlg, ID&, hLst*

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

TAB SET TEXT *hDlg, ID&, PageNum&, Text$*

The text in the parameter *Text$* is displayed on the tab of the page specified by *PageNum&*.

See also Dynamic Dialog Tools, CONTROL ADD TAB, CONTROL SET FONT, IMAGELIST

TAB GET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TAB statement IMPROVED

Purpose A Tab Control is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

Syntax

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

```
Function Form:
CountVar&    = TAB(COUNT,  hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar&    = TAB(IMAGE,  hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE,   PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$     = TAB$(TEXT,  hDlg, ID&, PageNum&)
```

hDlg Handle of the dialog that owns the Tab Control.

id& The control identifier assigned with CONTROL ADD TAB.

Remarks In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (hDlg), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

TAB DELETE *hDlg, ID&, PageNum&*

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

TAB GET COUNT *hDlg, id&* TO *CountVar&*

The number of pages in the TAB Control is retrieved, and assigned to the long integer variable specified by *CountVar&*.

TAB GET DIALOG *hDlg, ID&, PageNum&* TO *PageDlgVar&*

The handle of the child dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

TAB GET IMAGE *hDlg, ID&, PageNum&* TO *ImageVar&*

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

TAB GET PAGE *PageDlg* TO *PageNumVar&*

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process CallBack messages for Tab Page Dialogs. If you also need Parent and ID information, you can use WINDOW GET.

TAB GET SELECT *hDlg, id&* TO *SelectVar&*

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

TAB GET TEXT *hDlg, ID&, PageNum&* TO *TextVar$*

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar$*.

TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text$* [CALL *CallBack*] TO *PageDlgVar&*

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached IMAGELIST, based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by PageDlgVar&.

TAB RESET *hDlg, id&*

All pages in the specified Tab Control are deleted.

TAB SELECT *hDlg, ID&, PageNum&*

The page specified by the *PageNum&* parameter is chosen as the selected page for the

TAB control, and the associated dialog is displayed.

TAB SET IMAGE *hDlg, ID&, PageNum&, Image&*

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

TAB SET IMAGELIST *hDlg, ID&, hLst*

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

TAB SET TEXT *hDlg, ID&, PageNum&, Text$*

The text in the parameter *Text$* is displayed on the tab of the page specified by *PageNum&*.

See also Dynamic Dialog Tools, CONTROL ADD TAB, CONTROL SET FONT, IMAGELIST

TAB INSERT PAGE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TAB statement IMPROVED

Purpose A Tab Control is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

Syntax

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

```
Function Form:
CountVar&   = TAB(COUNT,  hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar&   = TAB(IMAGE,  hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE,   PageDlg&)
```

```
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$    = TAB$(TEXT,  hDlg, ID&, PageNum&)
```

hDlg Handle of the dialog that owns the Tab Control.

id& The control identifier assigned with CONTROL ADD TAB.

Remarks In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (hDlg), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

TAB DELETE *hDlg*, *ID&*, *PageNum&*

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

TAB GET COUNT *hDlg*, *id&* TO *CountVar&*

The number of pages in the TAB Control is retrieved, and assigned to the long integer variable specified by *CountVar&*.

TAB GET DIALOG *hDlg*, *ID&*, *PageNum&* TO *PageDlgVar&*

The handle of the child dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

TAB GET IMAGE *hDlg*, *ID&*, *PageNum&* TO *ImageVar&*

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

TAB GET PAGE *PageDlg* TO *PageNumVar&*

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process CallBack messages for Tab Page Dialogs. If you also need Parent and ID information, you can use WINDOW GET.

TAB GET SELECT *hDlg*, *id&* TO *SelectVar&*

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

TAB GET TEXT *hDlg*, *ID&*, *PageNum&* TO *TextVar$*

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar$*.

TAB INSERT PAGE *hDlg*, *ID&*, *PageNum&*, *Image&*, *Text$* [CALL *CallBack*] TO *PageDlgVar&*

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached IMAGELIST, based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by PageDlgVar&.

TAB RESET *hDlg, id&*

All pages in the specified Tab Control are deleted.

TAB SELECT *hDlg, ID&, PageNum&*

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

TAB SET IMAGE *hDlg, ID&, PageNum&, Image&*

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

TAB SET IMAGELIST *hDlg, ID&, hLst*

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

TAB SET TEXT *hDlg, ID&, PageNum&, Text$*

The text in the parameter *Text$* is displayed on the tab of the page specified by *PageNum&*.

See also Dynamic Dialog Tools, CONTROL ADD TAB, CONTROL SET FONT, IMAGELIST

TAB RESET statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TAB statement IMPROVED

Purpose A Tab Control is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

Syntax

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
```

```
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
Function Form:
CountVar&   = TAB(COUNT,  hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar&   = TAB(IMAGE,  hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE,   PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$    = TAB$(TEXT,  hDlg, ID&, PageNum&)
```

hDlg Handle of the dialog that owns the Tab Control.

id& The control identifier assigned with CONTROL ADD TAB.

Remarks In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (hDlg), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

TAB DELETE *hDlg*, *ID&*, *PageNum&*

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

TAB GET COUNT *hDlg*, *id&* TO *CountVar&*

The number of pages in the TAB Control is retrieved, and assigned to the long integer variable specified by *CountVar&*.

TAB GET DIALOG *hDlg*, *ID&*, *PageNum&* TO *PageDlgVar&*

The handle of the child dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

TAB GET IMAGE *hDlg*, *ID&*, *PageNum&* TO *ImageVar&*

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

TAB GET PAGE *PageDlg* TO *PageNumVar&*

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process CallBack messages for Tab Page Dialogs. If you also need Parent and ID information, you can use WINDOW GET.

TAB GET SELECT *hDlg*, *id&* TO *SelectVar&*

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

TAB GET TEXT *hDlg*, *ID&*, *PageNum&* TO *TextVar$*

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar$*.

TAB INSERT PAGE *hDlg*, *ID&*, *PageNum&*, *Image&*, *Text$* [CALL *CallBack*]

TO *PageDlgVar&*

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached IMAGELIST, based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by PageDlgVar&.

TAB RESET *hDlg, id&*

All pages in the specified Tab Control are deleted.

TAB SELECT *hDlg, ID&, PageNum&*

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

TAB SET IMAGE *hDlg, ID&, PageNum&, Image&*

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

TAB SET IMAGELIST *hDlg, ID&, hLst*

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

TAB SET TEXT *hDlg, ID&, PageNum&, Text$*

The text in the parameter *Text$* is displayed on the tab of the page specified by *PageNum&*.

See also Dynamic Dialog Tools, CONTROL ADD TAB, CONTROL SET FONT, IMAGELIST

TAB SELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TAB statement IMPROVED

Purpose A Tab Control is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

Syntax

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
```

```
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

```
Function Form:
CountVar&    = TAB(COUNT,  hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar&    = TAB(IMAGE,  hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE,    PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$     = TAB$(TEXT,  hDlg, ID&, PageNum&)
```

hDlg Handle of the dialog that owns the Tab Control.

id& The control identifier assigned with CONTROL ADD TAB.

Remarks In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (hDlg), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

TAB DELETE *hDlg, ID&, PageNum&*

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

TAB GET COUNT *hDlg, id&* TO *CountVar&*

The number of pages in the TAB Control is retrieved, and assigned to the long integer variable specified by *CountVar&*.

TAB GET DIALOG *hDlg, ID&, PageNum&* TO *PageDlgVar&*

The handle of the child dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

TAB GET IMAGE *hDlg, ID&, PageNum&* TO *ImageVar&*

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

TAB GET PAGE *PageDlg* TO *PageNumVar&*

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process CallBack messages for Tab Page Dialogs. If you also need Parent and ID information, you can use WINDOW GET.

TAB GET SELECT *hDlg, id&* TO *SelectVar&*

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

TAB GET TEXT *hDlg*, *ID&*, *PageNum&* TO *TextVar$*

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar$*.

TAB INSERT PAGE *hDlg*, *ID&*, *PageNum&*, *Image&*, *Text$* [CALL *CallBack*] TO *PageDlgVar&*

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached IMAGELIST, based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by PageDlgVar&.

TAB RESET *hDlg*, *id&*

All pages in the specified Tab Control are deleted.

TAB SELECT *hDlg*, *ID&*, *PageNum&*

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

TAB SET IMAGE *hDlg*, *ID&*, *PageNum&*, *Image&*

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

TAB SET IMAGELIST *hDlg*, *ID&*, *hLst*

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

TAB SET TEXT *hDlg*, *ID&*, *PageNum&*, *Text$*

The text in the parameter *Text$* is displayed on the tab of the page specified by *PageNum&*.

See also Dynamic Dialog Tools, CONTROL ADD TAB, CONTROL SET FONT, IMAGELIST

TAB SET IMAGE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TAB statement IMPROVED

Purpose A Tab Control is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

Syntax

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

```
Function Form:
CountVar&   = TAB(COUNT,  hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar&   = TAB(IMAGE,  hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE,   PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$    = TAB$(TEXT,  hDlg, ID&, PageNum&)
```

hDlg Handle of the dialog that owns the Tab Control.

id& The control identifier assigned with CONTROL ADD TAB.

Remarks In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (hDlg), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

TAB DELETE *hDlg*, *ID&*, *PageNum&*

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

TAB GET COUNT *hDlg*, *id&* TO *CountVar&*

The number of pages in the TAB Control is retrieved, and assigned to the long integer variable specified by *CountVar&*.

TAB GET DIALOG *hDlg*, *ID&*, *PageNum&* TO *PageDlgVar&*

The handle of the child dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

TAB GET IMAGE *hDlg*, *ID&*, *PageNum&* TO *ImageVar&*

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

TAB GET PAGE *PageDlg* TO *PageNumVar&*

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process CallBack messages for Tab Page Dialogs. If you also need Parent and ID information, you can use WINDOW GET.

TAB GET SELECT *hDlg*, *id&* TO *SelectVar&*

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

TAB GET TEXT *hDlg*, *ID&*, *PageNum&* TO *TextVar$*

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar$*.

TAB INSERT PAGE *hDlg*, *ID&*, *PageNum&*, *Image&*, *Text$* [CALL *CallBack*] TO *PageDlgVar&*

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached IMAGELIST, based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by PageDlgVar&.

TAB RESET *hDlg*, *id&*

All pages in the specified Tab Control are deleted.

TAB SELECT *hDlg*, *ID&*, *PageNum&*

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

TAB SET IMAGE *hDlg*, *ID&*, *PageNum&*, *Image&*

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

TAB SET IMAGELIST *hDlg*, *ID&*, *hLst*

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

TAB SET TEXT *hDlg*, *ID&*, *PageNum&*, *Text$*

The text in the parameter *Text$* is displayed on the tab of the page specified by *PageNum&*.

See also Dynamic Dialog Tools, CONTROL ADD TAB, CONTROL SET FONT, IMAGELIST

TAB SET IMAGELIST statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TAB statement IMPROVED

Purpose

A Tab Control is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

Syntax

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

```
Function Form:
CountVar&    = TAB(COUNT,  hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar&    = TAB(IMAGE,  hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE,   PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$     = TAB$(TEXT,  hDlg, ID&, PageNum&)
```

hDlg — Handle of the dialog that owns the Tab Control.

id& — The control identifier assigned with CONTROL ADD TAB.

Remarks

In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (hDlg), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

TAB DELETE *hDlg, ID&, PageNum&*

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

TAB GET COUNT *hDlg, id&* TO *CountVar&*

The number of pages in the TAB Control is retrieved, and assigned to the long integer variable specified by *CountVar&*.

TAB GET DIALOG *hDlg, ID&, PageNum&* TO *PageDlgVar&*

The handle of the child dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

TAB GET IMAGE *hDlg*, *ID&*, *PageNum&* TO *ImageVar&*

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

TAB GET PAGE *PageDlg* TO *PageNumVar&*

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process CallBack messages for Tab Page Dialogs. If you also need Parent and ID information, you can use WINDOW GET.

TAB GET SELECT *hDlg*, *id&* TO *SelectVar&*

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

TAB GET TEXT *hDlg*, *ID&*, *PageNum&* TO *TextVar$*

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar$*.

TAB INSERT PAGE *hDlg*, *ID&*, *PageNum&*, *Image&*, *Text$* [CALL *CallBack*] TO *PageDlgVar&*

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached IMAGELIST, based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by PageDlgVar&.

TAB RESET *hDlg*, *id&*

All pages in the specified Tab Control are deleted.

TAB SELECT *hDlg*, *ID&*, *PageNum&*

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

TAB SET IMAGE *hDlg*, *ID&*, *PageNum&*, *Image&*

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

TAB SET IMAGELIST *hDlg*, *ID&*, *hLst*

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

TAB SET TEXT *hDlg*, *ID&*, *PageNum&*, *Text$*

The text in the parameter *Text$* is displayed on the tab of the page specified by *PageNum&*.

See also Dynamic Dialog Tools, CONTROL ADD TAB, CONTROL SET FONT, IMAGELIST

TAB SET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TAB statement IMPROVED

Purpose

A Tab Control is analogous to the dividers in a notebook. It displays one particular page, selecting it from multiple pages, when the user chooses the corresponding tab. The TAB statement is used to manipulate a TAB control.

Syntax

```
TAB DELETE hDlg, ID&, PageNum&
TAB GET COUNT hDlg, ID& TO CountVar&
TAB GET DIALOG hDlg, ID&, PageNum& TO PageDlgVar&
TAB GET IMAGE hDlg, ID&, PageNum& TO ImageVar&
TAB GET PAGE PageDlg TO PageNumVar&
TAB GET SELECT hDlg, ID& TO PageNumVar&
TAB GET TEXT hDlg, ID&, PageNum& TO TextVar$
TAB INSERT PAGE hDlg, ID&, PageNum&, Image&, Text$ [CALL CallBack] TO
PageDlgVar&
TAB RESET hDlg, ID&
TAB SELECT hDlg, ID&, PageNum&
TAB SET IMAGE hDlg, ID&, PageNum&, Image&
TAB SET IMAGELIST hDlg, ID&, hLst
TAB SET TEXT hDlg, ID&, PageNum&, Text$
```

```
Function Form:
CountVar&    = TAB(COUNT,  hDlg, ID&)
PageDlgVar& = TAB(DIALOG, hDlg, ID&, PageNum&)
ImageVar&    = TAB(IMAGE,  hDlg, ID&, PageNum&)
PageNumVar& = TAB(PAGE,   PageDlg&)
PageNumVar& = TAB(SELECT, hDlg, ID&)
TextVar$     = TAB$(TEXT,  hDlg, ID&, PageNum&)
```

hDlg

Handle of the dialog that owns the Tab Control.

id&

The control identifier assigned with CONTROL ADD TAB.

Remarks

In each of the following descriptions, the Tab Control that is the subject of the statement is identified by the handle of the dialog that owns the Tab Control (hDlg), and the unique control ID you gave it upon creation in CONTROL ADD TAB. Whenever a TAB page number or IMAGELIST image number is referenced, it is indexed to one. That is, the first item is 1, the second item is 2, etc. Variations of TAB which return a single value may be written in the optional Function Form, as shown above. These functions may be embedded in an expression of any complexity.

TAB DELETE *hDlg*, *ID&*, *PageNum&*

The page specified by the *PageNum&* parameter is deleted from the Tab Control.

TAB GET COUNT *hDlg*, *id&* TO *CountVar&*

The number of pages in the TAB Control is retrieved, and assigned to the long integer variable specified by *CountVar&*.

TAB GET DIALOG *hDlg, ID&, PageNum&* TO *PageDlgVar&*

The handle of the child dialog attached to a TAB Control page is retrieved and assigned to the variable designated by *PageDlgVar&*. The dialog handle to be returned is determined by the value of the parameter *PageNum&*. If that page/dialog not exist, the value zero is returned.

TAB GET IMAGE *hDlg, ID&, PageNum&* TO *ImageVar&*

The index of the image displayed on the specified TAB page is retrieved, and assigned to the variable specified by *ImageVar&*. If no image is displayed, the value zero (0) is assigned.

TAB GET PAGE *PageDlg* TO *PageNumVar&*

Given the handle of a TAB Page Dialog, the PageNum is retrieved, and assigned to the variable specified by *PageNumVar&*. This may be particularly useful when you process CallBack messages for Tab Page Dialogs. If you also need Parent and ID information, you can use WINDOW GET.

TAB GET SELECT *hDlg, id&* TO *SelectVar&*

The index of the currently selected page in the Tab Control is retrieved, and assigned to the variable specified by *SelectVar&*. If there is no current selection, the value zero (0) is assigned.

TAB GET TEXT *hDlg, ID&, PageNum&* TO *TextVar$*

The text displayed on the specified page tab is retrieved, and assigned to the variable specified by *TextVar$*.

TAB INSERT PAGE *hDlg, ID&, PageNum&, Image&, Text$* [CALL *CallBack*] TO *PageDlgVar&*

A page is added to this TAB Control. The parameter *PageNum&* specifies the position of the page to be inserted. An optional image to be displayed on the tab area is selected from the attached IMAGELIST, based upon the parameter *Image&*. Set *Image&* to 0 if no image is desired. The *Text$* parameter specifies the text to be displayed on the tab area. *CallBack* is the name of a callback procedure to be used for the page dialog. The handle of the newly created dialog is assigned to the variable designated by PageDlgVar&.

TAB RESET *hDlg, id&*

All pages in the specified Tab Control are deleted.

TAB SELECT *hDlg, ID&, PageNum&*

The page specified by the *PageNum&* parameter is chosen as the selected page for the TAB control, and the associated dialog is displayed.

TAB SET IMAGE *hDlg, ID&, PageNum&, Image&*

The image specified by the parameter *Image&* is displayed on the page tab specified by the parameter *PageNum&*.

TAB SET IMAGELIST *hDlg, ID&, hLst*

The IMAGELIST specified by *hLst* is attached to this TAB control. The graphical images contained in the IMAGELIST are displayed on the tabs of this control. The image to be displayed is determined by the specification made in TAB INSERT PAGE or TAB SET

IMAGE. When the TAB control is destroyed, any attached IMAGELIST is automatically destroyed.

TAB SET TEXT *hDlg, ID&, PageNum&, Text$*

The text in the parameter *Text$* is displayed on the tab of the page specified by *PageNum&*.

See also Dynamic Dialog Tools, CONTROL ADD TAB, CONTROL SET FONT, IMAGELIST

TALLY function

TALLY function

Purpose Count the number of occurrences of specified characters or strings within a

.

Syntax `x& = TALLY(MainString, [ANY] MatchString)`

Remarks *MainString* is the string expression in which to count characters. *MatchString* is the string expression to count all occurrences of. If *MatchString* is not present in *MainString*, zero is returned. When a match is found, the scan for the next match begins at the position immediately following the prior match.

ANY If the ANY keyword is included, *MatchString* specifies a list of single characters to be searched for individually: a match on any one of which will cause the count to be incremented for each occurrence of that character. Note that repeated characters in *MatchString* will not increase the tally. For example:

```
X = TALLY("ABCD", ANY "BDB") ' returns 2, not 3
```

Restrictions TALLY is case-sensitive, so be wary of capitalization.

See also INSTR, JOIN$, LCASE$, LTRIM$, MID$, PARSE, PARSE$, PARSECOUNT, REMOVE$, REPLACE, RIGHT$, RTRIM$, TRIM$, UCASE$, VERIFY

Example

```
' Returns 1, counting the string "bac"
x& = TALLY("abacadabra", "bac")

'returns 8, counting all "b", "a", and "c" characters
x& = TALLY("abacadabra", ANY "bac")
```

TAN function

TAN function

Purpose Return the tangent of its argument.

Syntax `y = TAN(numeric_expression)`

Remarks *numeric_expression* is an angle specified in radians. To convert radians to degrees, multiply by 57.29577951308232##. To convert degrees to radians, multiply by 0.0174532925199433##. For more information on radians, see ATN.

TAN returns an Extended-precision result.

TAN is approximated with the expression:

```
TAN = SIN(Value) / COS(Value)
```

The Inverse Tangent (ARCTAN) of a value can be easily calculated with the ATN function.

The Hyperbolic Tangent (TANH) of a value can be calculated:

```
TanH = (EXP(2 * Value) - 1) / (EXP(2 * Value) + 1)
```

The Inverse Hyperbolic Tangent (ARCTANH) of a value can be calculated:

```
ArcTanH = LOG((1 + Value) / (1 - Value)) / 2

' Useful Macro functions
MACRO Pi = 3.141592653589793##
MACRO DegreesToRadians(dpDegrees) = (dpDegrees * 0.0174532925199433##)
MACRO RadiansToDegrees(dpRadians) = (dpRadians * 57.29577951308232##)
```

See also ATN, COS, SIN

Example

```
pi# = 3.141592653589793##
FOR I& = 5 TO 45 STEP 5
  x$ = "The Tangent of " + FORMAT$(I&,"* ") + _
    " degrees = " + FORMAT$(TAN(pi## / 180 * _
    I&),"0.00")
NEXT I&
```

Result

```
The Tangent of  5 degrees = 0.09
The Tangent of 10 degrees = 0.18
The Tangent of 15 degrees = 0.27
The Tangent of 20 degrees = 0.36
The Tangent of 25 degrees = 0.47
The Tangent of 30 degrees = 0.58
The Tangent of 35 degrees = 0.70
The Tangent of 40 degrees = 0.84
The Tangent of 45 degrees = 1.00
```

TCP ACCEPT statement

TCP ACCEPT statement

Purpose Accept an incoming request for communication from a specified TCP/IP port.

Syntax `TCP ACCEPT [#] fNum& AS newfNum&`

Remarks Accept an incoming connection request to the *fNum&* socket, and create a *newfNum&* socket handle to communicate with the new connection.

TCP ACCEPT is only valid with sockets opened using TCP OPEN SERVER.

See also TCP and UDP communications, TCP CLOSE, TCP LINE INPUT, TCP NOTIFY, TCP OPEN, TCP PRINT, TCP RECV, TCP SEND, UDP OPEN

TCP CLOSE statement

TCP CLOSE statement

Purpose Close a previously opened TCP/IP port.

Syntax `TCP CLOSE [#] fNum&`

Remarks Close the previously opened TCP/IP port specified by *fNum&*.

See also TCP and UDP communications, TCP ACCEPT, TCP LINE INPUT, TCP NOTIFY, TCP OPEN, TCP PRINT, TCP RECV, TCP SEND, UDP CLOSE

TCP LINE INPUT statement

TCP LINE INPUT statement

Purpose Receive a line of text from a specified TCP/IP port.

Syntax **`TCP LINE [INPUT] [#] fNum&, Buffer$`**

Remarks Receive a line of text from the *fNum&* TCP/IP port, and place the data in *Buffer$*. If no bytes are available, *Buffer$* will be empty (a null string). If TCP LINE did not receive a complete line of text (terminated by a $CRLF character pair), EOF(*fNum&*) will return TRUE (non-zero).

If a time-out occurs, ERR will be set to indicate a run-time Error 24 ("Device timeout"). See TCP OPEN to specify the TCP socket timeout value.

The EOF function may also be used with TCP LINE (and COMM LINE) to detect that an incomplete line was received. Normally, the TCP LINE statement reads data until a $CRLF character pair is found, and in that case, EOF will return false (zero). However, even if no $CRLF has been found, TCP LINE will return if no additional data is available. In that case, TCP LINE will return whatever data has been accumulated, and set EOF to logical TRUE (non-zero).

In many cases, it would be prudent to test EOF after every TCP LINE statement to verify that a full line has been received. In some cases, you may wish to execute the statement one or more additional times, combining the data, in order to obtain a full line of text.

See also TCP and UDP communications, EOF, TCP ACCEPT, TCP CLOSE, TCP NOTIFY, TCP OPEN, TCP PRINT, TCP RECV, TCP SEND, UDP RECV

TCP NOTIFY statement

TCP NOTIFY statement

Purpose Designate which TCP/IP events will generate a notification message.

Syntax **`TCP NOTIFY [#] fNum&, {SEND | RECV | ACCEPT | CONNECT | CLOSE} TO hWnd& AS wMsg&`**

Remarks Designates which events (SEND, RECV, ACCEPT, CONNECT and CLOSE) will generate a *wMsg&* notification message to the window procedure (callback) of the GUI window or dialog whose window handle is contained in *hWnd&*.

Your program defines the *wMsg&* value, and this value should be equal or larger than % WM_USER + 500 to avoid conflict with other (common) callback message values.

When the nominated callback function receives the *wMsg&* notification, the *wParam&* parameter identifies the operating system's handle of the socket (see FILEATTR), the low-order Word of *lParam&* specifies the code of the event (see table below), and the high-order Word of *lParam&* contains the error code (if any).

LO(WORD, *lParam&*)	Definition
`%FD_READ`	Data is available to be read from the socket.
`%FD_WRITE`	The socket is ready for data to be written.
`%FD_ACCEPT`	The socket is able to accept a new connection.
`%FD_CONNECT`	The connection has been established.
`%FD_CLOSE`	The socket has been closed.

Notification messages do not arrive in unabated or continuous streams. That is, once a particular notification message arrives, it will not be sent again until the initial message is acted upon. For example, if a %FD_READ notification is received, it will not be resent until after a TCP RECV statement is executed.

The Winsock error codes are listed in WINSOCK2.INC, prefixed with %WSAE.

See also TCP and UDP communications, TCP ACCEPT, TCP CLOSE, TCP LINE INPUT, TCP OPEN, TCP PRINT, TCP RECV, TCP SEND, UDP NOTIFY

TCP OPEN statement

TCP OPEN statement

Purpose	Enable an application to communicate with a TCP/IP server or client using the TCP protocol over Winsock.
Syntax	*As a client:* **TCP OPEN {PORT *p&* | *srvc$*} AT *address$* AS [#] *fNum&* [TIMEOUT *timeoutval&*]** As a server: **TCP OPEN SERVER [ADDR *ip&*] {PORT *p&* | *srvc$*} AS [#] *fNum&* [TIMEOUT *timeoutval&*]**
Remarks	Open a TCP/IP port or service for communication, either as a client or as a server.
SERVER	If the keyword server is included, the TCP port is opened as a TCP/IP server; otherwise, it is opened as a TCP/IP client.
ADDR *ip&*	As a server, if you specify the optional ADDR *ip&*, the TCP server monitors connections at the specified *ip&* address. Otherwise, the primary IP address for the computer is used by default.
PORT *p&*	As a client, PORT identifies the server port that the client attempts to connect to. As a server, PORT identifies the port the server will monitor for connection requests. You may specify either a port number or a service name, but not both.
srvc$	If the port number is not specified, a service name must be specified instead. A service name takes the form of "http", "smtp", or "ftp", etc. You may specify either a port number or a service name, but not both.
AT *address$*	As a client, *address$* identifies the address to connect with. *address$* can be a domain such as "powerbasic.com", or a dotted IP address in string form, such as "127.0.0.1".
fNum&	A file number such as #1, or a variable with a value obtained using the FREEFILE function.
TIMEOUT	The optional TIMEOUT value allows you to specify how long a TCP SEND, RECV, PRINT, or LINE operation should wait for completion, in milliseconds (*mSec*). If the specified number of milliseconds elapses without a response, the TCP operation will fail, and the ERR system variable will be set to indicate a run-time Error 24 ("Device timeout"). The default timeout is 60000 milliseconds (60 seconds).
See also	TCP and UDP communications, FREEFILE, TCP ACCEPT, TCP CLOSE, TCP LINE INPUT, TCP NOTIFY, TCP PRINT, TCP RECV, TCP SEND, UDP OPEN

Example

```
' Client TCP/IP example - retrieve a web page
#COMPILE EXE

FUNCTION PBMAIN() AS LONG
  LOCAL Buffer$, Site$, File$, Entire_page$
  LOCAL Length&

  Site$ = "www.powerbasic.com"
  File$ =
"http://www.powerbasic.com/support/forums/Forum2/HTML/000031.html"

  ' Connecting...
  TCP OPEN "http" AT Site$ AS #1 TIMEOUT 60000

  ' Could we connect to site?
  IF ERR THEN
      BEEP
      EXIT FUNCTION
  END IF
```

```
    ' Send the GET request...
    TCP PRINT #1, "GET " & File$ & " HTTP/1.0"
    TCP PRINT #1, "Referer: http://www.powerbasic.com/"
    TCP PRINT #1, "User-Agent: TCP OPEN Example (www.powerbasic.com)
    TCP PRINT #1, ""

    ' Retrieve the page...
    DO
      TCP RECV #1, 4096, Buffer$
      Entire_page = Entire_page + Buffer$
    LOOP WHILE ISTRUE LEN(Buffer$) AND ISFALSE ERR

    ' Close the TCP/IP port...
    TCP CLOSE #1
  END FUNCTION
```

TCP PRINT statement

TCP PRINT statement

Purpose Write a string to a nominated TCP/IP port.

Syntax `TCP PRINT [#] fNum&, string_expression[;]`

Remarks Write the data in *string_expression* to the *fNum&* TCP/IP port. If the optional semi-colon is not specified, a carriage-return and linefeed pair ($CRLF or CHR$(13,10)) is also sent.

The TCP PRINT statement does not return until *string_expression* has been sent, or an error occurs. That is, TCP PRINT is a synchronous or "blocking" statement. If a time-out occurs, ERR will be set to indicate a run-time Error 24 ("Device timeout"). See TCP OPEN to specify the TCP socket timeout value.

See also TCP and UDP communications, TCP ACCEPT, TCP CLOSE, TCP LINE INPUT, TCP NOTIFY, TCP OPEN, TCP RECV, TCP SEND, UDP OPEN

TCP RECV statement

TCP RECV statement

Purpose Receive data from a specified TCP/IP port.

Syntax `TCP RECV [#] fNum&, count&, Buffer$`

Remarks Receive *count&* bytes from the *fNum&* TCP/IP port and place them in *Buffer$*. If *count&* bytes are not available, *Buffer$* will receive whatever bytes are available and EOF(*fNum&*) will return TRUE (non-zero).

Typically used in a

to retrieve a stream of data, a TCP RECV loop should be terminated if *Buffer$* returns an empty , or if EOF(*fNum&*) returns TRUE, or if ERR becomes set. If a time-out occurs, ERR will be set to indicate a run-time Error 24 ("Device timeout"). See TCP OPEN to specify the TCP socket timeout value.

See also TCP and UDP communications, EOF, TCP ACCEPT, TCP CLOSE, TCP LINE INPUT, TCP NOTIFY, TCP OPEN, TCP PRINT, TCP SEND, UDP RECV

TCP SEND statement

TCP SEND statement

Purpose Write a string to a nominated TCP/IP port.

Syntax **TCP SEND [#] *fNum&, string_expression***

Remarks Write the specified *string_expression* to the TCP/IP port specified by *fNum&*.

The TCP SEND statement does not return until *string_expression* has been sent, or an error occurs. That is, TCP SEND is a synchronous or "blocking" statement. If a time-out occurs, ERR will be set to indicate a run-time Error 24 ("Device timeout"). See TCP OPEN to specify the TCP socket timeout value.

See also TCP and UDP communications, TCP ACCEPT, TCP CLOSE, TCP LINE INPUT, TCP NOTIFY, TCP OPEN, TCP PRINT, TCP RECV, UDP SEND

THREAD CLOSE statement

THREAD CLOSE statement

Purpose Release the handle of a running thread.

Syntax **THREAD CLOSE *hThread* TO *lResult&***

Remarks THREAD CLOSE releases the *thread handle* of the thread identified by the DWORD value *hThread* (see THREAD CREATE).

If successful, *lResult&* is TRUE (non-zero); otherwise, it is FALSE (zero). If a thread is not closed once it has completed, it will continue to take up memory and CPU resources. Note that THREAD CLOSE does not stop a thread if it is still running; it simply releases the thread's handle (i.e., the resources used to track the thread), and the thread itself will continue to run.

Once a thread handle is released, the value stored in *hThread* becomes undefined. On this basis, thread handles should not be released until there is no further need to test the thread status or change the suspend count for a thread. If a thread does not need to be monitored, its handle can be released immediately after the THREAD CREATE statement, and the threads resources will be freed automatically when the thread terminates naturally. Best practice suggests that after releasing a thread handle, the thread handle variable should be set to 0, to set it apart from other valid thread handle variables.

Once a thread has exited, it is not possible to restart the same thread (as identified by *hThread*). However, a fresh thread can be executed, using the same target thread Function, and resulting in a new thread handle which will identify the new thread.

Restrictions THREAD CLOSE will always execute successfully provided *hThread* contains a valid thread handle value. THREAD CLOSE generates no run-time errors; all exceptions are reported in the return value *lResult&*.

The *WaitForSingleObject* API function can be used wait until a nominated thread has finished executing. Similarly, the *WaitForMultipleObjects* API can be used to wait for one, two, or all secondary threads (to a maximum of 64 or %MAXIMUM_WAIT_OBJECTS) to complete before continuing on. Such functions can be very useful when a program creates a set of "worker" threads to process data, and the primary thread can then sit idle until all the worker threads have completed all their work. At that point, the primary thread may gather the results of the worker threads, etc.

It is also useful to understand that these kind of *wait* functions are very efficient and use almost no CPU time or resources while they are waiting; however, care must be exercised to avoid a deadlock or circular suspension. For example, a deadlock condition could occur if thread A is halted while it waits for thread B, which in turn has a suspend count that might only be adjustable by Thread A. Similarly, an infinite loop in one thread may also halt any other thread that is waiting for it to terminate.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

See also FUNCTION/END FUNCTION, THREAD Code Group, THREAD CREATE, THREAD Object, THREAD RESUME, THREAD STATUS, THREAD SUSPEND, THREADCOUNT, THREADED, THREADID

THREAD Code Group

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Code Group

Purpose The

Code Group offers a collection of statements which allow you to create and manipulate additional threads of execution in your programs.

Syntax

```
THREAD DirectorWord [params]
THREAD DirectorWord [params] TO ReturnVariable(s)
```

Remarks A Windows thread is a smaller "program-within-a-program", that runs concurrently with the main thread and other threads in the same application program. Threads provide powerful ways for an application to perform several tasks at the same time.

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. For that reason, PowerBASIC has introduced the concept of a THREAD OBJECT. While the THREAD Code Group will be supported for some time, we recommend that all new code use THREAD OBJECTS exclusively. They provide much greater control, and much better thread parameter handling for the programmer.

Restrictions Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed referencing the same thread.

See also FUNCTION/END FUNCTION, THREAD CLOSE, THREAD CREATE, THREAD GET PRIORITY, THREAD Object, THREAD RESUME, THREAD STATUS, THREAD SUSPEND, THREADCOUNT, THREADED, THREADID, THREADSAFE option descriptor

THREAD CREATE statement

THREAD CREATE statement

Purpose Create a Windows thread, which is a smaller "program-within-a-program", that runs concurrently with the main thread and other threads in the same application program. Threads provide powerful ways for an application to perform several tasks at the same time.

Syntax

```
THREAD CREATE FuncName(param) [StackSize,] [SUSPEND] TO hThread
```

Remarks THREAD CREATE creates and begins execution of a new thread Function identified by *FuncName*. *FuncName* is specified without quotation marks. This function must take exactly one Long-integer or Double-word (DWORD) parameter by value (BYVAL). For example:

```
THREAD FUNCTION MyThreadFunction(BYVAL x AS LONG) AS LONG
  ' Thread code goes here
END FUNCTION
' more code here
THREAD CREATE MyThreadFunction(var&) TO hThread???
```

The 32-bit parameter passed to the thread may be used to pass a value such as a programmer-defined ID or window handle to *post* "progress" messages back to a GUI window/dialog running in another thread. A more common use for the parameter is to pass the address to a UDT or other data structure. Passing an address this way can enable the thread to use a pointer to access large volumes of data that reside outside of the thread. For example:

```
THREAD FUNCTION MyThread(BYVAL y AS DWORD) AS DWORD
  DIM x AS MyUDT POINTER
  x = y  ' Set the pointer from the DWORD param
  ' From here we can access all of the UDT member elements
  ' using the standard @x pointer syntax
END FUNCTION
' more code here
DIM x AS MyUDT, hThread???
' Initialize the members of x here
THREAD CREATE MyThread( VARPTR(x) ) TO hThread???
' more code here
```

Note that data passed this way is subject to the notes (below) concerning GLOBAL and STATIC variables, in order to avoid synchronization problems during context-switching.

The return value of the thread Function is retrieved with the THREAD STATUS statement (once the thread has completed execution).

StackSize A long integer expression to specify the requested size of the stack for this newly created thread. This value should always be specified in increments of 64K (65536). If this parameter is omitted, the size of the stack for the main thread will be used.

SUSPEND Execution of the thread begins immediately unless the SUSPEND option is included. In that case, the *suspend count* for the thread will be initially set to 1, and the thread will be initially suspended. The THREAD RESUME statement is used to decrease the suspend count of a thread by 1, and when the suspend count reaches 0, the thread will start (resume) execution. Controlling the suspend state of a thread requires the thread handle value be retained until such time as the thread can be closed or left to run unmonitored.

hThread If successful, THREAD CREATE returns a Double-word (or Long-integer) handle in *hThread*, or zero (0) if the thread was not started. This handle is used with the other

to control the suspend count, and to release the thread handle, etc. Also see THREAD CLOSE for more information on monitoring, closing, and waiting for threads to complete.

FuncName The name of the thread function to execute as a thread. A thread Function must comply exactly with the following syntax:

```
THREAD FUNCTION ThreadFuncName (BYVAL param AS {LONG | DWORD}) AS {LONG
| DWORD}
```

Restrictions The THREAD CREATE statement generates no run-time errors; all exceptions are reported as a zero stored in the return value *hThread*. However, the target thread Function must be located in the same compiled module as the THREAD CREATE statement. That is, a thread Function may not be an imported Function.

Additionally, a thread Function may not be directly called or executed, *except* by a THREAD CREATE statement. This restriction is imposed to ensure that PowerBASIC run-time library can maintain a thread-safe state at all times, correctly allocate and deallocate internal thread-local storage, and the various

(such as THREADCOUNT) can return accurate values.

One situation that can arise is where a Function may need to be invoked both directly and used as a thread Function. The easiest solution is to create a small *wrapper* Function for the Function, then use THREAD CREATE with the wrapper Function when a thread is required, or continue to call the original Function directly when a separate thread is not required. For example:

```
FUNCTION WorkerFunc(BYVAL x AS LONG) AS LONG
  ' code here
END FUNCTION

THREAD FUNCTION WorkerThread(BYVAL x AS LONG) AS LONG
  FUNCTION = WorkerFunc(x)
END FUNCTION

' more code here

' Execute the worker function directly, thus:
lResult& = WorkerFunc(var&)

' Execute the worker thread as a thread, using
' the wrapper function:
THREAD CREATE WorkerThread(var&) TO hThread???
```

A thread can determine its own ID with the THREADID function. Note: a thread ID is not interchangeable with a thread handle.

Threads are initialized and started asynchronously, so it is wise to give the operating system a small amount of time to perform thread initialization before using the THREADCOUNT function to monitor the thread.

Once a thread has exited, it is not possible to restart the same thread as identified by *hThread* - however, a new thread can be initiated using the same Function (which naturally provides a new *hThread* handle value). In addition, the same thread Function can be launched multiple times to create a set of identical threads executing the same code.

As each thread is created, it is assigned its own "private" stack frame. Therefore, LOCAL and REGISTER variables are private to each thread, and are automatically "*thread-safe*".

Exercise care when using GLOBAL and STATIC variables that may be accessed by more than one thread at the same time. If one thread is part way through storing data at the point where another thread begins to read the same memory block, it can result in the second thread reading only partially updated (i.e., invalid) data. The point where one thread is suspended so that another can run is called a "*context-switch*". In these situations, the use of Windows' synchronization functions (such as *Critical Sections* and *Mutexes*) may be employed to create thread-safe code.

Thread-safe code is deemed to be unaffected by context-switching, regardless of when context-switching occurs. Local variables, being stored in a "private" stack frame, are not affected by context-switching.

Local variable storage created by each thread is automatically freed when the thread Function terminates, in the same manner as a normal Sub, Function, Method, or Property. However, the thread handle must be explicitly freed with a THREAD CLOSE statement. The THREAD CLOSE can occur at any time, since it only frees the thread handle and has no other impact on the running thread. If the thread result value is not required (or the thread state does not need to be altered), THREAD CLOSE can be used immediately after the THREAD CREATE statement, leaving the thread to run its course.

For more information on threading and synchronization techniques, please refer to MSDN http://msdn.microsoft.com.

The PowerBASIC run-time library is thread-safe and reentrant.

See also FUNCTION/END FUNCTION, THREAD CLOSE, THREAD Code Group, THREAD GET PRIORITY, THREAD Object, THREAD RESUME, THREAD STATUS, THREAD SUSPEND, THREADCOUNT, THREADED, THREADID

Example

```
SUB SpawnThreads()
  LOCAL x AS LONG
  LOCAL s AS LONG
  DIM hThread(10) AS LOCAL DWORD

  FOR x = 1 TO 10
    THREAD CREATE MyThread(x) TO hThread(x)
    SLEEP 50
  NEXT

  DisplayText "10 Threads Started! " + _
    "Wait for them to finish!"

  DO
    FOR x = 1 TO 10
      SLEEP 0
      THREAD STATUS hThread(x) TO s
      IF s <> &H103 AND s <> 0 THEN ITERATE DO
    NEXT
  LOOP WHILE s

  FOR x = 1 TO 10
    THREAD CLOSE hThread(x) TO s
  NEXT x

  DisplayText "Finished!"
END SUB

' The following is executed as a thread Function!
THREAD FUNCTION MyThread (BYVAL x AS LONG) AS LONG
  LOCAL n AS LONG
  LOCAL t AS SINGLE

  DisplayText "Begin Thread" + STR$(x)
  t = TIMER

  FOR n = 1 TO 10
    SLEEP 100 + 100 * x
  NEXT n

  t = TIMER - t
  DisplayText "End Thread" + STR$(x) + _
    " Elapsed time = " + STR$(t,5)

END FUNCTION
```

THREAD GET PRIORITY statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD GET PRIORITY statement

Purpose Retrieve the Priority Value for a

.

Syntax **THREAD GET PRIORITY *hThread* TO *lResult&***

Remarks THREAD GET PRIORITY retrieves the priority value for the thread specified by the thread handle (*hThread*). The thread handle is returned by the THREAD CREATE statement at the time the thread is created. If *hThread* is zero (0), the thread which is currently executing is presumed. The retrieved priority value is assigned to the long or dword variable designated by *lResult&*. A thread ID cannot be used in place of a thread handle.

The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
%THREAD_PRIORITY_LOWEST        =  -2
%THREAD_PRIORITY_BELOW_NORMAL  =  -1
%THREAD_PRIORITY_NORMAL        =   0
%THREAD_PRIORITY_ABOVE_NORMAL  =  +1
%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

See also PROCESS GET PRIORITY, PROCESS SET PRIORITY, THREAD Code Group, THREAD CREATE, THREAD Object, THREAD SET PRIORITY

THREAD Object

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD Object New!

Purpose A

is a "program-within-a-program", that runs concurrently with the main thread and other threads in a single application program. Threads provide powerful ways for an application to perform several tasks at the same time. When executed on a computer with a multi-core CPU, threads can improve performance to a remarkable level.

THREAD objects offer a collection of methods which allow you to easily create and maintain additional threads of execution in your programs.

A thread can be completely encapsulated (contained) within a thread object. Encapsulation makes an object the perfect vehicle to host a thread. With thread objects, you'll have easy access to multiple thread parameters, private methods, and thread local storage of data. In short, a complete program-within-a-program which can be executed with ease.

We liken this to the concept that "Threads are Alive". When a thread object is created and launched, it takes on a life of its own. It lives (and executes) until its lifetime is over and the thread ends. The life of the thread parallels the life of the object which makes it quite easy to manage.

PowerBASIC provides a pre-defined interface named "IPowerThread", which is a DUAL interface (Dispatch and direct access). When you create a thread object, you first inherit IPowerThread, giving you immediate access to all of its member methods. Next, you add a THREAD METHOD, a special form of private CLASS METHOD, which is automatically executed when the thread is launched.

It's important to remember that the THREAD METHOD you create contains the code which will be executed in the thread. When you start the thread (by calling the LAUNCH method), it executes your THREAD METHOD. When you reach the end of the THREAD METHOD, the thread ends, and its lifetime is over. The THREAD METHOD acts just like the MAIN (or PBMAIN) function in your executable.

You may give the THREAD METHOD any name you wish. However, it is recommended you name it MAIN or PBMAIN. This bit of self-documentation will be a simple reminder of the functionality when you review the code a year from now! Generally speaking, most thread objects consist primarily of CLASS METHODS which are called from the THREAD METHOD. If there are any Member Methods (visible from outside the class), they are not usually called from within the thread. Instead, they are typically called from other threads to monitor the status and progress.

There must be exactly one THREAD METHOD per Class. No more. No less. The THREAD METHOD is executed automatically; it may never be called from within your program.

Instance variables are declared just as in any other class. Unique parameters are passed to each object when it is launched. Finally, public methods and properties may be added to monitor and manipulate the life of your thread.

Here's a synopsis of THREAD OBJECT usage:

1. Create a class with an interface which inherits IPowerThread.
2. Create a THREAD METHOD, best named MAIN or PBMAIN.
3. Create an INSTANCE variable named THREADPARAM which will hold the parameter(s) you choose to pass to the thread when it begins execution. This is usually another object variable.
4. Create CLASS METHODS as needed, which will be called from the THREAD METHOD for support of that code.
5. From the main thread, create an object variable of the thread class and interface.
6. Call the LAUNCH method, passing the appropriate parameter to be used as THREADPARAM. Your thread is now running and alive.

Syntax

```
<ObjectVar>.membername(params)
RetVal = <ObjectVar>.membername(params)
<ObjectVar>.membername(params) TO ReturnVariable
```

Remarks

With the advent of multi-core CPU's and multi-CPU computers, it's clearly desirable to encapsulate all of the information about a particular thread in a single component. We recommend that all new code use THREAD OBJECTS exclusively, rather than the Thread Code Group. Thread objects provide much greater control, and much better thread parameter handling for the programmer.

IPowerThread Methods

The Dispatch ID (DispID) for each member method is displayed within angle brackets.

METHOD CLOSE() <2>

Releases the thread handle of this thread. Note that it does not stop a thread if it is still running; it simply releases the thread handle (i.e., the resources used to track the thread).

Thread handles should not be released until there is no further need to use other thread methods or properties. If a thread does not need to be monitored, its handle can be released immediately. The thread resources will be freed automatically when the thread terminates naturally.

THREADCOUNT continues to report a thread tally that will include threads whose handle has already been released. A thread ID value may not be used interchangeably with a thread handle value.

METHOD EQUALS(*ObjectVar* AS *InterfaceName*) AS *Long* <3>

Compares the parameter *ObjectVar* to determine if it references the same object as this object. If they both reference the same object, true (-1) is returned; if not, false (0) is returned.

METHOD HANDLE() AS Long <4>

Retrieves the handle of the thread for use with Windows API functions.

METHOD ID() AS Long <5>

Retrieves the ID of the thread for use with Windows API functions.

METHOD ISALIVE() AS Long <6>

Checks the thread to see if it is currently "alive". If the thread has been launched, but has not yet ended, the value true (-1) is returned; if not, the value false (0) is returned.

METHOD JOIN(*ThreadObjectVar* AS *InterfaceName*, *TimeOutVal* AS Long) <7>

Waits for the thread referenced by *ThreadObjectVar* to complete before execution of this thread continues. *TimeOutVal* specifies the maximum length of time to wait, in MilliSeconds. If *TimeOutVal* is zero (0), the time to wait is infinite.

METHOD LAUNCH(ByRef *Param* as *UDT*) <8>

LAUNCH begins execution of the thread, passing parameter data to it. Since the thread is hosted by an object, it is only fitting that the parameter data be contained in the most robust form, another object.

THREADPARAM is a mandatory Instance variable which you must define in each thread class. It is normally declared as the interface name of your choice:

```
INSTANCE ThreadParam as MyInterface
```

When the thread begins, PowerBASIC automatically creates a copy of the LAUNCH parameter, and assigns it to ThreadParam. Since it is stored in an Instance variable, it is visible to all of your code in your member methods, yet is kept private from the rest of the program. The use of an object as the parameter is the normally the best choice, as it allows virtually any number of data items to be contained.

In simpler cases, you may choose to declare THREADPARAM as a

, Long Integer, or Dword. In that case, you must pass the launch parameter using a
option, to override the expected object variable.

```
INSTANCE ThreadParam as LONG
...
MyThread.Launch(ByVal MyNumber&)
```

Of course, the Pointer parameter option can be used to pass a pointer to any variable, of any type. For example, it could be used to pass a used-defined type if that fits your needs:

```
INSTANCE ThreadParam AS MyType POINTER

 THREAD METHOD MyMethod() AS LONG
   xyz# = ThreadParam.member1
   ... other code
END METHOD
...
```

```
MyThread.Launch(ByVal VARPTR(MyType))
```

PROPERTY GET PRIORITY() AS Long <9>

Retrieves the priority value for this thread. The thread priority value is one of the following:

```
%THREAD_PRIORITY_IDLE         = -15
%THREAD_PRIORITY_LOWEST       =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL       =   0
%THREAD_PRIORITY_ABOVE_NORMAL =  +1
%THREAD_PRIORITY_HIGHEST      =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

PROPERTY SET PRIORITY (LEVEL AS Long) <9>

Sets the Priority Value for this thread. The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE         = -15
%THREAD_PRIORITY_LOWEST       =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL       =   0
%THREAD_PRIORITY_ABOVE_NORMAL =  +1
%THREAD_PRIORITY_HIGHEST      =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

METHOD RESULT() AS Long <10>

If the thread has ended, the result value returned by the THREAD METHOD is retrieved and returned to the caller. The result may be any integral value in the range of a long integer. However, you should avoid using the number &H103 (decimal 259), as that is the value used by Windows to signify that the thread is still running.

If the result is retrieved successfully, the OBJRESULT is set to %S_OK (0). If the thread has not ended, the value zero (0) is returned, and the OBJRESULT is set to %S_FALSE (1).

METHOD RESUME() AS Long <11>

Resumes execution of a suspended thread. The suspend count of the thread is decremented. When it reaches zero (0), execution of the thread resumes. If the resume is successful, the prior suspend count is returned; otherwise, -1 is returned.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running at that time.

PROPERTY GET STACKSIZE() AS Long <13>

Retrieves the size of the stack for this thread. If the value returned is zero (0), the thread StackSize is the same as that of the main thread.

PROPERTY SET STACKSIZE(Long) <13>

Sets the size of the stack for this thread to the value specified by the parameter. The value should always be specified in multiples of 64K (65536). PROPERTY SET must only be executed prior to thread execution with LAUNCH, or it will be ignored. If no PROPERTY SET STACKSIZE is executed, the size of the stack for the main thread will be used for this thread.

METHOD SUSPEND() AS Long <14>

Suspends execution of the thread. The suspend count of the thread is incremented. If the suspend was successful, the suspend count is returned; otherwise, -1 is returned.

If SUSPEND is executed prior to LAUNCH of the thread, the suspend count is incremented, and the subsequent LAUNCH is treated as a suspended launch. That is, all the necessary setup tasks are performed, but the thread is suspended just before execution of your THREAD METHOD begins. You can continue execution with RESUME.

A thread can suspend itself with SUSPEND (which increments the suspend count), but logically, cannot RESUME itself because it is not running while suspended.

METHOD TIMECREATE() AS Quad <16>

Retrieves the date and time-of-day of the thread creation, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time.

METHOD TIMEEXIT() AS Quad <17>

Retrieves the date and time-of-day of the thread exit, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format of Month/Day/Year/Time. If the thread has not yet exited, the return value is undefined.

METHOD TIMEKERNEL() AS Quad <18>

Retrieves the amount of time this thread has spent in kernel mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

METHOD TIMEUSER() AS Quad <19>

Retrieves the amount of time this thread has spent in user mode, and returns it as a Quad Integer value. The internal format of the value is that of a FILETIME structure, so you can use the PowerTime object to convert it to a human readable format.

Restrictions

Functions from the Thread Code Group and THREAD OBJECTS may co-exist in the same application. However, it is important that they not be intermixed when you reference one particular thread.

See also

PowerTime, THREAD Code Group

Example

```
CLASS MyClass
  INSTANCE ThreadParam as DataFace

  THREAD METHOD MAIN() AS LONG
    x& = ThreadParam.GetANumber()
    MsgBox DEC$(x&)
  END METHOD

  INTERFACE MyFace
    INHERIT IPOWERTHREAD

    METHOD abc
      END METHOD
    END INTERFACE
END CLASS

CLASS DataClass
  INTERFACE DataFace
    INHERIT DUAL

    METHOD GetANumber() AS LONG
    METHOD = 77
  END METHOD

  END INTERFACE
END CLASS

FUNCTION PBMain()
  LOCAL xx AS MyFace
  LET xx = CLASS "MyClass"

  LOCAL oo AS DataFace
  LET oo = CLASS "DataClass"

  xx.launch(oo)
  xx.join(xx, 0)
END FUNCTION
```

THREAD RESUME statement

THREAD RESUME statement

Purpose Resume execution of a Windows thread.

Syntax `THREAD RESUME hThread TO lResult&`

Remarks THREAD RESUME decreases the *suspend count* of the thread identified by the 32-bit DWORD value stored in *hThread* (see THREAD CREATE). If it succeeds, the *lResult&* value is the thread's previous suspend count; otherwise, it is -1.

Execution of a suspended thread resumes when the suspend count of a thread is decremented to zero. If the SUSPEND option is included in the associated THREAD CREATE statement, the thread will have an initial suspend count of 1. In that case, execution of the thread will only begin when a THREAD RESUME statement is executed, using the thread handle stored in *hThread* to identify the thread.

Restrictions The THREAD RESUME statement generates no run-time errors; all exceptions are reported in the return value *lResult&*. A thread ID cannot be used interchangeably with a thread handle. A thread can suspend itself by incrementing its own suspend count, but logically, cannot decrement its own suspend count.

See also FUNCTION/END FUNCTION, THREAD CLOSE, THREAD Code Group, THREAD CREATE, THREAD Object, THREAD STATUS, THREAD SUSPEND, THREADCOUNT, THREADED, THREADID

THREAD SET PRIORITY statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

THREAD SET PRIORITY statement

Purpose Sets the Priority Value for a

.

Syntax `THREAD SET PRIORITY hThread, Priority&`

Remarks THREAD SET PRIORITY assigns a new priority value to the thread specified by the thread handle (*hThread*). The thread handle is returned by the THREAD CREATE statement at the time the thread is created. If *hThread* is zero (0), the thread which is currently executing is presumed. A thread ID cannot be used in place of a thread handle.

The thread priority value must be one of the following:

```
%THREAD_PRIORITY_IDLE          = -15
%THREAD_PRIORITY_LOWEST        =  -2
%THREAD_PRIORITY_BELOW_NORMAL =  -1
%THREAD_PRIORITY_NORMAL        =   0
%THREAD_PRIORITY_ABOVE_NORMAL =  +1
%THREAD_PRIORITY_HIGHEST       =  +2
%THREAD_PRIORITY_TIME_CRITICAL= +15
```

See also PROCESS GET PRIORITY, PROCESS SET PRIORITY, THREAD Code Group, THREAD CREATE, THREAD GET PRIORITY, THREAD Object

THREAD STATUS statement

THREAD STATUS statement

Purpose Retrieve the Status of a Windows thread.

Syntax `THREAD STATUS hThread TO lResult&`

Remarks THREAD STATUS assigns the status of the thread identified by the DWORD value in *hThread* (see THREAD CREATE) to *lResult&*.

If the function fails, *lResult&* is set to zero. If the thread is still running, the system value &H103 is assigned. If the thread has terminated and the thread handle has not yet been closed, the return value from the thread Function is assigned to *lResult&*. To wait for one or more threads to complete execution, use the WaitForSingleObject or WaitForMultipleObjects API functions - see THREAD CLOSE for more information.

The number of currently running threads in a module can be determined with the THREADCOUNT function.

Restrictions The THREAD STATUS statement generates no run-time errors; all exceptions are reported in the return value *lResult&*. A thread ID cannot be used in place of a thread handle.

See also FUNCTION/END FUNCTION, THREAD CLOSE, THREAD Code Group, THREAD CREATE, THREAD Object, THREAD RESUME, THREAD SUSPEND, THREADCOUNT, THREADED, THREADID

THREAD SUSPEND statement

THREAD SUSPEND statement

Purpose Suspend execution of a Windows thread.

Syntax `THREAD SUSPEND hThread TO lResult&`

Remarks THREAD SUSPEND adds 1 to the *suspend count* of the thread specified by *hThread* (see THREAD CREATE). If it succeeds, the *lResult&* value is the thread's previous suspend count; otherwise, it is -1. A thread is always suspended if it has a suspend count of 1 or higher.

To decrement the suspend count of a thread, use the THREAD RESUME statement. A suspended thread will only resume execution when its suspend count is decremented to 0.

Restrictions The THREAD SUSPEND statement generates no run-time errors; all exceptions are reported in the return value *lResult&*. A thread ID cannot be used interchangeably with a thread handle. A thread can suspend itself by incrementing its own suspend count.

See also FUNCTION/END FUNCTION, THREAD CLOSE, THREAD Code Group, THREAD CREATE, THREAD Object, THREAD RESUME, THREAD STATUS, THREADCOUNT, THREADED, THREADID

THREADCOUNT function

THREADCOUNT function

Purpose Return the number of PowerBASIC-created active threads that exist in a module.

Syntax `lCount& = THREADCOUNT`

Remarks Applications will return a THREADCOUNT of at least 1, which is attributed to the "primary" application thread. Additional threads created by the application or module with the THREAD CREATE function will also be included in the tally returned by THREADCOUNT.

THREADCOUNT can be useful for when a "controlling thread" needs to poll the state of a collection of "worker threads" as they complete a set of tasks. However, care should be exercised if other (unrelated) threads may also be running in the same module - in such cases, using THREAD STATUS is the preferred solution. If polling is not desired, the WaitForMultipleObjects API function can also be useful - see THREAD CLOSE for more information.

Restrictions THREADCOUNT includes threads that have had their thread handle released with THREAD CLOSE, yet are still running.

Threads are initialized and started asynchronously, so it is wise to give the operating system a small amount of time to perform thread initialization before using the THREADCOUNT function to monitor the thread.

A thread Function may not be directly called or executed, except by a THREAD CREATE statement. This restriction is imposed to ensure that PowerBASIC run-time library can maintain a thread-safe state at all times, correctly allocate and deallocate internal thread-local storage), and functions such as THREADCOUNT can return accurate values. See THREAD CREATE for more information and solutions.

See also FUNCTION/END FUNCTION, THREAD CLOSE, THREAD Code Group, THREAD CREATE, THREAD Object, THREAD RESUME, THREAD STATUS, THREAD SUSPEND, THREADED, THREADID

Example

```
THREAD FUNCTION tZ(BYVAL x&) AS LONG
  ' Wait for a random time
  SLEEP x& * RND(1,1000)
  FUNCTION = 1
END FUNCTION

FUNCTION PBMAIN
  ' Create 10 threads
  FOR x& = 1 TO 10
    THREAD CREATE tZ(x&) TO hThread???
    THREAD CLOSE hThread??? TO lResult&
  NEXT x&

  'Wait until the threads are all done
  DO
    SLEEP 100
  LOOP WHILE THREADCOUNT > 1
END FUNCTION
```

THREADED statement

THREADED statement

Purpose Declare thread-local variables.

Syntax

```
THREADED variable[()] [AS type] [, variable[()]]
THREADED variable[()] [, variable[()]] [, ...] AS type
```

Remarks Threaded variables are global to every Sub, Function, Method, and Property but are not shared across threads. Each thread has its own independent set of thread-local variables.

To declare an array as a threaded variable, use an empty set of parentheses in the variable list: You can then use the DIM statement to dimension the array.

```
THREADED MyArray%()
THREADED StringArray() AS STRING
```

The THREADED statement may, optionally, accept a list of variables, all of which are defined by the type descriptor keyword that follows them. For example:

```
THREADED aaa, bbb, ccc AS INTEGER
THREADED vptr, aptr() AS LONG PTR
```

Restrictions DEF*type* has no effect on variables defined by a THREADED statement.

See also DIM, GLOBAL, INSTANCE, LOCAL, STATIC

Example

```
THREADED xxx, yyy, zzz AS INTEGER
THREADED vptr, aptr() AS LONG PTR
```

THREADID function

THREADID function

Purpose Return a Long-integer thread identifier of the current thread.

Syntax ***thrdID&*** **= THREADID**

Remarks The thread ID value is returned for the thread that is currently executing. The Thread ID is intended for use with the various (advanced) thread-related API functions provided by Windows.

Restrictions The thread ID value cannot be used interchangeably with the thread handle returned by THREAD CREATE.

See also FUNCTION/END FUNCTION, THREAD CLOSE, THREAD CREATE, THREAD RESUME, THREAD STATUS, THREAD SUSPEND, THREADED

TIME$ system variable

TIME$ system variable

Purpose Read and/or set the system time.

Syntax To read the time:

***s$*** **= TIME$**

To set the time:

TIME$ = ***string_expression***

Remarks The system variable TIME$ contains an eight-character

that represents the time of the system clock in the form "*hh:mm:ss*", where *hh* is hours (in 24-hour military form), *mm* is minutes, and *ss* is seconds.

Assigning *string_expression* to TIME$ resets the system clock. *string_expression* must contain time information in military (24-hour) format. Minutes and seconds information can be omitted. For example:

```
TIME$ = "12"       'set clock to 12 noon
TIME$ = "13:01"    'set clock to 1:01 PM
TIME$ = "13:01:30" 'set clock to 30 sec after 1:01 PM
TIME$ = "0:01"     'set clock to 1 min after midnight
```

Use the TIMER function to return the number of seconds that have elapsed since midnight.

See also DATE$, MONTHNAME$, POWERTIME, TIMER, TIX

TIMER function

TIMER function

Purpose Return the number of seconds that have elapsed since midnight.

Syntax `y = TIMER`

Remarks TIMER returns the number of seconds since midnight as a Double-precision floating-point value. The resolution is about 1/100 of a second on NT-based platforms, or 1/18th of a second on earlier platforms.

See also DATE$, TIME$, TIX

Example

```
OldTime$ = TIME$ ' Current time
TIME$ = "12"     ' Noon
NoonSec$ = FORMAT$(TIMER, "#,")
x$ = "Noon is " + NoonSec$ + " seconds past midnight"
TIME$ = OldTime$ ' Restore time
```

Result `Noon is 43,200 seconds past midnight`

TIX statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TIX statement

Purpose Measures elapsed CPU cycles.

Syntax

```
TIX QuadVar
TIX END QuadVar
```

Remarks The TIX statement offers you the ability to measure elapsed CPU cycles, the smallest timing increment possible. Modern processors typically execute billions of cycles per second. This can be beneficial for comparing the execution speed of various styles of coding in PowerBASIC.

TIX *QuadVar*

The first form of the TIX statement retrieves the current value of the cycle counter and assigns it to the Quad Integer variable.

TIX END *QuadVar*

The second form of the TIX statement retrieves the current value of the cycle counter. The value in the QuadVar is subtracted from it, and the result is assigned to QuadVar.

To measure the total cycle count for a particular set of statements, you would write:

```
TIX CycleCount&&
  ' statements to measure go here
TIX END CycleCount&&
```

At this point, CycleCount&& contains the elapsed number of CPU cycles.

See also #ALIGN, TIMER

TOOLBAR ADD BUTTON statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TOOLBAR statement IMPROVED

Purpose A ToolBar control contains one or more buttons which act as shortcuts to menu items. The TOOLBAR statement is used to manipulate a TOOLBAR control.

Syntax

```
TOOLBAR ADD BUTTON hDlg, ID, image&, cmd&, style&, text$ [AT item&] [CALL
callback]
TOOLBAR ADD SEPARATOR hDlg, ID, size& [,cmd&] [AT item&]
TOOLBAR DELETE BUTTON hDlg, id&, [BYCMD] item&
TOOLBAR GET STATE hDlg, ID, [BYCMD] item& TO datav&
TOOLBAR GET COUNT hDlg, ID TO datav&
TOOLBAR SET IMAGELIST hDlg, ID, hLst, ListType&
TOOLBAR SET STATE hDlg, ID, [BYCMD] item&, state&
```

hDlg Handle of the dialog that owns the ToolBar.

hLst Handle of the ImageList to be used for graphical items.

id& The control identifier assigned with CONTROL ADD TOOLBAR.

cmd& Command id number associated with this button.

image& Image number selected (1=first, 2=second, etc.)

item& A data item number. First=1, second=2...

size& Size of the item expressed in pixels.

state& A state descriptor to define specific attributes.

style& Style descriptor bits for this button.

text$ A text

to be displayed on this button.

type& A type descriptor to define specific attributes.

callback A callback function which receives messages for the control.

datav& A long integer variable to which result data is assigned.

txtv$ A string variable to which result text is assigned.

Remarks A TOOLBAR control contains one or more buttons, each of which normally corresponds to a menu item. It is generally placed at the top of the client area of a dialog. When the user "presses" a tool bar button, the program reacts in the same way as if the command had been selected from a menu. It simply acts as a shortcut to common menu commands.

In each of the following descriptions, the TOOLBAR is referenced by the dialog handle (*hDlg*) and id&. In some cases a specific button is chosen with the *item&* parameter. If the BYCMD option is included, *item&* specifies the command id number of the button to be used. If not, *item&* describes the button by its position on the TOOLBAR. Since separators are considered to be a special class of button by the operating system, they must be counted when you calculate a position item number. Positions are always indexed to one (1=first, 2=second, and so on).

TOOLBAR ADD BUTTON *hDlg*, *ID*, *image&*, *cmd&*, *style&*, *text$* [AT *item&*] [CALL *callback*]

A button is added to this TOOLBAR. The image to be displayed is selected from the attached IMAGELIST based upon the parameter *image&* (1=first, 2=second, etc.). The *cmd&* parameter specifies the command id number to be executed (with %WM_COMMAND) when the button is pressed. The *style&* parameter describes the style of the button from the following most often used attributes:

%BTNS_AUTOSIZE	The width of the button is calculated by the system, based upon the text and the image.
%BTNS_BUTTON	The button behaves like a standard push button.
%BTNS_CHECK	The button is dual-state which toggles between the pressed and nonpressed state each time it's clicked.
%BTNS_GROUP	Defines a group of buttons. When combined with the check style, it creates a button that stays pressed until another button in the group is pressed. This is similar to an option button or radio button.
%BTNS_CHECKGROUP	A combination of check and group styles.
%BTNS_DROPDOWN	Creates a drop-down style button that can display a list when clicked. Drop-down buttons send a %TBN_DROPDOWN notification instead of %WM_COMMAND.
%BTNS_NOPREFIX	The button text will not have an accelerator prefix associated with it.

The *text$* parameter specifies the text to be displayed on the button.

If the optional "AT *item&*" clause is included, the button is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

If the optional "CALL *callback*" clause is included, it specifies the name of a Callback Function that receives %WM_COMMAND messages when the button is clicked. If not specified, these command messages are sent to the dialog callback specified in

. Message routing by button allows you to easily determine which button generated the event.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

TOOLBAR ADD SEPARATOR *hDlg*, *ID*, *size&* [,*cmd&*] [AT *item&*]

A separator is added to this TOOLBAR. It separates two buttons by the number of pixels specified in *size&*. It may be used to separate and distinguish two adjacent button groups (%tbstyle_group), or to just enhance the visual appearance. If the optional *cmd&* parameter is included, it's a unique numeric identifier for this separator. Of course, a separator can't be pressed like a button, so it doesn't literally allow a command to be sent. However, it may be used later with a BYCMD option in TOOLBAR DELETE, TOOLBAR SET STATE, etc. If the "AT *item&*" clause is included, the separator is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

TOOLBAR DELETE BUTTON *hDlg*, *ID*, [BYCMD] *item&*

A BUTTON or SEPARATOR, specified by *item&*, is deleted from the TOOLBAR. The parameter *item&* may be positional, or it may represent a command id number with BYCMD.

TOOLBAR GET COUNT *hDlg*, *ID* to *datav&*

The number of buttons (and separators) on the TOOLBAR is retrieved and assigned to the long integer variable specified by *datav&*.

TOOLBAR GET STATE *hDlg*, *ID*, [BYCMD] *item&* TO *datav&*

The state descriptor bits for a specific button are retrieved and assigned to the variable designated by *datav&*. The parameter *item&* tells which button to check -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits may consist of one or more of:

%TBSTATE_DISABLED	The button is disabled and grayed. (value=0)
%TBSTATE_CHECKED	The button is checked.
%TBSTATE_PRESSED	The button is pressed.
%TBSTATE_ENABLED	The button is enabled.
%TBSTATE_HIDDEN	The button is hidden.
%TBSTATE_INDETERMINATE	The button is indeterminate and grayed.
%TBSTATE_MARKED	The button is highlighted.

TOOLBAR SET IMAGELIST *hDlg*, *ID*, *hLst*, *type&*

The IMAGELIST specified by *hLst* is attached to this TOOLBAR control. The value of *ListType&* specifies the type of IMAGELIST:

0	Default images
1	Disabled images
2	Hot images

The graphical images contained in the IMAGELIST are displayed on the TOOLBAR buttons. Up to three IMAGELIST structures may be attached to each TOOLBAR control. The image to be displayed is determined by the specification made in TOOLBAR ADD BUTTON, and the current state of the button. When the TOOLBAR control is destroyed, any attached IMAGELIST is automatically destroyed.

TOOLBAR SET STATE *hDlg*, *ID*, [BYCMD] *item&*, *state&*

The state descriptor bits for the specified button are applied from the expression *state&*. The parameter *item&* tells which button to set -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits *state&* may consist of:

%TBSTATE_DISABLED	The button is disabled and grayed. (value=0)
%TBSTATE_CHECKED	The button is checked.
%TBSTATE_PRESSED	The button is pressed.
%TBSTATE_ENABLED	The button is enabled.
%TBSTATE_HIDDEN	The button is hidden.
%TBSTATE_INDETERMINATE	The button is indeterminate and grayed.
%TBSTATE_MARKED	The button is highlighted.

See also DIALOG SHOW MODAL, DIALOG SHOW MODELESS, Dynamic Dialog Tools, CONTROL ADD TOOLBAR, CONTROL SET FONT, IMAGELIST

TOOLBAR ADD SEPARATOR statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TOOLBAR statement IMPROVED

Purpose	A ToolBar control contains one or more buttons which act as shortcuts to menu items. The TOOLBAR statement is used to manipulate a TOOLBAR control.
Syntax	**TOOLBAR ADD BUTTON *hDlg, ID, image&, cmd&, style&, text$* [AT *item&*] [CALL *callback*]** **TOOLBAR ADD SEPARATOR *hDlg, ID, size&* [,*cmd&*] [AT *item&*]** **TOOLBAR DELETE BUTTON *hDlg, id&,* [BYCMD] *item&*** **TOOLBAR GET STATE *hDlg, ID,* [BYCMD] *item&* TO *datav&*** **TOOLBAR GET COUNT *hDlg, ID* TO *datav&*** **TOOLBAR SET IMAGELIST *hDlg, ID, hLst, ListType&*** **TOOLBAR SET STATE *hDlg, ID,* [BYCMD] *item&, state&***
hDlg	Handle of the dialog that owns the ToolBar.
hLst	Handle of the ImageList to be used for graphical items.
id&	The control identifier assigned with CONTROL ADD TOOLBAR.
cmd&	Command id number associated with this button.
image&	Image number selected (1=first, 2=second, etc.)
item&	A data item number. First=1, second=2...
size&	Size of the item expressed in pixels.
state&	A state descriptor to define specific attributes.
style&	Style descriptor bits for this button.
text$	A text to be displayed on this button.
type&	A type descriptor to define specific attributes.
callback	A callback function which receives messages for the control.
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result text is assigned.

Remarks

A TOOLBAR control contains one or more buttons, each of which normally corresponds to a menu item. It is generally placed at the top of the client area of a dialog. When the user "presses" a tool bar button, the program reacts in the same way as if the command had been selected from a menu. It simply acts as a shortcut to common menu commands.

In each of the following descriptions, the TOOLBAR is referenced by the dialog handle (*hDlg*) and id&. In some cases a specific button is chosen with the *item&* parameter. If the BYCMD option is included, *item&* specifies the command id number of the button to be used. If not, *item&* describes the button by its position on the TOOLBAR. Since separators are considered to be a special class of button by the operating system, they must be counted when you calculate a position item number. Positions are always indexed to one (1=first, 2=second, and so on).

TOOLBAR ADD BUTTON *hDlg*, *ID*, *image&*, *cmd&*, *style&*, *text$* [AT *item&*] [CALL *callback*]

A button is added to this TOOLBAR. The image to be displayed is selected from the attached IMAGELIST based upon the parameter *image&* (1=first, 2=second, etc.). The *cmd&* parameter specifies the command id number to be executed (with %WM_COMMAND) when the button is pressed. The *style&* parameter describes the style of the button from the following most often used attributes:

%BTNS_AUTOSIZE	The width of the button is calculated by the system, based upon the text and the image.
%BTNS_BUTTON	The button behaves like a standard push button.
%BTNS_CHECK	The button is dual-state which toggles between the pressed and nonpressed state each time it's clicked.
%BTNS_GROUP	Defines a group of buttons. When combined with the check style, it creates a button that stays pressed until another button in the group is pressed. This is similar to an option button or radio button.
%BTNS_CHECKGROUP	A combination of check and group styles.
%BTNS_DROPDOWN	Creates a drop-down style button that can display a list when clicked. Drop-down buttons send a %TBN_DROPDOWN notification instead of %WM_COMMAND.
%BTNS_NOPREFIX	The button text will not have an accelerator prefix associated with it.

The *text$* parameter specifies the text to be displayed on the button.

If the optional "AT *item&*" clause is included, the button is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

If the optional "CALL *callback*" clause is included, it specifies the name of a Callback Function that receives %WM_COMMAND messages when the button is clicked. If not specified, these command messages are sent to the dialog callback specified in

. Message routing by button allows you to easily determine which button generated the event.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

TOOLBAR ADD SEPARATOR *hDlg*, *ID*, *size&* [,*cmd&*] [AT *item&*]

A separator is added to this TOOLBAR. It separates two buttons by the number of pixels specified in *size&*. It may be used to separate and distinguish two adjacent button groups (%tbstyle_group), or to just enhance the visual appearance. If the optional *cmd&* parameter is included, it's a unique numeric identifier for this separator. Of course, a separator can't be pressed like a button, so it doesn't literally allow a command to be sent. However, it may be used later with a BYCMD option in TOOLBAR DELETE, TOOLBAR SET STATE, etc. If the "AT *item&*" clause is included, the separator is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

TOOLBAR DELETE BUTTON *hDlg*, *ID*, [BYCMD] *item&*

A BUTTON or SEPARATOR, specified by *item&*, is deleted from the TOOLBAR. The parameter *item&* may be positional, or it may represent a command id number with BYCMD.

TOOLBAR GET COUNT *hDlg*, *ID* to *datav&*

The number of buttons (and separators) on the TOOLBAR is retrieved and assigned to the long integer variable specified by *datav&*.

TOOLBAR GET STATE *hDlg*, *ID*, [BYCMD] *item&* TO *datav&*

The state descriptor bits for a specific button are retrieved and assigned to the variable designated by *datav&*. The parameter *item&* tells which button to check -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits may consist of one or more of:

%TBSTATE_DISABLED	The button is disabled and grayed. (value=0)
%TBSTATE_CHECKED	The button is checked.
%TBSTATE_PRESSED	The button is pressed.
%TBSTATE_ENABLED	The button is enabled.
%TBSTATE_HIDDEN	The button is hidden.
%TBSTATE_INDETERMINATE	The button is indeterminate and grayed.
%TBSTATE_MARKED	The button is highlighted.

TOOLBAR SET IMAGELIST *hDlg*, *ID*, *hLst*, *type&*

The IMAGELIST specified by *hLst* is attached to this TOOLBAR control. The value of *ListType&* specifies the type of IMAGELIST:

0	Default images
1	Disabled images
2	Hot images

The graphical images contained in the IMAGELIST are displayed on the TOOLBAR buttons. Up to three IMAGELIST structures may be attached to each TOOLBAR control. The image to be displayed is determined by the specification made in TOOLBAR ADD BUTTON, and the current state of the button. When the TOOLBAR control is destroyed, any attached IMAGELIST is automatically destroyed.

TOOLBAR SET STATE *hDlg*, *ID*, [BYCMD] *item&*, *state&*

The state descriptor bits for the specified button are applied from the expression *state&*. The parameter *item&* tells which button to set -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits *state&* may consist of:

%TBSTATE_DISABLED	The button is disabled and grayed. (value=0)
%TBSTATE_CHECKED	The button is checked.
%TBSTATE_PRESSED	The button is pressed.
%TBSTATE_ENABLED	The button is enabled.
%TBSTATE_HIDDEN	The button is hidden.
%TBSTATE_INDETERMINATE	The button is indeterminate and grayed.
%TBSTATE_MARKED	The button is highlighted.

See also DIALOG SHOW MODAL, DIALOG SHOW MODELESS, Dynamic Dialog Tools, CONTROL ADD TOOLBAR, CONTROL SET FONT, IMAGELIST

TOOLBAR DELETE BUTTON statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TOOLBAR statement IMPROVED

Purpose A ToolBar control contains one or more buttons which act as shortcuts to menu items. The TOOLBAR statement is used to manipulate a TOOLBAR control.

Syntax

```
TOOLBAR ADD BUTTON hDlg, ID, image&, cmd&, style&, text$ [AT item&] [CALL callback]
TOOLBAR ADD SEPARATOR hDlg, ID, size& [,cmd&] [AT item&]
TOOLBAR DELETE BUTTON hDlg, id&, [BYCMD] item&
TOOLBAR GET STATE hDlg, ID, [BYCMD] item& TO datav&
TOOLBAR GET COUNT hDlg, ID TO datav&
TOOLBAR SET IMAGELIST hDlg, ID, hLst, ListType&
TOOLBAR SET STATE hDlg, ID, [BYCMD] item&, state&
```

hDlg Handle of the dialog that owns the ToolBar.

hLst Handle of the ImageList to be used for graphical items.

id& The control identifier assigned with CONTROL ADD TOOLBAR.

cmd& Command id number associated with this button.

image& Image number selected (1=first, 2=second, etc.)

item& A data item number. First=1, second=2...

size& Size of the item expressed in pixels.

state& A state descriptor to define specific attributes.

style& Style descriptor bits for this button.

text$ A text
to be displayed on this button.

type& A type descriptor to define specific attributes.

callback A callback function which receives messages for the control.

datav& A long integer variable to which result data is assigned.

txtv$ A string variable to which result text is assigned.

Remarks A TOOLBAR control contains one or more buttons, each of which normally corresponds to a menu item. It is generally placed at the top of the client area of a dialog. When the user "presses" a tool bar button, the program reacts in the same way as if the command had been selected from a menu. It simply acts as a shortcut to common menu commands.

In each of the following descriptions, the TOOLBAR is referenced by the dialog handle (*hDlg*) and id&. In some cases a specific button is chosen with the *item&* parameter. If the BYCMD option is included, *item&* specifies the command id number of the button to be used. If not, *item&* describes the button by its position on the TOOLBAR. Since separators are considered to be a special class of button by the operating system, they must be counted when you calculate a position item number. Positions are always indexed to one (1=first, 2=second, and so on).

TOOLBAR ADD BUTTON *hDlg*, *ID*, *image&*, *cmd&*, *style&*, *text$* [AT *item&*] [CALL *callback*]

A button is added to this TOOLBAR. The image to be displayed is selected from the attached IMAGELIST based upon the parameter *image&* (1=first, 2=second, etc.). The *cmd&* parameter specifies the command id number to be executed (with %

WM_COMMAND) when the button is pressed. The *style&* parameter describes the style of the button from the following most often used attributes:

%BTNS_AUTOSIZE	The width of the button is calculated by the system, based upon the text and the image.
%BTNS_BUTTON	The button behaves like a standard push button.
%BTNS_CHECK	The button is dual-state which toggles between the pressed and nonpressed state each time it's clicked.
%BTNS_GROUP	Defines a group of buttons. When combined with the check style, it creates a button that stays pressed until another button in the group is pressed. This is similar to an option button or radio button.
%BTNS_CHECKGROUP	A combination of check and group styles.
%BTNS_DROPDOWN	Creates a drop-down style button that can display a list when clicked. Drop-down buttons send a %TBN_DROPDOWN notification instead of %WM_COMMAND.
%BTNS_NOPREFIX	The button text will not have an accelerator prefix associated with it.

The *text$* parameter specifies the text to be displayed on the button.

If the optional "AT *item&*" clause is included, the button is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

If the optional "CALL *callback*" clause is included, it specifies the name of a Callback Function that receives %WM_COMMAND messages when the button is clicked. If not specified, these command messages are sent to the dialog callback specified in

. Message routing by button allows you to easily determine which button generated the event.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

TOOLBAR ADD SEPARATOR *hDlg*, *ID*, *size&* [,*cmd&*] [AT *item&*]

A separator is added to this TOOLBAR. It separates two buttons by the number of pixels specified in *size&*. It may be used to separate and distinguish two adjacent button groups (%tbstyle_group), or to just enhance the visual appearance. If the optional *cmd&* parameter is included, it's a unique numeric identifier for this separator. Of course, a separator can't be pressed like a button, so it doesn't literally allow a command to be sent. However, it may be used later with a BYCMD option in TOOLBAR DELETE, TOOLBAR SET STATE, etc. If the "AT *item&*" clause is included, the separator is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

TOOLBAR DELETE BUTTON *hDlg*, *ID*, [BYCMD] *item&*

A BUTTON or SEPARATOR, specified by *item&*, is deleted from the TOOLBAR. The parameter *item&* may be positional, or it may represent a command id number with BYCMD.

TOOLBAR GET COUNT *hDlg*, *ID* to *datav&*

The number of buttons (and separators) on the TOOLBAR is retrieved and assigned to the long integer variable specified by *datav&*.

TOOLBAR GET STATE *hDlg*, *ID*, [BYCMD] *item&* TO *datav&*

The state descriptor bits for a specific button are retrieved and assigned to the variable designated by *datav&*. The parameter *item&* tells which button to check -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits may consist of one or more of:

%TBSTATE_DISABLED	The button is disabled and grayed. (value=0)
%TBSTATE_CHECKED	The button is checked.
%TBSTATE_PRESSED	The button is pressed.
%TBSTATE_ENABLED	The button is enabled.
%TBSTATE_HIDDEN	The button is hidden.
%TBSTATE_INDETERMINATE	The button is indeterminate and grayed.
%TBSTATE_MARKED	The button is highlighted.

TOOLBAR SET IMAGELIST *hDlg*, *ID*, *hLst*, *type&*

The IMAGELIST specified by *hLst* is attached to this TOOLBAR control. The value of *ListType&* specifies the type of IMAGELIST:

0	Default images
1	Disabled images
2	Hot images

The graphical images contained in the IMAGELIST are displayed on the TOOLBAR buttons. Up to three IMAGELIST structures may be attached to each TOOLBAR control. The image to be displayed is determined by the specification made in TOOLBAR ADD BUTTON, and the current state of the button. When the TOOLBAR control is destroyed, any attached IMAGELIST is automatically destroyed.

TOOLBAR SET STATE *hDlg*, *ID*, [BYCMD] *item&*, *state&*

The state descriptor bits for the specified button are applied from the expression *state&*. The parameter *item&* tells which button to set -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits *state&* may consist of:

%TBSTATE_DISABLED	The button is disabled and grayed. (value=0)
%TBSTATE_CHECKED	The button is checked.
%TBSTATE_PRESSED	The button is pressed.
%TBSTATE_ENABLED	The button is enabled.
%TBSTATE_HIDDEN	The button is hidden.
%TBSTATE_INDETERMINATE	The button is indeterminate and grayed.
%TBSTATE_MARKED	The button is highlighted.

See also DIALOG SHOW MODAL, DIALOG SHOW MODELESS, Dynamic Dialog Tools, CONTROL ADD TOOLBAR, CONTROL SET FONT, IMAGELIST

TOOLBAR GET COUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TOOLBAR statement IMPROVED

Purpose A ToolBar control contains one or more buttons which act as shortcuts to menu items. The TOOLBAR statement is used to manipulate a TOOLBAR control.

Syntax

```
TOOLBAR ADD BUTTON hDlg, ID, image&, cmd&, style&, text$ [AT item&] [CALL callback]
TOOLBAR ADD SEPARATOR hDlg, ID, size& [,cmd&] [AT item&]
TOOLBAR DELETE BUTTON hDlg, id&, [BYCMD] item&
TOOLBAR GET STATE hDlg, ID, [BYCMD] item& TO datav&
TOOLBAR GET COUNT hDlg, ID TO datav&
TOOLBAR SET IMAGELIST hDlg, ID, hLst, ListType&
TOOLBAR SET STATE hDlg, ID, [BYCMD] item&, state&
```

hDlg Handle of the dialog that owns the ToolBar.

hLst Handle of the ImageList to be used for graphical items.

id& The control identifier assigned with CONTROL ADD TOOLBAR.

cmd& Command id number associated with this button.

image& Image number selected (1=first, 2=second, etc.)

item& A data item number. First=1, second=2...

size& Size of the item expressed in pixels.

state& A state descriptor to define specific attributes.

style& Style descriptor bits for this button.

text$ A text

to be displayed on this button.

type& A type descriptor to define specific attributes.

callback A callback function which receives messages for the control.

datav& A long integer variable to which result data is assigned.

txtv$ A string variable to which result text is assigned.

Remarks A TOOLBAR control contains one or more buttons, each of which normally corresponds to a menu item. It is generally placed at the top of the client area of a dialog. When the user "presses" a tool bar button, the program reacts in the same way as if the command had been selected from a menu. It simply acts as a shortcut to common menu commands.

In each of the following descriptions, the TOOLBAR is referenced by the dialog handle (*hDlg*) and id&. In some cases a specific button is chosen with the *item&* parameter. If the BYCMD option is included, *item&* specifies the command id number of the button to be used. If not, *item&* describes the button by its position on the TOOLBAR. Since separators are considered to be a special class of button by the operating system, they must be counted when you calculate a position item number. Positions are always indexed to one (1=first, 2=second, and so on).

TOOLBAR ADD BUTTON *hDlg*, *ID*, *image&*, *cmd&*, *style&*, *text$* [AT *item&*] [CALL *callback*]

A button is added to this TOOLBAR. The image to be displayed is selected from the attached IMAGELIST based upon the parameter *image&* (1=first, 2=second, etc.). The *cmd&* parameter specifies the command id number to be executed (with %WM_COMMAND) when the button is pressed. The *style&* parameter describes the style of the button from the following most often used attributes:

%BTNS_AUTOSIZE The width of the button is calculated by the system, based upon the text and the image.

%BTNS_BUTTON	The button behaves like a standard push button.
%BTNS_CHECK	The button is dual-state which toggles between the pressed and nonpressed state each time it's clicked.
%BTNS_GROUP	Defines a group of buttons. When combined with the check style, it creates a button that stays pressed until another button in the group is pressed. This is similar to an option button or radio button.
%BTNS_CHECKGROUP	A combination of check and group styles.
%BTNS_DROPDOWN	Creates a drop-down style button that can display a list when clicked. Drop-down buttons send a %TBN_DROPDOWN notification instead of %WM_COMMAND.
%BTNS_NOPREFIX	The button text will not have an accelerator prefix associated with it.

The *text$* parameter specifies the text to be displayed on the button.

If the optional "AT *item&*" clause is included, the button is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

If the optional "CALL *callback*" clause is included, it specifies the name of a Callback Function that receives %WM_COMMAND messages when the button is clicked. If not specified, these command messages are sent to the dialog callback specified in

. Message routing by button allows you to easily determine which button generated the event.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

TOOLBAR ADD SEPARATOR *hDlg*, *ID*, *size&* [,*cmd&*] [AT *item&*]

A separator is added to this TOOLBAR. It separates two buttons by the number of pixels specified in *size&*. It may be used to separate and distinguish two adjacent button groups (%tbstyle_group), or to just enhance the visual appearance. If the optional *cmd&* parameter is included, it's a unique numeric identifier for this separator. Of course, a separator can't be pressed like a button, so it doesn't literally allow a command to be sent. However, it may be used later with a BYCMD option in TOOLBAR DELETE, TOOLBAR SET STATE, etc. If the "AT *item&*" clause is included, the separator is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

TOOLBAR DELETE BUTTON *hDlg*, *ID*, [BYCMD] *item&*

A BUTTON or SEPARATOR, specified by *item&*, is deleted from the TOOLBAR. The parameter *item&* may be positional, or it may represent a command id number with BYCMD.

TOOLBAR GET COUNT *hDlg*, *ID* to *datav&*

The number of buttons (and separators) on the TOOLBAR is retrieved and assigned to the long integer variable specified by *datav&*.

TOOLBAR GET STATE *hDlg*, *ID*, [BYCMD] *item&* TO *datav&*

The state descriptor bits for a specific button are retrieved and assigned to the variable designated by *datav&*. The parameter *item&* tells which button to check -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits may consist of one or more of:

%TBSTATE_DISABLED	The button is disabled and grayed. (value=0)
%TBSTATE_CHECKED	The button is checked.
%TBSTATE_PRESSED	The button is pressed.
%TBSTATE_ENABLED	The button is enabled.
%TBSTATE_HIDDEN	The button is hidden.
%TBSTATE_INDETERMINATE	The button is indeterminate and grayed.
%TBSTATE_MARKED	The button is highlighted.

TOOLBAR SET IMAGELIST *hDlg*, *ID*, *hLst*, *type&*

The IMAGELIST specified by *hLst* is attached to this TOOLBAR control. The value of *ListType&* specifies the type of IMAGELIST:

0	Default images
1	Disabled images
2	Hot images

The graphical images contained in the IMAGELIST are displayed on the TOOLBAR buttons. Up to three IMAGELIST structures may be attached to each TOOLBAR control. The image to be displayed is determined by the specification made in TOOLBAR ADD BUTTON, and the current state of the button. When the TOOLBAR control is destroyed, any attached IMAGELIST is automatically destroyed.

TOOLBAR SET STATE *hDlg*, *ID*, [BYCMD] *item&*, *state&*

The state descriptor bits for the specified button are applied from the expression *state&*. The parameter *item&* tells which button to set -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits *state&* may consist of:

%TBSTATE_DISABLED	The button is disabled and grayed. (value=0)
%TBSTATE_CHECKED	The button is checked.
%TBSTATE_PRESSED	The button is pressed.
%TBSTATE_ENABLED	The button is enabled.
%TBSTATE_HIDDEN	The button is hidden.
%TBSTATE_INDETERMINATE	The button is indeterminate and grayed.
%TBSTATE_MARKED	The button is highlighted.

See also DIALOG SHOW MODAL, DIALOG SHOW MODELESS, Dynamic Dialog Tools, CONTROL ADD TOOLBAR, CONTROL SET FONT, IMAGELIST

TOOLBAR GET STATE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TOOLBAR statement IMPROVED

Purpose A ToolBar control contains one or more buttons which act as shortcuts to menu items. The TOOLBAR statement is used to manipulate a TOOLBAR control.

Syntax

```
TOOLBAR ADD BUTTON hDlg, ID, image&, cmd&, style&, text$ [AT item&] [CALL callback]
TOOLBAR ADD SEPARATOR hDlg, ID, size& [,cmd&] [AT item&]
TOOLBAR DELETE BUTTON hDlg, id&, [BYCMD] item&
TOOLBAR GET STATE hDlg, ID, [BYCMD] item& TO datav&
TOOLBAR GET COUNT hDlg, ID TO datav&
TOOLBAR SET IMAGELIST hDlg, ID, hLst, ListType&
TOOLBAR SET STATE hDlg, ID, [BYCMD] item&, state&
```

hDlg	Handle of the dialog that owns the ToolBar.
hLst	Handle of the ImageList to be used for graphical items.
id&	The control identifier assigned with CONTROL ADD TOOLBAR.
cmd&	Command id number associated with this button.
image&	Image number selected (1=first, 2=second, etc.)
item&	A data item number. First=1, second=2...
size&	Size of the item expressed in pixels.
state&	A state descriptor to define specific attributes.
style&	Style descriptor bits for this button.
text$	A text to be displayed on this button.
type&	A type descriptor to define specific attributes.
callback	A callback function which receives messages for the control.
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result text is assigned.

Remarks

A TOOLBAR control contains one or more buttons, each of which normally corresponds to a menu item. It is generally placed at the top of the client area of a dialog. When the user "presses" a tool bar button, the program reacts in the same way as if the command had been selected from a menu. It simply acts as a shortcut to common menu commands.

In each of the following descriptions, the TOOLBAR is referenced by the dialog handle (*hDlg*) and id&. In some cases a specific button is chosen with the *item&* parameter. If the BYCMD option is included, *item&* specifies the command id number of the button to be used. If not, *item&* describes the button by its position on the TOOLBAR. Since separators are considered to be a special class of button by the operating system, they must be counted when you calculate a position item number. Positions are always indexed to one (1=first, 2=second, and so on).

TOOLBAR ADD BUTTON *hDlg*, *ID*, *image&*, *cmd&*, *style&*, *text$* [AT *item&*] [CALL *callback*]

A button is added to this TOOLBAR. The image to be displayed is selected from the attached IMAGELIST based upon the parameter *image&* (1=first, 2=second, etc.). The *cmd&* parameter specifies the command id number to be executed (with % WM_COMMAND) when the button is pressed. The *style&* parameter describes the style of the button from the following most often used attributes:

%BTNS_AUTOSIZE	The width of the button is calculated by the system, based upon the text and the image.
%BTNS_BUTTON	The button behaves like a standard push button.
%BTNS_CHECK	The button is dual-state which toggles between the pressed and nonpressed state each time it's clicked.
%BTNS_GROUP	Defines a group of buttons. When combined with the check style, it creates a button that stays pressed until another

	button in the group is pressed. This is similar to an option button or radio button.
%BTNS_CHECKGROUP	A combination of check and group styles.
%BTNS_DROPDOWN	Creates a drop-down style button that can display a list when clicked. Drop-down buttons send a %TBN_DROPDOWN notification instead of %WM_COMMAND.
%BTNS_NOPREFIX	The button text will not have an accelerator prefix associated with it.

The *text$* parameter specifies the text to be displayed on the button.

If the optional "AT *item&*" clause is included, the button is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

If the optional "CALL *callback*" clause is included, it specifies the name of a Callback Function that receives %WM_COMMAND messages when the button is clicked. If not specified, these command messages are sent to the dialog callback specified in

. Message routing by button allows you to easily determine which button generated the event.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

TOOLBAR ADD SEPARATOR *hDlg*, *ID*, *size&* [,*cmd&*] [AT *item&*]

A separator is added to this TOOLBAR. It separates two buttons by the number of pixels specified in *size&*. It may be used to separate and distinguish two adjacent button groups (%tbstyle_group), or to just enhance the visual appearance. If the optional *cmd&* parameter is included, it's a unique numeric identifier for this separator. Of course, a separator can't be pressed like a button, so it doesn't literally allow a command to be sent. However, it may be used later with a BYCMD option in TOOLBAR DELETE, TOOLBAR SET STATE, etc. If the "AT *item&*" clause is included, the separator is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

TOOLBAR DELETE BUTTON *hDlg*, *ID*, [BYCMD] *item&*

A BUTTON or SEPARATOR, specified by *item&*, is deleted from the TOOLBAR. The parameter *item&* may be positional, or it may represent a command id number with BYCMD.

TOOLBAR GET COUNT *hDlg*, *ID* to *datav&*

The number of buttons (and separators) on the TOOLBAR is retrieved and assigned to the long integer variable specified by *datav&*.

TOOLBAR GET STATE *hDlg*, *ID*, [BYCMD] *item&* TO *datav&*

The state descriptor bits for a specific button are retrieved and assigned to the variable designated by *datav&*. The parameter *item&* tells which button to check -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits may consist of one or more of:

%TBSTATE_DISABLED	The button is disabled and grayed. (value=0)
%TBSTATE_CHECKED	The button is checked.
%TBSTATE_PRESSED	The button is pressed.
%TBSTATE_ENABLED	The button is enabled.

%TBSTATE_HIDDEN	The button is hidden.
%TBSTATE_INDETERMINATE	The button is indeterminate and grayed.
%TBSTATE_MARKED	The button is highlighted.

TOOLBAR SET IMAGELIST *hDlg, ID, hLst, type&*

The IMAGELIST specified by *hLst* is attached to this TOOLBAR control. The value of *ListType&* specifies the type of IMAGELIST:

0	Default images
1	Disabled images
2	Hot images

The graphical images contained in the IMAGELIST are displayed on the TOOLBAR buttons. Up to three IMAGELIST structures may be attached to each TOOLBAR control. The image to be displayed is determined by the specification made in TOOLBAR ADD BUTTON, and the current state of the button. When the TOOLBAR control is destroyed, any attached IMAGELIST is automatically destroyed.

TOOLBAR SET STATE *hDlg, ID*, [BYCMD] *item&, state&*

The state descriptor bits for the specified button are applied from the expression *state&*. The parameter *item&* tells which button to set -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits *state&* may consist of:

%TBSTATE_DISABLED	The button is disabled and grayed. (value=0)
%TBSTATE_CHECKED	The button is checked.
%TBSTATE_PRESSED	The button is pressed.
%TBSTATE_ENABLED	The button is enabled.
%TBSTATE_HIDDEN	The button is hidden.
%TBSTATE_INDETERMINATE	The button is indeterminate and grayed.
%TBSTATE_MARKED	The button is highlighted.

See also DIALOG SHOW MODAL, DIALOG SHOW MODELESS, Dynamic Dialog Tools, CONTROL ADD TOOLBAR, CONTROL SET FONT, IMAGELIST

TOOLBAR SET IMAGELIST statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TOOLBAR statement IMPROVED

Purpose A ToolBar control contains one or more buttons which act as shortcuts to menu items. The TOOLBAR statement is used to manipulate a TOOLBAR control.

Syntax

```
TOOLBAR ADD BUTTON hDlg, ID, image&, cmd&, style&, text$ [AT item&] [CALL callback]
TOOLBAR ADD SEPARATOR hDlg, ID, size& [,cmd&] [AT item&]
TOOLBAR DELETE BUTTON hDlg, id&, [BYCMD] item&
TOOLBAR GET STATE hDlg, ID, [BYCMD] item& TO datav&
TOOLBAR GET COUNT hDlg, ID TO datav&
```

TOOLBAR SET IMAGELIST *hDlg, ID, hLst, ListType&*
TOOLBAR SET STATE *hDlg, ID,* [BYCMD] *item&, state&*

hDlg	Handle of the dialog that owns the ToolBar.
hLst	Handle of the ImageList to be used for graphical items.
id&	The control identifier assigned with CONTROL ADD TOOLBAR.
cmd&	Command id number associated with this button.
image&	Image number selected (1=first, 2=second, etc.)
item&	A data item number. First=1, second=2...
size&	Size of the item expressed in pixels.
state&	A state descriptor to define specific attributes.
style&	Style descriptor bits for this button.
text$	A text to be displayed on this button.
type&	A type descriptor to define specific attributes.
callback	A callback function which receives messages for the control.
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result text is assigned.

Remarks

A TOOLBAR control contains one or more buttons, each of which normally corresponds to a menu item. It is generally placed at the top of the client area of a dialog. When the user "presses" a tool bar button, the program reacts in the same way as if the command had been selected from a menu. It simply acts as a shortcut to common menu commands.

In each of the following descriptions, the TOOLBAR is referenced by the dialog handle (*hDlg*) and id&. In some cases a specific button is chosen with the *item&* parameter. If the BYCMD option is included, *item&* specifies the command id number of the button to be used. If not, *item&* describes the button by its position on the TOOLBAR. Since separators are considered to be a special class of button by the operating system, they must be counted when you calculate a position item number. Positions are always indexed to one (1=first, 2=second, and so on).

TOOLBAR ADD BUTTON *hDlg, ID, image&, cmd&, style&, text$* [AT *item&*] [CALL *callback*]

A button is added to this TOOLBAR. The image to be displayed is selected from the attached IMAGELIST based upon the parameter *image&* (1=first, 2=second, etc.). The *cmd&* parameter specifies the command id number to be executed (with %WM_COMMAND) when the button is pressed. The *style&* parameter describes the style of the button from the following most often used attributes:

%BTNS_AUTOSIZE	The width of the button is calculated by the system, based upon the text and the image.
%BTNS_BUTTON	The button behaves like a standard push button.
%BTNS_CHECK	The button is dual-state which toggles between the pressed and nonpressed state each time it's clicked.
%BTNS_GROUP	Defines a group of buttons. When combined with the check style, it creates a button that stays pressed until another button in the group is pressed. This is similar to an option button or radio button.
%BTNS_CHECKGROUP	A combination of check and group styles.
%	Creates a drop-down style button that can display a list

BTNS_DROPDOWN	when clicked. Drop-down buttons send a %TBN_DROPDOWN notification instead of %WM_COMMAND.
%BTNS_NOPREFIX	The button text will not have an accelerator prefix associated with it.

The *text$* parameter specifies the text to be displayed on the button.

If the optional "AT *item&*" clause is included, the button is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

If the optional "CALL *callback*" clause is included, it specifies the name of a Callback Function that receives %WM_COMMAND messages when the button is clicked. If not specified, these command messages are sent to the dialog callback specified in

. Message routing by button allows you to easily determine which button generated the event.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

TOOLBAR ADD SEPARATOR *hDlg*, *ID*, *size&* [,*cmd&*] [AT *item&*]

A separator is added to this TOOLBAR. It separates two buttons by the number of pixels specified in *size&*. It may be used to separate and distinguish two adjacent button groups (%tbstyle_group), or to just enhance the visual appearance. If the optional *cmd&* parameter is included, it's a unique numeric identifier for this separator. Of course, a separator can't be pressed like a button, so it doesn't literally allow a command to be sent. However, it may be used later with a BYCMD option in TOOLBAR DELETE, TOOLBAR SET STATE, etc. If the "AT *item&*" clause is included, the separator is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

TOOLBAR DELETE BUTTON *hDlg*, *ID*, [BYCMD] *item&*

A BUTTON or SEPARATOR, specified by *item&*, is deleted from the TOOLBAR. The parameter *item&* may be positional, or it may represent a command id number with BYCMD.

TOOLBAR GET COUNT *hDlg*, *ID* to *datav&*

The number of buttons (and separators) on the TOOLBAR is retrieved and assigned to the long integer variable specified by *datav&*.

TOOLBAR GET STATE *hDlg*, *ID*, [BYCMD] *item&* TO *datav&*

The state descriptor bits for a specific button are retrieved and assigned to the variable designated by *datav&*. The parameter *item&* tells which button to check -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits may consist of one or more of:

%TBSTATE_DISABLED	The button is disabled and grayed. (value=0)
%TBSTATE_CHECKED	The button is checked.
%TBSTATE_PRESSED	The button is pressed.
%TBSTATE_ENABLED	The button is enabled.
%TBSTATE_HIDDEN	The button is hidden.
%TBSTATE_INDETERMINATE	The button is indeterminate and grayed.
%TBSTATE_MARKED	The button is highlighted.

TOOLBAR SET IMAGELIST *hDlg*, *ID*, *hLst*, *type&*

The IMAGELIST specified by *hLst* is attached to this TOOLBAR control. The value of *ListType&* specifies the type of IMAGELIST:

0	Default images
1	Disabled images
2	Hot images

The graphical images contained in the IMAGELIST are displayed on the TOOLBAR buttons. Up to three IMAGELIST structures may be attached to each TOOLBAR control. The image to be displayed is determined by the specification made in TOOLBAR ADD BUTTON, and the current state of the button. When the TOOLBAR control is destroyed, any attached IMAGELIST is automatically destroyed.

TOOLBAR SET STATE *hDlg*, *ID*, [BYCMD] *item&*, *state&*

The state descriptor bits for the specified button are applied from the expression *state&*. The parameter *item&* tells which button to set -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits *state&* may consist of:

%TBSTATE_DISABLED	The button is disabled and grayed. (value=0)
%TBSTATE_CHECKED	The button is checked.
%TBSTATE_PRESSED	The button is pressed.
%TBSTATE_ENABLED	The button is enabled.
%TBSTATE_HIDDEN	The button is hidden.
%TBSTATE_INDETERMINATE	The button is indeterminate and grayed.
%TBSTATE_MARKED	The button is highlighted.

See also DIALOG SHOW MODAL, DIALOG SHOW MODELESS, Dynamic Dialog Tools, CONTROL ADD TOOLBAR, CONTROL SET FONT, IMAGELIST

TOOLBAR SET STATE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TOOLBAR statement IMPROVED

Purpose A ToolBar control contains one or more buttons which act as shortcuts to menu items. The TOOLBAR statement is used to manipulate a TOOLBAR control.

Syntax

```
TOOLBAR ADD BUTTON hDlg, ID, image&, cmd&, style&, text$ [AT item&] [CALL callback]
TOOLBAR ADD SEPARATOR hDlg, ID, size& [,cmd&] [AT item&]
TOOLBAR DELETE BUTTON hDlg, id&, [BYCMD] item&
TOOLBAR GET STATE hDlg, ID, [BYCMD] item& TO datav&
TOOLBAR GET COUNT hDlg, ID TO datav&
TOOLBAR SET IMAGELIST hDlg, ID, hLst, ListType&
TOOLBAR SET STATE hDlg, ID, [BYCMD] item&, state&
```

hDlg Handle of the dialog that owns the ToolBar.

hLst Handle of the ImageList to be used for graphical items.

id&	The control identifier assigned with CONTROL ADD TOOLBAR.
cmd&	Command id number associated with this button.
image&	Image number selected (1=first, 2=second, etc.)
item&	A data item number. First=1, second=2...
size&	Size of the item expressed in pixels.
state&	A state descriptor to define specific attributes.
style&	Style descriptor bits for this button.
text$	A text to be displayed on this button.
type&	A type descriptor to define specific attributes.
callback	A callback function which receives messages for the control.
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result text is assigned.

Remarks

A TOOLBAR control contains one or more buttons, each of which normally corresponds to a menu item. It is generally placed at the top of the client area of a dialog. When the user "presses" a tool bar button, the program reacts in the same way as if the command had been selected from a menu. It simply acts as a shortcut to common menu commands.

In each of the following descriptions, the TOOLBAR is referenced by the dialog handle (*hDlg*) and id&. In some cases a specific button is chosen with the *item&* parameter. If the BYCMD option is included, *item&* specifies the command id number of the button to be used. If not, *item&* describes the button by its position on the TOOLBAR. Since separators are considered to be a special class of button by the operating system, they must be counted when you calculate a position item number. Positions are always indexed to one (1=first, 2=second, and so on).

TOOLBAR ADD BUTTON *hDlg*, *ID*, *image&*, *cmd&*, *style&*, *text$* [AT *item&*] [CALL *callback*]

A button is added to this TOOLBAR. The image to be displayed is selected from the attached IMAGELIST based upon the parameter *image&* (1=first, 2=second, etc.). The *cmd&* parameter specifies the command id number to be executed (with %WM_COMMAND) when the button is pressed. The *style&* parameter describes the style of the button from the following most often used attributes:

%BTNS_AUTOSIZE	The width of the button is calculated by the system, based upon the text and the image.
%BTNS_BUTTON	The button behaves like a standard push button.
%BTNS_CHECK	The button is dual-state which toggles between the pressed and nonpressed state each time it's clicked.
%BTNS_GROUP	Defines a group of buttons. When combined with the check style, it creates a button that stays pressed until another button in the group is pressed. This is similar to an option button or radio button.
%BTNS_CHECKGROUP	A combination of check and group styles.
%BTNS_DROPDOWN	Creates a drop-down style button that can display a list when clicked. Drop-down buttons send a %TBN_DROPDOWN notification instead of %WM_COMMAND.
%BTNS_NOPREFIX	The button text will not have an accelerator prefix associated with it.

The *text$* parameter specifies the text to be displayed on the button.

If the optional "AT *item&*" clause is included, the button is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

If the optional "CALL *callback*" clause is included, it specifies the name of a Callback Function that receives %WM_COMMAND messages when the button is clicked. If not specified, these command messages are sent to the dialog callback specified in

. Message routing by button allows you to easily determine which button generated the event.

If the Callback Function processes a message, it should return TRUE (non-zero) to prevent the message being passed unnecessarily to the dialog callback (if one exists). The dialog callback should also return TRUE if the notification message is processed by that Callback Function. Otherwise, the DDT engine processes unhandled messages.

TOOLBAR ADD SEPARATOR *hDlg*, *ID*, *size&* [,*cmd&*] [AT *item&*]

A separator is added to this TOOLBAR. It separates two buttons by the number of pixels specified in *size&*. It may be used to separate and distinguish two adjacent button groups (%tbstyle_group), or to just enhance the visual appearance. If the optional *cmd&* parameter is included, it's a unique numeric identifier for this separator. Of course, a separator can't be pressed like a button, so it doesn't literally allow a command to be sent. However, it may be used later with a BYCMD option in TOOLBAR DELETE, TOOLBAR SET STATE, etc. If the "AT *item&*" clause is included, the separator is inserted at the designated position (1=first, 2=second, etc.). Otherwise, it is added to the end of the list.

TOOLBAR DELETE BUTTON *hDlg*, *ID*, [BYCMD] *item&*

A BUTTON or SEPARATOR, specified by *item&*, is deleted from the TOOLBAR. The parameter *item&* may be positional, or it may represent a command id number with BYCMD.

TOOLBAR GET COUNT *hDlg*, *ID* to *datav&*

The number of buttons (and separators) on the TOOLBAR is retrieved and assigned to the long integer variable specified by *datav&*.

TOOLBAR GET STATE *hDlg*, *ID*, [BYCMD] *item&* TO *datav&*

The state descriptor bits for a specific button are retrieved and assigned to the variable designated by *datav&*. The parameter *item&* tells which button to check -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits may consist of one or more of:

%TBSTATE_DISABLED	The button is disabled and grayed. (value=0)
%TBSTATE_CHECKED	The button is checked.
%TBSTATE_PRESSED	The button is pressed.
%TBSTATE_ENABLED	The button is enabled.
%TBSTATE_HIDDEN	The button is hidden.
%TBSTATE_INDETERMINATE	The button is indeterminate and grayed.
%TBSTATE_MARKED	The button is highlighted.

TOOLBAR SET IMAGELIST *hDlg*, *ID*, *hLst*, *type&*

The IMAGELIST specified by *hLst* is attached to this TOOLBAR control. The value of *ListType&* specifies the type of IMAGELIST:

0	Default images
1	Disabled images
2	Hot images

The graphical images contained in the IMAGELIST are displayed on the TOOLBAR buttons. Up to three IMAGELIST structures may be attached to each TOOLBAR control. The image to be displayed is determined by the specification made in TOOLBAR ADD BUTTON, and the current state of the button. When the TOOLBAR control is destroyed, any attached IMAGELIST is automatically destroyed.

TOOLBAR SET STATE *hDlg*, *ID*, [BYCMD] *item&*, *state&*

The state descriptor bits for the specified button are applied from the expression *state&*. The parameter *item&* tells which button to set -- it may be positional, or it may be the command id number when used with BYCMD. The descriptor bits *state&* may consist of:

%TBSTATE_DISABLED	The button is disabled and grayed. (value=0)
%TBSTATE_CHECKED	The button is checked.
%TBSTATE_PRESSED	The button is pressed.
%TBSTATE_ENABLED	The button is enabled.
%TBSTATE_HIDDEN	The button is hidden.
%TBSTATE_INDETERMINATE	The button is indeterminate and grayed.
%TBSTATE_MARKED	The button is highlighted.

See also DIALOG SHOW MODAL, DIALOG SHOW MODELESS, Dynamic Dialog Tools, CONTROL ADD TOOLBAR, CONTROL SET FONT, IMAGELIST

TRACE statement

TRACE statement

Purpose Capture a representation of the precise flow of execution in a module.

Syntax

```
TRACE NEW fname$
TRACE ON
TRACE PRINT string_expr
TRACE OFF
TRACE CLOSE
```

Remarks The TRACE statement is used to generate a *trace file* detailing program flow as execution passes through Labels, plus entry and exit of all Subs, Functions, Methods, and Properties, along with details of passed parameters, etc. All trace details are written to a named disk file *fname$*.

TRACE also logs PowerBASIC run-time errors as they occur, to assist with locating program errors. TRACE can be dynamically started and stopped with the TRACE ON and TRACE OFF statements to enable the programmer to check specific portions of a program without generating volumes of irrelevant trace data.

The five general forms of the TRACE statement are described as follow:

TRACE NEW *fname$*

TRACE NEW causes a standard sequential *trace file* (of the specified file name *fname$*) to be created, deleting any previous file of the same name.

`TRACE ON`

When a subsequent TRACE ON is then executed, PowerBASIC begins to write pertinent trace information to the trace file. It will contain a chronological list of every call to an internal procedure, the associated parameter values, and the point at which it was exited. Further, it will list a label name each time that program execution flows through the label position.

In a test or debugging situation, TRACE, CALLSTK, and CALLSTK$ allow you to easily answer that age-old programming question, "How did I get here?". TRACE details the entry and exit of every procedure in your program, while CALLSTK simply lists the stack frames that exist above the current level. TRACE is particularly valuable in pinpointing the area of a program where a fatal machine crash occurs.

TRACE PRINT *string_expr*

TRACE PRINT writes the value of *string_expr* to the trace file. It can be used to record the value of important variables or other information of importance.

TRACE OFF

TRACE OFF temporarily stops output to the trace file. The trace can be subsequently restarted with another TRACE ON statement. An implied TRACE OFF is performed when you exit the procedure in which the current TRACE ON was executed.

TRACE CLOSE

TRACE CLOSE permanently detaches the trace file from the stream of trace data.

The TRACE statement can easily create a huge trace file, so caution must be exercised. Use TRACE ON at the lowest procedure level possible, to keep the output size within reason.

If PBMAIN contains TRACE NEW and TRACE ON statements, and subsequently calls SUB AAA(x&), which in turn calls SUB BBB(y&,a$), which then calls SUB CCC(z&), which encounters a run-time error 5, the trace file might look something like this:

```
Trace Begins...
 AAA(3)
  BBB(4,string data)
   CCC(5)
   TRACE PRINT printed this user data from CCC()
   ERROR 151 was generated in this thread
   CCC Exit
  BBB Exit
 AAA Exit
```

Numeric parameters are displayed in decimal, while pointer and array parameters display a decimal representation of the offset of the target value.

Restrictions

TRACE can be invaluable during debugging, but it generates substantial additional code that should be avoided in the final release version of an application. If the source code contains #TOOLS OFF, all TRACE statements which remain in the program are ignored by the compiler, and the parameters and expressions are excluded from the compiled program.

To conserve memory requirements in the code, long labels are truncated to 13 characters; however, procedure names are not truncated.

The TRACE statement is "Thread-Aware", displaying only Sub, Function, Method, Property, or Label details from the thread in which it was executed. You can execute TRACE multiple times, or even in multiple concurrent threads. However, you must use caution to ensure that each thread uses a unique name for its own trace file.

See also

#TOOLS, CALLSTK, CALLSTK$, CALLSTKCOUNT, FUNCNAME$, PROFILE

Example

```
#TOOLS ON
FUNCTION PBMAIN
  TRACE NEW "tracelog.txt"
  TRACE ON
  x& = 3
  CALL AAA(x&)
  TRACE OFF
  TRACE CLOSE
END FUNCTION

SUB AAA(x&)
  INCR x&
  CALL BBB(x&,"string data")
```

```
  ' More code
END SUB

SUB BBB(y&,a$)
  INCR y&
  CALL CCC(y&)
END SUB

SUB CCC(z&)
  TRACE PRINT "TRACE PRINT printed this " + _
    "user data from " + FUNCNAME$ + "()"
  ERROR 151 ' Trigger a run-time error
END SUB
```

TREEVIEW DELETE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose

A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

TREEVIEW DELETE ***hDlg, id&, hItem***
TREEVIEW GET BOLD ***hDlg, id&, hItem*** **TO** ***datav&***
TREEVIEW GET CHECK ***hDlg, id&, hItem*** **TO** ***datav&***
TREEVIEW GET CHILD ***hDlg, id&, hItem*** **TO** ***datav&***
TREEVIEW GET COUNT ***hDlg, id&*** **TO** ***datav&***
TREEVIEW GET EXPANDED ***hDlg, id&, hItem*** **TO** ***datav&***
TREEVIEW GET NEXT ***hDlg, id&, hItem*** **TO** ***datav&***
TREEVIEW GET PARENT ***hDlg, id&, hItem*** **TO** ***datav&***
TREEVIEW GET PREVIOUS ***hDlg, id&, hItem*** **TO** ***datav&***
TREEVIEW GET ROOT ***hDlg, id&*** **TO** ***datav&***
TREEVIEW GET SELECT ***hDlg, id&*** **TO** ***datav&***
TREEVIEW GET TEXT ***hDlg, id&, hItem*** **TO** ***txtv$***
TREEVIEW GET USER ***hDlg, id&, hItem*** **TO** ***datav&***
TREEVIEW INSERT ITEM ***hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$*** **TO** ***hItem***
TREEVIEW RESET ***hDlg, id&***
TREEVIEW SELECT ***hDlg, id&, hItem***
TREEVIEW SET BOLD ***hDlg, id&, hItem, flag&***
TREEVIEW SET CHECK ***hDlg, id&, hItem, flag&***
TREEVIEW SET EXPANDED ***hDlg, id&, hItem, flag&***
TREEVIEW SET IMAGELIST ***hDlg, id&, hLst***
TREEVIEW SET TEXT ***hDlg, id&, hItem, txt$***
TREEVIEW SET USER ***hDlg, id&, hItem, NumExpr***
TREEVIEW UNSELECT ***hDlg, id&***

hDlg	Handle of the dialog that owns the Treeview.
id&	The control identifier assigned with CONTROL ADD TREEVIEW.
hItem	Handle of a Treeview item, used to uniquely identify the item
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg*, *id&*, *hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg*, *id&*, *hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg*, *id&*, *hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg, id&, hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg, id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg, id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg, id&, hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg, id&, hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg, id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg, id&, hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg, id&, hItem, flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg, id&, hItem, flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg, id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg, id&, hItem, txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg, id&, hItem, NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg, id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW GET BOLD statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg	Handle of the dialog that owns the Treeview.
id&	The control identifier assigned with CONTROL ADD TREEVIEW.
hItem	Handle of a Treeview item, used to uniquely identify the item
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg*, *id&*, *hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg*, *id&*, *hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg*, *id&*, *hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hlAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg*, *id&*, *hItem*, *NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg*, *id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL

SET FONT, IMAGELIST

TREEVIEW GET CHECK statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the Treeview.

id& The control identifier assigned with CONTROL ADD TREEVIEW.

hItem Handle of a Treeview item, used to uniquely identify the item

datav& A long integer variable to which result data is assigned.

txtv$ A string variable to which result data is assigned.

hPrnt Handle of the parent item to insert the new item under.

hIAftr Handle of the item to insert the new item after.

image& Image index of the new item

simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg*, *id&*, *hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg*, *id&*, *hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg*, *id&*, *hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg, id&, hItem, txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg, id&, hItem, NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg, id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW GET CHILD statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
```

```
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg	Handle of the dialog that owns the Treeview.
id&	The control identifier assigned with CONTROL ADD TREEVIEW.
hItem	Handle of a Treeview item, used to uniquely identify the item
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg, id&, hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg, id&, hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg, id&, hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg*, *id&*, *hItem*, *NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg*, *id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW GET COUNT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose

A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

TREEVIEW DELETE *hDlg, id&, hItem*
TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&*
TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&*
TREEVIEW GET CHILD *hDlg, id&, hItem* TO *datav&*
TREEVIEW GET COUNT *hDlg, id&* TO *datav&*
TREEVIEW GET EXPANDED *hDlg, id&, hItem* TO *datav&*
TREEVIEW GET NEXT *hDlg, id&, hItem* TO *datav&*
TREEVIEW GET PARENT *hDlg, id&, hItem* TO *datav&*
TREEVIEW GET PREVIOUS *hDlg, id&, hItem* TO *datav&*
TREEVIEW GET ROOT *hDlg, id&* TO *datav&*
TREEVIEW GET SELECT *hDlg, id&* TO *datav&*
TREEVIEW GET TEXT *hDlg, id&, hItem* TO *txtv$*
TREEVIEW GET USER *hDlg, id&, hItem* TO *datav&*
TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$* TO *hItem*
TREEVIEW RESET *hDlg, id&*
TREEVIEW SELECT *hDlg, id&, hItem*
TREEVIEW SET BOLD *hDlg, id&, hItem, flag&*
TREEVIEW SET CHECK *hDlg, id&, hItem, flag&*
TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&*
TREEVIEW SET IMAGELIST *hDlg, id&, hLst*
TREEVIEW SET TEXT *hDlg, id&, hItem, txt$*
TREEVIEW SET USER *hDlg, id&, hItem, NumExpr*
TREEVIEW UNSELECT *hDlg, id&*

hDlg — Handle of the dialog that owns the Treeview.

id& — The control identifier assigned with CONTROL ADD TREEVIEW.

hItem — Handle of a Treeview item, used to uniquely identify the item

datav& — A long integer variable to which result data is assigned.

txtv$ — A string variable to which result data is assigned.

hPrnt — Handle of the parent item to insert the new item under.

hIAftr — Handle of the item to insert the new item after.

image& — Image index of the new item

simage& — Selected image index of the new item

txt$ — Text to be displayed for the Treeview item

flag& — A long integer value to define specific attributes

hLst — Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg, id&, hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg*, *id&*, *hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg*, *id&*, *hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg*, *id&*, *hItem*, *NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg, id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW GET EXPANDED statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the Treeview.

id& The control identifier assigned with CONTROL ADD TREEVIEW.

hItem	Handle of a Treeview item, used to uniquely identify the item
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg, id&, hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg, id&, hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg, id&, hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg, id&, hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg, id&, hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg, id&, hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or % TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg, id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg, id&, hItem, txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg, id&, hItem, NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg, id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW GET NEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
```

```
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg	Handle of the dialog that owns the Treeview.
id&	The control identifier assigned with CONTROL ADD TREEVIEW.
hItem	Handle of a Treeview item, used to uniquely identify the item
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg, id&, hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg, id&, hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items.

If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg, id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg, id&, hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg, id&, hItem, flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg, id&, hItem, flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg, id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg, id&, hItem, txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg, id&, hItem, NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg, id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW GET PARENT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose	A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text . Each time you add an item, you must specify its relationship to existing data items.
Syntax	**TREEVIEW DELETE *hDlg*, *id&*, *hItem*** **TREEVIEW GET BOLD *hDlg*, *id&*, *hItem* TO *datav&*** **TREEVIEW GET CHECK *hDlg*, *id&*, *hItem* TO *datav&*** **TREEVIEW GET CHILD *hDlg*, *id&*, *hItem* TO *datav&*** **TREEVIEW GET COUNT *hDlg*, *id&* TO *datav&*** **TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*** **TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*** **TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*** **TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*** **TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*** **TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*** **TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*** **TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*** **TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *simage&*, *txt$* TO *hItem*** **TREEVIEW RESET *hDlg*, *id&*** **TREEVIEW SELECT *hDlg*, *id&*, *hItem*** **TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*** **TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*** **TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*** **TREEVIEW SET IMAGELIST *hDlg*, *id&*, *hLst*** **TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*** **TREEVIEW SET USER *hDlg*, *id&*, *hItem*, *NumExpr*** **TREEVIEW UNSELECT *hDlg*, *id&***
hDlg	Handle of the dialog that owns the Treeview.
id&	The control identifier assigned with CONTROL ADD TREEVIEW.
hItem	Handle of a Treeview item, used to uniquely identify the item
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg, id&, hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg, id&, hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg, id&, hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg, id&, hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg, id&, hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg, id&, hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg, id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg, id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg, id&, hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg, id&, hItem, NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg, id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW GET PREVIOUS statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
```

```
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg	Handle of the dialog that owns the Treeview.
id&	The control identifier assigned with CONTROL ADD TREEVIEW.
hItem	Handle of a Treeview item, used to uniquely identify the item
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg, id&, hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg, id&, hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg, id&, hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg, id&, hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg*, *id&*, *hItem*, *NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg*, *id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW GET ROOT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

TREEVIEW DELETE *hDlg, id&, hItem*
TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&*
TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&*
TREEVIEW GET CHILD *hDlg, id&, hItem* TO *datav&*
TREEVIEW GET COUNT *hDlg, id&* TO *datav&*
TREEVIEW GET EXPANDED *hDlg, id&, hItem* TO *datav&*
TREEVIEW GET NEXT *hDlg, id&, hItem* TO *datav&*
TREEVIEW GET PARENT *hDlg, id&, hItem* TO *datav&*
TREEVIEW GET PREVIOUS *hDlg, id&, hItem* TO *datav&*
TREEVIEW GET ROOT *hDlg, id&* TO *datav&*
TREEVIEW GET SELECT *hDlg, id&* TO *datav&*
TREEVIEW GET TEXT *hDlg, id&, hItem* TO *txtv$*
TREEVIEW GET USER *hDlg, id&, hItem* TO *datav&*
TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$* TO *hItem*
TREEVIEW RESET *hDlg, id&*
TREEVIEW SELECT *hDlg, id&, hItem*
TREEVIEW SET BOLD *hDlg, id&, hItem, flag&*
TREEVIEW SET CHECK *hDlg, id&, hItem, flag&*
TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&*
TREEVIEW SET IMAGELIST *hDlg, id&, hLst*
TREEVIEW SET TEXT *hDlg, id&, hItem, txt$*
TREEVIEW SET USER *hDlg, id&, hItem, NumExpr*
TREEVIEW UNSELECT *hDlg, id&*

hDlg Handle of the dialog that owns the Treeview.

id& The control identifier assigned with CONTROL ADD TREEVIEW.

hItem Handle of a Treeview item, used to uniquely identify the item

datav& A long integer variable to which result data is assigned.

txtv$ A string variable to which result data is assigned.

hPrnt Handle of the parent item to insert the new item under.

hIAftr Handle of the item to insert the new item after.

image& Image index of the new item

simage& Selected image index of the new item

txt$ Text to be displayed for the Treeview item

flag& A long integer value to define specific attributes

hLst Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg, id&, hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg*, *id&*, *hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT

control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg*, *id&*, *hItem*, *NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight

user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg, id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW GET SELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the Treeview.

id& The control identifier assigned with CONTROL ADD TREEVIEW.

hItem Handle of a Treeview item, used to uniquely identify the item

datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg, id&, hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg, id&, hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg, id&, hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg, id&, hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg, id&, hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg, id&, hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is

found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg, id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg, id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg, id&, hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg, id&, hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg, id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg, id&, hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg, id&, hItem, flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg, id&, hItem, flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg*, *id&*, *hItem*, *NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg*, *id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW GET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
```

```
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg	Handle of the dialog that owns the Treeview.
id&	The control identifier assigned with CONTROL ADD TREEVIEW.
hItem	Handle of a Treeview item, used to uniquely identify the item
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg*, *id&*, *hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg*, *id&*, *hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg*, *id&*, *hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer

variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or % TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the

text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg*, *id&*, *hItem*, *NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg*, *id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW GET USER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose	A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text . Each time you add an item, you must specify its relationship to existing data items.
Syntax	**TREEVIEW DELETE** ***hDlg, id&, hItem*** **TREEVIEW GET BOLD** ***hDlg, id&, hItem*** **TO** ***datav&*** **TREEVIEW GET CHECK** ***hDlg, id&, hItem*** **TO** ***datav&*** **TREEVIEW GET CHILD** ***hDlg, id&, hItem*** **TO** ***datav&*** **TREEVIEW GET COUNT** ***hDlg, id&*** **TO** ***datav&*** **TREEVIEW GET EXPANDED** ***hDlg, id&, hItem*** **TO** ***datav&*** **TREEVIEW GET NEXT** ***hDlg, id&, hItem*** **TO** ***datav&*** **TREEVIEW GET PARENT** ***hDlg, id&, hItem*** **TO** ***datav&*** **TREEVIEW GET PREVIOUS** ***hDlg, id&, hItem*** **TO** ***datav&*** **TREEVIEW GET ROOT** ***hDlg, id&*** **TO** ***datav&*** **TREEVIEW GET SELECT** ***hDlg, id&*** **TO** ***datav&*** **TREEVIEW GET TEXT** ***hDlg, id&, hItem*** **TO** ***txtv$*** **TREEVIEW GET USER** ***hDlg, id&, hItem*** **TO** ***datav&*** **TREEVIEW INSERT ITEM** ***hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$*** **TO** ***hItem*** **TREEVIEW RESET** ***hDlg, id&*** **TREEVIEW SELECT** ***hDlg, id&, hItem*** **TREEVIEW SET BOLD** ***hDlg, id&, hItem, flag&*** **TREEVIEW SET CHECK** ***hDlg, id&, hItem, flag&*** **TREEVIEW SET EXPANDED** ***hDlg, id&, hItem, flag&*** **TREEVIEW SET IMAGELIST** ***hDlg, id&, hLst*** **TREEVIEW SET TEXT** ***hDlg, id&, hItem, txt$*** **TREEVIEW SET USER** ***hDlg, id&, hItem, NumExpr*** **TREEVIEW UNSELECT** ***hDlg, id&***
hDlg	Handle of the dialog that owns the Treeview.
id&	The control identifier assigned with CONTROL ADD TREEVIEW.
hItem	Handle of a Treeview item, used to uniquely identify the item
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg, id&, hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg, id&, hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg, id&, hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg, id&, hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg, id&, hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg, id&, hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg, id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg, id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg, id&, hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg*, *id&*, *hItem*, *NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg*, *id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW INSERT ITEM statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
```

```
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg	Handle of the dialog that owns the Treeview.
id&	The control identifier assigned with CONTROL ADD TREEVIEW.
hItem	Handle of a Treeview item, used to uniquely identify the item
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg*, *id&*, *hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg*, *id&*, *hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg*, *id&*, *hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg*, *id&*, *hItem*, *NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg*, *id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW RESET statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose

A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg — Handle of the dialog that owns the Treeview.

id& — The control identifier assigned with CONTROL ADD TREEVIEW.

hItem — Handle of a Treeview item, used to uniquely identify the item

datav& — A long integer variable to which result data is assigned.

txtv$ — A string variable to which result data is assigned.

hPrnt — Handle of the parent item to insert the new item under.

hIAftr — Handle of the item to insert the new item after.

image& — Image index of the new item

simage& — Selected image index of the new item

txt$ — Text to be displayed for the Treeview item

flag& — A long integer value to define specific attributes

hLst — Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg, id&, hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg*, *id&*, *hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT

control offers an additional eight user values which can be accessed with [CONTROL GET USER] and [CONTROL SET USER].

TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg, id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg, id&, hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg, id&, hItem, flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg, id&, hItem, flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg, id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg, id&, hItem, txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg, id&, hItem, NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight

user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg, id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW SELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the Treeview.

id& The control identifier assigned with CONTROL ADD TREEVIEW.

hItem Handle of a Treeview item, used to uniquely identify the item

datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg*, *id&*, *hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg*, *id&*, *hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg*, *id&*, *hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is

found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg, id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg, id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg, id&, hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg, id&, hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg, id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg, id&, hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg, id&, hItem, flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg, id&, hItem, flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg*, *id&*, *hItem*, *NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg*, *id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW SET BOLD statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
```

```
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the Treeview.

id& The control identifier assigned with CONTROL ADD TREEVIEW.

hItem Handle of a Treeview item, used to uniquely identify the item

datav& A long integer variable to which result data is assigned.

txtv$ A string variable to which result data is assigned.

hPrnt Handle of the parent item to insert the new item under.

hIAftr Handle of the item to insert the new item after.

image& Image index of the new item

simage& Selected image index of the new item

txt$ Text to be displayed for the Treeview item

flag& A long integer value to define specific attributes

hLst Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg*, *id&*, *hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg*, *id&*, *hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg*, *id&*, *hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer

variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or % TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the

text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg, id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg, id&, hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg, id&, hItem, flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg, id&, hItem, flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg, id&, hItem, flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg, id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg, id&, hItem, txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg, id&, hItem, NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg, id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW SET CHECK statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg	Handle of the dialog that owns the Treeview.
id&	The control identifier assigned with CONTROL ADD TREEVIEW.
hItem	Handle of a Treeview item, used to uniquely identify the item
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg*, *id&*, *hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg*, *id&*, *hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg*, *id&*, *hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg*, *id&*, *hItem*, *NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg*, *id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW SET EXPANDED statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
```

```
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg	Handle of the dialog that owns the Treeview.
id&	The control identifier assigned with CONTROL ADD TREEVIEW.
hItem	Handle of a Treeview item, used to uniquely identify the item
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg, id&, hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg, id&, hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg, id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg, id&, hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg, id&, hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg*, *id&*, *hItem*, *NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg*, *id&*

All items in the TREEVIEW control are set to an unselected state.

See also [Dynamic Dialog Tools], [CONTROL ADD TREEVIEW], [CONTROL SET COLOR], [CONTROL SET FONT], [IMAGELIST]

TREEVIEW SET IMAGELIST statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose

A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg	Handle of the dialog that owns the Treeview.
id&	The control identifier assigned with CONTROL ADD TREEVIEW.
hItem	Handle of a Treeview item, used to uniquely identify the item
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg, id&, hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg, id&, hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg, id&, hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg*, *id&*, *hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT

control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg*, *id&*, *hItem*, *NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight

user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg*, *id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW SET TEXT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg Handle of the dialog that owns the Treeview.

id& The control identifier assigned with CONTROL ADD TREEVIEW.

hItem Handle of a Treeview item, used to uniquely identify the item

datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks **TREEVIEW DELETE *hDlg*, *id&*, *hItem***

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg*, *id&*, *hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg*, *id&*, *hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg*, *id&*, *hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is

found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg, id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg, id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg, id&, hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg, id&, hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg, id&, hPrnt, hIAftr, image&, selimage&, txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or % TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg, id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg, id&, hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg, id&, hItem, flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg, id&, hItem, flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg*, *id&*, *hItem*, *NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg*, *id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW SET USER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
```

```
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg	Handle of the dialog that owns the Treeview.
id&	The control identifier assigned with CONTROL ADD TREEVIEW.
hItem	Handle of a Treeview item, used to uniquely identify the item
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg*, *id&*, *hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg*, *id&*, *hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg*, *id&*, *hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer

variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the

text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg*, *id&*, *hItem*, *NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg*, *id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TREEVIEW UNSELECT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TREEVIEW statement

Purpose A TreeView control displays a set of data items with a parent-child relationship between the items. This creates a hierarchical list of data which can have any number of levels. Each item displays an optional image and a text

. Each time you add an item, you must specify its relationship to existing data items.

Syntax

```
TREEVIEW DELETE hDlg, id&, hItem
TREEVIEW GET BOLD hDlg, id&, hItem TO datav&
TREEVIEW GET CHECK hDlg, id&, hItem TO datav&
TREEVIEW GET CHILD hDlg, id&, hItem TO datav&
TREEVIEW GET COUNT hDlg, id& TO datav&
TREEVIEW GET EXPANDED hDlg, id&, hItem TO datav&
TREEVIEW GET NEXT hDlg, id&, hItem TO datav&
TREEVIEW GET PARENT hDlg, id&, hItem TO datav&
TREEVIEW GET PREVIOUS hDlg, id&, hItem TO datav&
TREEVIEW GET ROOT hDlg, id& TO datav&
TREEVIEW GET SELECT hDlg, id& TO datav&
TREEVIEW GET TEXT hDlg, id&, hItem TO txtv$
TREEVIEW GET USER hDlg, id&, hItem TO datav&
TREEVIEW INSERT ITEM hDlg, id&, hPrnt, hIAftr, image&, simage&, txt$ TO
hItem
TREEVIEW RESET hDlg, id&
TREEVIEW SELECT hDlg, id&, hItem
TREEVIEW SET BOLD hDlg, id&, hItem, flag&
TREEVIEW SET CHECK hDlg, id&, hItem, flag&
TREEVIEW SET EXPANDED hDlg, id&, hItem, flag&
TREEVIEW SET IMAGELIST hDlg, id&, hLst
TREEVIEW SET TEXT hDlg, id&, hItem, txt$
TREEVIEW SET USER hDlg, id&, hItem, NumExpr
TREEVIEW UNSELECT hDlg, id&
```

hDlg	Handle of the dialog that owns the Treeview.
id&	The control identifier assigned with CONTROL ADD TREEVIEW.
hItem	Handle of a Treeview item, used to uniquely identify the item
datav&	A long integer variable to which result data is assigned.
txtv$	A string variable to which result data is assigned.
hPrnt	Handle of the parent item to insert the new item under.
hIAftr	Handle of the item to insert the new item after.
image&	Image index of the new item
simage&	Selected image index of the new item
txt$	Text to be displayed for the Treeview item
flag&	A long integer value to define specific attributes
hLst	Handle of the ImageList to be used for graphical items.

Remarks

TREEVIEW DELETE *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is deleted from the TREEVIEW control.

TREEVIEW GET BOLD *hDlg*, *id&*, *hItem* TO *datav&*

The bold attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is bold, the value true (-1) is assigned. If not bold, the value false (0) is assigned.

TREEVIEW GET CHECK *hDlg*, *id&*, *hItem* TO *datav&*

The checkmark attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the checkbox is checked, the value true (-1) is assigned. If not checked, the value false (0) is assigned.

TREEVIEW GET CHILD *hDlg*, *id&*, *hItem* TO *datav&*

The parent data item specified by *hItem* is scanned for child data items. If any are found, the handle of the first child is assigned to the variable specified by *datav&*. If none are found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET COUNT *hDlg*, *id&* TO *datav&*

The number of data items in the TREEVIEW is retrieved, and assigned to the long integer variable specified by *datav&*.

TREEVIEW GET EXPANDED *hDlg*, *id&*, *hItem* TO *datav&*

The expanded attribute for the data item *hItem* is retrieved and assigned to the variable *datav&*. If the item is expanded, displaying its child data items, the value true (-1) is assigned. If the item is collapsed, the value false (0) is assigned.

TREEVIEW GET NEXT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the next sibling is assigned to the variable specified by *datav&*. If no next sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PARENT *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for its parent data item. The handle of the parent is assigned to the variable specified by *datav&*. If no parent is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET PREVIOUS *hDlg*, *id&*, *hItem* TO *datav&*

The data item specified by *hItem* is scanned for sibling data items. The handle of the previous sibling is assigned to the variable specified by *datav&*. If no previous sibling is found, the value zero (0) is assigned to *datav&*.

TREEVIEW GET ROOT *hDlg*, *id&* TO *datav&*

The handle of the very first data item (topmost) in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*.

TREEVIEW GET SELECT *hDlg*, *id&* TO *datav&*

The handle of the data item currently selected in the TREEVIEW is retrieved, and assigned to the variable specified by *datav&*. If there is no current selection, the value zero (0) is assigned.

TREEVIEW GET TEXT *hDlg*, *id&*, *hItem* TO *txtv$*

The text of a specific data item (specified by the handle *hItem*) is retrieved from the TREEVIEW control and assigned to the string variable designated by *txtv$*.

TREEVIEW GET USER *hDlg*, *id&*, *hItem* TO *datav&*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed. The returned user value is assigned to the long integer variable specified by *datav&*. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW INSERT ITEM *hDlg*, *id&*, *hPrnt*, *hIAftr*, *image&*, *selimage&*, *txt$* TO *hItem*

A new data item is added to this TREEVIEW control. The parameter *hPrnt* specifies the parent of this item, or zero if item is to be inserted at the root. The parameter *hIAftr* specifies the handle of the item after which this new item is to be inserted, or %TVI_FIRST (at the beginning), %TVI_LAST (at the end), %TVI_SORT (alphabetical order). If an IMAGELIST has been attached, the parameters *image&* and *selimage&* specify which image should be displayed (1=first, 2=second, etc.) for normal and selected items. If no image is needed, the value(s) 0 should be used. The parameter *txt$* designates the text string which should be displayed. If the operation is successful, the handle to the new data item is assigned to the variable designated by *hItem*. If the operation fails, the value zero is assigned to *hItem*.

TREEVIEW RESET *hDlg*, *id&*

All data items are deleted from the specified TREEVIEW control.

TREEVIEW SELECT *hDlg*, *id&*, *hItem*

The data item specified by the handle *hItem* is chosen as selected text for the TREEVIEW control, and the selected text is scrolled into a visible position.

TREEVIEW SET BOLD *hDlg*, *id&*, *hItem*, *flag&*

The bold attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in bold format. If *flag&* is false (zero), it is displayed in normal format.

TREEVIEW SET CHECK *hDlg*, *id&*, *hItem*, *flag&*

The optional checkbox for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is checked. If *flag&* is false (zero), it is unchecked.

TREEVIEW SET EXPANDED *hDlg*, *id&*, *hItem*, *flag&*

The expanded attribute for the data item specified by *hItem* is set based upon the value of the *flag&* parameter. If *flag&* is true (non-zero), it is displayed in expanded format, with its child items visible. If *flag&* is false (zero), it is displayed in collapsed format.

TREEVIEW SET IMAGELIST *hDlg*, *id&*, hLst

The IMAGELIST specified by *hLst* is attached to this TREEVIEW control. The images it contains are displayed as needed with each data item. When the TREEVIEW control is destroyed, any attached IMAGELIST is automatically destroyed.

TREEVIEW SET TEXT *hDlg*, *id&*, *hItem*, *txt$*

The text of a specific data item (specified by the handle *hItem*) is replaced by the text in the string expression *txt$*.

TREEVIEW SET USER *hDlg, id&, hItem, NumExpr*

Each item in a TREEVIEW may have a long integer user value associated with it at the discretion of the programmer. This user value is assigned with TREEVIEW SET USER, and retrieved with TREEVIEW GET USER. The parameter *hItem* specifies the handle of the user item to be accessed, while *NumExpr* is the user value saved for later retrieval. In addition to these TREEVIEW user values, every DDT control offers an additional eight user values which can be accessed with CONTROL GET USER and CONTROL SET USER.

TREEVIEW UNSELECT *hDlg, id&*

All items in the TREEVIEW control are set to an unselected state.

See also Dynamic Dialog Tools, CONTROL ADD TREEVIEW, CONTROL SET COLOR, CONTROL SET FONT, IMAGELIST

TRIM$ function

TRIM$ function IMPROVED

Purpose Removes leading and trailing characters or substrings.

Syntax

```
NewString$ = TRIM$(OldString$ [, [ANY] CharsToTrim$])
NewString$ = TRIM$(NumrExpr [,Digits&])
```

Remarks TRIM$ combines the functionality of LTRIM$ and RTRIM$ into a single function. *OldString$* is the string expression from which to remove characters, and *CharsToTrim$* is the string expression to remove leading and trailing occurrences. If *CharsToTrim$* is not specified, TRIM$ removes leading and trailing spaces.

ANY If the ANY keyword is included, *CharsToTrim$* specifies a list of single characters to be searched for individually, a match on any one of which as a leading or trailing character will cause the character to be removed from the result.

NumrExpr If a numeric expression is provided as the parameter, it is converted to a string (just like STR$), but with no leading or trailing spaces.

digits& The maximum number of significant digits, in the range of 1 to 18. If not included, PowerBASIC supplies a default value of 7 for single precision values, or 16 for more precise values. Use care that *digits&* is large enough to contain the integral part of a number, or scientific notation must be used to estimate it. For example, TRIM$(123.456, 2) returns "1.2E+2", while FORMAT$(123.456, 5) returns the string "123.45".

Restrictions TRIM$ is case sensitive, so capitalization matters.

See also CLIP$, FORMAT$, INSTR, LCASE$, LTRIM$, MCASE$, MID$, REMOVE$, REPLACE, RIGHT$, RTRIM$, SHRINK$, TALLY, UCASE$, UNWRAP$, VERIFY

TRY/END TRY block

TRY/END TRY block

Purpose A structured method of trapping and responding to run-time errors.

Syntax

```
TRY
  [statements]
  [EXIT TRY]
  [statements]
```

```
CATCH
  [error handling statements]
  [EXIT TRY]
  [error handling statements]
[FINALLY
  [statements]
  [EXIT TRY]
  [statements]]
END TRY
```

Remarks

Statements in the TRY section are executed normally. The first time a run-time error occurs, control is transferred to the CATCH section. If no run-time errors are generated in the TRY section, the CATCH section is skipped entirely.

Then, regardless of error status, the FINALLY section is executed, if it is present. Error trapping and control transfer are disabled in the CATCH and FINALLY sections, so you would normally use conventional "

ERR =…" tests to check the success of error-prone operations in those sections.

However, TRY structures can be nested to any level, so it may be desirable to use another TRY block within these clauses.

Restrictions

CATCH is a mandatory section of this structure, although the FINALLY section is optional.

Because of the nesting requirements, the ERR value is local to the TRY structure. Upon exit, the prior ERR value is restored, so be sure to save the value of ERR if it will be needed outside of the TRY structure.

To leave the TRY structure, execution must pass normally through END TRY, or by an EXIT TRY statement. Leaving a TRY block any other way is strongly discouraged because error trapping will remain disabled, and the previous ERR value will not be restored. Future versions of PowerBASIC may disallow such practices.

ON ERROR GOTO is invalid within a TRY structure, but may be used within the same Sub/Function/Method/Property.

See also

#DEBUG ERROR, ERL, ERR, ERRCLEAR, ERROR, Error Overview, ERROR$, Error Trapping, ON ERROR

Example

```
TRY
  OPEN "file.dat" FOR INPUT LOCK READ WRITE AS #1
CATCH
  CALL NotifyUserOfError(ERR)
  EXIT TRY
FINALLY
  CALL UpdateDataBase()
  CLOSE #1
END TRY
```

TXT.CELL method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TXT pseudo-object New!

Purpose

Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

Syntax

```
TXT.membername(params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

Remarks

Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to GRAPHIC WINDOWS and GRAPHIC CONTROLS instead.

Text Window methods are accessed like any other object. The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a function which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and pixel positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists. There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

TXT METHODS

TXT.CELL

Syntax

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar&    <or>    ColVar& = TXT.COL
TXT.ROW TO RowVar&    <or>    RowVar& = TXT.ROW
```

Remarks

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

TXT.CLS

Syntax `TXT.CLS`

Remarks The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

TXT.COLOR

Syntax `TXT.COLOR = RGBColor&`

Remarks TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many built-in RGB color equates which may be used here, like %RGB_RED, %RGB_BLUE, etc.

TXT.END

Syntax `TXT.END`

Remarks The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

TXT.INKEY$

Syntax

```
TXT.INKEY$ TO InkeyVar$
InkeyVar$ = TXT.INKEY$
```

Remarks Reads a keyboard character if one is ready. TXT.INKEY$ returns a

of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string (LEN=0) means that the buffer is empty - no key was pressed.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.INKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.INSTAT

Syntax

```
TXT.INSTAT TO InStatVar&
InstatVar& = TXT.INSTAT
```

Remarks Determines whether a keyboard character is ready. The

variable receives the keyboard buffer status for the current text window. The value assigned is TRUE (non-zero) if a keyboard character is ready to be retrieved, or FALSE (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY$, TXT.LINE.INPUT, etc.

TXT.LINE.INPUT

Syntax `TXT.LINE.INPUT(["prompt",] StringVar)`

Remarks Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string constant or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a fixed-length, nul-terminated, or a dynamic string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit. Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a UDT variable, although fixed-length and nul-terminated UDT member variables are allowed.

TXT.PRINT

Syntax `TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)`

Remarks Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

ExprList: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

SPC(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

TAB(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a Variant, an object variable, or an entire array. Individual member values must be extracted with the appropriate function before they can be displayed.

TXT.WAITKEY$

Syntax
```
TXT.WAITKEY$ [TO WaitVar$]
WaitVar$ = TXT.WAITKEY$
```

Remarks Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.WINDOW

Syntax `TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin`

Remarks A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the handle will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

See also DIALOG NEW, GRAPHIC WINDOW, INPUTBOX$, MSGBOX

TXT.CLS method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TXT pseudo-object New!

Purpose Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

Syntax

```
TXT.membername(params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

Remarks Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to GRAPHIC WINDOWS and GRAPHIC CONTROLS instead.

Text Window methods are accessed like any other object. The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
```

```
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a function which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and pixel positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists. There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

TXT METHODS

TXT.CELL

Syntax

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar&   <or>   ColVar& = TXT.COL
TXT.ROW TO RowVar&   <or>   RowVar& = TXT.ROW
```

Remarks

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

TXT.CLS

Syntax

```
TXT.CLS
```

Remarks

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

TXT.COLOR

Syntax

```
TXT.COLOR = RGBColor&
```

Remarks

TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many built-in RGB color equates which may be used here, like %RGB_RED, %RGB_BLUE, etc.

TXT.END

Syntax

```
TXT.END
```

Remarks The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

TXT.INKEY$

Syntax
```
TXT.INKEY$ TO InkeyVar$
InkeyVar$ = TXT.INKEY$
```

Remarks Reads a keyboard character if one is ready. TXT.INKEY$ returns a

of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string (LEN=0) means that the buffer is empty - no key was pressed.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.INKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.INSTAT

Syntax
```
TXT.INSTAT TO InStatVar&
InstatVar& = TXT.INSTAT
```

Remarks Determines whether a keyboard character is ready. The

variable receives the keyboard buffer status for the current text window. The value assigned is TRUE (non-zero) if a keyboard character is ready to be retrieved, or FALSE (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY$, TXT.LINE.INPUT, etc.

TXT.LINE.INPUT

Syntax
```
TXT.LINE.INPUT(["prompt",] StringVar)
```

Remarks Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string constant or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a fixed-length, nul-terminated, or a dynamic string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit. Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a UDT variable, although fixed-length and nul-terminated UDT member variables are allowed.

TXT.PRINT

Syntax
```
TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)
```

Remarks Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

ExprList: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

SPC(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

TAB(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a Variant, an object variable, or an entire array. Individual member values must be extracted with the appropriate function before they can be displayed.

TXT.WAITKEY$

Syntax

TXT.WAITKEY$ [TO *WaitVar$*]
***WaitVar$* = TXT.WAITKEY$**

Remarks

Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.WINDOW

Syntax

TXT.WINDOW(*Cap$*, *x*, *y* [,*Rows*, *Cols*]) TO *hWin*

Remarks

A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the handle will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

See also

DIALOG NEW, GRAPHIC WINDOW, INPUTBOX$, MSGBOX

TXT.COLOR method

Keyword Template

TXT pseudo-object New!

Purpose Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

Syntax

```
TXT.membername(params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

Remarks Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to GRAPHIC WINDOWS and GRAPHIC CONTROLS instead.

Text Window methods are accessed like any other object. The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a function which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and pixel positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists. There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

TXT METHODS

TXT.CELL

Syntax

TXT.CELL = *RowValue&, ColValue&*
TXT.CELL TO *RowVar&, ColVar&*
TXT.COL TO *ColVar&* <or> ***ColVar&* = TXT.COL**
TXT.ROW TO *RowVar&* <or> ***RowVar&* = TXT.ROW**

Remarks

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

TXT.CLS

Syntax

TXT.CLS

Remarks

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

TXT.COLOR

Syntax

TXT.COLOR = *RGBColor&*

Remarks

TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many built-in RGB color equates which may be used here, like %RGB_RED, %RGB_BLUE, etc.

TXT.END

Syntax

TXT.END

Remarks

The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

TXT.INKEY$

Syntax

TXT.INKEY$ TO *InkeyVar$*
***InkeyVar$* = TXT.INKEY$**

Remarks

Reads a keyboard character if one is ready. TXT.INKEY$ returns a

of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string (LEN=0) means that the buffer is empty - no key was pressed.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.INKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.INSTAT

Syntax

TXT.INSTAT TO *InStatVar&*
***InstatVar&* = TXT.INSTAT**

Remarks

Determines whether a keyboard character is ready. The

variable receives the keyboard buffer status for the current text window. The value assigned is TRUE (non-zero) if a keyboard character is ready to be retrieved, or FALSE (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY$, TXT.LINE.INPUT, etc.

TXT.LINE.INPUT

Syntax **TXT.LINE.INPUT(["*prompt*",] *StringVar*)**

Remarks Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string constant or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a fixed-length, nul-terminated, or a dynamic string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit. Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a UDT variable, although fixed-length and nul-terminated UDT member variables are allowed.

TXT.PRINT

Syntax **TXT.PRINT([*ExprList*] [SPC(*n*)] [TAB(*n*)] [,] [;]...)**

Remarks Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

ExprList: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

SPC(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

TAB(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a Variant, an object variable, or an entire array. Individual member values must be extracted with the appropriate function before they can be displayed.

TXT.WAITKEY$

Syntax **TXT.WAITKEY$ [TO *WaitVar$*]**
***WaitVar$* = TXT.WAITKEY$**

Remarks Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the

TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.WINDOW

Syntax `TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin`

Remarks A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the handle will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

See also DIALOG NEW, GRAPHIC WINDOW, INPUTBOX$, MSGBOX

TXT.END method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TXT pseudo-object New!

Purpose Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

Syntax

```
TXT.membername(params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

Remarks Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to GRAPHIC WINDOWS and GRAPHIC CONTROLS instead.

Text Window methods are accessed like any other object. The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a function which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and pixel positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists. There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

TXT METHODS

TXT.CELL

Syntax

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar&    <or>    ColVar& = TXT.COL
TXT.ROW TO RowVar&    <or>    RowVar& = TXT.ROW
```

Remarks

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

TXT.CLS

Syntax

```
TXT.CLS
```

Remarks

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

TXT.COLOR

Syntax `TXT.COLOR = RGBColor&`

Remarks TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many built-in RGB color equates which may be used here, like %RGB_RED, %RGB_BLUE, etc.

TXT.END

Syntax `TXT.END`

Remarks The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

TXT.INKEY$

Syntax

```
TXT.INKEY$ TO InkeyVar$
InkeyVar$ = TXT.INKEY$
```

Remarks Reads a keyboard character if one is ready. TXT.INKEY$ returns a

of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string (LEN=0) means that the buffer is empty - no key was pressed.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.INKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.INSTAT

Syntax

```
TXT.INSTAT TO InStatVar&
InstatVar& = TXT.INSTAT
```

Remarks Determines whether a keyboard character is ready. The

variable receives the keyboard buffer status for the current text window. The value assigned is TRUE (non-zero) if a keyboard character is ready to be retrieved, or FALSE (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY$, TXT.LINE.INPUT, etc.

TXT.LINE.INPUT

Syntax `TXT.LINE.INPUT(["prompt",] StringVar)`

Remarks Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string constant or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a fixed-length, nul-terminated, or a dynamic string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit. Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a UDT variable, although fixed-length and nul-terminated UDT member variables are allowed.

TXT.PRINT

Syntax `TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)`

Remarks Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

ExprList: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

SPC(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

TAB(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a Variant, an object variable, or an entire array. Individual member values must be extracted with the appropriate function before they can be displayed.

TXT.WAITKEY$

Syntax

```
TXT.WAITKEY$ [TO WaitVar$]
WaitVar$ = TXT.WAITKEY$
```

Remarks

Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.WINDOW

Syntax

```
TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin
```

Remarks

A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the handle will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

See also DIALOG NEW, GRAPHIC WINDOW, INPUTBOX$, MSGBOX

TXT.INKEY$ method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TXT pseudo-object New!

Purpose Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

Syntax

```
TXT.membername(params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

Remarks Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to GRAPHIC WINDOWS and GRAPHIC CONTROLS instead.

Text Window methods are accessed like any other object. The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a function which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and pixel positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text

Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists. There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

TXT METHODS

TXT.CELL

Syntax

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar&   <or>   ColVar& = TXT.COL
TXT.ROW TO RowVar&   <or>   RowVar& = TXT.ROW
```

Remarks

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

TXT.CLS

Syntax

```
TXT.CLS
```

Remarks

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

TXT.COLOR

Syntax

```
TXT.COLOR = RGBColor&
```

Remarks

TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many built-in RGB color equates which may be used here, like %RGB_RED, %RGB_BLUE, etc.

TXT.END

Syntax

```
TXT.END
```

Remarks

The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

TXT.INKEY$

Syntax

```
TXT.INKEY$ TO InkeyVar$
InkeyVar$ = TXT.INKEY$
```

Remarks

Reads a keyboard character if one is ready. TXT.INKEY$ returns a

of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string (LEN=0) means that the buffer is empty - no key was pressed.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.INKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.INSTAT

Syntax

```
TXT.INSTAT TO InStatVar&
InstatVar& = TXT.INSTAT
```

Remarks

Determines whether a keyboard character is ready. The variable receives the keyboard buffer status for the current text window. The value assigned is TRUE (non-zero) if a keyboard character is ready to be retrieved, or FALSE (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY$, TXT.LINE.INPUT, etc.

TXT.LINE.INPUT

Syntax

```
TXT.LINE.INPUT(["prompt",] StringVar)
```

Remarks

Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string constant or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a fixed-length, nul-terminated, or a dynamic string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit. Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a UDT variable, although fixed-length and nul-terminated UDT member variables are allowed.

TXT.PRINT

Syntax

```
TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)
```

Remarks

Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

ExprList: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

SPC(*n*)	An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.
TAB(*n*)	An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a Variant, an object variable, or an entire array. Individual member values must be extracted with the appropriate function before they can be displayed.

TXT.WAITKEY$

Syntax

```
TXT.WAITKEY$ [TO WaitVar$]
WaitVar$ = TXT.WAITKEY$
```

Remarks

Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.WINDOW

Syntax

```
TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin
```

Remarks

A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the handle will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

See also

DIALOG NEW, GRAPHIC WINDOW, INPUTBOX$, MSGBOX

TXT.INSTAT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TXT pseudo-object New!

Purpose

Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

Syntax

```
TXT.membername(params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

Remarks

Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to GRAPHIC WINDOWS and GRAPHIC CONTROLS instead.

Text Window methods are accessed like any other object. The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a function which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and pixel positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists. There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

TXT METHODS

TXT.CELL

Syntax

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar&    <or>    ColVar& = TXT.COL
TXT.ROW TO RowVar&    <or>    RowVar& = TXT.ROW
```

Remarks

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

TXT.CLS

Syntax `TXT.CLS`

Remarks The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

TXT.COLOR

Syntax `TXT.COLOR = RGBColor&`

Remarks TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many built-in RGB color equates which may be used here, like %RGB_RED, %RGB_BLUE, etc.

TXT.END

Syntax `TXT.END`

Remarks The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

TXT.INKEY$

Syntax

```
TXT.INKEY$ TO InkeyVar$
InkeyVar$ = TXT.INKEY$
```

Remarks Reads a keyboard character if one is ready. TXT.INKEY$ returns a

of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string (LEN=0) means that the buffer is empty - no key was pressed.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.INKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.INSTAT

Syntax

```
TXT.INSTAT TO InStatVar&
InstatVar& = TXT.INSTAT
```

Remarks Determines whether a keyboard character is ready. The

variable receives the keyboard buffer status for the current text window. The value assigned is TRUE (non-zero) if a keyboard character is ready to be retrieved, or FALSE (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY$, TXT.LINE.INPUT, etc.

TXT.LINE.INPUT

Syntax `TXT.LINE.INPUT(["prompt",] StringVar)`

Remarks Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string constant or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a fixed-length, nul-terminated, or a dynamic string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit. Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a UDT variable, although fixed-length and nul-terminated UDT member variables are allowed.

TXT.PRINT

Syntax `TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)`

Remarks Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

ExprList: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

SPC(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

TAB(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a Variant, an object variable, or an entire array. Individual member values must be extracted with the appropriate function before they can be displayed.

TXT.WAITKEY$

Syntax `TXT.WAITKEY$ [TO WaitVar$]`
`WaitVar$ = TXT.WAITKEY$`

Remarks Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.WINDOW

Syntax `TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin`

Remarks A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the handle will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

See also DIALOG NEW, GRAPHIC WINDOW, INPUTBOX$, MSGBOX

TXT.LINE.INPUT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TXT pseudo-object New!

Purpose Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

Syntax

```
TXT.membername(params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

Remarks Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to GRAPHIC WINDOWS and GRAPHIC CONTROLS instead.

Text Window methods are accessed like any other object. The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a function which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and pixel positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists. There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

TXT METHODS

TXT.CELL

Syntax

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar&   <or>   ColVar& = TXT.COL
TXT.ROW TO RowVar&   <or>   RowVar& = TXT.ROW
```

Remarks

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

TXT.CLS

Syntax

```
TXT.CLS
```

Remarks

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

TXT.COLOR

Syntax

```
TXT.COLOR = RGBColor&
```

Remarks

TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many built-in RGB color equates which may be used here, like %RGB_RED, %RGB_BLUE, etc.

TXT.END

Syntax

```
TXT.END
```

Remarks

The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

TXT.INKEY$

Syntax `TXT.INKEY$ TO InkeyVar$`
`InkeyVar$ = TXT.INKEY$`

Remarks Reads a keyboard character if one is ready. TXT.INKEY$ returns a

of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string (LEN=0) means that the buffer is empty - no key was pressed.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.INKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.INSTAT

Syntax `TXT.INSTAT TO InStatVar&`
`InstatVar& = TXT.INSTAT`

Remarks Determines whether a keyboard character is ready. The

variable receives the keyboard buffer status for the current text window. The value assigned is TRUE (non-zero) if a keyboard character is ready to be retrieved, or FALSE (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY$, TXT.LINE.INPUT, etc.

TXT.LINE.INPUT

Syntax `TXT.LINE.INPUT(["prompt",] StringVar)`

Remarks Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string constant or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a fixed-length, nul-terminated, or a dynamic string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit. Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a UDT variable, although fixed-length and nul-terminated UDT member variables are allowed.

TXT.PRINT

Syntax `TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)`

Remarks Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

ExprList: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

SPC(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

TAB(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a Variant, an object variable, or an entire array. Individual member values must be extracted with the appropriate function before they can be displayed.

TXT.WAITKEY$

Syntax

TXT.WAITKEY$ [TO *WaitVar$*]
***WaitVar$* = TXT.WAITKEY$**

Remarks

Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.WINDOW

Syntax

TXT.WINDOW(*Cap$*, *x*, *y* [,*Rows*, *Cols*]) TO *hWin*

Remarks

A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the handle will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

See also

DIALOG NEW, GRAPHIC WINDOW, INPUTBOX$, MSGBOX

TXT.PRINT method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TXT pseudo-object New!

Purpose

Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

Syntax

```
TXT.membername(params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

Remarks

Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to GRAPHIC WINDOWS and GRAPHIC CONTROLS instead.

Text Window methods are accessed like any other object. The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a function which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and pixel positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists. There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

TXT METHODS

TXT.CELL

Syntax

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar&   <or>   ColVar& = TXT.COL
TXT.ROW TO RowVar&   <or>   RowVar& = TXT.ROW
```

Remarks

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

TXT.CLS

Syntax `TXT.CLS`

Remarks The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

TXT.COLOR

Syntax `TXT.COLOR = RGBColor&`

Remarks TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many built-in RGB color equates which may be used here, like %RGB_RED, %RGB_BLUE, etc.

TXT.END

Syntax `TXT.END`

Remarks The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

TXT.INKEY$

Syntax

```
TXT.INKEY$ TO InkeyVar$
InkeyVar$ = TXT.INKEY$
```

Remarks Reads a keyboard character if one is ready. TXT.INKEY$ returns a

of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string (LEN=0) means that the buffer is empty - no key was pressed.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.INKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.INSTAT

Syntax

```
TXT.INSTAT TO InStatVar&
InstatVar& = TXT.INSTAT
```

Remarks Determines whether a keyboard character is ready. The

variable receives the keyboard buffer status for the current text window. The value assigned is TRUE (non-zero) if a keyboard character is ready to be retrieved, or FALSE (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY$, TXT.LINE.INPUT, etc.

TXT.LINE.INPUT

Syntax `TXT.LINE.INPUT(["prompt",] StringVar)`

Remarks Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string constant or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a fixed-length, nul-terminated, or a dynamic string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit. Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a UDT variable, although fixed-length and nul-terminated UDT member variables are allowed.

TXT.PRINT

Syntax `TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)`

Remarks Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

ExprList: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

SPC(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

TAB(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a Variant, an object variable, or an entire array. Individual member values must be extracted with the appropriate function before they can be displayed.

TXT.WAITKEY$

Syntax
```
TXT.WAITKEY$ [TO WaitVar$]
WaitVar$ = TXT.WAITKEY$
```

Remarks Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.WINDOW

Syntax `TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin`

Remarks A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the handle will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

See also DIALOG NEW, GRAPHIC WINDOW, INPUTBOX$, MSGBOX

TXT.WAITKEY$ method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TXT pseudo-object New!

Purpose Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

Syntax

```
TXT.membername(params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

Remarks Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to GRAPHIC WINDOWS and GRAPHIC CONTROLS instead.

Text Window methods are accessed like any other object. The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a function which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and pixel positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists. There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

TXT METHODS

TXT.CELL

Syntax

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar&    <or>    ColVar& = TXT.COL
TXT.ROW TO RowVar&    <or>    RowVar& = TXT.ROW
```

Remarks

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

TXT.CLS

Syntax

```
TXT.CLS
```

Remarks

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

TXT.COLOR

Syntax

```
TXT.COLOR = RGBColor&
```

Remarks

TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many built-in RGB color equates which may be used here, like %RGB_RED, %RGB_BLUE, etc.

TXT.END

Syntax `TXT.END`

Remarks The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

TXT.INKEY$

Syntax

```
TXT.INKEY$ TO InkeyVar$
InkeyVar$ = TXT.INKEY$
```

Remarks Reads a keyboard character if one is ready. TXT.INKEY$ returns a

of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string (LEN=0) means that the buffer is empty - no key was pressed.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.INKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.INSTAT

Syntax

```
TXT.INSTAT TO InStatVar&
InstatVar& = TXT.INSTAT
```

Remarks Determines whether a keyboard character is ready. The

variable receives the keyboard buffer status for the current text window. The value assigned is TRUE (non-zero) if a keyboard character is ready to be retrieved, or FALSE (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY$, TXT.LINE.INPUT, etc.

TXT.LINE.INPUT

Syntax

```
TXT.LINE.INPUT(["prompt",] StringVar)
```

Remarks Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string constant or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a fixed-length, nul-terminated, or a dynamic string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit. Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a UDT variable, although fixed-length and nul-terminated UDT member variables are allowed.

TXT.PRINT

Syntax

```
TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)
```

Remarks Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

ExprList: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

SPC(*n*) An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

TAB(*n*) An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a Variant, an object variable, or an entire array. Individual member values must be extracted with the appropriate function before they can be displayed.

TXT.WAITKEY$

Syntax

```
TXT.WAITKEY$ [TO WaitVar$]
WaitVar$ = TXT.WAITKEY$
```

Remarks

Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.WINDOW

Syntax

```
TXT.WINDOW(Cap$, x, y [,Rows, Cols]) TO hWin
```

Remarks

A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the handle will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

See also

DIALOG NEW, GRAPHIC WINDOW, INPUTBOX$, MSGBOX

TXT.WINDOW method

Keyword Template

Purpose

Syntax

Remarks

See also

Example

TXT pseudo-object New!

Purpose

Displays and inputs text on a specially created TEXT WINDOW. This is similar to a CONSOLE window, with some advantages. Generally speaking, a Text Window is more attractive. But, just like a Console Window, only fixed-width text may be displayed.

Syntax

```
TXT.membername(params)
RetVal = TXT.membername(params)
TXT.membername(params) TO ReturnVariable
```

Remarks

Text Windows offer a specific, but limited capability. They are very easy to implement and use, and they offer an excellent means to produce quick and straightforward programs in text mode.

Text Windows offer an excellent path for the beginning programmer, or for anyone who needs a procedural code model. As the name implies, they display only fixed-width text. Further, only one Text Window may exist at a time. If you need snazzy graphics, more specialized fonts, multiple windows, or a GUI interface, you should look to GRAPHIC WINDOWS and GRAPHIC CONTROLS instead.

Text Window methods are accessed like any other object. The object name TXT is followed by a period separator, and the name of the method or property:

```
TXT.Cell = RowValue&, ColumnVal&
```

Text Window methods which return a value may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
TXT.Row TO RowVar&
RowVar& = TXT.Row
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a function which returns a value), it can be a term in any expression of any complexity.

Most PowerBASIC functions specify graphic and pixel positions as x,y (the horizontal term first, then the vertical term). However, for compatibility with most current and prior versions of BASIC (PowerBASIC included), the functions which reference text rows and columns name the vertical term first (rows, columns).

Text Windows handle text wrapping and auto-scrolling much like a typical Console Window. When printing exceeds the end of a line, the print position wraps to the first column of the next row. When printing exceeds the last row, the entire page is scrolled to open a new line at the bottom.

In order to use the TXT object successfully, you must use care to first create a Text Window in your program. To do this, you can execute the TXT.WINDOW method.

All Text Windows are stable. They cannot be closed unexpectedly by the user, so there are no surprises when you find you are trying to print to a window which no longer exists. There is no Close Box, no System Menu, nor is ALT-F4 recognized as a close command. They can only be closed by executing TXT.END, or by terminating the entire application.

TXT METHODS

TXT.CELL

Syntax

```
TXT.CELL = RowValue&, ColValue&
TXT.CELL TO RowVar&, ColVar&
TXT.COL TO ColVar&   <or>   ColVar& = TXT.COL
TXT.ROW TO RowVar&   <or>   RowVar& = TXT.ROW
```

Remarks

TXT.CELL is used to set or retrieve the cursor position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the Text Window is considered to be cell 1,1.

The first form of TXT.CELL moves the cursor to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of TXT.CELL retrieves the current cursor position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The last two forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

TXT.CLS

Syntax

```
TXT.CLS
```

Remarks

The text window is cleared, and the caret (next print position) is moved to the upper left corner (row 1, column 1).

TXT.COLOR

Syntax

```
TXT.COLOR = RGBColor&
```

Remarks

TXT.COLOR is used to change the foreground color of new text drawn with TXT.PRINT. Existing text on the Text Window is not changed. PowerBASIC includes many built-in RGB color equates which may be used here, like %RGB_RED, %RGB_BLUE, etc.

TXT.END

Syntax

```
TXT.END
```

Remarks

The Text Window currently attached to your program is destroyed and detached from the process. No errors are generated, even if no Text Window is currently attached.

TXT.INKEY$

Syntax

```
TXT.INKEY$ TO InkeyVar$
InkeyVar$ = TXT.INKEY$
```

Remarks

Reads a keyboard character if one is ready. TXT.INKEY$ returns a

of 0 or 1 characters that reflects the status of the keyboard buffer for the current text window. A null string (LEN=0) means that the buffer is empty - no key was pressed.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.INKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.INSTAT

Syntax

```
TXT.INSTAT TO InStatVar&
InstatVar& = TXT.INSTAT
```

Remarks

Determines whether a keyboard character is ready. The variable receives the keyboard buffer status for the current text window. The value assigned is TRUE (non-zero) if a keyboard character is ready to be retrieved, or FALSE (zero) if not.

TXT.INSTAT does not remove the character from the buffer, so repeated execution will continue to return TRUE until the character is read with TXT.INKEY$, TXT.LINE.INPUT, etc.

TXT.LINE.INPUT

Syntax `TXT.LINE.INPUT(["prompt",] StringVar)`

Remarks Reads an entire line from the keyboard into a string variable, ignoring any delimiters which may be embedded. The prompt is an optional string constant or string equate. Upon execution, the prompt is displayed and the program waits for keyboard input. Keystrokes are accepted until the user presses ENTER, at which time the resulting string is stored into the *StringVar*.

The *StringVar* may be a fixed-length, nul-terminated, or a dynamic string. For fixed-length and nul-terminated strings, keyboard input longer than the string is truncated to fit. Dynamic strings receive the complete keyboard input without truncation. *StringVar* may not be a UDT variable, although fixed-length and nul-terminated UDT member variables are allowed.

TXT.PRINT

Syntax `TXT.PRINT([ExprList] [SPC(n)] [TAB(n)] [,] [;]...)`

Remarks Write text data to the TEXT WINDOW at the current caret location. The TXT.PRINT method has the following parts, which may occur in any order and quantity:

ExprList: Numeric and/or string expression(s) to be written to the TEXT WINDOW.

SPC(*n*)	An optional function used to insert *n* spaces into the printed output. Multiple use of the SPC argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.
TAB(*n*)	An optional function used to tab to the *n*th column before printing an expression. Multiple use of the TAB argument is permitted in TXT.PRINT, such as positions between expressions. Values of *n* less than 1 are ignored.

; and , are special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument of TXT.PRINT is a semicolon or comma, the caret position is maintained at the current location, rather than the default action of moving the print position to the start of the next line. For example:

```
TXT.PRINT "Hello";
TXT.PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, TXT.PRINT prints a blank line. Printing always begins at the current caret position.

Any control codes, such as Carriage Return, Line-Feed and Backspace are not interpreted. They will display on the screen as symbols.

It is not possible to print a User-Defined Type (UDT), a Variant, an object variable, or an entire array. Individual member values must be extracted with the appropriate function before they can be displayed.

TXT.WAITKEY$

Syntax `TXT.WAITKEY$ [TO WaitVar$]`

***WaitVar$*** **= TXT.WAITKEY$**

Remarks Reads a keyboard character, waiting until one is ready. It removes the character from the keyboard buffer for the Text Window, and optionally assigns it to the string variable. If the TO clause is omitted, the keyboard character is discarded.

TXT.WAITKEY$ returns a string of 0 or 1 characters that reflects the status of the keyboard buffer for the Text Window. A null string (LEN=0) means that there was an error, such as the case when no Text Window currently exists.

A string length of one means that a standard key was pressed and the string contains the character. A value between 1 and 31 indicates a control code.

TXT.WAITKEY$ only processes standard characters. Extended keys, like function keys and the insert key, are ignored.

TXT.WINDOW

Syntax **TXT.WINDOW(*Cap$*, *x*, *y* [,*Rows*, *Cols*]) TO *hWin***

Remarks A new Text Window is created and attached to your program. The size of the Window is determined by rows and cols, or defaults to 25 rows and 80 columns. Subsequent TXT Methods will act upon this newly created Text Window.

If the Text Window is created successfully, the handle will be assigned to the variable specified by *hWin*. If it fails, the value zero (0) will be assigned instead. If you try to create a Text Window while another still exists, it will fail. In this case, you must first destroy the prior Text Window, as only one may exist at a time.

The parameters *x* and *y* specify the requested location of the window, relative to the upper left corner of the desktop. The parameters are always given in pixels. Rows and columns optionally specify the size of the window, given in the number of characters which will fit within the borders. If not given, the method defaults to 25 vertical rows by 80 horizontal columns.

See also DIALOG NEW, GRAPHIC WINDOW, INPUTBOX$, MSGBOX

TYPE/END TYPE block

TYPE/END TYPE block

Purpose Define a User-Defined Data Type (UDT), containing one or more member elements.

Syntax

```
TYPE MyType [BYTE | WORD | DWORD | QWORD] [FILL]
  [MemberName [(subscripts)] AS] TypeName
  [MemberName [(subscripts)] AS TypeName]
  [...]
END TYPE
```

Remarks The TYPE statement has the following parts:

TYPE The beginning of a User-Defined Type definition.

MyType The name of the User-Defined Type, which must conform to standard variable naming conventions.

Member alignment

TYPE definitions may optionally specify an alignment of BYTE (the default), WORD, DWORD, or QWORD, as well as FILL characteristics. With standard alignment, each member of a Type Structure will be located on the specified boundary. For example, with DWORD, up to 3 bytes may be skipped between members to accomplish alignment.

However, when a user-defined type is defined as a member of a larger user-defined type, this "sub-type" retains its original size and alignment, just as first declared.

BYTE Each member will be aligned on a BYTE boundary - no padding or alignment is applied to the structure. This is the default alignment method.

WORD — Each member will be aligned on a WORD boundary. Any odd byte between members of TYPE will be automatically skipped and ignored. The UDT structure may also be padded with one trailing byte to ensure the total structure size is a multiple of 2 bytes.

DWORD — Each member will be aligned on a DWORD boundary. Up to three bytes will be skipped to accomplish this alignment. The UDT structure is also padded with up to three trailing bytes to ensure the total structure size is a multiple of 4 bytes.

QWORD — QWORD alignment is included for compatibility with Windows, it cannot be fully implemented in a 32-bit operating system. With QWORD, individual members are 64-bit aligned for the appropriate structure size, but variables of that type may only be aligned on 32-bit boundaries, as stack pointer alignment is not guaranteed.

FILL — If the FILL option is specified, such as TYPE xxx DWORD FILL, the following rules apply:

1. No bytes are skipped if the next member of the Type will fit entirely into that space to be skipped.
2. Fixed-length strings are considered to be an array of bytes, so no bytes are skipped preceding them.
3. The total size of an array is considered to determine if FILL should affect its placement within the structure. For example, with DWORD FILL, an array of two integers would be started on a 4-byte boundary, even if two or three bytes must be skipped.

Type members

MemberName — The name of a member of the User-Defined Type. This too must follow the standard variable naming conventions.

subscripts — The dimensions of a member array. Arrays of one and two dimensions are supported, but must be defined with constant or numeric literal values. That is, the total size of a UDT must be known at compile-time, so items like dynamic strings, which vary in size, cannot be part of a TYPE structure. A STRING PTR can, however, since a pointer is implemented as a DWORD.

Like conventional arrays, the default lower array boundary is zero, but positive non-zero values may be used to specify a specific range of subscript index values for the array, separated from the upper array boundary subscript with the TO keyword. Additionally, both the lower and upper subscript index values must be zero or greater (ie, negative subscript values are not permitted). Examples of valid syntax follow:

```
TYPE MYTYPE
  id AS INTEGER                 ' Scalar UDT member
  Styles(6)          AS DWORD '  7 elements (0 TO 6)
  Yrs(1980 TO 2010) AS LONG  ' 31 elements
  Team(100 TO 101)  AS BYTE  '  2 elements
  Rating(1 TO 10)   AS DWORD ' 10 elements
  X(1 TO 5, 0 TO 5) AS EXT   ' 30 elements (5x6)
  Y(4,3)            AS QUAD  ' 20 elements (5x4)
END TYPE
```

Individual UDT structures can be up to 16 MB each. A single member element of a UDT may also occupy the entire 16 MB. For example, arrays within a UDT, nul-terminated strings, and fixed-length strings. UDT member arrays are not resizable at runtime. Additionally, the

cannot be used directly on a UDT member array. Instead, use DIM..AT to declare a conventional array at the same memory address as the UDT member array, and the ARRAY statement can then be used on that array.

TypeName — One of the supported data types, including User-Defined Types and Unions, with the exception of arrays.

END TYPE — Marks the end of the User-Defined Type definition.

It is often very convenient to be able to refer to several different types of things as a single unit or data structure. For example, in an accounting program, an account number and amount are part of what makes up a single journal entry. The TYPE/END TYPE block statements make it easy to create a single UDT that holds such information.

```
TYPE JournalType DWORD    ' type name and alignment
  AccountNumber AS LONG  ' member name and data type
  Amount        AS CUR   ' this is another one
END TYPE                 ' end of type declaration

DIM JournalEntry AS JournalType ' declare a record
```

TYPE/END TYPE blocks must be defined outside of a Sub, Function, or Class and may be defined only once in any program. It is usually easiest to put your TYPE/END TYPE block definitions in an Include file and use the #INCLUDE metastatement in any module that may need to use them.

TYPE/END TYPE blocks do not declare any variables; instead, they simply define a new type. You can declare variables of that type using the DIM or REDIM statements, or any statement that lets you use an AS clause:

```
DIM TypeVariable as TypeVariableType
```

Once you have a User-Defined Type variable declared, you can access its member elements using the following format:

```
TypeVariable.Element
```

For example, to change the account number in the *JournalEntryType* type, you might use a statement like:

```
JournalEntry.AccountNumber = 1000
```

A User-Defined Type can be used like any built-in PowerBASIC type. For example, you can define an array of record variables:

```
DIM JournalEntries(1 TO 100) AS JournalEntryType
```

…or even create a procedure that accepts a record variable:

```
SUB PrintJournalEntry(aJournalEntry AS JournalEntryType)
  ' Print journal
END SUB
```

You can also use pointers in a TYPE definition. *Note* that the first member in the next example is auto-aligned to start on a DWORD boundary, and three bytes are skipped so that the second member is also aligned on a DWORD boundary:

```
TYPE MyType DWORD
  Count AS BYTE     ' Aligned to a DWORD boundary
  y AS INTEGER PTR ' Aligned to next DWORD boundary
  z AS STRING PTR
END TYPE
```

Since pointers are stored as a DWORD, their length is 4 bytes when used in a TYPE/END TYPE, regardless of the length of their target. To access the target of a pointer, you must place the at-sign in front of the TYPE/END TYPE member, not the name of the TYPE itself:

```
iResult% = @MyType.y    ' Invalid
iResult% = MyType.@y    ' Valid
```

You can also declare a variable that is a pointer to a TYPE:

```
TYPE MyData
  Val1 AS INTEGER
  Val2 AS INTEGER
  Val3 AS INTEGER
  Val4 AS INTEGER
END TYPE

DIM Info AS MyData PTR
Info = VARPTR(YourData)
```

```
Message$ = HEX$(@Info.Val1) + $CRLF + _
           HEX$(@Info.Val2) + $CRLF + _
           HEX$(@Info.Val3) + $CRLF + _
           HEX$(@Info.Val4)
```

Note that the target specifier is in front of the TYPE name since it is the pointer. Val1, Val2, Val3, and Val4 represent offsets from that pointer. PowerBASIC does support a pointer within a structure pointer, but you should be *very* careful in their use. Changing the structure pointer itself could make all member pointers invalid. See the topic on pointers for more information.

Bit Variables

TYPE structures may contain bit variables, which are named BIT (unsigned values) or SBIT (signed values). Each bit variable may occupy from 1 to 31 bits, and they may be packed one after another up to a total of 32 bits per bit field. The size of a bit variable is defined as follows:

```
var AS BIT * nlit [IN BYTE|WORD|DWORD]
```

…where the term "* nlit" defines the number of bits (1 to 31), and the optional term "IN BYTE|WORD|DWORD", if present, defines the start of a new bit field of 1, 2, or 4 bytes. For example:

```
TYPE ABCD
  Valu2 AS BIT  * 31 IN DWORD
  Sign1 AS SBIT * 1
  nybl2 AS BIT  * 4 IN BYTE
  nybl1 AS BIT  * 4
END TYPE
```

The example TYPE structure above is 5 bytes in size, containing a 4-byte bit field and a 1-byte bit field. In this case, each contains two bit-variables of varying size. The range of values which may be stored depends upon the number of bits available. For example, "BIT * 4" has a range of 0 to 15, "SBIT * 1" has a range of -1 to 0, and "SBIT * 5" has a range of -16 to +15.

Structures within structures

Structures (TYPE/UNION) may be embedded within another structure, for simplification in referencing deeply nested items, by simply stating the structure name alone at the appropriate position. The internal alignment of the member structure is precisely maintained regardless of other alignment specifications, to foster inheritance issues. For example:

TYPE ABCD3	TYPE **ABCD2**	UNION **ABCD1**
A AS LONG	D AS DWORD	F AS DWORD
ABCD2	E AS DOUBLE	G AS LONG
C AS LONG	**ABCD1**	H AS SINGLE
END TYPE	END TYPE	END UNION

In this case, you could access the lone Single-precision float member of this structure very simply. Assuming DIM X AS ABCD3, you could reference the Single-precision Union member with the statement X.H, instead of the extended syntax X.ABCD2.ABCD1.H

For related information, please refer to the UNION/END UNION and User-Defined Types and Unions sections.

Restrictions

When measuring the size of a padded (aligned) UDT structure with the LEN or SIZEOF statements, the measured length includes any padding that was added to the structure. For example, the following UDT structure:

```
TYPE LengthTestType DWORD
  a AS INTEGER
```

```
END TYPE
' more code here
DIM abc AS LengthTestType
x& = LEN(abc)
```

Returns a length of 4 bytes in *x&*, since the UDT was padded with 2 additional bytes to enforce DWORD alignment. Note that the LEN and SIZEOF of individual UDT members will return the true size of the member without regard to padding or alignment. In the previous example, LEN(abc.a) returns 2.

Individual UDT structures can be up to 16 MB each. Arrays within a UDT, nul-terminated strings and fixed-length strings may occupy the full 16 MB structure size limit.

Field strings and dynamic strings cannot be used in UDT or UNION structures. Attempting to do so results in a compile-time Error 485 ("Dynamic/Field strings not allowed").

See also DIM, LEN, REDIM, LET (with Types), SIZEOF, TYPE SET, UNION/END UNION, User-Defined Types, Unions

Example

```
TYPE JournalEntryType
  AccountName    AS STRING * 20
  AccountNumber  AS LONG
  Amount         AS CUR
END TYPE

DIM JournalEntry AS JournalEntryType

JournalEntry.AccountName   = "Joe Smith"
JournalEntry.AccountNumber = 7467047&
JournalEntry.Amount        = 42.01@
' process journal entry here
JournalEntry.AccountNumber = 705233476&
JournalEntry.Amount        = 69.35@
' process journal entry here
```

TYPE SET statement

TYPE SET statement

Purpose Assign the value of a User-Defined Type or byte string expression into another User-Defined Type variable.

Syntax `TYPE SET typevar = {typevar | ByteStringExpr$} [USING ustring_expression]`

Remarks TYPE SET is primarily designed to assign the value of a User-Defined Type (UDT) to a different class of User-Defined Type. Additionally, TYPE SET can be used to assign a string expression (*ByteStringExpr$*) to a UDT, though it is generally not appropriate to assign a wide Unicode string.

USING Any Byte positions remaining after the assignment are filled (padded) in the target *typevar* with the first character of the USING string expression, or binary zeros if not specified.

See also CSET, CSET$, LET (with Types), LSET, LSET$, RSET, RSET$, TYPE/END TYPE

Example

```
TYPE udt1
  x AS STRING * 12
  y AS LONG
  z AS INTEGER
END TYPE

TYPE udt2
  a(1 TO 18) AS BYTE
```

```
END TYPE

FUNCTION PBMAIN
  DIM u1 AS udt1
  DIM u2 AS udt2

  u1.x = "ABC"
  TYPE SET u2 = u1
  a$ = CHR$(u2.a(1), u2.a(2), u2.a(3))

  TYPE SET u2 = "1" USING "2"
  b$ = CHR$(u2.a(1), u2.a(2), u2.a(3))
END FUNCTION
```

Result

```
a$ contains "ABC"
b$ contains "122"
```

UBOUND function

UBOUND function

Purpose Return the largest possible subscript (boundary) for an array's specified dimension.

Syntax

```
y = UBOUND(array [(dimension)])
y = UBOUND(array, dimension)
```

Remarks *array* is the array of interest. *dimension* is an

value or expression from 1 up to the number of dimensions in *array*; it specifies which dimension's upper bound value will be returned. If you omit *dimension*, it defaults to 1 (the first dimension). To find the lower bound of an array's dimension, use the LBOUND function. Use LBOUND and UBOUND together to determine an array's size. UBOUND of an undimensioned array returns -1, so that `UBOUND(array) - LBOUND(array) + 1` yields zero (0) for such an array.

Restrictions UBOUND cannot be used on arrays *within* User-Defined Types.

See also ARRAYATTR, DIM, LBOUND, REDIM

Example

```
' Dimension an array with lower and upper bounds
DIM MyArray%(1900 TO 2000,5 TO 10)

' print out the values of the array
Message$ = "The array's first dimension is from" + _
           STR$(LBOUND(MyArray%(1))) + "to" + _
           STR$(UBOUND(MyArray%(1)))
Message$ = "The array's second dimension is from" + _
           STR$(LBOUND(MyArray%(2))) + "to" + _
           STR$(UBOUND(MyArray%(2)))
```

Result

```
The array's first dimension is from 1900 to 2000
The array's second dimension is from 5 to 10
```

UCASE$ function

UCASE$ function

Purpose Return an all-uppercase (capitalized) version of a

.

Syntax

```
s$ = UCASE$(string_expression [,ANSI | OEM])
```

Remarks UCASE$ returns a string equivalent to *string_expression*, except that lowercase letters in *string_expression* are converted to uppercase. The optional ANSI or OEM parameter specifies whether the conversion is made using the ANSI charset for the system, or the original IBM OEM charset. If no charset is specified, PowerBASIC for Windows uses the system ANSI charset, while PB/CC uses the IBM OEM charset. Only "International" characters in the range of CHR$(128) to CHR$(255) are affected by this parameter.

The OEM charset is based upon the original IBM OEM charset to ensure compatibility with programs written for all previous versions of the PowerBASIC compiler.

See also ASC, LCASE$, MCASE$

Example
```
x$ = UCASE$("Beware of cats!")
```

Result
```
BEWARE OF CATS!
```

UCODE$ function

UCODE$ function

Purpose Translates ANSI bytes into Unicode bytes.

Syntax
```
a$ = UCODE$(AnsiStrExpression [,CodePage&])
```

Remarks This version of PowerBASIC handles all conversions between ANSI strings and UNICODE strings automatically. For example:

```
MyWideString$$ = MyAnsiString$
```

In this case, the ANSI characters are transparently converted to WIDE UNICODE characters when they are stored in *MyWideString$*. You should not insert a UCODE$ function here. The simple fact that the variables are of differing types (ANSI/WIDE) causes the compiler to make all conversions for you, whenever they are needed.

Of course, this automatic conversion was not available in previous versions of the compiler. In the past, there were no WIDE UNICODE variables offered, so it was necessary to force wide characters into standard byte strings when UNICODE was needed. The ACODE$ and UCODE$ functions are used for this purpose alone: to support legacy programs which calculated strings in this fashion.

New PowerBASIC programs and updates to your older PowerBASIC programs should use the new WIDE UNICODE variables which are now available.

UCODE$ presumes that the *AnsiStrExpression* contains ANSI byte characters stored in an ANSI byte string. It converts them into WIDE UNICODE characters and returns them as an ANSI byte string. To convert a UNICODE byte string into an ANSI byte string, use the ACODE$ function.

If the optional parameter *CodePage&* is present, it represents the code page to be used for the conversion process. If not given, the default code page for the locale of the executing computer is used.

Unicode strings require two bytes to represent a Unicode character, whereas ANSI strings (the native PowerBASIC string format) use one byte to represent a character. Therefore, UCODE$ returns a string that has double the byte count of the ANSI string, yet represents the same number of characters.

See also ACODE$, UCODEPAGE

UCODEPAGE statement

Keyword Template

Purpose

Syntax
Remarks
See also
Example

UCODEPAGE statement IMPROVED

Purpose Set the default codepage used for ANSI / UNICODE conversions.

Syntax `UCODEPAGE ANSI|OEM|NumExpr [TO PrevPage&]`

Remarks PowerBASIC will make many conversions between ANSI and UNICODE (wide character) . UCODEPAGE specifies the CodePage to be used for these translations. The default is UCODEPAGE ANSI which will use the system ANSI codepage for your computer. UCODEPAGE OEM will use the system OEM codepage for your computer, while a expression can specify a particular CodePage of your choice.

If the optional TO clause is used, the number of the previous default CodePage is assigned to the long integer variable specified by *PrevPage&*. By saving the previous codepage, you can later restore it, if that's appropriate.

This statement does not change the CodePage in use by your computer. It tells which codepage PowerBASIC should use for ANSI/UNICODE conversions.

By default, the system ANSI CodePage, is used to map the character translation, and this generally works very well, as it represents the usual codepage for your primary language. However, if you are compiling a CONSOLE application which makes use of the high-order ANSI codes, CHR$(128) through CHR$(255) for line drawing and a few international characters, you should declare an OEM CodePage by placing UCODEPAGE OEM at the start of your MAIN function.

The CodePage specification is maintained on a thread-by-thread basis. At program start, the default is the system ANSI CodePage. If a new is launched, it inherits the CodePage in use by the main thread.

See also ACODE$, UCODE$

UDP CLOSE statement

UDP CLOSE statement

Purpose Close a previously opened UDP socket that was created with the UDP OPEN statement.

Syntax `UDP CLOSE [#] fNum&`

Remarks Close the previously opened UDP/IP port specified by *fNum&*.

See also TCP and UDP Communication, TCP CLOSE, UDP NOTIFY, UDP OPEN, UDP RECV, UDP SEND

UDP NOTIFY statement

UDP NOTIFY statement

Purpose Designate which UDP/IP events will generate a notification message.

Syntax `UDP NOTIFY [#] fNum&, {SEND | RECV | CLOSE} TO hWnd& AS wMsg&`

Remarks Designates which events (SEND, RECV, and CLOSE) will generate a notification *wMsg&*

message, to be sent to the window/dialog procedure (CALLBACK), identified by the window handle *hWnd&*.

Your program defines the *wMsg&* value, and this value should be equal or larger than %WM_USER + 500, to avoid conflict with common Windows callback message values.

When the nominated Callback Function receives the *wMsg&* notification, the *wParam&* parameter identifies the operating system's handle of the socket (see FILEATTR). The low-order Word of *lParam&* specifies the code of the event (see table below), and the high-order Word of *lParam&* contains the error code (if any).

LO(WORD, *lParam&*)	Definition
%FD_READ	Data is available to be read from the socket.
%FD_WRITE	The socket is ready for data to be written.
%FD_CLOSE	The socket has been closed.

Notification messages do not arrive in unabated or continuous streams. That is, once a particular notification message arrives, it will not be sent again until the initial message is acted upon. For example, if an %FD_READ notification is received for a particular socket, it will not be resent until after a UDP RECV statement is executed.

The Winsock error codes are listed in WINSOCK2.INC, prefixed with `%WSAE`.

See also FILEATTR, TCP and UDP Communication, TCP NOTIFY, UDP CLOSE, UDP OPEN, UDP RECV, UDP SEND

UDP OPEN statement

UDP OPEN statement

Purpose Create a socket for an application to communicate with a UDP server or client using the UDP (connectionless) protocol over Winsock (UDP/IP).

Syntax **`UDP OPEN [PORT p&] AS [#] fNum& [TIMEOUT timeoutval&]`**

Remarks Open a UDP socket (port or service) for UDP communication. *FNum&* is a file number such as #1, or a variable with a value obtained using the FREEFILE function.

PORT If PORT *p&* is specified, the socket is opened as a server that can receive UDP data. Use the UDP NOTIFY statement to receive server notifications from the socket so that the data can be retrieved. Common port numbers include 7 (Echo, see RFC862); 37 (Time, see RFC868); and 123 (NTP - RFC1305).

TIMEOUT The TIMEOUT option allows you to specify how long, in milliseconds (*mSec*), a UDP SEND/RECV operation should wait for completion. If the specified number of milliseconds elapses, the UDP operation will fail, and the ERR system variable will be set to indicate a run-time Error 24 ("Device timeout"). The default timeout is 60000 milliseconds (60 seconds).

See also TCP and UDP Communication, FREEFILE, TCP OPEN, UDP CLOSE, UDP NOTIFY, UDP RECV, UDP SEND

UDP RECV statement

UDP RECV statement

Purpose Receive data from a previously opened UDP port.

Syntax **`UDP RECV [#] fNum&, FROM ip&, pNum&, Buffer$`**

Remarks Receive any bytes from the previously opened UDP port specified by *fNum&*, and place them into *Buffer$*. The IP address that sent the UDP packet is placed into the *ip&* variable, and the port number is placed into the *pNum&* variable.

ip& and *pNum&* may be subsequently used to send data back in response to data received.

UDP RECV is a blocking statement. That is, execution does not continue until either data is retrieved from the socket, or the timeout period expires.

If a timeout occurs, a run-time Error 24 ("Device timeout") is generated and placed in the ERR system variable. See UDP OPEN to specify the UDP socket timeout value.

See also TCP and UDP Communication, TCP RECV, UDP CLOSE, UDP NOTIFY, UDP OPEN, UDP SEND

UDP SEND statement

UDP SEND statement

Purpose Send a

of data through a previously opened UDP socket.

Syntax **UDP SEND [#]** ***fNum&*****, AT** ***ip&*****,** ***pNum&*****,** ***string_expression***

Remarks Write the specified *string_expression* to the UDP/IP port *pNum&* at the IP address specified in *ip&*, using the UDP connection specified by *fNum&*.

See also TCP and UDP Communication, TCP SEND, UDP CLOSE, UDP NOTIFY, UDP OPEN, UDP RECV

UNION/END UNION block

UNION/END UNION statements

Purpose Create a new User-Defined Type definition whose member elements overlap in memory.

Syntax

```
UNION UnionName
   MemberName [(subscripts)] AS TypeName
  [MemberName [(subscripts)] AS TypeName]
  [...]
END UNION
```

Remarks A union is a type - very similar to a User-Defined Type - except that its elements overlap in memory. While this may seem strange at first, it has enormous potential.

For example, say you are designing an accounting program. You want to make it general purpose so it has widespread appeal. But everyone does their accounting differently; for example, some people use account numbers that are plain integral values, while others may use alphanumeric account names. Using a Union makes this easy. Another common use of a Union is variable type conversion. The is best described by way of an example:

```
UNION VarConvert
  iLong  AS LONG
  iDword AS DWORD
  sStr   AS STRING * 4
END UNION

DIM x AS VarConvert, y AS DWORD, z AS STRING
x.iLong = 123456&
y       = x.iDword
z       = x.sStr
```

Like a User-Defined Type, a Union may also contain arrays, and these follow the same rules as User-Defined Type member arrays (see Type Members for syntax rules and additional examples). The following example demonstrates the use of a Union member array:

```
UNION Arrs
  a1(1 TO 1024) AS BYTE
  st AS ASCIIZ * 10
END UNION

FUNCTION PBMAIN
    DIM a AS Arrs
    a.a1(1) = 72
    a.a1(2) = 101
    a.a1(3) = 108
    a.a1(4) = 108
    a.a1(5) = 111
    a.a1(6) = 33
    ' At this point, a.st contains "Hello!"
END FUNCTION
```

Bit Variables

UNION structures may contain bit variables, which are named BIT (unsigned values) or SBIT (signed values). Each bit variable may occupy from 1 to 31 bits, and they may be packed one after another up to a total of 32 bits per bit field. The size of a bit variable is defined as follows:

```
var AS BIT * nlit [IN BYTE|WORD|DWORD]
```

…where the term "* nlit" defines the number of bits (1 to 31), and the optional term "IN BYTE|WORD|DWORD", if present, defines the start of a new bit field of 1, 2, or 4 bytes. For example:

```
UNION ABCDE
  Odd1 AS BIT * 1 IN DWORD
  Value1 AS LONG
END UNION
```

The example UNION structure above is 4 bytes in size, containing a 1-byte bit field and a 4-byte LONG.

```
UNION abcde
  Part1 AS BIT * 8 IN DWORD
  Part2 AS BIT * 16
END UNION
```

The example union above is 4 bytes in size, containing an 8-bit field and an overlapping 16-bit field.

Structures within structures

Structures (TYPE/UNION) may be embedded within another structure, for simplification in referencing deeply nested items, by simply stating the structure name alone at the appropriate position. The internal alignment of the member structure is precisely maintained regardless of other alignment specifications, to foster inheritance issues. For example:

TYPE ABCD3	TYPE **ABCD2**	UNION **ABCD1**
A AS LONG	D AS DWORD	F AS DWORD
ABCD2	E AS DOUBLE	G AS LONG
C AS LONG	**ABCD1**	H AS SINGLE
END TYPE	END TYPE	END UNION

In this case, you could access the lone Single-precision float member of this structure very simply. Assuming DIM X AS ABCD3, you could reference the Single-precision Union member with the variable name X.H, instead of the extended syntax X.ABCD2.ABCD1.H

Restrictions A Union can contain elements of dissimilar sizes. The size of a Union structure is always determined by the longest member element. This is usually an important consideration when using a Union within another Union or UDT structure, in order to determine the size of the final structure.

For related information, please refer to the TYPE/END TYPE, User-Defined Types and Unions sections.

Field strings cannot be used in UDT or UNION structures. Attempting to do so results in a compile-time Error 485 ("Dynamic/Field strings not allowed").

See also DIM, LEN, LET (with Types), SIZEOF, TYPE/END TYPE, User-Defined Types, Unions

Example

```
UNION AccountUnion
  AccountNumber  AS LONG
  AccountName    AS STRING * 16
END UNION

TYPE JournalEntryType
  Account  AS AccountUnion
  Amount   AS CUR
END TYPE

DIM JournalEntry AS JournalEntryType

JournalEntry.Account.AccountName = "Smith"
JournalEntry.Amount = 123.01@
' process journal entry here
JournalEntry.Account.AccountNumber = 1001
JournalEntry.Amount = -1.99@
```

UNLOCK statement

UNLOCK statement

Purpose Remove locks placed on a file to permit other threads, processes, and applications to access the locked sections of the file.

Syntax **UNLOCK [#] *filenum&* [, {*record&&* | *start&&* TO *finish&&*}]**

Remarks UNLOCK restores access to a record, range of records, byte, or range of bytes locked by the LOCK statement, in file opened as file number *filenum&*.

If the file was opened in random-access mode, *record&&*, *start&&*, and *finish&&* specify record numbers.

When used with binary mode files, *record&&*, *start&&*, and *finish&&* specify byte positions, starting from either one (the default) or zero, depending on the BASE setting given when the file was Opened.

If a record is specified, only that record (or byte) is unlocked. Otherwise, a range of records (or bytes) is unlocked, from *start&&* to *finish&&*. If no records are specified, or if the file was opened in sequential mode, the entire file is unlocked.

All records (or bytes) to be unlocked must have been previously locked using the LOCK statement. Multiple locks may be placed on a file, and locks may be unlocked in any order. However, the parameters used for each UNLOCK statement must exactly match those used for the previous corresponding LOCK statement.

All locked records (or bytes) must be unlocked using the UNLOCK statement before the file can be closed.

If an unlock attempt fails, PowerBASIC sets the ERR system variable to reflect a run-time Error 70 ("Permission denied"), or Error 75 ("Path/file access error").

See also LOCK, OPEN

Example See the example for LOCK.

UNWRAP$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

UNWRAP$ function New!

Purpose Remove paired characters from the beginning and end of a

.

Syntax ***s$*** **= UNWRAP$(*StringExpression*, *LeftChar$*, *RightChar$*)**

Remarks The UNWRAP$ function removes the characters in *LeftChar$* from the beginning of *StringExpression*, if there is an exact match. It then removes the characters in *RightChar$* from the end, if there is an exact match. The remaining character are then returned. For example:

```
UNWRAP$("<MyWord>", "<", ">")  returns  "MyWord"
```

UNWRAP$ is particularly useful for removing parentheses, quotes, brackets, etc. from a text item.

See also EXTRACT$, LTRIM$, MID$, REMOVE$, REPLACE, RTRIM$, SHRINK$, TRIM$, WRAP$

USING$ function

USING$ function

Purpose Format one or more

or expressions, based upon the contents of the format mask string.

Syntax ***sResult$*** **= USING$(*fmtmask$*, *expr* [, *expr* [, ...]])**

Remarks The rules of formatting are based upon the PRINT USING statement supported in many DOS versions of BASIC, including PowerBASIC for DOS.

However, since it is implemented as a function, it allows far more versatility in that it is not necessary to output a value to gain the benefit of this unique functionality. Also, USING$ offers a wider range of applications than FORMAT$ because it can format both numeric and string expressions, and can take multiple arguments.

fmtmask$ A string expression, string variable or string literal consisting of format characters that will determine how the complete expression should be formatted. This expression is termed the *mask*. There may be as many format masks in *fmtmask$*, arranged in the same order as the *expr* arguments are specified. See the examples below for more information.

expr A string or numeric expression, variable, or literal value to be formatted. The mask characters available depend on whether *expr* is a string or numeric.

Character **Definition**

(string expr)	**When *expr* is a string, the following format codes apply within *fmtmask$*:**
!	The first character of the string is returned.
&	The entire string is returned.
\\	The first two characters are returned.
\ \	If backslashes enclose *n* spaces, *n* + 2 characters of the string expression are returned.
_	Escape (underscore) character. The following character is interpreted as a literal character instead of a mask format character.
(numeric expr)	**When *expr* is numeric, the following format codes apply within *fmtmask$*:**
#	A numeric digit position, which is space-filled to the left, and zero-filled to the right of the decimal point. If the number is negative, a minus sign occupies a digit position.
.	The decimal point is placed at this position.
,	A numeric digit position, which signifies that whole number digits should be displayed with a comma each three digits.
$$	Two numeric digit positions which cause a dollar sign to be inserted immediately before the number.
**x*	Two numeric digit positions which cause leading blank spaces in the field to be replaced with the character in the second position of the pair "*x*" (where "x" represents your own choice of character). For example, two asterisks "**" will convert leading spaces to asterisks, and "*=" converts leading spaces to equals characters, etc. The **x* mask characters also act as two digit (#) placeholders. Your mask must contain at least three characters to use this.
+	A plus at the start of the field causes the sign of the value (+ -) to be inserted before the number. A plus at the end of the field causes the sign of the value (+ -) to be added after the number.
-	A minus at the end of the field causes a minus signed to be added after a negative number, or a space to be added after a positive number. A minus at the start of the field is treated as a literal character, which is always inserted.
^	Numbers can be formatted in scientific notation by including three to six carets (^) in the format string. Each caret corresponds to a numeric digit position in the exponent, one for E, one for the exponent sign, and one to four for the actual digits of the exponent value.
_	Escape (underscore) character. The following character is interpreted as a literal character instead of a mask format character. Therefore, to include a literal underscore character in the format mask, use two underscore characters.
	All characters in the format mask string that are not identified above are copied into the output string just as they are encountered. You can override or *escape* any special format code by preceding it with an underscore character (_) and it will be copied as any other literal character. This provides the flexibility to include literal string text within the formatted return string.

Restrictions The returned string is limited to an absolute length limit of 1024 bytes.

By specifying a single mask in fmtmask$, all *expr* arguments are subjected to the single mask. See the examples below.

If there are fewer *expr* arguments than matching format masks in fmtmask$, parsing of the *fmtmask$* halts after the last referenced mask position, and subsequent characters in *fmtmask$* are ignored. This is consistent with the behavior of PRINT USING$ in PB/DOS.

If a numeric argument overflows its mask (i.e., there are more digits than digit positions), the resulting string will occupy as many spaces as needed to represent the number. In such cases, PB/DOS includes a leading "%" symbol to indicate the mask overflow;

however, PowerBASIC for Windows does not return the additional "%" overflow character.

The semicolon (;) and zero (0) characters are reserved for future use, so it would be prudent to escape such literal characters in USING$ masks to maintain future compatibility.

See also GRAPHIC PRINT, XPRINT, FORMAT$, STR$

Example

```
a$ = USING$("!", "abc")
' returns "a"

a$ = USING$("You owe $$#,.##", 12345.67@)
' returns "You owe $12,345.67

DIM p AS BYTE PTR
HOST ADDR "localhost" TO ip&
p = VARPTR(ip&)
a$ = USING$("#_.#_.#_.#", @p, @p[1], @p[2], @p[3])
' returns "127.0.0.1"

a$ = USING$("&=#.##############", "Pi", ATN(1)*4)
' returns "Pi=3.14159265358979"

a$ = USING$("!", "AX", "BX", "CX")
' returns "ABC"

a$ = USING$("$#.##_,", 1,20,300,4)
' returns "$1.00,$20.00,$300.00,$4.00,"

a$ = USING$("$*=#####.##_,",1,20)
' returns "$======1.00,$=====20.00,"
```

Utf8ToChr$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

Utf8ToChr$ function New!

Purpose Translates a byte string of OEM characters into ANSI/WIDE characters.

Syntax `a$$ = Utf8ToChr$(UtfExpr$)`

Remarks *UtfExpr$* contains a series of bytes in UTF-8 format. Utf8ToChr$ translates it into either ANSI multi-byte equivalent characters or WIDE (16-bit) Unicode characters, depending upon the context of the source code. PowerBASIC will always choose the correct form with no intervention needed by the programmer.

See also ChrToOem$, ChrToUtf8$, OemToChr$

VAL function

VAL function IMPROVED

Purpose Convert a text

to a value.

Syntax ***y* = VAL(*string_expression* [, *offset*])**

Remarks The VAL function converts a string argument to a number. If the optional Offset parameter is included, it indicates the position in the string where the conversion should begin. If not given, it defaults to one (1), and begins at the first character. Leading white-space characters (spaces, tabs, carriage-returns, and linefeeds) are skipped and ignored. Evaluation of the number continues until a non-numeric character is found, or the end of the string is reached. If no number is found, the VAL() function returns zero (0). Format characters (like commas) are not allowed, and will cause early termination of the evaluation.

VAL interprets the letters "e" and "d" (and "E" and "D") as the symbols for exponentiation and scientific notation:

```
i& = VAL("10.101e3") ' 10101 ~ 10.101*(10^3)
j& = VAL("2D4")      ' 20000 ~ 2 * (10 ^ 4)
```

Hexadecimal, Binary and Octal conversions

VAL can also be used to convert string arguments that are in the form of Hexadecimal, Binary and Octal numbers. Hexadecimal values should be prefixed with "&H" and Binary with "&B". Octal values may be prefixed "&O", "&Q" or just "&". If the *string_expressio* contains a leading zero, the result is returned as an unsigned value; otherwise, a signed value is returned. For example:

```
i& = VAL("&HF5F3")        ' Hex, returns -2573 (signed)
j& = VAL("&H0F5F3")       ' Hex, returns 62963 (unsigned)
x& = VAL("&B0100101101") ' Binary, returns 301 (unsigned)
y& = VAL("&O4574514")     ' Octal, returns 1243468 (signed)
```

Valid hex characters include 0 to 9, A to F (and a to f). Valid Octal characters include 0 to 7, and binary 0 to 1.

Use the STR$, DEC$, FORMAT$, and USING$ functions to convert numeric values into decimal strings. Use BIN$, HEX$ and OCT$ to convert them to Binary, Hexadecimal, and Octal representations.

Restrictions VAL stops analyzing *string_expression* when non-numeric characters are encountered. When dealing with Hexadecimal, Binary, and Octal number systems, the period character is classified as non-numeric. This is because PowerBASIC only supports floating-point formats for the decimal number system. VAL accepts the period character as a decimal place for all decimal number system values.

VAL does not analyze trailing type-specifiers for decimal strings. For example, VAL("9.1&") is evaluated as 9.1 rather than 9 because the "&" suffix is treated as a non-numeric character, not a type-specifier. However, type suffixes may be used with binary, octal, and hex values.

See also BIN$, DEC$, FORMAT$, HEX$, OCT$, STR$, USING$, VAL statement

Example

```
Price$ = "$ 15,345.92"
Cost@@ = VAL(REMOVE$(Price$, ANY "$, "))
```

Result

```
15345.92
```

VAL statement

Keyword Template

Purpose

Syntax
Remarks
See also
Example

VAL statement New!

Purpose Convert a text

to a value with additional information.

Syntax **VAL *StrgExpr* [, *offset*] TO *ValueVar* [, *DigitsVar&*, *UnusedVar&*]**

Remarks The VAL statement converts a string argument to a number, but adds additional information about the conversion. Both Leading and trailing white-space characters (spaces, tabs, carriage-returns, and linefeeds) are skipped and ignored. If no number is found, the value zero (0) is returned. Format characters (like commas) are not allowed, and will cause early termination of the evaluation.

VAL interprets the letters "e" and "d" (and "E" and "D") as the symbols for exponentiation and scientific notation:

```
VAL "10.101e3" TO i&    ' 10101 ~ 10.101*(10^3)
VAL "2D4" TO j&         ' 20000 ~ 2 * (10 ^ 4)
```

Hexadecimal, Binary and Octal conversions

VAL can also be used to convert string arguments that are in the form of Hexadecimal, Binary and Octal numbers. Hexadecimal values should be prefixed with "&H" and Binary with "&B". Octal values may be prefixed "&O", "&Q" or just "&". If the *StrgExpr* contains a leading zero, the result is returned as an unsigned value; otherwise, a signed value is returned. For example:

```
VAL "&HF5F3"   TO i&      ' Hex, returns -2573 (signed)
VAL "&H0F5F3"  TO j&      ' Hex, returns 62963 (unsigned)
VAL "&B0100101101"  TO x& ' Binary, returns 301 (unsigned)
VAL "&O4574514"  TO y&    ' Octal, returns 1243468 (signed)
```

Valid hex characters include 0 to 9, A to F (and a to f). Valid Octal characters include 0 to 7, and binary 0 to 1.

Use the STR$, DEC$, FORMAT$, and USING$ functions to convert numeric values into decimal strings. Use BIN$, HEX$ and OCT$ to convert them to Binary, Hexadecimal, and Octal representations.

Offset If the optional Offset parameter is included, it indicates the position in the string where the conversion should begin. If not given, it defaults to one (1), and begins at the first character.

ValueVar A numeric variable which receives the result of the conversion.

DigitsVar An optional long integer variable which receives the count of the number of significant digits found in the evaluation. If this value is zero (0), no valid number was found and zero (0) was also assigned to *ValueVar*.

UnUsedVar An optional long integer variable which receives the count of the unused characters. Since the evaluation skips both leading and trailing white-space, a non-zero value indicates that additional characters of some significance may be present. You can use RIGHT$(StrgExpr, UnUsedVar) to separate the unused characters.

Restrictions VAL stops analyzing string_expression when non-numeric characters are encountered. When dealing with Hexadecimal, Binary, and Octal number systems, the period character is classified as non-numeric. This is because PowerBASIC only supports floating-point formats for the decimal number system. VAL accepts the period character as a decimal place for all decimal number system values.

VAL does not analyze trailing type-specifiers for decimal strings. For example, VAL("9.1&") is evaluated as 9.1 rather than 9 because the "&" suffix is treated as a non-numeric character, not a type-specifier. However, type suffixes may be used with binary, octal, and hex values.

See also BIN$, DEC$, FORMAT$, HEX$, OCT$, STR$ USING$, VAL function

Example

```
s = "The total cost is $145.26."
VAL s, INSTR(s, "$")+1 to i
```

Result

```
145.26
```

VARIANT# function

VARIANT# function

Purpose Returns the numeric value contained in a Variant variable.

Syntax ***numericvar*** **= VARIANT#(*vrntvar*)**

Remarks The value returned by VARIANT# may be any range from BYTE to DOUBLE/QUAD/CURRENCY, depending upon the internal representation used within the Variant.

While Variant variables, by definition, do not offer support for Extended Precision Float data types, you should note that it is possible for a QUAD or CURRENCY value to exceed the precision level offered by a DOUBLE. You should therefore use some judgement in deciding on the

variable type to be used as the destination of this function, based upon the expected return values, and the internal representation, which you can obtain with VARIANTVT.

Restrictions VARIANT# presumes that a valid numeric value is present (not an array); otherwise, the value zero is returned.

See also DIM, LET, OBJECT, LET (with Variants), VARIANT$, VARIANT$$, VARIANTVT

Example

```
DIM vVnt AS VARIANT
vVnt = 999&
a& = VARIANT#(vVnt)
```

VARIANT$/VARIANT$$ function

VARIANT$ / VARIANT$$ function

Purpose Returns the byte

contained in a Variant variable.

Syntax

```
AnsiVar  = VARIANT$(VrntVar)
WideVar  = VARIANT$$(VrntVar)
TypeVar  = VARIANT$(BYTE, VrntVar)
```

Remarks VARIANT$ extracts a string from a variant variable if a dynamic string (VT_BSTR) is found there. If the variant contains any other VT type, an empty string is returned. By definition, a BSTR is a wide Unicode string. It is generally safe to assume this is the case, unless the variant was created by PowerBASIC and you know the internal format is bytes rather than wide Unicode words.

The first form of VARIANT$ converts the wide Unicode contents to ANSI, returning it as an ANSI string. The second form of VARIANT$$ returns the contents directly as a wide Unicode string. Of course, in all assignment and parameter situations, PowerBASIC will automatically handle any conversions needed between ANSI and WIDE string values. For that reason, no additional code should be added to this operation for ANSI/WIDE conversion. Also, keep in mind that the correct choice of function can improve the performance of your program.

BYTE

If the BYTE option is specified, you are telling PowerBASIC that the string contains a set of BYTES rather than wide Unicode words. This would be the case if you stored a User-Defined Type in a variant:

```
LET VariantVar = ThisUDTVar AS STRING
ThatUDTVar = VARIANT$(BYTE, VariantVar)
```

This form of VARIANT$ always returns the contents as an ANSI byte string. This result can be assigned to an ANSI string variable or a User-Defined Type.

Legacy

Older legacy programs were forced to store Unicode characters in an ANSI string variable because wide string variables were not yet available. These programs should continue to use VARIANT$ with ACODE$ and variant assignment with UCODE$ until the program logic is updated to use wide Unicode variables.

See also

DIM, LET, OBJECT, LET (with Variants), VARIANT#, VARIANTVT

Example

```
DIM vVnt AS VARIANT
vVnt = "Hello World"$$
a$ = VARIANT$(vVnt)
```

VARIANTVT function

VARIANTVT function

Purpose

Determine the internal data type of the data stored in a Variant variable.

Syntax

```
numericvar = VARIANTVT(vrntvar)
```

Remarks

The VARIANTVT function returns the internal VT data type stored in the Variant. The entire range of %VT prefixed values are documented by the OLE (COM) specification and are available in WIN32API.INC.

The most important values in this limited context include %VT_EMPTY (=0) and %VT_BSTR (=8), since the others are

formats automatically resolved by the LET (with Variants) statement and VARIANT# function.

Result	Equate	Content Type
0	%VT_EMPTY	An Empty Variant
1	%VT_NULL	Null value
2	%VT_I2	Integer
3	%VT_I4	Long-Integer
4	%VT_R4	Single
5	%VT_R8	Double
6	%VT_CY	Currency
7	%VT_DATE	Date
8	%VT_BSTR	Dynamic String
9	%VT_DISPATCH	IDispatch
10	%VT_ERROR	Error Code
11	%VT_BOOL	Boolean
12	%VT_VARIANT	Variant
13	%VT_UNKNOWN	IUnknown
14	%VT_DECIMAL	Decimal
16	%VT_I1	Byte (signed)

17	%VT_UI1	Byte (unsigned)
18	%VT_UI2	Word
19	%VT_UI4	DWORD
20	%VT_I8	Quad (signed)
21	%VT_UI8	Quad (unsigned)
22	%VT_INT	Long-Integer
23	%VT_UINT	DWord
24	%VT_VOID	A C-style void type
25	%VT_HRESULT	COM result code
26	%VT_PTR	Pointer
27	%VT_SAFEARRAY	VB Array
28	%VT_CARRAY	A C-style array
29	%VT_USERDEFINED	User Defined Type
30	%VT_LPSTR	ANSI
31	%VT_LPWSTR	Unicode string
36	%VT_RECORD	UDT
64	%VT_FILETIME	A FILETIME value
65	%VT_BLOB	An arbitrary block of memory
66	%VT_STREAM	A stream of bytes
67	%VT_STORAGE	Name of the storage
68	%VT_STREAMED_OBJECT	A stream that contains an object
69	%VT_STORED_OBJECT	A storage object
70	%VT_BLOB_OBJECT	A block of memory that represents an obj
71	%VT_CF	Clipboard format
72	%VT_CLSID	Class ID
&H1000	%VT_VECTOR	An array with a leading count
&H2000	%VT_ARRAY	Array
&H4000	%VT_BYREF	A reference value

If a Variant contains a complete array, the Variant type is determined by adding the base type to the arra modifier. That is, for a string array, it would be %VT_BSTR plus %VT_ARRAY (= &H2008).

Quad arrays within Variants are not supported by most versions of Windows. The result from VARIANTVT used to see whether such an array was created properly.

See also DIM, Just what is COM?, OBJECT, LET (with Variants), VARIANT#, VARIANT$, VARIANT$$, What is an anyway?

VARPTR function

VARPTR function

Purpose Return the 32-bit address of a variable.

Syntax `y = VARPTR(variable)`

Remarks VARPTR returns a complete 32-bit address to the specified *variable* as a Double-word (DWORD) value. *variable* is any

, , structure variable (User-Defined Type or Union), or element of an array. VARPTR returns a pointer (32-bit address in memory) where the variable data is stored.

VARPTR may also be used to locate an array descriptor, as well as the array data itself. To find the address of an array descriptor, use the array name with empty parentheses: VARPTR(x( )).

When you use VARPTR to get the address of a dynamic (variable length) string, keep in mind that the value being returned is the address of the string *handle*, not the actual *data* in the string. This can be useful for manipulating a dynamic string array using indexed-pointers, For example:

```
DIM A$(100), b$, pA AS STRING PTR, x&
' Assume A$() is filled here
pA = VARPTR(a$(0)) ' 1st element handle
FOR X& = 0 TO 100
  B$ = B$ + @pA[x&] + ","
NEXT x&
```

You can use STRPTR to find the address of the string's data. When used with pointers, VARPTR returns the address of the pointer itself.

Restrictions VARPTR cannot be used on Register variables, because Register variables are stored in internal processor registers rather than application memory. VARPTR can be used on UDT and Union variables, but not the UDT definition name. For example:

```
TYPE MyType
   ABC AS LONG
END TYPE
' more code here
DIM x AS MyTYPE, y&
y& = VARPTR(x)      ' This is legal
y& = VARPTR(MyType) ' This is not
```

See also CODEPTR, PEEK, Pointers, POKE, STRPTR

Example

```
DIM x AS INTEGER PTR, a%, b%
a% = 55
x = VARPTR(A%)
b% = @x
CALL DisplayResult("b% contains " + FORMAT$(b%))
```

Result

```
b% contains 55
```

VERIFY function

VERIFY function

Purpose Determine whether each character of a is present in another string.

Syntax ***x*** **= VERIFY([*start&*,] *MainString*, *MatchString*)**

Remarks VERIFY returns zero if each character in *MainString* is present in *MatchString*. If not, it returns the position of the first non-matching character in *MainString*.

This function is very useful for determining if a string contains only digits, for example.

VERIFY is case-sensitive, so capitalization matters.

Restrictions If *start&* evaluates to a position outside of the string on either side, or if *start&* is zero, VERIFY returns zero.

See also INSTR, LCASE$, LTRIM$, MID$, REMOVE$, REPLACE, RIGHT$, RTRIM$, TALLY, TRIM$, UCASE$

Example

```
' returns 4 since "." is not in "0123456789"
x& = VERIFY("123.65,22.5", "0123456789")
```

```
' returns 7 since 5 starts it past the first non-digit ("." at position 4)
x& = VERIFY(5,"123.65,22.5", "0123456789")
```

WHILE/WEND statements

WHILE/WEND statements

Purpose

Define a block of program statements that are executed repeatedly for as long as certain conditions are met.

Syntax

```
WHILE integer_expression
  [statements]
  [EXIT LOOP]
  [statements]
WEND
```

Remarks

If *integer_expression* is TRUE (it evaluates to a non-zero value), all of the statements between the WHILE and the terminating WEND are executed. PowerBASIC then jumps back to the WHILE statement and repeats the test. If it is still TRUE, PowerBASIC executes the enclosed statements again. This process is repeated until the test expression evaluates to zero, or an EXIT statement is encountered. In either case, execution passes to the statement following WEND.

If *integer_expression* evaluates to FALSE (zero) on the first pass, none of the statements in the loop are executed.

Loops built with WHILE/WEND statements can be nested (enclosed within each other). Each WEND matches the most recent unmatched WHILE.

One use of a WHILE/WEND loop is to input data from a file until the end of the file is reached:

```
i& = 0
WHILE ISFALSE EOF(1)
  INCR i&
  LINE INPUT #1, FileTxt$(i&)
WEND
```

Although the compiler does not care, it's a good idea to indent the statements between WHILE and WEND, to clarify the structure of the loop you have constructed.

Note that the following code creates in infinite loop:

```
WHILE -1
  [statements]
WEND
```

To exit a WHILE/WEND loop prematurely, use the EXIT LOOP statement.

PowerBASIC's DO/LOOP construct offers a more flexible way to build conditional loops.

Also see the discussion on the IF statement for notes on PowerBASIC's Short-circuit evaluation and its possible side effects.

See also

#OPTIMIZE, DO/LOOP, EXIT, FOR EACH/NEXT, FOR/NEXT, ITERATE, Short-circuit evaluation

WINDOW GET HANDLE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

WINDOW GET statement IMPROVED

Purpose Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or Dialog.

Syntax

```
WINDOW GET HANDLE hWin, ID& TO DataVar&
WINDOW GET ID hWin TO DataVar&
WINDOW GET PARENT hWin TO DataVar&
WINDOW GET STYLE hWin TO DataVar&
WINDOW GET STYLEX hWin TO DataVar&
WINDOW GET USER hWin TO DataVar&
```

hWin Handle of the Window to be used.

DataVar& A long integer variable to which result data is assigned.

Remarks The WINDOW statement may be used with any type of window in your program, including a Control or Dialog. Generally speaking, the window to be manipulated or tested is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use WINDOW GET HANDLE or CONTROL HANDLE to retrieve its handle for this purpose. If the operation fails, the value zero (0) is assigned to the result variable.

WINDOW GET HANDLE *hWin, ID&* TO *DataVar&*

This statement retrieves the handle of a Window, translating from the parent handle and the specific integral control ID given at the time it was created. *hWin* is the handle of the parent, *ID&* is the control ID, and *DataVar&* represents the variable which receives the desired window handle.

WINDOW GET ID *hWin* To *DataVar&*

The integral ID of the window *hWin* is retrieved and assigned to the variable designated by *DataVar&*. Generally, only a CONTROL will have an ID, so windows of other classes will normally return the value zero.

WINDOW GET PARENT *hWin* To *DataVar&*

The handle of the parent is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET STYLE hWin TO DataVar&

The window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET STYLEX *hWin* TO *DataVar&*

The extended window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET USER *hWin* TO *DataVar&*

The 32-bit user data value associated with the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by DDT for each dialog and control created with DDT.

See also CONTROL HANDLE, WINDOW SET

WINDOW GET ID statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

WINDOW GET statement IMPROVED

Purpose Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or Dialog.

Syntax

```
WINDOW GET HANDLE hWin, ID& TO DataVar&
WINDOW GET ID hWin TO DataVar&
WINDOW GET PARENT hWin TO DataVar&
WINDOW GET STYLE hWin TO DataVar&
WINDOW GET STYLEX hWin TO DataVar&
WINDOW GET USER hWin TO DataVar&
```

hWin Handle of the Window to be used.

DataVar& A long integer variable to which result data is assigned.

Remarks The WINDOW statement may be used with any type of window in your program, including a Control or Dialog. Generally speaking, the window to be manipulated or tested is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use WINDOW GET HANDLE or CONTROL HANDLE to retrieve its handle for this purpose. If the operation fails, the value zero (0) is assigned to the result variable.

WINDOW GET HANDLE *hWin, ID&* TO *DataVar&*

This statement retrieves the handle of a Window, translating from the parent handle and the specific integral control ID given at the time it was created. *hWin* is the handle of the parent, *ID&* is the control ID, and *DataVar&* represents the variable which receives the desired window handle.

WINDOW GET ID *hWin* To *DataVar&*

The integral ID of the window *hWin* is retrieved and assigned to the variable designated by *DataVar&*. Generally, only a CONTROL will have an ID, so windows of other classes will normally return the value zero.

WINDOW GET PARENT *hWin* To *DataVar&*

The handle of the parent is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET STYLE hWin TO DataVar&

The window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET STYLEX *hWin* TO *DataVar&*

The extended window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET USER *hWin* TO *DataVar&*

The 32-bit user data value associated with the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by DDT for each dialog and control created with DDT.

See also CONTROL HANDLE, WINDOW SET

WINDOW GET PARENT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

WINDOW GET statement IMPROVED

Purpose Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or Dialog.

Syntax

```
WINDOW GET HANDLE hWin, ID& TO DataVar&
WINDOW GET ID hWin TO DataVar&
WINDOW GET PARENT hWin TO DataVar&
WINDOW GET STYLE hWin TO DataVar&
WINDOW GET STYLEX hWin TO DataVar&
WINDOW GET USER hWin TO DataVar&
```

hWin Handle of the Window to be used.

DataVar& A long integer variable to which result data is assigned.

Remarks The WINDOW statement may be used with any type of window in your program, including a Control or Dialog. Generally speaking, the window to be manipulated or tested is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use WINDOW GET HANDLE or CONTROL HANDLE to retrieve its handle for this purpose. If the operation fails, the value zero (0) is assigned to the result variable.

WINDOW GET HANDLE *hWin, ID&* TO *DataVar&*

This statement retrieves the handle of a Window, translating from the parent handle and the specific integral control ID given at the time it was created. *hWin* is the handle of the parent, *ID&* is the control ID, and *DataVar&* represents the variable which receives the desired window handle.

WINDOW GET ID *hWin* To *DataVar&*

The integral ID of the window *hWin* is retrieved and assigned to the variable designated by *DataVar&*. Generally, only a CONTROL will have an ID, so windows of other classes will normally return the value zero.

WINDOW GET PARENT *hWin* To *DataVar&*

The handle of the parent is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET STYLE hWin TO DataVar&

The window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET STYLEX *hWin* TO *DataVar&*

The extended window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET USER *hWin* TO *DataVar&*

The 32-bit user data value associated with the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by DDT for each dialog and control created with DDT.

See also CONTROL HANDLE, WINDOW SET

WINDOW GET STYLE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

WINDOW GET statement IMPROVED

Purpose Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or Dialog.

Syntax

```
WINDOW GET HANDLE hWin, ID& TO DataVar&
WINDOW GET ID hWin TO DataVar&
WINDOW GET PARENT hWin TO DataVar&
WINDOW GET STYLE hWin TO DataVar&
WINDOW GET STYLEX hWin TO DataVar&
WINDOW GET USER hWin TO DataVar&
```

hWin Handle of the Window to be used.

DataVar& A long integer variable to which result data is assigned.

Remarks The WINDOW statement may be used with any type of window in your program, including a Control or Dialog. Generally speaking, the window to be manipulated or tested is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use WINDOW GET HANDLE or CONTROL HANDLE to retrieve its handle for this purpose. If the operation fails, the value zero (0) is assigned to the result variable.

WINDOW GET HANDLE *hWin*, *ID&* TO *DataVar&*

This statement retrieves the handle of a Window, translating from the parent handle and the specific integral control ID given at the time it was created. *hWin* is the handle of the parent, *ID&* is the control ID, and *DataVar&* represents the variable which receives the desired window handle.

WINDOW GET ID *hWin* To *DataVar&*

The integral ID of the window *hWin* is retrieved and assigned to the variable designated by *DataVar&*. Generally, only a CONTROL will have an ID, so windows of other classes will normally return the value zero.

WINDOW GET PARENT *hWin* To *DataVar&*

The handle of the parent is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET STYLE hWin TO DataVar&

The window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET STYLEX *hWin* TO *DataVar&*

The extended window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET USER *hWin* TO *DataVar&*

The 32-bit user data value associated with the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by DDT for each dialog and control created with DDT.

See also CONTROL HANDLE, WINDOW SET

WINDOW GET STYLEX statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

WINDOW GET statement IMPROVED

Purpose Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or Dialog.

Syntax

```
WINDOW GET HANDLE hWin, ID& TO DataVar&
WINDOW GET ID hWin TO DataVar&
WINDOW GET PARENT hWin TO DataVar&
WINDOW GET STYLE hWin TO DataVar&
WINDOW GET STYLEX hWin TO DataVar&
WINDOW GET USER hWin TO DataVar&
```

hWin Handle of the Window to be used.

DataVar& A long integer variable to which result data is assigned.

Remarks The WINDOW statement may be used with any type of window in your program, including a Control or Dialog. Generally speaking, the window to be manipulated or tested is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use WINDOW GET HANDLE or CONTROL HANDLE to retrieve its handle for this purpose. If the operation fails, the value zero (0) is assigned to the result variable.

WINDOW GET HANDLE *hWin, ID&* TO *DataVar&*

This statement retrieves the handle of a Window, translating from the parent handle and the specific integral control ID given at the time it was created. *hWin* is the handle of the parent, *ID&* is the control ID, and *DataVar&* represents the variable which receives the desired window handle.

WINDOW GET ID *hWin* To *DataVar&*

The integral ID of the window *hWin* is retrieved and assigned to the variable designated by *DataVar&*. Generally, only a CONTROL will have an ID, so windows of other classes will normally return the value zero.

WINDOW GET PARENT *hWin* To *DataVar&*

The handle of the parent is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET STYLE hWin TO DataVar&

The window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET STYLEX *hWin* TO *DataVar&*

The extended window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET USER *hWin* TO *DataVar&*

The 32-bit user data value associated with the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by DDT for each dialog and control created with DDT.

See also CONTROL HANDLE, WINDOW SET

WINDOW GET USER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

WINDOW GET statement IMPROVED

Purpose Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or Dialog.

Syntax

```
WINDOW GET HANDLE hWin, ID& TO DataVar&
WINDOW GET ID hWin TO DataVar&
WINDOW GET PARENT hWin TO DataVar&
WINDOW GET STYLE hWin TO DataVar&
WINDOW GET STYLEX hWin TO DataVar&
WINDOW GET USER hWin TO DataVar&
```

hWin Handle of the Window to be used.

DataVar& A long integer variable to which result data is assigned.

Remarks The WINDOW statement may be used with any type of window in your program, including a Control or Dialog. Generally speaking, the window to be manipulated or tested is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use WINDOW GET HANDLE or CONTROL HANDLE to retrieve its handle for this purpose. If the operation fails, the value zero (0) is assigned to the result variable.

WINDOW GET HANDLE *hWin, ID&* TO *DataVar&*

This statement retrieves the handle of a Window, translating from the parent handle and the specific integral control ID given at the time it was created. *hWin* is the handle of the parent, *ID&* is the control ID, and *DataVar&* represents the variable which receives the desired window handle.

WINDOW GET ID *hWin* To *DataVar&*

The integral ID of the window *hWin* is retrieved and assigned to the variable designated by *DataVar&*. Generally, only a CONTROL will have an ID, so windows of other classes will normally return the value zero.

WINDOW GET PARENT *hWin* To *DataVar&*

The handle of the parent is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET STYLE hWin TO DataVar&

The window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

WINDOW GET STYLEX *hWin* TO *DataVar&*

The extended window style value of the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*.

<u>WINDOW GET USER *hWin* TO *DataVar&*</u>

The 32-bit user data value associated with the window specified by the handle *hWin* is retrieved and assigned to the variable designated by *DataVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by DDT for each dialog and control created with DDT.

See also CONTROL HANDLE, WINDOW SET

WINDOW SET ID statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

WINDOW SET statement New!

Purpose Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or Dialog.

Syntax

```
WINDOW SET ID hWin, NewVal& TO OldValVar&
WINDOW SET STYLE hWin, NewVal& TO OldValVar&
WINDOW SET STYLEX hWin, NewVal& TO OldValVar&
WINDOW SET USER hWin, NewVal& TO OldValVar&
```

hWin Handle of the Window to be used.

OldValVar& A long integer variable to which the old value of the item is assigned.

Remarks The WINDOW SET statement may be used with any type of window in your program, including a Control or Dialog. However, you must use care due to possible side effects. Generally speaking, the window to be manipulated is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use WINDOW GET HANDLE or CONTROL HANDLE to retrieve its handle for this purpose.

<u>WINDOW SET ID *hWin*, *NewVal&* To *OldValVar&*</u>

The integral ID of the window *hWin* is changed to *NewVal&*. The prior ID value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*. As a general rule, you should not change the ID of a Window, Dialog, or Control created with DDT as it will cause unpredictable results.

<u>WINDOW SET STYLE *hWin*, *NewVal&* TO *OldValVar&*</u>

The window style value of the window *hWin* is changed to *NewVal&*. The prior style value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*.

<u>WINDOW SET STYLEX *hWin*, *NewVal&* TO *OldValVar&*</u>

The extended window style value of the window *hWin* is changed to *NewVal&*. The prior extended style value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*.

WINDOW SET USER *hWin, NewVal&* TO *OldValVar&*

The 32-bit user data value associated with the window specified by the handle *hWin* is changed to *NewVal&*. The prior user data value is assigned to the variable designated by *OldValVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by DDT for each dialog and control created with DDT. If the operation fails, the value zero (0) is assigned to *OldValVar&*. However, this is not a certain indication of failure, since the prior user value might have been zero.

See also CONTROL HANDLE, WINDOW GET

WINDOW SET STYLE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

WINDOW SET statement New!

Purpose Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or Dialog.

Syntax

```
WINDOW SET ID hWin, NewVal& TO OldValVar&
WINDOW SET STYLE hWin, NewVal& TO OldValVar&
WINDOW SET STYLEX hWin, NewVal& TO OldValVar&
WINDOW SET USER hWin, NewVal& TO OldValVar&
```

hWin Handle of the Window to be used.

OldValVar& A long integer variable to which the old value of the item is assigned.

Remarks The WINDOW SET statement may be used with any type of window in your program, including a Control or Dialog. However, you must use care due to possible side effects. Generally speaking, the window to be manipulated is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use WINDOW GET HANDLE or CONTROL HANDLE to retrieve its handle for this purpose.

WINDOW SET ID *hWin, NewVal&* To *OldValVar&*

The integral ID of the window *hWin* is changed to *NewVal&*. The prior ID value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*. As a general rule, you should not change the ID of a Window, Dialog, or Control created with DDT as it will cause unpredictable results.

WINDOW SET STYLE *hWin, NewVal&* TO *OldValVar&*

The window style value of the window *hWin* is changed to *NewVal&*. The prior style value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero

(0) is assigned to *OldValVar&*.

WINDOW SET STYLEX *hWin, NewVal&* TO *OldValVar&*

The extended window style value of the window *hWin* is changed to *NewVal&*. The prior extended style value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*.

WINDOW SET USER *hWin, NewVal&* TO *OldValVar&*

The 32-bit user data value associated with the window specified by the handle *hWin* is changed to *NewVal&*. The prior user data value is assigned to the variable designated by *OldValVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by DDT for each dialog and control created with DDT. If the operation fails, the value zero (0) is assigned to *OldValVar&*. However, this is not a certain indication of failure, since the prior user value might have been zero.

See also CONTROL HANDLE, WINDOW GET

WINDOW SET STYLEX statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

WINDOW SET statement New!

Purpose Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or Dialog.

Syntax

```
WINDOW SET ID hWin, NewVal& TO OldValVar&
WINDOW SET STYLE hWin, NewVal& TO OldValVar&
WINDOW SET STYLEX hWin, NewVal& TO OldValVar&
WINDOW SET USER hWin, NewVal& TO OldValVar&
```

hWin Handle of the Window to be used.

OldValVar& A long integer variable to which the old value of the item is assigned.

Remarks The WINDOW SET statement may be used with any type of window in your program, including a Control or Dialog. However, you must use care due to possible side effects. Generally speaking, the window to be manipulated is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use WINDOW GET HANDLE or CONTROL HANDLE to retrieve its handle for this purpose.

WINDOW SET ID *hWin, NewVal&* To *OldValVar&*

The integral ID of the window *hWin* is changed to *NewVal&*. The prior ID value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*. As a general rule, you should not change the ID of a Window, Dialog, or Control created with DDT as it will cause unpredictable results.

WINDOW SET STYLE *hWin, NewVal&* TO *OldValVar&*

The window style value of the window *hWin* is changed to *NewVal&*. The prior style value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*.

WINDOW SET STYLEX *hWin, NewVal&* TO *OldValVar&*

The extended window style value of the window *hWin* is changed to *NewVal&*. The prior extended style value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*.

WINDOW SET USER *hWin, NewVal&* TO *OldValVar&*

The 32-bit user data value associated with the window specified by the handle *hWin* is changed to *NewVal&*. The prior user data value is assigned to the variable designated by *OldValVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by DDT for each dialog and control created with DDT. If the operation fails, the value zero (0) is assigned to *OldValVar&*. However, this is not a certain indication of failure, since the prior user value might have been zero.

See also CONTROL HANDLE, WINDOW GET

WINDOW SET USER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

WINDOW SET statement New!

Purpose Manipulate a Window in the program, which may include setting or retrieving data. The target window may be of any class, including a

or Dialog.

Syntax

```
WINDOW SET ID hWin, NewVal& TO OldValVar&
WINDOW SET STYLE hWin, NewVal& TO OldValVar&
WINDOW SET STYLEX hWin, NewVal& TO OldValVar&
WINDOW SET USER hWin, NewVal& TO OldValVar&
```

hWin Handle of the Window to be used.

OldValVar& A long integer variable to which the old value of the item is assigned.

Remarks The WINDOW SET statement may be used with any type of window in your program, including a Control or Dialog. However, you must use care due to possible side effects. Generally speaking, the window to be manipulated is identified by its handle (*hWin*), which is often obtained at the time it is created. However, since a control is usually accessed by a "Parent / ID" combination, you must use WINDOW GET HANDLE or CONTROL HANDLE to retrieve its handle for this purpose.

WINDOW SET ID *hWin, NewVal&* To *OldValVar&*

The integral ID of the window *hWin* is changed to *NewVal&*. The prior ID value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*. As a general rule, you should not change the ID of a Window, Dialog, or Control created with DDT as it will cause unpredictable results.

WINDOW SET STYLE *hWin*, *NewVal&* TO *OldValVar&*

The window style value of the window *hWin* is changed to *NewVal&*. The prior style value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*.

WINDOW SET STYLEX *hWin*, *NewVal&* TO *OldValVar&*

The extended window style value of the window *hWin* is changed to *NewVal&*. The prior extended style value is assigned to the variable designated by *OldValVar&*. If the operation fails, the value zero (0) is assigned to *OldValVar&*.

WINDOW SET USER *hWin*, *NewVal&* TO *OldValVar&*

The 32-bit user data value associated with the window specified by the handle *hWin* is changed to *NewVal&*. The prior user data value is assigned to the variable designated by *OldValVar&*. This particular user data value is associated with every window in your program, and is maintained by the Windows operating system. It is separate and apart from user data maintained by DDT for each dialog and control created with DDT. If the operation fails, the value zero (0) is assigned to *OldValVar&*. However, this is not a certain indication of failure, since the prior user value might have been zero.

See also CONTROL HANDLE, WINDOW GET

WINMAIN function

WINMAIN function

Purpose WINMAIN (or its synonym MAIN) is a user-defined function called by Windows to begin execution of an application.

Syntax

```
FUNCTION {WINMAIN | MAIN} ( _
    BYVAL  hInstance    AS DWORD, _
    BYVAL  hPrevInst    AS DWORD, _
    BYVAL  lpszCmdLine  AS WSTRINGZ PTR, _
    BYVAL  nCmdShow     AS LONG ) AS LONG
```

Remarks The WINMAIN function is called by Windows when an executable application first loads and begins to run. It is often referred to as the "entry point" for the application. When the execution of WINMAIN is completed, the application is deemed to be finished, and Windows releases the application memory back to the heap. WINMAIN receives the following parameters:

hInstance The executable's (EXE) *instance handle*. Each instance of a Windows application has a unique handle. It is used as a parameter to a number of Windows API functions which may need to distinguish between multiple instances of an application.

hPrevInst Not used by 32-bit Windows. It is present merely for compatibility with existing 16-bit code, and always returns zero in 32-bit applications.

lpszCmdLine A pointer to an nul-terminated string that contains a command-line. Note that the string passed in *lpszCmdLine* is not the same as the string returned by the *GetCommandLine* API call. The string in *lpszCmdLine* contains the command-line arguments only (like COMMAND$), but *GetCommandLine* returns the program name (including path) followed by the arguments.

nCmdShow Specifies how to display the application's main window. For example, the calling application can specify %SW_NORMAL or %SW_MINIMIZE, etc. It is up to the programmer to honor this parameter, and to do so is recommended.

Return

The return value assigned to WINMAIN is optional, but by convention, the return value is derived from the *wParam&* parameter of a %WM_QUIT message.

Typically, a GUI-based application uses the WINMAIN function to create the initial GUI application window, and then enters a message loop. This loop should terminate when a %WM_QUIT message is received, and the *wParam&* parameter of that message should be passed on as the return value for WINMAIN. If WINMAIN terminates before entering the message loop, WINMAIN should return zero.

Console applications may use the return value to set an error level that can be passed back to the calling application, in the range 0 to 255 inclusive. Batch files may act on the result through the IF [NOT] ERRORLEVEL batch command.

If the parameters passed to WINMAIN are not required by the application itself, the PBMAIN function may be used in place of WINMAIN.

Restrictions

Pointers may not be passed BYREF, so the *lpszCmdLine* parameter of WINMAIN must be declared to be passed BYVAL.

See also

PBMAIN

Example

```
#COMPILE EXE
FUNCTION WINMAIN(BYVAL hInst???, BYVAL hPrevInst???, BYVAL pCmdLine AS
WSTRINGZ PTR, BYVAL nCmdShow&) AS LONG
  ' more code here
  FUNCTION = 1
END FUNCTION
```

WRAP$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

WRAP$ function New!

Purpose

Add paired characters to the beginning and end of a

.

Syntax

***s$* = WRAP$(*StringExpression*, *LeftChar$*, *RightChar$*)**

Remarks

The WRAP$ function prepends LeftChar$ to the StringExpression, then appends RightChar$, and returns the total result. For example:

```
WRAP$("MyWord", "<", ">")  returns  "<MyWord>"
```

It is particularly useful for enclosing text with parenthesess, quotes, brackets, etc.

See also

BUILD$, STRINGBUILDER, STRINSERT$, UNWRAP$

WRITE# statement

WRITE# statement

Purpose Output data to a sequential file in a delimited format.

Syntax

```
WRITE #filenum&
WRITE #filenum&, [expression [{;|,} expression] ...] [;|,]
```

filenum& The file number used when the file or device was opened.

expression A

or a string expression representing the data to be written to the file or device.

Remarks WRITE# is similar to PRINT#, except WRITE# inserts a comma in the output file between each expression. It encloses

data within quotation marks, and adds no leading or trailing spaces around numeric values.

WRITE# is the preferred method of writing data to a sequential file, since it formats the output to be readable by the INPUT# statement. In other words, INPUT# respects the delimiter characters that separate items in a line of text, as created by WRITE#.

WRITE# with a file number and a comma but no expressions, outputs a carriage return to the file.

To read a delimited file without regard to the delimiter characters, use the LINE INPUT# statement.

Restrictions For best results, strings should not contain quotation marks, as these may interfere with the expected output format.

Each expression in the WRITE# statement must be separated from other expressions by a comma or semicolon. If you include a trailing comma or semicolon, the final carriage return / line feed is suppressed and replaced with a comma delimiter. This allows you to append data to the sequential record by executing another WRITE statement.

See also GET, GET$, GET$$, INPUT#, LINE INPUT#, OPEN, PRINT#, PUT, PUT$, PUT$$, SETEOF

Example

```
' Open a sequential output file and write to it
OPEN "FILE.TXT" FOR OUTPUT AS #1
WRITE #1, "TEST"
z& = -12345&
info1$ = "Do not covet"
info2$ = "thy neighbors ox"
WRITE #1, z&, info1$, info2$
WRITE #1, "TEST"
CLOSE #1
```

Result

```
"TEST"
-12345,"Do not covet","thy neighbors ox"
"TEST"
```

XOR operator

XOR operator

Purpose The XOR operator works as both a logical and a bitwise arithmetic operator.

Syntax *p* XOR *q*

Remarks

XOR as a logical operator

XOR returns FALSE (zero) if *and only if* both its operands have the same value. Here is XOR's truth table:

Truth table

x	y	x XOR y
T	T	F
T	F	T

F	T	T
F	F	F

Using XOR as a bitwise arithmetic operator

An XOR mask complements (reverses) selected bits of an

value, without affecting the other bits of that value. For example, to complement the two most-significant bits in &H9700, use XOR with a mask of &HC000; that is, all zeros except for the positions to be complemented:

```
        1001 0111 0000 0000 = &H9700
XOR     1100 0000 0000 0000 = &HC000 (the mask)
        0101 0111 0000 0000 = &H5700 (result)
MSB                                LSB (bit 0)
```

See also Arithmetic Operators, AND, EQV, IMP, NOT, OR

XPRINT Code Group

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT Code Group

Purpose

The

Code Group offers statements and functions which draw text and graphics on a Host Printer Page. In addition, it provides a wide variety of support to manage and interact with these items.

Syntax

```
XPRINT DirectorWord [params]
XPRINT DirectorWord [params] TO ReturnVariable(s)
```

```
Function Form:
ReturnVariable  = XPRINT(DirectorWord [,params] )
ReturnVariable$ = XPRINT$(DirectorWord [,params] )
```

Remarks

Some of the functionality of the XPRINT group was available in prior versions of PowerBASIC, but it has now been expanded. Some XPRINT Procedures (namely those which return a single value) may be used in two forms, a statement with a TO clause, or a function which may be used as a term in an expression:

```
XPRINT GET LINES TO LineCountVar&
LineCountVar& = XPRINT(LINES)
```

The two examples above are functionally identical. The choice is simply a matter of your personal preference. If you use the second form (as a function which returns a value), it can be a term in any expression of any complexity. When a function form is available, it is labeled with the prefix "Function Form".

Some XPRINT procedures return two or more values. As it is not possible to simultaneously inject multiple terms into a valid expression, the function option is not available for them.

PIXELS and POINTS

For the purposes of this discussion on XPRINT, the terms PIXELS and POINTS are considered to be synonyms. They may be used interchangeably.

XPRINT STREAM

The XPRINT Stream is the connection between XPRINT code and a host printer page. The XPrint Stream is created when you attach a particular printer with XPRINT ATTACH. From that moment forward, all XPrint code acts on that selected printer. This continues until such time as you end your print job with XPRINT CLOSE.

PAGE UNITS

PAGE UNITS are used to measure the size of a graphical item, or to define a particular position on an XPrint page. You can define page units to be points or scaled units of your choice.

Initially, each XPrint session begins with Page Units set to points. You can change this to scaled world coordinates of your choice with XPRINT SCALE.

By default, the upper left corner of a printer page is considered to be the X,Y position 0,0 and grows larger to the right or downward. The X axis is horizontal, while the Y axis is vertical. Whenever an X,Y position is given, the X value is stated first.

XPRINT POSITION (POS)

Each time you draw text or graphics, it is displayed at the current XPrint position (POS). Upon completion, the POS is updated to the last point referenced. You can draw a relative distance from the POS (using a STEP option), or set an entirely new position with XPRINT SET POS.

TEXT CELL (ROW/COLUMN POSITION)

For ease of programming, a few procedures specify text position by row and column. In this case, the position is measured in text cells, which is the space occupied by one character. This works well with fixed width fonts, which is recommended. If a variable width font is chosen, PowerBASIC must use the average character size for these calculations, which can give imprecise results.

For compatibility with most current and prior versions of BASIC (PowerBASIC included), code which references text rows and columns names the vertical term first (ROWS, COLUMNS). Rows and columns are always numbered from one upward.

See also Printing, Printing Commands

XPRINT(CANVAS.X) function

XPRINT GET CANVAS statement New!

Purpose Retrieves the writable size of the attached host printer.

Syntax

```
XPRINT GET CANVAS TO WidthVar!, HeightVar!

Function Form:
WidthVar!  = XPRINT(CANVAS.X)
HeightVar! = XPRINT(CANVAS.Y)
```

Remarks XPRINT GET CANVAS retrieves the logical size of the client area (printable area) for the attached host printer. This is the size of the page, minus the unprintable margins, without any reductions for a CLIP area. The size is specified in Page Units, so it could return scaled values if they were applied with XPRINT SCALE. This is very similar to XPRINT GET CLIENT, with the single exception that scaled values (set by XPRINT SCALE) are returned if they have been utilized. If executed without a host printer attached, error 57 is generated.

See also XPRINT GET CLIENT, XPRINT GET CLIP, XPRINT GET SIZE, XPRINT GET SCALE, XPRINT SCALE

XPRINT(CANVAS.Y) function

XPRINT GET CANVAS statement New!

Purpose Retrieves the writable size of the attached host printer.

Syntax

```
XPRINT GET CANVAS TO WidthVar!, HeightVar!

Function Form:
WidthVar!  = XPRINT(CANVAS.X)
HeightVar! = XPRINT(CANVAS.Y)
```

Remarks XPRINT GET CANVAS retrieves the logical size of the client area (printable area) for the attached host printer. This is the size of the page, minus the unprintable margins, without any reductions for a CLIP area. The size is specified in Page Units, so it could return scaled values if they were applied with XPRINT SCALE. This is very similar to XPRINT GET CLIENT, with the single exception that scaled values (set by XPRINT SCALE) are returned if they have been utilized. If executed without a host printer attached, error 57 is generated.

See also XPRINT GET CLIENT, XPRINT GET CLIP, XPRINT GET SIZE, XPRINT GET SCALE, XPRINT SCALE

XPRINT(Cell.Size.X) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT CELL SIZE statement New!

Purpose Retrieve the character cell size including external leading.

Syntax

```
XPRINT CELL SIZE TO WidthVar, HeightVar!

Function Form:
WidthVar!  = XPRINT(Cell.Size.X)
HeightVar! = XPRINT(Cell.Size.Y)
```

Remarks XPRINT CELL SIZE retrieves the size of one character cell, for the current font, on the attached printer. The returned cell size is specified in PAGE UNITS, and allows you to calculate the number of text lines which will fit in a particular space. The height value is the size of the displayed character, including external leading (if any) for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console,the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some scaled units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the exact height of characters without external leading, use XPRINT CHR SIZE.

See also XPRINT CELL, XPRINT CHR SIZE, XPRINT SET FONT, XPRINT TEXT SIZE

XPRINT(Cell.Size.Y) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT CELL SIZE statement New!

Purpose Retrieve the character cell size including external leading.

Syntax

```
XPRINT CELL SIZE TO WidthVar, HeightVar!

Function Form:
WidthVar!  = XPRINT(Cell.Size.X)
HeightVar! = XPRINT(Cell.Size.Y)
```

Remarks XPRINT CELL SIZE retrieves the size of one character cell, for the current font, on the attached printer. The returned cell size is specified in PAGE UNITS, and allows you to calculate the number of text lines which will fit in a particular space. The height value is the size of the displayed character, including external leading (if any) for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console,the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some scaled units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the exact height of characters without external leading, use XPRINT CHR SIZE.

See also XPRINT CELL, XPRINT CHR SIZE, XPRINT SET FONT, XPRINT TEXT SIZE

XPRINT(Chr.Size.X) function

XPRINT CHR SIZE statement IMPROVED

Purpose Retrieve the character size for the current font on a host printer page.

Syntax

```
XPRINT CHR SIZE TO WidthVar!, HeightVar!

Function Form:
WidthVar!  = XPRINT(Chr.Size.X)
HeightVar! = XPRINT(Chr.Size.Y)
```

Remarks The character size is specified in the same terms (pixels or scaled units) as originally stated. The height value retrieved is the actual size of the printed character without including any external leading for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console, the sizes returned are as exact as possible, given the fractional rounding approximations possible when converting from pixels to other coordinates. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the total row height including external leading, use XPRINT CELL SIZE.

See also XPRINT, XPRINT ATTACH, XPRINT CELL SIZE, XPRINT SET FONT, XPRINT TEXT SIZE

XPRINT(Chr.Size.Y) function

XPRINT CHR SIZE statement IMPROVED

Purpose Retrieve the character size for the current font on a host printer page.

Syntax

```
XPRINT CHR SIZE TO WidthVar!, HeightVar!
Function Form:
WidthVar!  = XPRINT(Chr.Size.X)
HeightVar! = XPRINT(Chr.Size.Y)
```

Remarks The character size is specified in the same terms (pixels or scaled units) as originally stated. The height value retrieved is the actual size of the printed character without including any external leading for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console, the sizes returned are as exact as possible, given the fractional rounding approximations possible when converting from pixels to other coordinates. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the total row height including external leading, use XPRINT CELL SIZE.

See also XPRINT, XPRINT ATTACH, XPRINT CELL SIZE, XPRINT SET FONT, XPRINT TEXT SIZE

XPRINT(Client.X) function

XPRINT GET CLIENT statement IMPROVED

Purpose Retrieves the size of the client area (printable area) on the host printer page.

Syntax

```
XPRINT GET CLIENT To WidthVar!, HeightVar!
Function Form:
WidthVar!  = XPRINT(Client.X)
HeightVar! = XPRINT(Client.Y)
```

Remarks XPRINT GET CLIENT retrieves the physical size of the client area (printable area) for the attached host printer. The size is always specified in Pixels (points). This is very similar to XPRINT GET CANVAS, with the single exception that scaled values (set by XPRINT SCALE) are not utilized. If executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET CANVAS, XPRINT GET CLIP, XPRINT GET MARGIN, XPRINT GET PPI, XPRINT GET SIZE

XPRINT(Client.Y) function

XPRINT GET CLIENT statement IMPROVED

Purpose Retrieves the size of the client area (printable area) on the host printer page.

Syntax

```
XPRINT GET CLIENT To WidthVar!, HeightVar!

Function Form:
WidthVar!  = XPRINT(Client.X)
HeightVar! = XPRINT(Client.Y)
```

Remarks XPRINT GET CLIENT retrieves the physical size of the client area (printable area) for the attached host printer. The size is always specified in Pixels (points). This is very similar to XPRINT GET CANVAS, with the single exception that scaled values (set by XPRINT SCALE) are not utilized. If executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET CANVAS, XPRINT GET CLIP, XPRINT GET MARGIN, XPRINT GET PPI, XPRINT GET SIZE

XPRINT(Clip.X) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET CLIP statement New!

Purpose Retrieves the size of the clip area on the selected printer.

Syntax

```
XPRINT GET CLIP TO WidthVar!, HeightVar!

Function Form:
WidthVar!  = XPRINT(Clip.X)
HeightVar! = XPRINT(Clip.Y)
```

Remarks The clip area of the printer is that space where print operations can be written. That is, the clip area is that portion of the client area which is not protected (clipped) by the XPRINT SET CLIP statement.

XPRINT GET CLIP retrieves the size of the clip area, and assigns these values to the variables specified by *WidthVar!* and *HeightVar!*. The size is specified in PAGE UNITS (pixels/points or scaled units). If no printer is selected, the values 0,0 are returned.

See also XPRINT GET CANVAS, XPRINT GET CLIENT, XPRINT SET CLIP

XPRINT(Clip.Y) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET CLIP statement New!

Purpose Retrieves the size of the clip area on the selected printer.

Syntax

```
XPRINT GET CLIP TO WidthVar!, HeightVar!

Function Form:
WidthVar!  = XPRINT(Clip.X)
HeightVar! = XPRINT(Clip.Y)
```

Remarks The clip area of the printer is that space where print operations can be written. That is, the clip area is that portion of the client area which is not protected (clipped) by the XPRINT SET CLIP statement.

XPRINT GET CLIP retrieves the size of the clip area, and assigns these values to the variables specified by *WidthVar!* and *HeightVar!*. The size is specified in PAGE UNITS (pixels/points or scaled units). If no printer is selected, the values 0,0 are returned.

See also XPRINT GET CANVAS, XPRINT GET CLIENT, XPRINT SET CLIP

XPRINT(COL) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT CELL statement New!

Purpose Sets or retrieves the next print position (LPR - Last Point Referenced), based upon the row and column position of a text cell.

Syntax

```
XPRINT CELL = RowValue&, ColValue&
XPRINT CELL TO RowVar&, ColVar&
XPRINT COL TO ColVar&
XPRINT ROW TO RowVar&

Function Form:
ColVar& = XPRINT(COL)
RowVar& = XPRINT(ROW)
```

Remarks XPRINT CELL is used to set or retrieve the print position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the page is considered to be cell 1,1.

The first form of XPRINT CELL moves the print position to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of XPRINT CELL retrieves the current print position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The remaining forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

See also XPRINT CELL SIZE, XPRINT SET FONT, XPRINT SET WORDWRAP, XPRINT SET WRAP, XPRINT SPLIT

XPRINT(COLLATE) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET COLLATE statement IMPROVED

Purpose Retrieves the XPRINT collate status.

Syntax

```
XPRINT GET COLLATE TO CollateVar&
```

Function Form:

```
CollateVar& = XPRINT(COLLATE)
```

Remarks XPRINT allows you to set the collate status, if the printer driver supports both multiple copies and collate capability. XPRINT GET COLLATE retrieves the collate status, assigning the value to the long integer variable specified by *CollateVar&*. The following equates are predefined in the compiler to symbolically represent the possible collate status:

```
%DMCOLLATE_FALSE       = 0
%DMCOLLATE_TRUE        = 1
```

If this statement is executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT SET COLLATE

XPRINT(COLORMODE) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET COLORMODE statement IMPROVED

Purpose Retrieves the XPRINT colormode status.

Syntax

```
XPRINT GET COLORMODE TO ColorVar&
```

Function Form:

ColorVar& **= XPRINT(COLORMODE)**

Remarks XPRINT allows you to set the color or monochrome print mode if the printer driver supports it. XPRINT GET COLORMODE retrieves the colormode status, assigning the value to the long integer variable specified by *ColorVar&*. The value zero may be returned if colormode is not supported by the printer driver. The following equates are predefined in the compiler to symbolically represent the possible status:

```
%DMCOLOR_MONOCHROME    = 1
%DMCOLOR_COLOR         = 2
```

If this statement is executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT SET COLORMODE

XPRINT(COPIES) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET COPIES statement IMPROVED

Purpose Retrieves the XPRINT copy count.

Syntax **XPRINT GET COPIES TO** ***CopyVar&***

Function Form:

CopyVar& **= XPRINT(COPIES)**

Remarks XPRINT allows you to set the number of copies to be automatically printed, if it is supported by the printer driver. XPRINT GET COPIES retrieves the copy count, assigning the value to the long integer variable specified by *CopyVar&*. The default value is one (1). If this statement is executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT SET COPIES

XPRINT(DC) function

XPRINT GET DC statement IMPROVED

Purpose Retrieve the handle of the device context (DC) for the host printer page.

Syntax **XPRINT GET DC TO** ***hDC***

Function Form:
hDC **= XPRINT(DC)**

Remarks If no host printer is currently attached, zero is returned. The DC handle may be used with various Windows API functions to perform specialized operations on the host printer page.

See also XPRINT ATTACH

XPRINT(DUPLEX) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET DUPLEX statement IMPROVED

Purpose Retrieve the XPRINT duplex status.

Syntax **XPRINT GET DUPLEX TO *DuplexVar&***

Function Form:
***DuplexVar&* = XPRINT(DUPLEX)**

Remarks XPRINT allows you to get/set the duplex status, if the printer supports printing on both sides of a page. XPRINT GET DUPLEX retrieves the duplex status, assigning the value to the long integer variable specified by *DuplexVar&*. The following equates are predefined in the compiler to symbolically represent the possible duplex status:

```
%DMDUP_SIMPLEX        = 1    (single sided printing)
%DMDUP_VERTICAL       = 2    (page flipped on the vertical edge)
%DMDUP_HORIZONTAL     = 3    (page flipped on the horizontal edge)
```

If the printer does not support duplex printing, the value zero (0) is returned. If this statement is executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT SET DUPLEX

XPRINT(LINES) function

XPRINT GET LINES statement IMPROVED

Purpose Retrieve the number of lines that can be printed.

Syntax **XPRINT GET LINES To *LineVar&***

Function Form:
***LineVar&* = XPRINT(LINES)**

Remarks XPRINT GET LINES retrieves the number of lines of text which can be printed on the host printer page, given the current selected font. Since

statements do not generate an automatic formfeed when text is printed on the last line, this statement can be used to determine when your program should execute an XPRINT FORMFEED to move to the next printed page on a host printer. If executed without a host printer attached, error 57 is generated.

See also XPRINT, XPRINT ATTACH, XPRINT SET FONT, XPRINT FORMFEED

XPRINT(MIX) function

XPRINT GET MIX statement IMPROVED

Purpose Retrieve the color mix mode for a host printer page.

Syntax **XPRINT GET MIX To *MixVar&***

Function Form:

```
MixVar& = XPRINT(MIX)
```

Remarks Prior to any

operations, a host printer must first be selected with XPRINT ATTACH. There are 16 mix modes available to use for mixing the drawing color with the color that already exists at the drawing location. The mix mode equates are predefined in PowerBASIC. If executed without a host printer attached, error 57 is generated.

%MIX_BLACKNESS	Pixel is always 0 (black).
%MIX_NOTMERGESRC	Pixel is the inverse of the MergeSrc color.
%MIX_MASKNOTSRC	Pixel is a combination of the colors common to both the pixel and the inverse of the source.
%MIX_NOTCOPYSRC	Pixel is the inverse of the pen color.
%MIX_MASKSRCNOT	Pixel is a combination of the colors common to both the source and the inverse of the pixel.
%MIX_NOT	Pixel is the inverse of the pixel color.
%MIX_XORSRC	Pixel is a combination of the colors in the source and in the pixel, but not in both.
%MIX_NOTMASKSRC	Pixel is the inverse of the MaskSrc color.
%MIX_MASKSRC	Pixel is a combination of the colors common to both the source and the pixel.
%MIX_NOTXORSRC	Pixel is the inverse of the XorSrc color.
%MIX_NOP	Pixel remains unchanged.
%MIX_MERGENOTSRC	Pixel is a combination of the source color and the inverse of the pixel color.
%MIX_COPYSRC	Pixel is the source color (default).
%MIX_MERGESRCNOT	Pixel is a combination of the source color and the inverse of the pixel color.
%MIX_MERGESRC	Pixel is a combination of the source color and the pixel color.
%MIX_WHITENESS	Pixel is always 1 (white).

See also XPRINT ATTACH, XPRINT SET MIX

XPRINT(ORIENTATION) function

XPRINT GET ORIENTATION statement IMPROVED

Purpose Retrieve the paper orientation for a host printer page.

Syntax

```
XPRINT GET ORIENTATION To OrentVar&
Function Form:
OrentVar& = XPRINT(ORIENTATION)
```

Remarks XPRINT GET ORIENTATION retrieves the orientation of the paper in the host printer, assigning the value to the long integer variable specified by *OrentVar&*. The value 1 indicates portrait mode, while 2 indicates landscape mode. If the printer does not support paper orientation, 0 is returned. If a host printer is not attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT SET ORIENTATION

XPRINT(OVERLAP) function

XPRINT GET OVERLAP statement New!

Purpose Retrieves the status of XPrint Overlap Mode.

Syntax

```
XPRINT GET OVERLAP To OverlapVar&
Function Form:
```

OverlapVar& **= XPRINT(OVERLAP)**

Remarks XPRINT GET OVERLAP retrieves the status of overlap mode and assigns it to the variable specified by *OverlapVar&*. If Overlap Mode is enabled, the value true (non-zero) is assigned. If it's disabled, the value false (zero) is assigned instead. The value returned reflects the status of the host printer which is currently attached to the XPrint stream.

With Overlap Mode, you can control how PowerBASIC treats XPrint operations which involve a bounding rectangle (RECT structure) in their definition. Windows maintains unique conventions for a RECT. The bottom and right coordinates of a RECT are exclusive. In other words, the pixels at the bottom and right edges lie immediately outside the rectangle. They are ignored. For example:

```
XPRINT BOX (0,0) - (50,50)
```

In this case, a box is drawn from 0,0 to 49,49. The final pixels at the bottom and right edge are simply not drawn. However, if Overlap Mode is enabled with XPRINT SET OVERLAP, the box is drawn from 0,0 to 50,50.

The Overlap Mode affects all XPRINT functions which take a bounding rectangle as a parameter. This includes XPRINT SCALE, XPRINT BOX, XPRINT ELLIPSE, XPRINT LINE, XPRINT POLYLINE, etc.

See also XPRINT SET OVERLAP

XPRINT(PAPER) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET PAPER statement IMPROVED

Purpose Retrieves the current paper size/type.

Syntax **XPRINT GET PAPER TO *PaperVar&***

Function Form:
PaperVar& **= XPRINT(PAPER)**

Remarks XPRINT GET PAPER retrieves the paper style for which the host printer is currently configured. The paper style is identified by an

value which is assigned to the long integer variable specified by *PaperVar&*. The following equates are predefined in the compiler, and represent the most common paper styles:

```
%DMPAPER_LETTER    =  1      Letter    8.5   x 11    inches
%DMPAPER_TABLOID   =  3      Tabloid   11    x 17    inches
%DMPAPER_LEDGER    =  4      Ledger    17    x 11    inches
%DMPAPER_LEGAL     =  5      Legal     8.5   x 14    inches
%DMPAPER_STATEMENT =  6      Statement 5.5   x 8.5   inches
%DMPAPER_EXECUTIVE =  7      Executive 7.25  x 10.5  inches
%DMPAPER_A3        =  8      A3        297   x 420   mm
%DMPAPER_A4        =  9      A4        210   x 297   mm
%DMPAPER_A5        = 11      A5        148   x 210   mm
%DMPAPER_B4        = 12      B4        250   x 354   mm
%DMPAPER_B5        = 13      B5        182   x 257   mm
```

```
%DMPAPER_FOLIO      = 14      Folio     8.5   x 13    inches
%DMPAPER_QUARTO     = 15      Quarto    215   x 275   mm
%DMPAPER_10X14      = 16      10x14     10    x 14    inches
%DMPAPER_11X17      = 17      11x17     11    x 17    inches
%DMPAPER_NOTE       = 18      Note      8.5   x 11    inches
%DMPAPER_ENV_9      = 19      9 Envlp   3.875 x 8.875 inches
%DMPAPER_ENV_10     = 20      10 Envlp  4.125 x 9.5   inches
```

Other paper style codes may be defined by Windows or printer suppliers. You can use XPRINT GET PAPERS to obtain a list of all the paper styles supported by the attached host printer.

If the printer does not support paper style changes, the value zero is returned. If executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET PAPERS, XPRINT SET PAPER

XPRINT(PIXEL...) function

XPRINT GET PIXEL statement IMPROVED

Purpose Retrieves the color of a pixel on a host printer page.

Syntax **XPRINT GET PIXEL [STEP] (x!, y!) TO *PixelVar&***

Function Form:
***PixelVar&* = XPRINT(PIXEL [STEP], *x!*, *y!*)**

Remarks Not all printer drivers support the ability to retrieve the color of a pixel. If this feature is not supported, or if the coordinates are outside the printer client area, an invalid color value of -1 is returned. If no host printer is attached, error 57 is generated.

See also Built In RGB Color Equates, XPRINT ATTACH, XPRINT COLOR, XPRINT SET PIXEL

XPRINT(POS.X) function

XPRINT GET POS statement IMPROVED

Purpose Retrieves the last point referenced (POS) by an statement.

Syntax **XPRINT GET POS TO *XVar!*, *YVar!***

Function Form:
***XVar!* = XPRINT(POS.X)**
***YVar!* = XPRINT(POS.Y)**

Remarks XPRINT GET POS allows you to retrieve the last point referenced (POS) by XPRINT statements. The coordinate points are specified in Page Units. If executed without a host printer attached, an error 57 is generated, and the values 0,0 are returned.

See also XPRINT ATTACH, XPRINT SET POS

XPRINT(POS.Y) function

XPRINT GET POS statement IMPROVED

Purpose Retrieves the last point referenced (POS) by an statement.

Syntax **XPRINT GET POS TO *XVar!*, *YVar!***

```
Function Form:
XVar! = XPRINT(POS.X)
YVar! = XPRINT(POS.Y)
```

Remarks XPRINT GET POS allows you to retrieve the last point referenced (POS) by XPRINT statements. The coordinate points are specified in Page Units. If executed without a host printer attached, an error 57 is generated, and the values 0,0 are returned.

See also XPRINT ATTACH, XPRINT SET POS

XPRINT(PPI.X) function

XPRINT GET PPI statement IMPROVED

Purpose Retrieves the resolution of the host printer page.

Syntax

```
XPRINT GET PPI TO XVar&, YVar&
Function Form:
XVar& = XPRINT(PPI.X)
YVar& = XPRINT(PPI.Y)
```

Remarks XPRINT GET PPI retrieves the resolution (points per inch) of the host printer page. The resolution is always specified in pixels, regardless of any XPRINT SCALE option. If executed without a host printer attached, error 57 is generated, and the values 0,0 are returned. This statement is particularly useful in drawing items such as rulers and graphs to a particular physical size. There are 25.4 millimeters per inch, so just divide by 25.4 to convert from pixels per inch to pixels per millimeter.

See also XPRINT ATTACH, XPRINT GET CLIENT, XPRINT GET MARGIN, XPRINT GET SIZE

XPRINT(PPI.Y) function

XPRINT GET PPI statement IMPROVED

Purpose Retrieves the resolution of the host printer page.

Syntax

```
XPRINT GET PPI TO XVar&, YVar&
Function Form:
XVar& = XPRINT(PPI.X)
YVar& = XPRINT(PPI.Y)
```

Remarks XPRINT GET PPI retrieves the resolution (points per inch) of the host printer page. The resolution is always specified in pixels, regardless of any XPRINT SCALE option. If executed without a host printer attached, error 57 is generated, and the values 0,0 are returned. This statement is particularly useful in drawing items such as rulers and graphs to a particular physical size. There are 25.4 millimeters per inch, so just divide by 25.4 to convert from pixels per inch to pixels per millimeter.

See also XPRINT ATTACH, XPRINT GET CLIENT, XPRINT GET MARGIN, XPRINT GET SIZE

XPRINT(QUALITY) function

XPRINT GET QUALITY statement IMPROVED

Purpose Retrieves the print quality setting for the host printer.

Syntax

```
XPRINT GET QUALITY To QualVar&
Function Form:
QualVar& = XPRINT(QUALITY)
```

Remarks XPRINT GET QUALITY retrieves the print quality setting for the host printer. The value 1 is draft mode, 2 is low resolution, 3 is medium resolution, and 4 is high resolution. If the printer does not support print quality settings, 0 is returned. If no host printer is attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT SET QUALITY

XPRINT(ROW) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT CELL statement New!

Purpose Sets or retrieves the next print position (LPR - Last Point Referenced), based upon the row and column position of a text cell.

Syntax

```
XPRINT CELL = RowValue&, ColValue&
XPRINT CELL TO RowVar&, ColVar&
XPRINT COL TO ColVar&
XPRINT ROW TO RowVar&
```

```
Function Form:
ColVar& = XPRINT(COL)
RowVar& = XPRINT(ROW)
```

Remarks XPRINT CELL is used to set or retrieve the print position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the page is considered to be cell 1,1.

The first form of XPRINT CELL moves the print position to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of XPRINT CELL retrieves the current print position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The remaining forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

See also XPRINT CELL SIZE, XPRINT SET FONT, XPRINT SET WORDWRAP, XPRINT SET WRAP, XPRINT SPLIT

XPRINT(SELECTION) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET SELECTION statement New!

Purpose Retrieves the status of the SELECTION flag.

Syntax
```
XPRINT GET SELECTION TO SelectVar&

Function Form:
SelectVar& = XPRINT(SELECTION)
```

Remarks You may elect to limit a particular print job to just that part of the total which is selected/highlighted. If so, it is the programmer's responsibility to limit XPRINT output to just the selected region.

The selection flag can only be set by the user in the Print Dialog which is displayed when XPRINT ATTACH is executed with the CHOOSE option. It cannot be set under program control. This flag is maintained only to give the programmer information about the user's request. If you do not wish to honor this option, you should disable it in XPRINT ATTACH CHOOSE.

If XPRINT GET SELECTION is executed without a host printer attached, an error 57 is generated.

See also XPRINT ATTACH

XPRINT(SIZE.X) function

XPRINT GET SIZE statement IMPROVED

Purpose Retrieve the total size of the host printer page.

Syntax
```
XPRINT GET SIZE TO WidthVar&, HeightVar&

Function Form:
WidthVar&  = XPRINT(SIZE.X)
HeightVar& = XPRINT(SIZE.Y)
```

Remarks XPRINT GET SIZE allows you to retrieve the full size of the host printer page, including both the printable client area and any unprintable margins. The sizes are specified in pixels (points). If no host printer is attached, error 57 is generated, and the values 0,0 are returned.

See also XPRINT ATTACH, XPRINT GET CLIENT, XPRINT GET MARGIN, XPRINT GET MIX, XPRINT GET PPI

XPRINT(SIZE.Y) function

XPRINT GET SIZE statement IMPROVED

Purpose Retrieve the total size of the host printer page.

Syntax
```
XPRINT GET SIZE TO WidthVar&, HeightVar&

Function Form:
WidthVar&  = XPRINT(SIZE.X)
HeightVar& = XPRINT(SIZE.Y)
```

Remarks XPRINT GET SIZE allows you to retrieve the full size of the host printer page, including both the printable client area and any unprintable margins. The sizes are specified in pixels (points). If no host printer is attached, error 57 is generated, and the values 0,0 are returned.

See also XPRINT ATTACH, XPRINT GET CLIENT, XPRINT GET MARGIN, XPRINT GET MIX, XPRINT GET PPI

XPRINT(STRETCHMODE) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET STRETCHMODE statement New!

Purpose Retrieves the default bitmap stretching mode for the attached DC.

Syntax

```
XPRINT GET STRETCHMODE TO ModeVar&
```

Function Form:

```
ModeVar& = XPRINT(STRETCHMODE)
```

Remarks There are several operations in PowerBASIC which involve stretching or condensing images on bitmaps, most notably XPRINT STRETCH. As individual points must be added or removed, there is a good chance that the quality of the image will be degraded. However, if you describe the nature of the image by defining a StretchMode, you can substantially enhance the appearance.

The default StretchMode is maintained individually for each DC. You can retrieve the default mode with this statement, or set it with XPRINT SET STRETCHMODE. Of course, you can also override the default StretchMode when you execute one of the affected statements.

The 4 stretch mode equates are predefined in PowerBASIC.

%BLACKONWHITE	1	This is the default Windows stretch mode, and is most appropriate for monochrome bitmaps, or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels.
%WHITEONBLACK	2	Performs a boolean OR of eliminated and existing pixels. It preserves white pixels at the expense of black pixels.
%COLORONCOLOR	3	Deletes eliminated lines of pixels without trying to preserve their information.
%HALFTONE	4	This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source pixel block.

See also XPRINT COPY, XPRINT RENDER, XPRINT STRETCH, XPRINT SET STRETCHMODE

XPRINT(TEXT.SIZE.X...) function

XPRINT TEXT SIZE statement IMPROVED

Purpose Calculate the size of text to be printed on a host printer.

Syntax **XPRINT TEXT SIZE *txt$* To *nWidth!*, *nHeight!***

Function Form:
***WidthVar!* = XPRINT(TEXT.SIZE.X, *txt$*)**
***HeightVar!* = XPRINT(TEXT.SIZE.Y, *txt$*)**

Remarks This statement calculates the total size of the printed text, based upon the current font for the host printer. The sizes returned are specified in Page Units.

This allows you to easily calculate the appropriate print position, particularly when using a proportional font. If this statement is executed without a host printer attached, error 57 is generated.

See also XPRINT CELL SIZE, XPRINT CHR SIZE, XPRINT SET FONT

Example

```
FUNCTION PBMAIN
  ' The following example draws the text both horizontally
  ' and vertically centered on the host printer page

  LOCAL x, y, w, h, w2, h2 AS LONG
  LOCAL sText AS STRING
  sText = "PowerBASIC"

  XPRINT ATTACH "Lexmark C750"
  XPRINT COLOR %BLUE, -2  ' blue text, clear background
  XPRINT FONT "Times New Roman", 18, 3  ' 18p, bold, italic

  XPRINT GET CLIENT TO w, h  ' get client size
  XPRINT TEXT SIZE sText TO w2, h2      ' get text size
  x = (w-w2) / 2                        ' centered x-pos
  y = (h-h2) / 2                        ' centered y-pos

  XPRINT SET POS (x, y)                 ' set position
  XPRINT sText                          ' draw the text
  XPRINT CLOSE
END FUNCTION
```

XPRINT(TEXT.SIZE.Y...) function

XPRINT TEXT SIZE statement IMPROVED

Purpose Calculate the size of text to be printed on a host printer.

Syntax **XPRINT TEXT SIZE *txt$* To *nWidth!*, *nHeight!***

Function Form:
***WidthVar!* = XPRINT(TEXT.SIZE.X, *txt$*)**
***HeightVar!* = XPRINT(TEXT.SIZE.Y, *txt$*)**

Remarks This statement calculates the total size of the printed text, based upon the current font for the host printer. The sizes returned are specified in Page Units.

This allows you to easily calculate the appropriate print position, particularly when using a proportional font. If this statement is executed without a host printer attached, error 57 is generated.

See also XPRINT CELL SIZE, XPRINT CHR SIZE, XPRINT SET FONT

Example

```
FUNCTION PBMAIN
  ' The following example draws the text both horizontally
  ' and vertically centered on the host printer page
```

```
  LOCAL x, y, w, h, w2, h2 AS LONG
  LOCAL sText AS STRING
  sText = "PowerBASIC"

  XPRINT ATTACH "Lexmark C750"
  XPRINT COLOR %BLUE, -2  ' blue text, clear background
  XPRINT FONT "Times New Roman", 18, 3  ' 18p, bold, italic

  XPRINT GET CLIENT TO w, h  ' get client size
  XPRINT TEXT SIZE sText TO w2, h2      ' get text size
  x = (w-w2) / 2                        ' centered x-pos
  y = (h-h2) / 2                        ' centered y-pos

  XPRINT SET POS (x, y)                 ' set position
  XPRINT sText                          ' draw the text
  XPRINT CLOSE
END FUNCTION
```

XPRINT(TRAY) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET TRAY statement IMPROVED

Purpose Retrieves the active printer tray.

Syntax `XPRINT GET TRAY TO` ***TrayVar&***

Function Form:
TrayVar& `= XPRINT(TRAY)`

Remarks XPRINT GET TRAY retrieves the paper tray which is active on the host printer. A descriptive value is assigned to the long integer variable specified by *TrayVar&*. The following equates are predefined in the compiler, and represent the most common paper trays:

```
%DMBIN_UPPER         = 1
%DMBIN_LOWER         = 2
%DMBIN_MIDDLE        = 3
%DMBIN_MANUAL        = 4
%DMBIN_ENVELOPE      = 5
%DMBIN_ENVMANUAL     = 6
%DMBIN_AUTO          = 7
%DMBIN_TRACTOR       = 8
%DMBIN_SMALLFMT      = 9
%DMBIN_LARGEFMT      = 10
%DMBIN_LARGECAPACITY = 11
%DMBIN_CASSETTE      = 14
%DMBIN_FORMSOURCE    = 15
```

Other tray codes may be defined by Windows or printer suppliers, so your program should be written to consider that possibility. You can use XPRINT GET TRAYS to obtain a list of all the paper trays supported by the attached host printer.

If the printer does not support the tray change requested, error 5 is generated. If executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET TRAYS, XPRINT SET TRAY

XPRINT(WORDWRAP) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET WORDWRAP statement New!

Purpose Retrieves the status of XPRINT WordWrap Mode.

Syntax **XPRINT GET WORDWRAP TO *WrapVar&***

Function Form:
***WrapVar&* = XPRINT(WORDWRAP)**

Remarks XPRINT GET WORDWRAP retrieves the status of wordwrap mode and assigns it to the variable specified by *WrapVar&*. If WordWrap Mode is enabled, the value true (non-zero) is assigned. If it's disabled, the value false (zero) is assigned instead. The value returned reflects the status of the attached printer.

With WordWrap Mode, you can control how PowerBASIC prints text on an XPRINT page when it reaches the end of a line. Since XPRINT operates on a full page basis, the default is to ignore text which is printed past the end of the line. This can be modified under program control by using XPRINT SET WORDWRAP.

When WordWrap mode is enabled, it affects only XPRINT print operations. If XPRINT print attempts to display a word beyond the end of a row, the entire word is automatically wrapped to the first column of the next row.

See also XPRINT CELL, XPRINT GET WRAP, XPRINT SET WORDWRAP, XPRINT SET WRAP, XPRINT SPLIT

XPRINT(WRAP) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET WRAP statement New!

Purpose Retrieves the status of XPRINT Wrap Mode.

Syntax **XPRINT GET WRAP TO *WrapVar&***

Function Form:
***WrapVar&* = XPRINT(WRAP)**

Remarks XPRINT GET WRAP retrieves the status of wrap mode and assigns it to the variable specified by *WrapVar&*. If Wrap Mode is enabled, the value true (non-zero) is assigned. If it's disabled, the value false (zero) is assigned instead. The value returned reflects the status of the attached printer.

With Wrap Mode, you can control how PowerBASIC prints text on an XPRINT page when it reaches the end of a line. Since XPRINT operates on a full page basis, the default is to ignore text which is printed past the end of the line. This can be modified under program control by using XPRINT SET WRAP.

When Wrap Mode is enabled, it affects only XPRINT print operations. If XPRINT print attempts to display a character beyond the end of a row, it is automatically wrapped to the first column of the next row.

See also XPRINT CELL, XPRINT GET WORDWRAP, XPRINT SET WORDWRAP, XPRINT SET WRAP, XPRINT SPLIT

XPRINT$ function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET ATTACH statement New!

Purpose Retrieve the name of the attached host printer.

Syntax **XPRINT GET ATTACH TO *PrinterVar$***

Function Form:
***PrinterVar$* = XPRINT$(ATTACH)**
***PrinterVar$* = XPRINT$**

Remarks XPRINT GET ATTACH returns the name of the attached host printer, which is the printer that would be used by XPRINT statements. If there is no attached host printer, an empty string is returned. XPRINT$ is typically used to detect if an XPRINT ATTACH operation was successful.

See also XPRINT ATTACH

XPRINT$(ATTACH) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET ATTACH statement New!

Purpose Retrieve the name of the attached host printer.

Syntax `XPRINT GET ATTACH TO PrinterVar$`

Function Form:

```
PrinterVar$ = XPRINT$(ATTACH)
PrinterVar$ = XPRINT$
```

Remarks XPRINT GET ATTACH returns the name of the attached host printer, which is the printer that would be used by XPRINT statements. If there is no attached host printer, an empty string is returned. XPRINT$ is typically used to detect if an XPRINT ATTACH operation was successful.

See also XPRINT ATTACH

XPRINT$(PAPERS) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET PAPERS statement IMPROVED

Purpose Retrieves a list of supported paper types.

Syntax `XPRINT GET PAPERS TO PapersVar$`

Function Form:

```
PapersVar$ = XPRINT$(PAPERS)
```

Remarks XPRINT GET PAPERS retrieves a

which contains a list of all of the paper types supported by the attached host printer. This string is assigned to the string variable specified by *PapersVar$*.

The string contains a comma-delimited list of *papertype*, *papername*... repeated as many times as necessary. For example:

```
"1,Letter,5,Legal,7,Executive,20,Envelope #10"
```

You can use PARSECOUNT to determine the number of delimited fields in the string, and PARSE$() to easily extract the type numbers and names. The following equates are predefined in the compiler, and represent the most common paper styles:

```
%DMPAPER_LETTER    =  1     Letter    8.5   x 11    inches
%DMPAPER_TABLOID   =  3     Tabloid   11    x 17    inches
%DMPAPER_LEDGER    =  4     Ledger    17    x 11    inches
%DMPAPER_LEGAL     =  5     Legal     8.5   x 14    inches
%DMPAPER_STATEMENT =  6     Statement 5.5   x 8.5   inches
%DMPAPER_EXECUTIVE =  7     Executive 7.25  x 10.5  inches
%DMPAPER_A3        =  8     A3        297   x 420   mm
%DMPAPER_A4        =  9     A4        210   x 297   mm
```

```
%DMPAPER_A5         = 11      A5        148   x 210   mm
%DMPAPER_B4         = 12      B4        250   x 354   mm
%DMPAPER_B5         = 13      B5        182   x 257   mm
%DMPAPER_FOLIO      = 14      Folio     8.5   x 13    inches
%DMPAPER_QUARTO     = 15      Quarto    215   x 275   mm
%DMPAPER_10X14      = 16      10x14     10    x 14    inches
%DMPAPER_11X17      = 17      11x17     11    x 17    inches
%DMPAPER_NOTE       = 18      Note      8.5   x 11    inches
%DMPAPER_ENV_9      = 19      9 Envlp   3.875 x 8.875 inches
%DMPAPER_ENV_10     = 20      10 Envlp  4.125 x 9.5   inches
```

Other paper style codes may be defined by Windows or printer suppliers. If executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET PAPERS, XPRINT SET PAPER

XPRINT$(TRAYS) function

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET TRAYS statement IMPROVED

Purpose Retrieves a list of supported paper trays.

Syntax **XPRINT GET TRAYS TO *TrayVar$***

Function Form:
***TrayVar$* = XPRINT$(TRAYS)**

Remarks XPRINT GET TRAYS retrieves a

which contains a list of all of the paper trays supported by the attached host printer. This string is assigned to the string variable specified by *TrayVar$*.

The string contains a comma-delimited list of traytype, trayname... repeated as many times as necessary. For example:

```
"1,Upper,2,Lower,5,Envelope"
```

You can use PARSECOUNT to determine the number of delimited fields in the string, and PARSE$() to easily extract the tray numbers and names. The following equates are predefined in the compiler, and represent the most common trays:

```
%DMBIN_UPPER          = 1
%DMBIN_LOWER          = 2
%DMBIN_MIDDLE         = 3
%DMBIN_MANUAL         = 4
%DMBIN_ENVELOPE       = 5
%DMBIN_ENVMANUAL      = 6
%DMBIN_AUTO           = 7
%DMBIN_TRACTOR        = 8
%DMBIN_SMALLFMT       = 9
%DMBIN_LARGEFMT       = 10
%DMBIN_LARGECAPACITY  = 11
%DMBIN_CASSETTE       = 14
%DMBIN_FORMSOURCE     = 15
```

Other paper style codes may be defined by Windows or printer suppliers. If executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET TRAY, XPRINT SET TRAY

XPRINT ARC statement

XPRINT ARC statement

Purpose Draw an arc on a host printer page.

Syntax **XPRINT ARC (*x1!*, *y1!*) - (*x2!*, *y2!*), *arcStart!*, *arcEnd!* [, *rgbColor&*]**

Remarks An arc is a section of a circle or an ellipse. To specify a particular arc, you would first define the full circle or ellipse of which it is a part, and then specify the points on the ellipse where the arc starts and stops.

The full circle or ellipse is defined by its bounding rectangle, which is the smallest rectangle which can be drawn around the circle or ellipse. For example, if the circle is centered at position (400,400), with a radius of 100 pixels, the upper left corner (x1,y1) of the bounding rectangle is (300,300), and the lower right corner (x2,y2) is (500,500).

The start point and end point of the arc are specified by their angle, which must be given in radians. A complete circle or ellipse is 2*pi radians. On a 12-hour clock-face, the values 0 and 2*pi both refer to the position of 3 o'clock, while the value 1*pi refers to the position of 9 o'clock. Other positions are specified by a radian value relative to these. In PowerBASIC, arcs are always drawn counter-clockwise from the starting point to the ending point.

Prior to any

operations, a host printer must first be selected with XPRINT ATTACH. The coordinate points are specified in pixels (or world coordinates, if those were chosen with XPRINT SCALE). Line width can be set using XPRINT WIDTH. If line width is set to 1 (the default), the line style can be set with XPRINT STYLE. Because of the nature of an arc, XPRINT ARC neither uses, nor updates, (last point referenced). If executed without a host printer attached, error 57 is generated.

x1!, *y1!* The upper left corner of the bounding rectangle of the full circle or ellipse.

x2!, *y2!* The lower right corner of the bounding rectangle of the full circle or ellipse.

ArcStart! The starting angle of the arc, in radians, from 0 to 2*pi.

ArcEnd! The ending angle of the arc, in radians, from 0 to 2*pi radians. Note that arcs are always drawn counter-clockwise from *arcStart!* to *arcEnd!*. Compared with a 12-hour clock-face, 0 or 2*pi radians is at 3 o'clock, and 1*pi radians is at 9 o'clock.

rgbColor& Optional RGB color for the arc. If omitted (or -1), the current foreground color for the host printer page is used.

See also Built In RGB Color Equates, XPRINT ATTACH, XPRINT COLOR, XPRINT ELLIPSE, XPRINT PIE, XPRINT STYLE, XPRINT WIDTH

Example

```
' Draw two arcs that combine into a circle.
' The upper half uses the default foreground color.
' The lower half is drawn in red.
LOCAL Pi AS DOUBLE
Pi = 4 * ATN(1)                            ' Calculate Pi
XPRINT ARC (5, 5) - (105, 105), 0,  Pi      ' Upper half
XPRINT ARC (5, 5) - (105, 105), Pi, 0, %RED ' Lower half
```

XPRINT ATTACH statement

XPRINT ATTACH statement IMPROVED

Purpose	Connect a host-based (GDI) printer for use with code.
Syntax	**XPRINT ATTACH {DEFAULT | *PrinterName$*} [,*JobName$*]** **XPRINT ATTACH CHOOSE [USING *Flags&*] [,*JobName$*]**
Remarks	XPRINT ATTACH connects to a host-based (Windows-only or GDI-based) printer for use with subsequent XPRINT operations. Host-based printing is device-independent and performed through the Windows printing system and printer driver. Device independence can be achieved because the printer driver handles the task of converting text into the manufacturers proprietary binary format used by the printer. To send device-dependent print data (such as plain text) to a line printer device, use the LPRINT ATTACH statement instead. XPRINT ATTACH allows you to change the printer device used by XPRINT operation. When executed, the current connection (if any) is closed and the new connection is established.
DEFAULT	If DEFAULT is specified, the default printer (as set in the Printers applet in Control Panel) is used. For example: **XPRINT ATTACH DEFAULT**
CHOOSE	If CHOOSE is specified, the Choose Printer common dialog is opened, allowing the user to select from the list of installed printers. For example: **XPRINT ATTACH CHOOSE** With CHOOSE, you may elect to include an optional numeric expression called *Flags&*. This value consists of one or more of the following equates to control the execution of the Printer Dialog:

%PD_ALLPAGES	"All Pages" button is the default.
%PD_SELECTION	"Selection" button is the default.
%PD_PAGENUMS	"Numbered Pages" button is the default. (Only one of the above is allowed)
%PD_NOSELECTION	Disables the "Selection" button.
%PD_NOPAGENUMS	Disables the "Numbered Pages" button.
%PD_COLLATE	"Collate" option is checked.
%PD_PRINTTOFILE	"Print To File" option is checked.
%PD_DISABLEPRINTTOFILE	Disables the "Print To File" option.
%PD_HIDEPRINTTOFILE	Hides the "Print To File" option.

PrinterName$	The name of the printer to attach (as shown in the Printers applet in Control Panel, or returned by the PRINTER$ function). *printername$* must be a valid device name and cannot exceed 259 characters in length. For example: **XPRINT ATTACH "HP LaserJet 5MP"**
JobName$	The name of the print job. This will be shown in the print spooler. If you do not supply a name, "Printjob" is used by default.

If XPRINT ATTACH is not successful, XPRINT$ returns an empty

. Error 68 ("device unavailable") is generated if an invalid printer was specified. No error is generated if the user cancels the Choose Printer dialog (with XPRINT ATTACH CHOOSE). Therefore, for host-based printing, applications should always use XPRINT ATTACH to explicitly select the intended host-based printer, then test for a successful selection with the XPRINT$ and ERR functions to ensure the host-based printer selection was successful.

Unlike direct printing (LPRINT ATTACH), host-based printing is handled by a printer driver and the operating system's spooler subsystem. Therefore, spooler settings such as "work offline" in the Printer Properties dialog will not impede the creation of a spooled print job. Once all the data has been sent to the printer, detach the printer so other applications can use it., with the XPRINT CLOSE statement.

Host-based printers use proprietary control protocols, unlike line printers, so it is usually not possible to send them printer-dependent control codes. To attach a line printer, use LPRINT ATTACH instead of XPRINT ATTACH.

Note: You can enumerate the available printers with the PRINTERCOUNT and PRINTER$ functions.

See also LPRINT ATTACH, PRINTER$, XPRINT CANCEL, XPRINT CLOSE, XPRINT GET ATTACH, XPRINT GET PAGES, XPRINT GET SELECTION

Example

```
ERRCLEAR
XPRINT ATTACH "HP DeskJet 960c"
IF ERR = 0 AND LEN(XPRINT$) > 0 THEN
  XPRINT COLOR RGB(0,0,255) ' Blue
  XPRINT "This is your printer talking"
  XPRINT FORMFEED           ' Issue a formfeed
  XPRINT CLOSE              ' Deselect the printer
END IF
```

XPRINT BOX statement

XPRINT BOX statement

Purpose Draw a box with square or rounded corners on a host printer page.

Syntax **XPRINT BOX (*x1!*, *y1!*) - (*x2!*, *y2!*) [, [*corner&*] [, [*rgbColor&*] [, [*fillcolor&*] [, [*fillstyle&*]]]]]**

Remarks Prior to any

operations, a host printer must first be selected with XPRINT ATTACH. The coordinate points are specified in pixels (or world coordinates, if those were chosen with XPRINT SCALE). Line width can be set using XPRINT WIDTH. If line width is set to 1 (the default), the line style can be set with XPRINT STYLE. Because of the nature of a box, XPRINT BOX neither uses, nor updates, (last point referenced). If executed without a host printer attached, error 57 is generated.

Windows graphic conventions consider the bottom and right coordinates of a BOX to be exclusive. The pixels at the bottom and right edges are not drawn unless OVERLAP MODE is enabled. See XPRINT SET OVERLAP for details.

x1!, *y1!* The upper left corner of the box.

x2!, *y2!* The lower right corner of the box.

corner& The percentage of roundness of the corners, in the range of 0 to 100. A value of zero creates square corners, while 100 creates a circle/oval. A value of 20 being most common for a pleasant, rounded appearance. If *corner&* is omitted, the default is 0, which creates a rectangle with square corners.

rgbColor&	Optional RGB color of the box edge. If omitted (or -1), the edge color defaults to the current foreground color for the host printer page.
fillcolor&	Optional RGB color of the box interior. If *fillcolor&* is omitted (or -2), the interior of the box is not filled, allowing the background to show through. If *fillcolor&* is -1, the interior is painted with the same color as the edge. Otherwise, *fillcolor&* specifies the RGB color to be used.
fillstyle&	Optional fill style (pattern) to be used. If *fillstyle&* is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the *fillcolor&*, while the background is specified by the default background color for the host printer page. The optional *fillstyle&* may be:

0	Solid (default)
1	Horizontal Lines
2	Vertical Lines
3	Upward Diagonal Lines
4	Downward Diagonal Lines
5	Crossed Lines
6	Diagonal Crossed Lines

See also Built In RGB Color Equates, XPRINT ATTACH, XPRINT COLOR, XPRINT LINE, XPRINT SET OVERLAP, XPRINT STYLE, XPRINT WIDTH

Example

```
' Draw rectangle with square corners and default colors.
XPRINT BOX (10, 10) - (100, 80)

' Draw a blue rectangle with 20% rounded corners,
' filled with a light-gray, diagonal cross pattern
XPRINT BOX (15, 15) - (95, 75), 20, %BLUE, RGB(191,191,191), 6
```

XPRINT CANCEL statement

XPRINT CANCEL statement

Purpose Cancel a print job on the host printer.

Syntax `XPRINT CANCEL`

Remarks XPRINT CANCEL deletes the current print job and detaches the host printer, as long as XPRINT CLOSE has not yet been executed. This function is generally used to abort the print process when an error occurs.

See also XPRINT ATTACH, XPRINT CLOSE

XPRINT CELL statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT CELL statement New!

Purpose Sets or retrieves the next print position (LPR - Last Point Referenced), based upon the row and column position of a text cell.

Syntax

```
XPRINT CELL = RowValue&, ColValue&
XPRINT CELL TO RowVar&, ColVar&
XPRINT COL TO ColVar&
XPRINT ROW TO RowVar&
```

```
Function Form:
ColVar& = XPRINT(COL)
RowVar& = XPRINT(ROW)
```

Remarks

XPRINT CELL is used to set or retrieve the print position, based upon the row and column position of a Text Cell. That is the row and column position where the next printed text will be displayed. *RowValue&* specifies the horizontal screen row (starting at 1) at which to position the cursor. *ColValue&* specifies the vertical screen column (starting at 1) at which to position the cursor. Since row and column numbers start at one (1), the upper left corner of the page is considered to be cell 1,1.

The first form of XPRINT CELL moves the print position to the desired row and column. If a value given is zero (0), that parameter is ignored and that position is not changed. The second form of XPRINT CELL retrieves the current print position, and assigns the values to the variables specified by *RowVar&* and *ColVar&*.

The remaining forms allow you to retrieve just a single value, either row or column, and are supported in both statement and function form.

See also

XPRINT CELL SIZE, XPRINT SET FONT, XPRINT SET WORDWRAP, XPRINT SET WRAP, XPRINT SPLIT

XPRINT CELL SIZE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT CELL SIZE statement New!

Purpose

Retrieve the character cell size including external leading.

Syntax

```
XPRINT CELL SIZE TO WidthVar, HeightVar!
```

```
Function Form:
WidthVar!  = XPRINT(Cell.Size.X)
HeightVar! = XPRINT(Cell.Size.Y)
```

Remarks

XPRINT CELL SIZE retrieves the size of one character cell, for the current font, on the attached printer. The returned cell size is specified in PAGE UNITS, and allows you to calculate the number of text lines which will fit in a particular space. The height value is the size of the displayed character, including external leading (if any) for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console,the sizes returned are as exact as possible, given the fractional rounding approximations necessary for some scaled units. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the exact height of characters without external leading, use XPRINT CHR SIZE.

See also XPRINT CELL, XPRINT CHR SIZE, XPRINT SET FONT, XPRINT TEXT SIZE

XPRINT CHR SIZE statement

XPRINT CHR SIZE statement IMPROVED

Purpose Retrieve the character size for the current font on a host printer page.

Syntax

```
XPRINT CHR SIZE TO WidthVar!, HeightVar!

Function Form:
WidthVar!  = XPRINT(Chr.Size.X)
HeightVar! = XPRINT(Chr.Size.Y)
```

Remarks The character size is specified in the same terms (pixels or scaled units) as originally stated. The height value retrieved is the actual size of the printed character without including any external leading for this particular font.

If the font is a fixed-width font, like Courier New or Lucida Console, the sizes returned are as exact as possible, given the fractional rounding approximations possible when converting from pixels to other coordinates. If the font is proportional, like Arial or Times New Roman, the width will be the average size for the entire font.

External leading is the vertical distance from the bottom of one character to the top of the character below it. This value is specified by the font in use. It may vary from zero to a larger value, depending upon the font and point size. To retrieve the total row height including external leading, use XPRINT CELL SIZE.

See also XPRINT, XPRINT ATTACH, XPRINT CELL SIZE, XPRINT SET FONT, XPRINT TEXT SIZE

XPRINT CLOSE statement

XPRINT CLOSE statement

Purpose Detach a host printer so printing may begin.

Syntax `XPRINT CLOSE`

Remarks XPRINT CLOSE detaches the printer from the current process, and allows printing to a HOST printer to begin. If XPRINT CLOSE is not executed, printed data may be lost.

See also XPRINT ATTACH, XPRINT CANCEL

XPRINT COLOR statement

XPRINT COLOR statement IMPROVED

Purpose Set the foreground color (and, optionally, the background color) for various statements.

Syntax `XPRINT COLOR foreground& [, background&]`

Remarks Colors are expressed as RGB values, or use -1 for the default color. If the background parameter is -2, the background is made transparent. If either parameter is -3, the existing color is not changed. A host printer must first be connected with XPRINT ATTACH. If a host printer is not attached, error 57 is generated.

See also Built In RGB Color Equates, XPRINT, XPRINT ATTACH

Example

```
' Set colors to red foreground and blue background.
```

```
XPRINT COLOR %RED, RGB(0,0,191)
```

XPRINT COPY statement

XPRINT COPY statement

Purpose Copy a

to a host printer page.

Syntax

XPRINT COPY ***hbmpSource???, id&*** **[,** ***style&*****]**
XPRINT COPY ***hbmpSource???, id&*** **TO (*****x!, y!*****) [,** ***style&*****]**
XPRINT COPY ***hbmpSource???, id&*****, (*****x1!, y1!*****)-(*****x2!, y2!*****) TO (*****x!, y!*****) [,** ***style %*****]**

Remarks You can copy a complete bitmap, or a portion of it, to the host printer page. The expression *hbmpSource???* specifies the handle of the source bitmap or window. The expression *id&* is the unique control identifier in the range 1 to 65535, as assigned with the CONTROL ADD GRAPHIC statement. *id&* must be 0 for a GRAPHIC WINDOW or a

. The destination of the copy operation is the host printer page. You must use care that your parameters are valid for the specified bitmaps, or results of the operation are undefined.

The first form of the XPRINT COPY statement copies the complete bitmap, positioning it at (0,0), which is the upper left corner of the destination.

The second form of XPRINT COPY also copies the complete bitmap, but positions it at the point specified by the parameter (*x!*, *y!*).

The third form copies a portion of the bitmap, positioning it at the point specified by the parameter (*x!*, *y!*). If *style&* is included, it is one of the following values:

%mix_Blackness	Pixel is always 0 (black).
%mix_NotMergeSrc	Pixel is the inverse of the MergeSrc color.
%mix_MaskNotSrc	Pixel is a combination of the colors common to both the pixel and the inverse of the source.
%mix_NotCopySrc	Pixel is the inverse of the pen color.
%mix_MaskSrcNot	Pixel is a combination of the colors common to both the source and the inverse of the pixel.
%mix_Not	Pixel is the inverse of the pixel color.
%mix_XorSrc	Pixel is a combination of the colors in the source and in the pixel, but not in both.
%mix_NotMaskSrc	Pixel is the inverse of the MaskSrc color.
%mix_MaskSrc	Pixel is a combination of the colors common to both the source and the pixel.
%mix_NotXorSrc	Pixel is the inverse of the XorSrc color.
%mix_Nop	Pixel remains unchanged.
%mix_MergeNotSrc	Pixel is a combination of the source color and the inverse of the pixel color.
%mix_CopySrc	Pixel is the source color (default).
%mix_MergeSrcNot	Pixel is a combination of the source color and the inverse of the pixel color.
%mix_MergeSrc	Pixel is a combination of the source color and the pixel color.
%mix_Whiteness	Pixel is always 1 (white).

A host printer must first be connected with XPRINT ATTACH. If a host printer is not attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT RENDER, XPRINT STRETCH, XPRINT SET STRETCHMODE

XPRINT ELLIPSE statement

XPRINT ELLIPSE statement

Purpose Draw an ellipse or a circle on a host printer page.

Syntax `XPRINT ELLIPSE (x1!, y1!) - (x2!, y2!) [, [rgbColor&] [, [fillcolor&] [, [fillstyle&]]]]`

Remarks A host printer must first be connected with XPRINT ATTACH. The coordinate points are specified in pixels (or world coordinates, if those were defined with an XPRINT SCALE statement). Line width can be set using XPRINT WIDTH. If line width is set to 1 (the default), the line style can be set with XPRINT STYLE. Because of the nature of an ellipse, which has no obvious beginning or end, XPRINT ELLIPSE neither uses, nor updates, the last point referenced (POS). If executed without a host printer attached, error 57 is generated.

The coordinate pair define an invisible bounding rectangle which would enclose the ellipse to be drawn. It tells both the size and the proportions of the ellipse. Windows graphic conventions consider the bottom and right coordinates of it to be exclusive. The pixels at the bottom and right edges are ignored, unless Overlap Mode is enabled. See XPRINT SET OVERLAP for details.

x1!, *y1!* The upper left corner of the bounding rectangle.

x2!, *y2!* The lower right corner of the bounding rectangle.

rgbColor& Optional RGB color of the ellipse edge. If omitted (or -1), the edge color defaults to the current foreground color for the host printer page.

fillcolor& Optional RGB color of the ellipse interior. If *fillcolor&* is omitted (or -2), the interior of the ellipse is not filled, allowing the background to show through. If *fillcolor&* is -1, the interior is painted with the same color as the edge. Otherwise, *fillcolor&* specifies the RGB color to be used.

fillstyle& Optional fill style (pattern) to be used. If *fillstyle&* is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the *fillcolor&*, while the background is specified by the default background color for the host printer page. The optional *fillstyle&* may be:

0	Solid (default)
1	Horizontal Lines
2	Vertical Lines
3	Upward Diagonal Lines
4	Downward Diagonal Lines
5	Crossed Lines
6	Diagonal Crossed Lines

See also Built In RGB Color Equates, XPRINT ARC, XPRINT ATTACH, XPRINT COLOR, XPRINT LINE, XPRINT PIE, XPRINT SET OVERLAP, RINT STYLE, XPRINT WIDTH

Example

```
' Draw a circle, using default colors.
XPRINT ELLIPSE (10, 10) - (100, 100)
' Draw a blue ellipse filled with a light-gray, diagonal cross pattern.
XPRINT ELLIPSE (15, 25) - (95, 50), %BLUE, RGB(191,191,191), 6
```

XPRINT FORMFEED statement

XPRINT FORMFEED statement

Purpose Start a new page for the host printer.

Syntax `XPRINT FORMFEED`

Remarks XPRINT FORMFEED causes the current print page to be ejected, and a new page started. If XPRINT FORMFEED is unsuccessful, an error is generated. Note that some printers do not eject a page if it is blank.

See also XPRINT ATTACH, XPRINT CLOSE

XPRINT GET ATTACH statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET ATTACH statement New!

Purpose Retrieve the name of the attached host printer.

Syntax

```
XPRINT GET ATTACH TO PrinterVar$

Function Form:
PrinterVar$ = XPRINT$(ATTACH)
PrinterVar$ = XPRINT$
```

Remarks XPRINT GET ATTACH returns the name of the attached host printer, which is the printer that would be used by XPRINT statements. If there is no attached host printer, an empty string is returned. XPRINT$ is typically used to detect if an XPRINT ATTACH operation was successful.

See also XPRINT ATTACH

XPRINT GET CANVAS statement

XPRINT GET CANVAS statement New!

Purpose Retrieves the writable size of the attached host printer.

Syntax

```
XPRINT GET CANVAS TO WidthVar!, HeightVar!

Function Form:
WidthVar!  = XPRINT(CANVAS.X)
HeightVar! = XPRINT(CANVAS.Y)
```

Remarks XPRINT GET CANVAS retrieves the logical size of the client area (printable area) for the attached host printer. This is the size of the page, minus the unprintable margins, without any reductions for a CLIP area. The size is specified in Page Units, so it could return scaled values if they were applied with XPRINT SCALE. This is very similar to XPRINT GET CLIENT, with the single exception that scaled values (set by XPRINT SCALE) are returned if they have been utilized. If executed without a host printer attached, error 57 is generated.

See also XPRINT GET CLIENT, XPRINT GET CLIP, XPRINT GET SIZE, XPRINT GET SCALE, XPRINT SCALE

XPRINT GET CLIENT statement

XPRINT GET CLIENT statement IMPROVED

Purpose Retrieves the size of the client area (printable area) on the host printer page.

Syntax
```
XPRINT GET CLIENT To WidthVar!, HeightVar!

Function Form:
WidthVar!  = XPRINT(Client.X)
HeightVar! = XPRINT(Client.Y)
```

Remarks XPRINT GET CLIENT retrieves the physical size of the client area (printable area) for the attached host printer. The size is always specified in Pixels (points). This is very similar to XPRINT GET CANVAS, with the single exception that scaled values (set by XPRINT SCALE) are not utilized. If executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET CANVAS, XPRINT GET CLIP, XPRINT GET MARGIN, XPRINT GET PPI, XPRINT GET SIZE

XPRINT GET CLIP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET CLIP statement New!

Purpose Retrieves the size of the clip area on the selected printer.

Syntax
```
XPRINT GET CLIP TO WidthVar!, HeightVar!

Function Form:
WidthVar!  = XPRINT(Clip.X)
HeightVar! = XPRINT(Clip.Y)
```

Remarks The clip area of the printer is that space where print operations can be written. That is, the clip area is that portion of the client area which is not protected (clipped) by the XPRINT SET CLIP statement.

XPRINT GET CLIP retrieves the size of the clip area, and assigns these values to the variables specified by *WidthVar!* and *HeightVar!*. The size is specified in PAGE UNITS (pixels/points or scaled units). If no printer is selected, the values 0,0 are returned.

See also XPRINT GET CANVAS, XPRINT GET CLIENT, XPRINT SET CLIP

XPRINT GET COLLATE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET COLLATE statement IMPROVED

Purpose Retrieves the XPRINT collate status.

Syntax
```
XPRINT GET COLLATE TO CollateVar&

Function Form:
CollateVar& = XPRINT(COLLATE)
```

Remarks XPRINT allows you to set the collate status, if the printer driver supports both multiple copies and collate capability. XPRINT GET COLLATE retrieves the collate status, assigning the value to the long integer variable specified by *CollateVar&*. The following equates are predefined in the compiler to symbolically represent the possible collate status:

```
%DMCOLLATE_FALSE        = 0
%DMCOLLATE_TRUE         = 1
```

If this statement is executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT SET COLLATE

XPRINT GET COLORMODE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET COLORMODE statement IMPROVED

Purpose Retrieves the XPRINT colormode status.

Syntax
```
XPRINT GET COLORMODE TO ColorVar&

Function Form:
ColorVar& = XPRINT(COLORMODE)
```

Remarks XPRINT allows you to set the color or monochrome print mode if the printer driver supports it. XPRINT GET COLORMODE retrieves the colormode status, assigning the value to the long integer variable specified by *ColorVar&*. The value zero may be returned if colormode is not supported by the printer driver. The following equates are predefined in the compiler to symbolically represent the possible status:

```
%DMCOLOR_MONOCHROME     = 1
%DMCOLOR_COLOR          = 2
```

If this statement is executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT SET COLORMODE

XPRINT GET COPIES statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET COPIES statement IMPROVED

Purpose Retrieves the XPRINT copy count.

Syntax **XPRINT GET COPIES TO *CopyVar&***

Function Form:

***CopyVar&* = XPRINT(COPIES)**

Remarks XPRINT allows you to set the number of copies to be automatically printed, if it is supported by the printer driver. XPRINT GET COPIES retrieves the copy count, assigning the value to the long integer variable specified by *CopyVar&*. The default value is one (1). If this statement is executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT SET COPIES

XPRINT GET DC statement

XPRINT GET DC statement IMPROVED

Purpose Retrieve the handle of the device context (DC) for the host printer page.

Syntax **XPRINT GET DC TO *hDC***

Function Form:
***hDC* = XPRINT(DC)**

Remarks If no host printer is currently attached, zero is returned. The DC handle may be used with various Windows API functions to perform specialized operations on the host printer page.

See also XPRINT ATTACH

XPRINT GET DUPLEX statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET DUPLEX statement IMPROVED

Purpose Retrieve the XPRINT duplex status.

Syntax **XPRINT GET DUPLEX TO *DuplexVar&***

Function Form:
***DuplexVar&* = XPRINT(DUPLEX)**

Remarks XPRINT allows you to get/set the duplex status, if the printer supports printing on both sides of a page. XPRINT GET DUPLEX retrieves the duplex status, assigning the value to the long integer variable specified by *DuplexVar&*. The following equates are predefined in the compiler to symbolically represent the possible duplex status:

```
%DMDUP_SIMPLEX        = 1    (single sided printing)
%DMDUP_VERTICAL       = 2    (page flipped on the vertical edge)
%DMDUP_HORIZONTAL     = 3    (page flipped on the horizontal edge)
```

If the printer does not support duplex printing, the value zero (0) is returned. If this statement is executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT SET DUPLEX

XPRINT GET LINES statement

XPRINT GET LINES statement IMPROVED

Purpose Retrieve the number of lines that can be printed.

Syntax

```
XPRINT GET LINES To LineVar&
Function Form:
LineVar& = XPRINT(LINES)
```

Remarks XPRINT GET LINES retrieves the number of lines of text which can be printed on the host printer page, given the current selected font. Since

statements do not generate an automatic formfeed when text is printed on the last line, this statement can be used to determine when your program should execute an XPRINT FORMFEED to move to the next printed page on a host printer. If executed without a host printer attached, error 57 is generated.

See also XPRINT, XPRINT ATTACH, XPRINT SET FONT, XPRINT FORMFEED

XPRINT GET MARGIN statement

XPRINT GET MARGIN statement

Purpose Retrieve the margin sizes for the host printer.

Syntax

```
XPRINT GET MARGIN TO nLeft!, nTop!, nRight!, nBottom!
```

Remarks XPRINT GET MARGIN retrieves the size of the margins (the non-printable area) of the printer page. This is important because some printers do not provide equal margins on each side of the page. This is more common on the vertical coordinate, but could be found in either or both directions. The size of the four margins are specified in pixels (or world coordinates, if those were defined with an XPRINT SCALE statement). If executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET CLIENT, XPRINT GET PPI, XPRINT GET SIZE

XPRINT GET MIX statement

XPRINT GET MIX statement IMPROVED

Purpose Retrieve the color mix mode for a host printer page.

Syntax

```
XPRINT GET MIX To MixVar&
Function Form:
MixVar& = XPRINT(MIX)
```

Remarks Prior to any

operations, a host printer must first be selected with XPRINT ATTACH. There are 16 mix modes available to use for mixing the drawing color with the color that already exists at the drawing location. The mix mode equates are predefined in PowerBASIC. If executed without a host printer attached, error 57 is generated.

%MIX_BLACKNESS	Pixel is always 0 (black).
%MIX_NOTMERGESRC	Pixel is the inverse of the MergeSrc color.
%MIX_MASKNOTSRC	Pixel is a combination of the colors common to both the pixel and the inverse of the source.
%MIX_NOTCOPYSRC	Pixel is the inverse of the pen color.
%MIX_MASKSRCNOT	Pixel is a combination of the colors common to both the source and the inverse of the pixel.
%MIX_NOT	Pixel is the inverse of the pixel color.
%MIX_XORSRC	Pixel is a combination of the colors in the source and in the pixel, but not in both.
%MIX_NOTMASKSRC	Pixel is the inverse of the MaskSrc color.
%MIX_MASKSRC	Pixel is a combination of the colors common to both the source and the pixel.
%MIX_NOTXORSRC	Pixel is the inverse of the XorSrc color.
%MIX_NOP	Pixel remains unchanged.
%MIX_MERGENOTSRC	Pixel is a combination of the source color and the inverse of the pixel color.
%MIX_COPYSRC	Pixel is the source color (default).
%MIX_MERGESRCNOT	Pixel is a combination of the source color and the inverse of the pixel color.
%MIX_MERGESRC	Pixel is a combination of the source color and the pixel color.
%MIX_WHITENESS	Pixel is always 1 (white).

See also XPRINT ATTACH, XPRINT SET MIX

XPRINT GET ORIENTATION statement

XPRINT GET ORIENTATION statement IMPROVED

Purpose Retrieve the paper orientation for a host printer page.

Syntax

```
XPRINT GET ORIENTATION To OrentVar&
Function Form:
OrentVar& = XPRINT(ORIENTATION)
```

Remarks XPRINT GET ORIENTATION retrieves the orientation of the paper in the host printer, assigning the value to the long integer variable specified by *OrentVar&*. The value 1 indicates portrait mode, while 2 indicates landscape mode. If the printer does not support paper orientation, 0 is returned. If a host printer is not attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT SET ORIENTATION

XPRINT GET OVERLAP statement

XPRINT GET OVERLAP statement New!

Purpose Retrieves the status of XPrint Overlap Mode.

Syntax

```
XPRINT GET OVERLAP To OverlapVar&
Function Form:
OverlapVar& = XPRINT(OVERLAP)
```

Remarks XPRINT GET OVERLAP retrieves the status of overlap mode and assigns it to the variable specified by *OverlapVar&*. If Overlap Mode is enabled, the value true (non-zero) is assigned. If it's disabled, the value false (zero) is assigned instead. The value returned reflects the status of the host printer which is currently attached to the XPrint stream.

With Overlap Mode, you can control how PowerBASIC treats XPrint operations which involve a bounding rectangle (RECT structure) in their definition. Windows maintains unique conventions for a RECT. The bottom and right coordinates of a RECT are exclusive. In other words, the pixels at the bottom and right edges lie immediately outside the rectangle. They are ignored. For example:

```
XPRINT BOX (0,0) - (50,50)
```

In this case, a box is drawn from 0,0 to 49,49. The final pixels at the bottom and right edge are simply not drawn. However, if Overlap Mode is enabled with XPRINT SET OVERLAP, the box is drawn from 0,0 to 50,50.

The Overlap Mode affects all XPRINT functions which take a bounding rectangle as a parameter. This includes XPRINT SCALE, XPRINT BOX, XPRINT ELLIPSE, XPRINT LINE, XPRINT POLYLINE, etc.

See also XPRINT SET OVERLAP

XPRINT GET PAGES statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET PAGES statement New!

Purpose Retrieves the XPRINT page number limits for this print job.

Syntax **XPRINT GET PAGES TO *FromPage&, ToPage&***

Remarks You may elect to limit a particular print job to a subset of the total number of pages. This can be accomplished under program control by executing XPRINT SET PAGES, or the user can make the appropriate choice in the Print Dialog which is displayed when XPRINT ATTACH is executed with the CHOOSE option. When the pages are limited in this way, PowerBASIC handles all the details of print suppression for you.

Normally, XPRINT pages are numbered from one. The parameter *FromPage&* specifies the first page of the full report which will be printed, while *ToPage&* specifies the last page.

If XPRINT GET PAGES is executed without a host printer attached, an error 57 is generated.

See also XPRINT PREVIEW, XPRINT GET SELECTION, XPRINT SET PAGES

XPRINT GET PAPER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET PAPER statement IMPROVED

Purpose Retrieves the current paper size/type.

Syntax

```
XPRINT GET PAPER TO PaperVar&

Function Form:
PaperVar& = XPRINT(PAPER)
```

Remarks XPRINT GET PAPER retrieves the paper style for which the host printer is currently configured. The paper style is identified by an

value which is assigned to the long integer variable specified by *PaperVar&*. The following equates are predefined in the compiler, and represent the most common paper styles:

```
%DMPAPER_LETTER    =  1     Letter    8.5   x 11    inches
%DMPAPER_TABLOID   =  3     Tabloid   11    x 17    inches
%DMPAPER_LEDGER    =  4     Ledger    17    x 11    inches
%DMPAPER_LEGAL     =  5     Legal     8.5   x 14    inches
%DMPAPER_STATEMENT =  6     Statement 5.5   x 8.5   inches
%DMPAPER_EXECUTIVE =  7     Executive 7.25  x 10.5  inches
%DMPAPER_A3        =  8     A3        297   x 420   mm
%DMPAPER_A4        =  9     A4        210   x 297   mm
%DMPAPER_A5        = 11     A5        148   x 210   mm
%DMPAPER_B4        = 12     B4        250   x 354   mm
%DMPAPER_B5        = 13     B5        182   x 257   mm
%DMPAPER_FOLIO     = 14     Folio     8.5   x 13    inches
%DMPAPER_QUARTO    = 15     Quarto    215   x 275   mm
%DMPAPER_10X14     = 16     10x14     10    x 14    inches
%DMPAPER_11X17     = 17     11x17     11    x 17    inches
%DMPAPER_NOTE      = 18     Note      8.5   x 11    inches
%DMPAPER_ENV_9     = 19     9 Envlp   3.875 x 8.875 inches
%DMPAPER_ENV_10    = 20     10 Envlp  4.125 x 9.5   inches
```

Other paper style codes may be defined by Windows or printer suppliers. You can use XPRINT GET PAPERS to obtain a list of all the paper styles supported by the attached host printer.

If the printer does not support paper style changes, the value zero is returned. If executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET PAPERS, XPRINT SET PAPER

XPRINT GET PAPERS statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET PAPERS statement IMPROVED

Purpose Retrieves a list of supported paper types.

Syntax `XPRINT GET PAPERS TO PapersVar$`

Function Form:
`PapersVar$ = XPRINT$(PAPERS)`

Remarks XPRINT GET PAPERS retrieves a

which contains a list of all of the paper types supported by the attached host printer. This string is assigned to the string variable specified by *PapersVar$*.

The string contains a comma-delimited list of *papertype*, *papername*... repeated as many times as necessary. For example:

```
"1,Letter,5,Legal,7,Executive,20,Envelope #10"
```

You can use PARSECOUNT to determine the number of delimited fields in the string, and PARSE$() to easily extract the type numbers and names. The following equates are predefined in the compiler, and represent the most common paper styles:

```
%DMPAPER_LETTER    =  1      Letter    8.5   x 11    inches
%DMPAPER_TABLOID   =  3      Tabloid   11    x 17    inches
%DMPAPER_LEDGER    =  4      Ledger    17    x 11    inches
%DMPAPER_LEGAL     =  5      Legal     8.5   x 14    inches
%DMPAPER_STATEMENT =  6      Statement 5.5   x 8.5   inches
%DMPAPER_EXECUTIVE =  7      Executive 7.25  x 10.5  inches
%DMPAPER_A3        =  8      A3        297   x 420   mm
%DMPAPER_A4        =  9      A4        210   x 297   mm
%DMPAPER_A5        = 11      A5        148   x 210   mm
%DMPAPER_B4        = 12      B4        250   x 354   mm
%DMPAPER_B5        = 13      B5        182   x 257   mm
%DMPAPER_FOLIO     = 14      Folio     8.5   x 13    inches
%DMPAPER_QUARTO    = 15      Quarto    215   x 275   mm
%DMPAPER_10X14     = 16      10x14     10    x 14    inches
%DMPAPER_11X17     = 17      11x17     11    x 17    inches
%DMPAPER_NOTE      = 18      Note      8.5   x 11    inches
%DMPAPER_ENV_9     = 19      9 Envlp   3.875 x 8.875 inches
%DMPAPER_ENV_10    = 20      10 Envlp  4.125 x 9.5   inches
```

Other paper style codes may be defined by Windows or printer suppliers. If executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET PAPERS, XPRINT SET PAPER

XPRINT GET PIXEL statement

XPRINT GET PIXEL statement IMPROVED

Purpose Retrieves the color of a pixel on a host printer page.

Syntax `XPRINT GET PIXEL [STEP] (x!, y!) TO PixelVar&`

Function Form:
`PixelVar& = XPRINT(PIXEL [STEP], x!, y!)`

Remarks Not all printer drivers support the ability to retrieve the color of a pixel. If this feature is not supported, or if the coordinates are outside the printer client area, an invalid color value of -1 is returned. If no host printer is attached, error 57 is generated.

See also Built In RGB Color Equates, XPRINT ATTACH, XPRINT COLOR, XPRINT SET PIXEL

XPRINT GET POS statement

XPRINT GET POS statement IMPROVED

Purpose Retrieves the last point referenced (POS) by an statement.

Syntax
```
XPRINT GET POS TO XVar!, YVar!
Function Form:
XVar! = XPRINT(POS.X)
YVar! = XPRINT(POS.Y)
```

Remarks XPRINT GET POS allows you to retrieve the last point referenced (POS) by XPRINT statements. The coordinate points are specified in Page Units. If executed without a host printer attached, an error 57 is generated, and the values 0,0 are returned.

See also XPRINT ATTACH, XPRINT SET POS

XPRINT GET PPI statement

XPRINT GET PPI statement IMPROVED

Purpose Retrieves the resolution of the host printer page.

Syntax
```
XPRINT GET PPI TO XVar&, YVar&
Function Form:
XVar& = XPRINT(PPI.X)
YVar& = XPRINT(PPI.Y)
```

Remarks XPRINT GET PPI retrieves the resolution (points per inch) of the host printer page. The resolution is always specified in pixels, regardless of any XPRINT SCALE option. If executed without a host printer attached, error 57 is generated, and the values 0,0 are returned. This statement is particularly useful in drawing items such as rulers and graphs to a particular physical size. There are 25.4 millimeters per inch, so just divide by 25.4 to convert from pixels per inch to pixels per millimeter.

See also XPRINT ATTACH, XPRINT GET CLIENT, XPRINT GET MARGIN, XPRINT GET SIZE

XPRINT GET QUALITY statement

XPRINT GET QUALITY statement IMPROVED

Purpose Retrieves the print quality setting for the host printer.

Syntax
```
XPRINT GET QUALITY To QualVar&
Function Form:
QualVar& = XPRINT(QUALITY)
```

Remarks XPRINT GET QUALITY retrieves the print quality setting for the host printer. The value 1 is draft mode, 2 is low resolution, 3 is medium resolution, and 4 is high resolution. If the printer does not support print quality settings, 0 is returned. If no host printer is attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT SET QUALITY

XPRINT GET SCALE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET SCALE statement

Purpose Retrieve the current coordinate limits for the host printer page.

Syntax `XPRINT GET SCALE TO x1!, y1!, x2!, y2!`

Remarks XPRINT SCALE allows you to define your own world coordinate system for subsequent statements. World coordinates may be values, with the only requirement that *x1!* not equal *x2!*, and *y1!* not equal *y2!*.

XPRINT GET SCALE retrieves the coordinate limits, which may be either custom world coordinates (if an XPRINT SCALE has been executed), or else default pixel coordinates. This allows you to save and restore a previous set of coordinates.

See also XPRINT SCALE, XPRINT SCALE PIXELS

XPRINT GET SELECTION statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET SELECTION statement New!

Purpose Retrieves the status of the SELECTION flag.

Syntax `XPRINT GET SELECTION TO SelectVar&`

Function Form:
`SelectVar& = XPRINT(SELECTION)`

Remarks You may elect to limit a particular print job to just that part of the total which is selected/highlighted. If so, it is the programmer's responsibility to limit XPRINT output to just the selected region.

The selection flag can only be set by the user in the Print Dialog which is displayed when XPRINT ATTACH is executed with the CHOOSE option. It cannot be set under program control. This flag is maintained only to give the programmer information about the user's request. If you do not wish to honor this option, you should disable it in XPRINT ATTACH CHOOSE.

If XPRINT GET SELECTION is executed without a host printer attached, an error 57 is generated.

See also XPRINT ATTACH

XPRINT GET SIZE statement

XPRINT GET SIZE statement IMPROVED

Purpose Retrieve the total size of the host printer page.

Syntax

```
XPRINT GET SIZE TO WidthVar&, HeightVar&
Function Form:
WidthVar&  = XPRINT(SIZE.X)
HeightVar& = XPRINT(SIZE.Y)
```

Remarks XPRINT GET SIZE allows you to retrieve the full size of the host printer page, including both the printable client area and any unprintable margins. The sizes are specified in pixels (points). If no host printer is attached, error 57 is generated, and the values 0,0 are returned.

See also XPRINT ATTACH, XPRINT GET CLIENT, XPRINT GET MARGIN, XPRINT GET MIX, XPRINT GET PPI

XPRINT GET STRETCHMODE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET STRETCHMODE statement New!

Purpose Retrieves the default bitmap stretching mode for the attached DC.

Syntax

```
XPRINT GET STRETCHMODE TO ModeVar&
Function Form:
ModeVar& = XPRINT(STRETCHMODE)
```

Remarks There are several operations in PowerBASIC which involve stretching or condensing images on bitmaps, most notably XPRINT STRETCH. As individual points must be added or removed, there is a good chance that the quality of the image will be degraded. However, if you describe the nature of the image by defining a StretchMode, you can substantially enhance the appearance.

The default StretchMode is maintained individually for each DC. You can retrieve the default mode with this statement, or set it with XPRINT SET STRETCHMODE. Of course, you can also override the default StretchMode when you execute one of the affected statements.

The 4 stretch mode equates are predefined in PowerBASIC.

%BLACKONWHITE	1	This is the default Windows stretch mode, and is most appropriate for monochrome bitmaps, or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels.
%	2	Performs a boolean OR of eliminated and existing pixels. It

WHITEONBLACK		preserves white pixels at the expense of black pixels.
%COLORONCOLOR	3	Deletes eliminated lines of pixels without trying to preserve their information.
%HALFTONE	4	This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source pixel block.

See also XPRINT COPY, XPRINT RENDER, XPRINT STRETCH, XPRINT SET STRETCHMODE

XPRINT GET TRAY statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET TRAY statement IMPROVED

Purpose Retrieves the active printer tray.

Syntax

```
XPRINT GET TRAY TO TrayVar&
```

Function Form:

```
TrayVar& = XPRINT(TRAY)
```

Remarks XPRINT GET TRAY retrieves the paper tray which is active on the host printer. A descriptive value is assigned to the long integer variable specified by *TrayVar&*. The following equates are predefined in the compiler, and represent the most common paper trays:

```
%DMBIN_UPPER         = 1
%DMBIN_LOWER         = 2
%DMBIN_MIDDLE        = 3
%DMBIN_MANUAL        = 4
%DMBIN_ENVELOPE      = 5
%DMBIN_ENVMANUAL     = 6
%DMBIN_AUTO          = 7
%DMBIN_TRACTOR       = 8
%DMBIN_SMALLFMT      = 9
%DMBIN_LARGEFMT      = 10
%DMBIN_LARGECAPACITY = 11
%DMBIN_CASSETTE      = 14
%DMBIN_FORMSOURCE    = 15
```

Other tray codes may be defined by Windows or printer suppliers, so your program should be written to consider that possibility. You can use XPRINT GET TRAYS to obtain a list of all the paper trays supported by the attached host printer.

If the printer does not support the tray change requested, error 5 is generated. If executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET TRAYS, XPRINT SET TRAY

XPRINT GET TRAYS statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET TRAYS statement IMPROVED

Purpose Retrieves a list of supported paper trays.

Syntax

```
XPRINT GET TRAYS TO TrayVar$
```

Function Form:

```
TrayVar$ = XPRINT$(TRAYS)
```

Remarks XPRINT GET TRAYS retrieves a

which contains a list of all of the paper trays supported by the attached host printer. This string is assigned to the string variable specified by *TrayVar$*.

The string contains a comma-delimited list of traytype, trayname... repeated as many times as necessary. For example:

```
"1,Upper,2,Lower,5,Envelope"
```

You can use PARSECOUNT to determine the number of delimited fields in the string, and PARSE$() to easily extract the tray numbers and names. The following equates are predefined in the compiler, and represent the most common trays:

```
%DMBIN_UPPER         = 1
%DMBIN_LOWER         = 2
%DMBIN_MIDDLE        = 3
%DMBIN_MANUAL        = 4
%DMBIN_ENVELOPE      = 5
%DMBIN_ENVMANUAL     = 6
%DMBIN_AUTO          = 7
%DMBIN_TRACTOR       = 8
%DMBIN_SMALLFMT      = 9
%DMBIN_LARGEFMT      = 10
%DMBIN_LARGECAPACITY = 11
%DMBIN_CASSETTE      = 14
%DMBIN_FORMSOURCE    = 15
```

Other paper style codes may be defined by Windows or printer suppliers. If executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET TRAY, XPRINT SET TRAY

XPRINT GET WORDWRAP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET WORDWRAP statement New!

Purpose Retrieves the status of XPRINT WordWrap Mode.

Syntax
```
XPRINT GET WORDWRAP TO WrapVar&
```
Function Form:
```
WrapVar& = XPRINT(WORDWRAP)
```

Remarks XPRINT GET WORDWRAP retrieves the status of wordwrap mode and assigns it to the variable specified by *WrapVar&*. If WordWrap Mode is enabled, the value true (non-zero) is assigned. If it's disabled, the value false (zero) is assigned instead. The value returned reflects the status of the attached printer.

With WordWrap Mode, you can control how PowerBASIC prints text on an XPRINT page when it reaches the end of a line. Since XPRINT operates on a full page basis, the default is to ignore text which is printed past the end of the line. This can be modified under program control by using XPRINT SET WORDWRAP.

When WordWrap mode is enabled, it affects only XPRINT print operations. If XPRINT print attempts to display a word beyond the end of a row, the entire word is automatically wrapped to the first column of the next row.

See also XPRINT CELL, XPRINT GET WRAP, XPRINT SET WORDWRAP, XPRINT SET WRAP, XPRINT SPLIT

XPRINT GET WRAP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT GET WRAP statement New!

Purpose Retrieves the status of XPRINT Wrap Mode.

Syntax
```
XPRINT GET WRAP TO WrapVar&
```
Function Form:
```
WrapVar& = XPRINT(WRAP)
```

Remarks XPRINT GET WRAP retrieves the status of wrap mode and assigns it to the variable specified by *WrapVar&*. If Wrap Mode is enabled, the value true (non-zero) is assigned. If it's disabled, the value false (zero) is assigned instead. The value returned reflects the status of the attached printer.

With Wrap Mode, you can control how PowerBASIC prints text on an XPRINT page when it reaches the end of a line. Since XPRINT operates on a full page basis, the default is to ignore text which is printed past the end of the line. This can be modified under program control by using XPRINT SET WRAP.

When Wrap Mode is enabled, it affects only XPRINT print operations. If XPRINT print attempts to display a character beyond the end of a row, it is automatically wrapped to the first column of the next row.

See also XPRINT CELL, XPRINT GET WORDWRAP, XPRINT SET WORDWRAP, XPRINT SET WRAP, XPRINT SPLIT

XPRINT IMAGELIST statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT IMAGELIST statement

Purpose Prints an image from an IMAGELIST

Syntax `XPRINT IMAGELIST (x!,y!), hLst, index&, overlay&, style&`

Remarks One of the images stored in an IMAGELIST is printed on the attached host printer. The parameters *x!*,*y!* define the upper left corner of the position of the image. *hLst* is the handle of the IMAGELIST and *index&* is the selector of the image to be displayed (1=first, 2=second, etc.). If *overlay&* is non-zero, it specifies an overlay image to be added to the printed image from the image list. The parameter *style&* may be one of the following style bits:

%ILD_NORMAL	Draws the image using the background color of the image list. If the background color is the default value %CLR_NONE (defined in the Commctrl.inc file), the image is drawn transparently.
%ILD_TRANSPARENT	Draws the image transparently if there is a mask.
%ILD_MASK	Draws the mask.
%ILD_BLEND25	If there is a mask, the image is drawn blending 25% with the system highlight color.
%ILD_BLEND50	If there is a mask, the image is drawn blending 50% with the system highlight color.

See also XPRINT ATTACH, IMAGELIST

XPRINT LINE statement

XPRINT LINE statement

Purpose Draw a line on a host printer page.

Syntax `XPRINT LINE [STEP] [(x1!, y1!)] - [STEP] (x2!, y2!)[, rgbColor&]`

Remarks The line is drawn from the first point, up to, but not including the second point. Coordinate points are specified in pixels, unless optional world coordinates have been defined with an XPRINT SCALE statement. Line width can be set using XPRINT WIDTH. If line width is set to 1 (the default), the line style can be set with XPRINT STYLE. If executed without a host printer attached, error 57 is generated.

Windows graphic conventions consider the final x2 and y2 coordinates to be exclusive. Therefore, by default, the final pixel is not drawn unless Overlap Mode is enabled. See

	XPRINT SET OVERLAP for details.
x1!, *y1!*	Optional values which define the starting point of the line. If this optional first point is omitted, the line begins at the last point referenced ( ) in a preceding statement. If the first STEP option is included, the *x1!* and *y1!* starting coordinates are relative to the last point referenced (POS) on the host printer page.
x2!, *y2!*	The ending point of the line. If the second STEP option is included, the *x2!* and *y2!* ending coordinates are relative to the starting coordinates.
rgbColor&	Optional RGB color value for the line. If *rgbColor&* is omitted (or -1), the line color defaults to the current foreground color for the host printer page.
See also	Built In RGB Color Equates, XPRINT ARC, XPRINT ATTACH, XPRINT BOX, XPRINT COLOR, XPRINT ELLIPSE, XPRINT PIE, XPRINT POLYGON, XPRINT POLYLINE, XPRINT SET MIX, XPRINT SET OVERLAP, XPRINT STYLE, XPRINT WIDTH

Example

```
' Draw a triangle. Note that, since LINE draws up to,
' but not including the second point, one extra point
' must be added when STEP is used.
XPRINT LINE (10, 10) - (10, 100)  ' left side
XPRINT LINE STEP - (101, 100)     ' base line
XPRINT LINE STEP - (10, 10)       ' back to top
```

XPRINT PIE statement

XPRINT PIE statement

Purpose Draw a pie section on a host printer page.

Syntax **XPRINT PIE (*x1!*, *y1!*) - (*x2!*, *y2!*), *arcStart!*, *arcEnd!* [, [*rgbColor&*] [, [*fillcolor&*] [, [*fillstyle&*]]]]**

Remarks A pie section is an arc, with a line drawn from each end point to the center of the circle or ellipse. To specify a pie section, you would first define the full circle or ellipse of which it is a part, and then specify the points on the ellipse where the arc starts and stops.

The full circle or ellipse is defined by its bounding rectangle, which is defined as the smallest rectangle which can be drawn around the circle or ellipse. For example, if the circle is centered at position (400,400), with a radius of 100 pixels, the upper left corner (x1,y1) of the bounding rectangle is (300,300), and the lower right corner (x2,y2) is (500,500).

The start point and end point of the arc are specified by their angle, which must be given in radians. A complete circle or ellipse is 2*pi radians. On a 12-hour clock-face, the values 0 and 2*pi both refer to the position of 3 o'clock, while the value 1*pi refers to the position of 9 o'clock. Other positions are specified by a radian value relative to these. In PowerBASIC, arcs are always drawn counter-clockwise from the starting point to the ending point.

Prior to any

operations, a host printer must first be selected with XPRINT ATTACH. The coordinate points are specified in pixels (or world coordinates, if those were chosen with XPRINT SCALE). Line width can be set using XPRINT WIDTH. If line width is set to 1 (the default), the line style can be set with XPRINT STYLE. Because of the nature of a pie section, XPRINT PIE neither uses, nor updates, (last point referenced). If executed without a host printer attached, error 57 is generated.

x1!, *y1!*	The upper left corner of the bounding rectangle of the full circle or ellipse.
x2!, *y2!*	The lower right corner of the bounding rectangle of the full circle or ellipse.
ArcStart!	The starting angle of the arc, in radians, from 0 to 2*pi.

ArcEnd!	The ending angle of the arc, in radians, from 0 to 2*pi radians. Note that arcs are always drawn counter-clockwise from *arcStart!* to *arcEnd!*. Compared with a 12-hour clock-face, 0 or 2*pi radians is at 3 o'clock, and 1*pi radians is at 9 o'clock.
rgbColor&	Optional RGB color of the pie edge. If omitted (or -1), the edge color defaults to the current foreground color for the host printer page.
fillcolor&	Optional RGB color of the pie interior. If *fillcolor&* is omitted (or -2), the interior of the pie is not filled, allowing the background to show through. If *fillcolor&* is -1, the interior is painted with the same color as the edge. Otherwise, *fillcolor&* specifies the RGB color to be used.
fillstyle&	Optional fill style (pattern) to be used. If *fillstyle&* is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the *fillcolor&*, while the background is specified by the default background color for the host printer page. The optional *fillstyle&* may be:

0	Solid (default)
1	Horizontal Lines
2	Vertical Lines
3	Upward Diagonal Lines
4	Downward Diagonal Lines
5	Crossed Lines
6	Diagonal Crossed Lines

See also Built In RGB Color Equates, XPRINT ARC, XPRINT ATTACH, XPRINT BOX, XPRINT COLOR, XPRINT ELLIPSE, XPRINT LINE, XPRINT STYLE, XPRINT WIDTH

Example

```
' A full circle is 2*pi radians (100%).
' To show a 25% Pie, use the formula 0.25 * 2 * pi.
' The following divides a full circle into four 25% parts, each
' with its own colors, each slightly separated from the others.
' Note: 0 is at 3 o'clock, then it builds counter-clockwise.
LOCAL Pi2 AS DOUBLE
Pi2 = ATN(1)* 8  ' 2 * Pi can be useful here
XPRINT PIE (10, 9)-(110, 109), 0, Pi2 * 0.25, %BLUE, %LTGRAY, 3
XPRINT PIE (9, 9)-(109, 109), Pi2 * 0.25, Pi2 * 0.50, %RED, %LTGRAY, 4
XPRINT PIE (9, 10)-(109, 110), Pi2 * 0.5,  Pi2 * 0.75, RGB(0,127,0), %
LTGRAY, 3
XPRINT PIE (10, 10)-(110, 110), Pi2 * 0.75, 0, %GRAY, %LTGRAY, 4
```

XPRINT POLYGON statement

XPRINT POLYGON statement

Purpose Draw a polygon on a host printer page.

Syntax **XPRINT POLYGON points [, [*rgbColor&*] [, [*fillcolor&*] [, [*fillstyle&*] [, *fillmode&*]]]]**

Remarks The coordinate points are specified in pixels, unless optional world coordinates have been defined with an XPRINT SCALE statement. Line width can be set using XPRINT WIDTH. If line width is set to 1 (the default), the line style can be set with XPRINT STYLE. XPRINT POLYGON neither uses, nor updates, the last point referenced (

). If executed without a host printer attached, error 57 is generated.

points User-defined type that defines the number of vertices and the location of each. There must be at least two, and no more than 1024 vertices. The first member is a long integer point count, followed directly by the appropriate number of single precision floats to specify the actual coordinates. Floating point coordinates are required, because of the possibility of their use as world coordinates with XPRINT SCALE. You can use a type with a scalar list, like this:

```
TYPE PolyPoints
  count as long
```

```
  x1 as single
  y1 as single
  x2 as single
  y2 as single
  x3 as single
  y3 as single
END TYPE
Or, you can create an array using point types, like this:
TYPE PolyPoint
  x as single
  y as single
END TYPE

TYPE PolyArray
  count as long
  xy(1 TO 3) as PolyPoint
END TYPE
```

rgbColor& Optional RGB color of the polygon edge. If omitted (or -1), the edge color defaults to the current foreground color for the host printer page.

fillcolor& Optional RGB color of the polygon interior. If *fillcolor&* is omitted (or -2), the interior of the ellipse is not filled, allowing the background to show through. If *fillcolor&* is -1, the interior is painted with the same color as the edge. Otherwise, *fillcolor&* specifies the RGB color to be used.

fillstyle& Optional fill style (pattern) to be used. If *fillstyle&* is omitted, the default fill style is solid (0). If a hatch pattern is chosen (1 to 6), the foreground color is specified by the *fillcolor&*, while the background is specified by the default background color for the host printer page. The optional *fillstyle&* may be:

0	Solid (default)
1	Horizontal Lines
2	Vertical Lines
3	Upward Diagonal Lines
4	Downward Diagonal Lines
5	Crossed Lines
6	Diagonal Crossed Lines

fillmode& If *fillmode&* is missing (or zero), the winding mode is selected. This fills any region with a non-zero winding value. If *fillmode&* is non-zero, the alternate mode is selected. This fills the area between odd-numbered and even-numbered polygon sides on each scan line. That is, it fills the area between the first side and the second side, between the third side and fourth side, etc.

See also Built In RGB Color Equates, XPRINT ARC, XPRINT ATTACH, XPRINT BOX, XPRINT COLOR, XPRINT ELLIPSE, XPRINT LINE, XPRINT POLYLINE

XPRINT POLYLINE statement

XPRINT POLYLINE statement

Purpose Draw a series of connected lines on a host printer page.

Syntax **XPRINT POLYLINE *points [, rgbColor&*]**

Remarks The coordinate points are specified in pixels, unless optional world coordinates have been defined with an XPRINT SCALE statement. Line width can be set using XPRINT WIDTH. If line width is set to 1 (the default), the line style can be set with XPRINT STYLE. XPRINT POLYLINE neither uses, nor updates, the last point referenced (

). If executed without a host printer attached, error 57 is generated.

Windows graphic conventions consider the final x2 and y2 coordinates to be exclusive. Therefore, by default, the final pixel is not drawn unless Overlap Mode is enabled. See

XPRINT SET OVERLAP for details.

points User-defined type that defines the number of vertices and the location of each. There must be at least two, and no more than 1024 vertices. The first member is a long integer point count, followed directly by the appropriate number of single precision floats to specify the actual coordinates. Floating point coordinates are required, because of the possibility of their use as world coordinates with SCALE. You can use a type with a scalar list, like this:

```
TYPE PolyPoints
  count as long
  x1 as single
  y1 as single
  x2 as single
  y2 as single
  x3 as single
  y3 as single
END TYPE
Or, you can create an array using point types, like this:
TYPE PolyPoint
  x as single
  y as single
END TYPE

TYPE PolyArray
  count as long
  xy(1 TO 3) as PolyPoint
END TYPE
```

rgbColor& Optional RGB color of the polygon edge. If omitted (or -1), the edge color defaults to the current foreground color for the host printer page.

See also Built In RGB Color Equates, XPRINT ARC, XPRINT ATTACH, XPRINT BOX, XPRINT COLOR, XPRINT ELLIPSE, XPRINT LINE, XPRINT POLYGON, XPRINT SET OVERLAP, XPRINT STYLE, XPRINT WIDTH

XPRINT PREVIEW statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT PREVIEW statement New!

Purpose Display a replica of a printed document on the screen.

Syntax
```
XPRINT PREVIEW hWin, ID [, CALL xxx]
XPRINT PREVIEW CLOSE
```

Remarks Print Preview is a powerful concept which should be considered in most application programs which provide printed reports. Briefly, the idea involves displaying a printed report on the screen before it is committed to printing on paper.

XPRINT PREVIEW allows you to redirect output from

statements to a graphic , control, or window so that it may be displayed on the screen. When XPRINT PREVIEW CLOSE is executed, XPRINT output reverts back to the host printer so that a repeat of the XPRINT code is now sent to the printer for completion of the printed report.

XPRINT PREVIEW selects the graphic target, and should be executed directly after the printer is selected with XPRINT ATTACH. The target is identified by the handle and ID given when it was created. You can optionally specify a callback function which is called upon every execution of an XPRINT FORMFEED or XPRINT CLOSE.

XPRINT PREVIEW must be executed immediately after XPRINT ATTACH or an error 98 "XPrint Preview Error" will be generated at run time. No XPRINT statements (other than the XPRINT$ function) may be executed between XPRINT ATTACH and XPRINT PREVIEW.

If you include the CallBack option, the callback procedure must be a simple SUB with no parameters and no return value. It is called automatically by the XPRINT engine at the completion of each preview page (upon execution of XPRINT FORMFEED or XPRINT PREVIEW CLOSE. This Sub can perform all sorts of housekeeping help, such as copying the preview bitmap for separate storage, counting pages in the report, or most anything else needed by your program. Copying the bitmap is important in multi-page reports as XPRINT FORMFEED erases the graphic target for preview of the next page.

See also XPRINT ATTACH, XPRINT CLOSE, XPRINT FORMFEED

XPRINT PRINT statement

XPRINT PRINT statement IMPROVED

Purpose Output text to be printed on the selected printer.

Syntax

```
XPRINT PRINT [EXPRLIST] [POS(n)] [SPC(n)] [TAB(n)] [,] [;]...
XPRINT [EXPRLIST] [POS(n)] [SPC(n)] [TAB(n)] [,] [;]...
```

Remarks Prior to any XPRINT operations, you should be certain that a printer has been selected with XPRINT ATTACH. The text foreground and background color are set with XPRINT COLOR. Text which extends beyond the bounds of the page is clipped. The size of the text to be printed can be determined in advance with XPRINT TEXT SIZE, and formatted to fit a particular field with XPRINT SPLIT. Drawing begins at the last point referenced by another statement, or the point specified by XPRINT SET POS. The upper left corner of the text is positioned at the POS.

XPRINT PRINT has the following parts, which may occur in any order and quantity, within a single statement:

EXPRLIST and/or expression(s) which are written to the page. A semicolon can be used as separator between multiple expressions in the same statement. Upon completion, the POS is moved to the left margin of the next line.

POS(*n*) An optional function used to set the POS to the horizontal page unit (pixel, scaled unit, etc.) specified by the numeric argument, Multiple uses of the POS function is permitted in a single statement. The vertical position is unchanged.

SPC(*n*) An optional function used to insert *n* spaces into the printed output. Multiple uses of SPC is permitted in a single statement. Values of *n* less than 1 are ignored.

TAB(*n*) An optional function used to tab to the *n*th column before printing the next expression. Multiple use of TAB is permitted in a single statement. Since TAB references columns, rather than pixels, it can give unpredictable results when used with a variable width font. It is best used with a fixed width font.

[;|,] Special characters that determine the position of the next text item printed. A semicolon (;) means the next text item is printed immediately; a comma (,) means the next text item is printed at the start of the next print zone. Print zones begin every 14 columns.

If the final argument is a semicolon or comma, the POS is maintained at the current location, rather than the default action of moving to the start of the next line. For example:

```
XPRINT PRINT "Hello";
XPRINT PRINT " world!";
```

...produces the contiguous result "Hello world!"

If you omit all arguments, XPRINT PRINT just moves the POS to the left margin of the next line. Any control codes, such as Carriage Return, Line-Feed, and Backspace are not interpreted. They will display as symbols in the current selected font.

USING$ is a separate function, which may be included in the *ExprList*. See the USING$() function for more information.

It is not possible to print a User-Defined Type (UDT), a Variant, an object variable, or an entire array. Individual member values must be extracted with the appropriate function before they can be displayed.

See also FONT NEW, LPRINT, XPRINT ATTACH, XPRINT CELL, XPRINT CHR SIZE, XPRINT COLOR, XPRINT CLOSE, XPRINT SET FONT, XPRINT GET POS, XPRINT SET POS, XPRINT SET WORDWRAP, XPRINT SET WRAP, XPRINT SPLIT, XPRINT TEXT SIZE

Example

```
' Typical XPRINT printing strategy
ERRCLEAR
XPRINT ATTACH DEFAULT  ' Use default printer
IF ERR = 0 AND LEN(XPRINT$) > 0 THEN
  XPRINT "This is your printer talking"
  XPRINT FORMFEED      ' Issue a formfeed
  XPRINT CLOSE         ' detach the printer
END IF
```

XPRINT RENDER statement

XPRINT RENDER statement

Purpose Render an image on a host printer page.

Syntax **XPRINT RENDER *BmpName$*, (*x1!*, *y1!*)-(*x2!*, *y2!*)**

Remarks Renders an image (bitmap or icon), loaded from a resource or a disk file, to a host printer page. The parameter *BmpName$* contains the name of the image to be loaded. If *BmpName$* contains a period, it is presumed to be the name of a disk file. Otherwise, an attempt is made to load it from the program's resource data; if not found, it is then presumed to be a disk file. The parameters x1!,y1! define the upper left corner of the destination rectangle, while x2!,y2! define the lower right corner of that rectangle. If the destination rectangle is larger or smaller than the original, the image is stretched or condensed to the requested size. If XPRINT RENDER is unsuccessful, an appropriate error is generated.

The following code will retrieve the natural size of an image in a bitmap file, in pixels:

```
nFile& = FREEFILE
OPEN "myimage.bmp" FOR BINARY AS nFile&
GET #nFile&, 19, nWidth&
GET #nFile&, 23, nHeight&
CLOSE nFile&
```

See also XPRINT ATTACH, XPRINT COPY, XPRINT STRETCH, XPRINT SET STRETCHMODE

XPRINT SCALE statement

XPRINT SCALE statement

Purpose Define a custom world coordinate system for a host printer page.

Syntax

```
XPRINT SCALE (x1!, y1!)-(x2!, y2!)
XPRINT SCALE PIXELS
```

Remarks XPRINT SCALE lets you define your own world coordinate system for all subsequent statements. World coordinates may be values, with the only requirement that *x1!* not equal *x2!*, and *y1!* not equal *y2!*. If either pair are equal, an error 5 is generated. The custom coordinates remain with the printer page until XPRINT SCALE is repeated, or the host printer is detached. If executed without a host printer attached, error 57 is generated.

If *x2!* is greater than *x1!*, coordinates grow larger as they move to the right. Otherwise, they grow larger as they move to the left.

If *y2!* is greater than *y1!*, coordinates grow larger as they move downward. Otherwise, they grow larger as they move upward.

By default, the position *x2!*/*y2!* translates to the first pixel which is outside of the client area, and therefore not drawn. However, if OVERLAP MODE is enabled by XPRINT SET OVERLAP, x2!/y2! translates to the final pixel in the client area and is drawn.

XPRINT SCALE PIXELS sets or resets the coordinate system to pixel coordinates.

See also XPRINT ATTACH, XPRINT GET SCALE, XPRINT SET OVERLAP statement

Example

```
' Attach the default Windows printer
XPRINT ATTACH DEFAULT

' Retrieve the client size (printable area) of the printer page
XPRINT GET CLIENT TO ncWidth!, ncHeight!

' Retrieve the resolution (points per inch) of the attached printer
XPRINT GET PPI TO x&, y&

' Width in inches of the printable area
ncWidth!  = ncWidth!/x&

' Height in inches of the printable area
ncHeight! = ncHeight!/y&

' Set the scale to inches, for American letter-size paper
' in portrait mode. This is the equivalent to 8.5x11 minus the margins.
XPRINT SCALE (0,0)-(ncWidth!,ncHeight!)
```

XPRINT SET CLIP statement

XPRINT SET CLIP statement New!

Purpose Establishes margins around the outer edges of the print page.

Syntax

```
XPRINT SET CLIP LeftMargin!, TopMargin!, RightMargin!, BottomMargin!
```

Remarks This statement establishes margins on any or all sides of the selected printer. All subsequent

operations are "clipped" on these boundaries, so that no additional text or graphics are written in these protected areas.

Each of the 4 parameters is specified in the PAGE UNITS currently in effect. However, as this changes the target space available to you, the page units are immediately set to pixels/points. The upper left corner of the clip area is now addressed as point (0,0), while the right and bottom limits are reduced by the size of the margins. If you would prefer to use new Scaled Page Units for this revised clip area, you must executes a new XPRINT SCALE.

XPRINT SET CLIP is particularly useful for displaying text, where enclosing "white space" improves the appearance a good deal.

You can disable a clip area by executing GRAPHIC SET CLIP 0,0,0,0.

See also XPRINT GET CANVAS, XPRINT GET CLIENT, XPRINT GET SCALE, XPRINT SCALE

XPRINT SET COLLATE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT SET COLLATE statement

Purpose Change the XPRINT collate status.

Syntax `XPRINT SET COLLATE numrexp`

Remarks XPRINT allows you to set the collate status, if the printer driver supports both multiple copies and collate capability. XPRINT SET COLLATE enables or disables collating, depending upon the value of the *numrexp* (1=true 0=false). The following equates are predefined in the compiler to symbolically represent the possible status:

```
%DMCOLLATE_FALSE        = 0
%DMCOLLATE_TRUE         = 1
```

If the printer does not support collating, or other values are used, error 5 is generated. If this statement is executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET COLLATE

XPRINT SET COLORMODE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT SET COLORMODE statement

Purpose Changes the XPRINT colormode status.

Syntax **`XPRINT SET COLORMODE`** ***`numrexp`***

Remarks XPRINT allows you to set the color or monochrome print mode if the printer driver supports it. XPRINT SET COLORMODE expects a

expression which evaluates to one of the following listed values. The following equates are predefined in the compiler to symbolically represent the possible status:

```
%DMCOLOR_MONOCHROME    = 1
%DMCOLOR_COLOR         = 2
```

If this statement is executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET COLORMODE

XPRINT SET COPIES statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT SET COPIES statement

Purpose Change the XPRINT copy count.

Syntax **`XPRINT SET COPIES`** ***`numrexp`***

Remarks XPRINT SET COPIES allows you to set the number of copies to be automatically printed, if it is supported by the printer driver. The default value is one (1). If multiple copies are not supported by the printer driver, or the count requested is greater than that supported by the printer driver, error 5 is generated. If this statement is executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET COPIES

XPRINT SET DUPLEX statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT SET DUPLEX statement

Purpose Change the XPRINT duplex status.

Syntax **`XPRINT SET DUPLEX`** ***`numrexp`***

Remarks XPRINT allows you to set the duplex status, if the printer supports printing on both sides of a page. XPRINT SET DUPLEX changes the mode to that specified by the *numrexp*. The following equates are predefined in the compiler to symbolically represent the possible duplex status:

```
%DMDUP_SIMPLEX        = 1    (single sided printing)
%DMDUP_VERTICAL       = 2    (page flipped on the vertical edge)
%DMDUP_HORIZONTAL     = 3    (page flipped on the horizontal edge)
```

If the printer does not support duplex printing, error 5 is generated. If this statement is executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET DUPLEX

XPRINT SET FONT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT SET FONT statement IMPROVED

Purpose Select a font for the XPRINT statement.

Syntax `XPRINT SET FONT FontHndl&`

fonthndl& The numeric handle returned by the FONT NEW statement.

Remarks The font specified by *FontHndl&* is selected to be used by

statements. This is the most efficient way to change fonts and their general appearance (size, style, etc.). If you specify a *FontHndl&* of zero, the font is changed back to the original default font chosen by PowerBASIC.

You can predefine virtually any number of fonts and attributes by executing FONT NEW statements for each of them. That makes them ready for immediate use when selected by XPRINT SET FONT.

Prior to any XPRINT operations, a specific printer must first be selected with XPRINT ATTACH. If no specific font is selected, the default font is Courier New with no style attributes.

See also FONT NEW, XPRINT, XPRINT ATTACH, XPRINT CHR SIZE, XPRINT TEXT SIZE

XPRINT SET MIX statement

XPRINT SET MIX statement

Purpose Set the color mix mode for a host printer page.

Syntax `XPRINT SET MIX mode&`

Remarks Prior to any graphical operations, a host printer must first be selected with XPRINT ATTACH. There are 16 mix modes available to use for mixing the drawing color with the color that already exists at the drawing location. The default mix mode is 13, %mix_CopySrc. The mix mode equates are predefined in PowerBASIC.

%MIX_BLACKNESS	Pixel is always 0 (black).
%MIX_NOTMERGESRC	Pixel is the inverse of the MergeSrc color.
%MIX_MASKNOTSRC	Pixel is a combination of the colors common to both the pixel and the inverse of the source.
%MIX_NOTCOPYSRC	Pixel is the inverse of the pen color.
%MIX_MASKSRCNOT	Pixel is a combination of the colors common to both the source and the inverse of the pixel.
%MIX_NOT	Pixel is the inverse of the pixel color.
%MIX_XORSRC	Pixel is a combination of the colors in the source and in the pixel, but not in both.
%MIX_NOTMASKSRC	Pixel is the inverse of the MaskSrc color.
%MIX_MASKSRC	Pixel is a combination of the colors common to both the source and the pixel.
%MIX_NOTXORSRC	Pixel is the inverse of the XorSrc color.
%MIX_NOP	Pixel remains unchanged.
%MIX_MERGENOTSRC	Pixel is a combination of the source color and the inverse of the pixel color.
%MIX_COPYSRC	Pixel is the source color (default).
%MIX_MERGESRCNOT	Pixel is a combination of the source color and the inverse of the pixel color.
%MIX_MERGESRC	Pixel is a combination of the source color and the pixel color.
%MIX_WHITENESS	Pixel is always 1 (white).

See also XPRINT ATTACH, XPRINT GET MIX

XPRINT SET ORIENTATION statement

XPRINT SET ORIENTATION statement

Purpose Set the paper orientation for a host printer page.

Syntax `XPRINT SET ORIENTATION orent&`

Remarks XPRINT SET ORIENTATION sets the orientation of the paper in the host printer. The value 1 indicates portrait mode, while 2 indicates landscape mode. If a host printer is not attached, or does not support setting the orientation, error 57 is generated.

See also FONT NEW, XPRINT ATTACH, XPRINT GET ORIENTATION, XPRINT SET FONT

XPRINT SET OVERLAP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT SET OVERLAP statement New!

Purpose Enables or disables XPRINT Overlap Mode.

Syntax `XPRINT SET OVERLAP [NumrExpr&]`

Remarks XPRINT SET OVERLAP enables or disables overlap mode for the host printer which is currently attached to the XPRINT stream. It has no effect on any other XPRINT target. If *NumrExpr&* is true (non-zero), overlap mode is enabled. If false (zero), overlap mode is disabled. If *NumrExpr&* is missing, the default is to enable Overlap Mode.

With Overlap Mode, you can control how PowerBASIC treats XPRINT operations which involve a bounding rectangle (RECT structure) in their definition. Windows maintains unique conventions for a RECT. The bottom and right coordinates of a RECT are exclusive. In other words, the pixels at the bottom and right edges lie immediately outside the rectangle. They are ignored. For example:

```
XPRINT BOX (0,0) - (50,50)
```

In this case, a box is drawn from 0,0 to 49,49. The final pixels at the bottom and right edge are simply not drawn. However, if Overlap Mode is enabled, the box is drawn from 0,0 to 50,50.

The Overlap Mode affects all XPRINT functions which take a bounding rectangle as a parameter. This includes XPRINT SCALE, XPRINT BOX, XPRINT ELLIPSE, XPRINT LINE, XPRINT POLYLINE, etc.

See also XPRINT BOX, XPRINT ELLIPSE, XPRINT GET OVERLAP, XPRINT LINE, XPRINT POLYLINE, XPRINT SCALE

XPRINT SET PAGES statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT SET PAGES statement New!

Purpose Sets the XPRINT page number limits for this print job.

Syntax **XPRINT SET PAGES *FromPage&, ToPage&***

Remarks You may elect to limit a particular print job to a subset of the total number of pages. This can be accomplished under program control by executing XPRINT SET PAGES, or the user can make the appropriate choice in the Print Dialog which is displayed when XPRINT ATTACH is executed with the CHOOSE option. When the pages are limited in this way, PowerBASIC handles all the details of print suppression for you.

Normally, XPRINT pages are numbered from one. The parameter *FromPage&* specifies the first page of the full report which will be printed, while *ToPage&* specifies the last page.

If XPRINT SET PAGES is executed without a host printer attached, an error 57 is generated.

See also XPRINT ATTACH, XPRINT GET PAGES, XPRINT SET COPIES

XPRINT SET PAPER statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT SET PAPER statement

Purpose Sets a new paper size/type.

Syntax `XPRINT SET PAPER papertype&`

Remarks XPRINT SET PAPER changes the paper style for the host printer to that designated by *papertype&*. The paper style is identified by an

value given in the expression *papertype&*. The following equates are predefined in the compiler, and represent the most common paper styles:

```
%DMPAPER_LETTER    =  1      Letter    8.5   x 11    inches
%DMPAPER_TABLOID   =  3      Tabloid   11    x 17    inches
%DMPAPER_LEDGER    =  4      Ledger    17    x 11    inches
%DMPAPER_LEGAL     =  5      Legal     8.5   x 14    inches
%DMPAPER_STATEMENT =  6      Statement 5.5   x 8.5   inches
%DMPAPER_EXECUTIVE =  7      Executive 7.25  x 10.5  inches
%DMPAPER_A3        =  8      A3        297   x 420   mm
%DMPAPER_A4        =  9      A4        210   x 297   mm
%DMPAPER_A5        = 11      A5        148   x 210   mm
%DMPAPER_B4        = 12      B4        250   x 354   mm
%DMPAPER_B5        = 13      B5        182   x 257   mm
%DMPAPER_FOLIO     = 14      Folio     8.5   x 13    inches
%DMPAPER_QUARTO    = 15      Quarto    215   x 275   mm
%DMPAPER_10X14     = 16      10x14     10    x 14    inches
%DMPAPER_11X17     = 17      11x17     11    x 17    inches
%DMPAPER_NOTE      = 18      Note      8.5   x 11    inches
%DMPAPER_ENV_9     = 19      9 Envlp   3.875 x 8.875 inches
%DMPAPER_ENV_10    = 20      10 Envlp  4.125 x 9.5   inches
```

Other paper style codes may be defined by Windows or printer suppliers. You can use XPRINT GET PAPERS to obtain a list of all the paper styles supported by the attached host printer.

If the printer does not support the paper style specified, error 5 is generated. If executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET PAPER, XPRINT GET PAPERS

XPRINT SET PIXEL statement

XPRINT SET PIXEL statement

Purpose Set the color of a pixel on a host printer page.

Syntax `XPRINT SET PIXEL [STEP] (x!, y!) [, rgbColor&]`

Remarks XPRINT SET PIXEL draws a single pixel on the host printer page. The optional color parameter is an RGB value; if not included, the color defaults to the current foreground color for the host printer. If the STEP option is included, the *x!* and *y!* coordinates are relative to the last point referenced (

). The coordinate points are specified in pixels, unless world coordinates were set with an XPRINT SCALE statement. If no host printer is attached, error 57 is generated.

See also Built In RGB Color Equates, XPRINT ATTACH, XPRINT COLOR, XPRINT GET PIXEL

XPRINT SET POS statement

XPRINT SET POS statement

Purpose Set the last point referenced (POS) by an statement.

Syntax `XPRINT SET POS [STEP] (x!, y!)`

Remarks XPRINT SET POS allows you to set the last point referenced (POS) by XPRINT statements. If the STEP option is included, the *x!* and *y!* coordinates are relative to the prior POS. The coordinate points are specified in pixels (or world coordinates, if those were defined with an XPRINT SCALE statement). If executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET POS

XPRINT SET QUALITY statement

XPRINT SET QUALITY statement

Purpose Set the print quality for a host printer.

Syntax `XPRINT SET QUALITY qual&`

Remarks XPRINT SET QUALITY sets the print quality setting for the host printer. The value 1 is draft mode, 2 is low resolution, 3 is medium resolution, and 4 is high resolution. It should be noted that some printers only allow higher resolutions to be set from the printer dialog (in XPRINT ATTACH CHOOSE). If no host printer is attached, or the printer does not support print quality settings, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET QUALITY

XPRINT SET STRETCHMODE statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT SET STRETCHMODE statement New!

Purpose Sets the default bitmap stretching mode for the current DC.

Syntax `XPRINT SET STRETCHMODE ModeExpr`

Remarks There are several operations in PowerBASIC which involve stretching or condensing images on bitmaps, most notably XPRINT STRETCH. As individual pixels must be added or removed, there is a good chance that the quality of the image will be degraded. However, if you describe the nature of the image by defining a StretchMode, you can substantially enhance the appearance.

The default StretchMode is maintained individually for each DC. You can set the default mode with this statement, or retrieve it with XPRINT GET STRETCHMODE. Of course, you can also override the default StretchMode when you execute one of the affected statements.

The 4 stretch mode equates are predefined in PowerBASIC.

%BLACKONWHITE	1	This is the default Windows stretch mode, and is most appropriate for monochrome bitmaps, or those with blocks of color. Performs a boolean OR of eliminated and existing pixels. It preserves black pixels at the expense of white pixels.
%WHITEONBLACK	2	Performs a boolean OR of eliminated and existing pixels. It preserves white pixels at the expense of black pixels.
%COLORONCOLOR	3	Deletes eliminated lines of pixels without trying to preserve their information.
%HALFTONE	4	This provides the highest quality for complex color bitmaps. The average color of the destination pixel block is kept approximately the same as the source pixel block.

See also XPRINT COPY, XPRINT GET STRETCHMODE, XPRINT RENDER, XPRINT STRETCH

XPRINT SET TRAY statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT SET TRAY statement

Purpose Sets a new active printer tray.

Syntax **XPRINT SET TRAY *numrexp***

Remarks XPRINT SET TRAY changes the active paper tray on the host printer to that specified by *numrexp*. The following equates are predefined in the compiler, and represent the most common paper trays:

```
%DMBIN_UPPER         = 1
%DMBIN_LOWER         = 2
%DMBIN_MIDDLE        = 3
%DMBIN_MANUAL        = 4
%DMBIN_ENVELOPE      = 5
%DMBIN_ENVMANUAL     = 6
%DMBIN_AUTO          = 7
%DMBIN_TRACTOR       = 8
%DMBIN_SMALLFMT      = 9
%DMBIN_LARGEFMT      = 10
%DMBIN_LARGECAPACITY = 11
%DMBIN_CASSETTE      = 14
```

```
%DMBIN_FORMSOURCE    = 15
```

Other tray codes may be defined by Windows or printer suppliers, so your program should be written to consider that possibility. You can use XPRINT GET TRAYS to obtain a list of all the paper trays supported by the attached host printer.

If the printer does not support the tray change requested, error 5 is generated. If executed without a host printer attached, error 57 is generated.

See also XPRINT ATTACH, XPRINT GET TRAY, XPRINT GET TRAYS

XPRINT SET WORDWRAP statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT SET WORDWRAP statement New!

Purpose Enables or disables XPRINT WordWrap Mode.

Syntax `XPRINT SET WORDWRAP [NumrExpr&]`

Remarks XPRINT SET WORDWRAP enables or disables WordWrap mode for the host printer which is currently attached to the XPRINT stream. It has no effect on any other printer. If *NumrExpr&* is true (non-zero), WordWrap mode is enabled. If false (zero), WordWrap mode is disabled. If *NumrExpr&* is missing, the default is to enable WordWrap Mode.

With WordWrap Mode, you can control how PowerBASIC prints text on an XPRINT page when it reaches the end of a line. Since a host printer operates on a full page basis, the default is to ignore text which is printed past the end of the line.

When WordWrap mode is enabled, it affects only XPRINT PRINT operations. If XPRINT PRINT attempts to display a word beyond the end of a row, the entire word is automatically wrapped to the first column of the next row.

See also XPRINT CELL, XPRINT GET WORDWRAP, XPRINT PRINT, XPRINT SET WRAP, XPRINT SPLIT

XPRINT SET WRAP statement

XPRINT SET WRAP statement New!

Purpose Enables or disables XPrint Wrap Mode.

Syntax `XPRINT SET WRAP [NumrExpr&]`

Remarks XPRINT SET WRAP enables or disables wrap mode for the host printer which is currently attached to the XPrint stream. It has no effect on any other printer. If *NumrExpr&* is true (non-zero), wrap mode is enabled. If false (zero), wrap mode is disabled. If *NumrExpr&* is missing, the default is to enable Wrap Mode.

With Wrap Mode, you can control how PowerBASIC prints text on an XPRINT PAGE when it reaches the end of a line. Since a host printer operates on a full page basis, the default is to ignore text which is printed past the end of the line.

When Wrap Mode is enabled, it affects only XPRINT PRINT operations. If XPRINT PRINT attempts to display a character beyond the end of a row, it is automatically wrapped to the first column of the next row.

See also XPRINT CELL, XPRINT GET WRAP, XPRINT PRINT, XPRINT SET WORDWRAP, XPRINT SPLIT

XPRINT SPLIT statement

Keyword Template

Purpose

Syntax

Remarks

See also

Example

XPRINT SPLIT statement New!

Purpose Splits a

into two parts for printing with XPRINT.

Syntax `XPRINT SPLIT [WORD] MainStr, Part1Len TO Part1Var, Part2Var`

Remarks Generally speaking, XPRINT SPLIT allows you to determine how much text will fit on a line (or a line section), so you don't overrun the end. This is critical with variable-width fonts. Since these text characters have different widths, you cannot rely on a simple character count.

XPRINT SPLIT separates the *MainStr* string expression into two parts, which are then assigned to the two string variables specified by *Part1Var* and *Part2Var*. The

expression *Part1Len* specifies the maximum width of the print field, using page units (pixels/points, scaled units). After completion of XPRINT SPLIT, the *Part1Var* will contain those characters which can be safely printed in the print field. The *Part2Var* will contain the remaining characters, which might be printed on following lines.

Since this operation creates a "line break" not contemplated in the original text, you may have to modify the results in order to obtain the best appearance. For example, it's usually best to remove any leading spaces from *Part2Var* before printing it.

WORD If the WORD option is included, PowerBASIC guarantees that *Part1* will not end on a partial word. This may require that *Part1Len* is adjusted to a smaller value. In that case, *Part2Var* would be assigned these characters to compensate.

See also XPRINT CELL, XPRINT SET FONT, XPRINT SET WORDWRAP, XPRINT SET WRAP

XPRINT STRETCH statement

XPRINT STRETCH statement IMPROVED

Purpose Copy and resize a

to the XPRINT page.

Syntax `XPRINT STRETCH hBmp, ID, (x1,y1)-(x2,y2) TO (x3,y3)-(x4,y4) [,Mix, Stretch]`
`XPRINT STRETCH PAGE hBmp, ID [, Mix, Stretch]`

Remarks You can copy a complete bitmap, or a portion of it, to the XPRINT page, while resizing it to a larger or sm variable *hBmp* specifies the handle of the source bitmap or window. The parameter *ID* is the control ident with CONTROL ADD GRAPHIC. *ID* must be zero (0) for a GRAPHIC WINDOW or a

. The destination of the stretch operation is always the attached XPRINT page. The bitmap is auto destination parameters. You must use care that your parameters are valid for the specified bitmaps, undefined.

The second form, XPRINT STRETCH PAGE, is a shortcut for copying a complete bitmap to the clip or cli page. The image is automatically stretched or condensed to fit the target appropriately.

Mix If the Mix parameter is included, it is one of the values in the following table. If not specified, a default of presumed. There are 16 mix modes available to use for mixing drawing colors with the colors which alre drawing location. The mix mode equates are predefined in PowerBASIC.

%mix_Blackness	Pixel is always 0 (black).
%mix_NotMergeSrc	Pixel is the inverse of the MergeSrc color.
%mix_MaskNotSrc	Pixel is a combination of the colors common to both the pixel and the invers
%mix_NotCopySrc	Pixel is the inverse of the pen color.
%mix_MaskSrcNot	Pixel is a combination of the colors common to both the source and the inve
%mix_Not	Pixel is the inverse of the pixel color.
%mix_XorSrc	Pixel is a combination of the colors in the source and in the pixel, but not in
%mix_NotMaskSrc	Pixel is the inverse of the MaskSrc color.
%mix_MaskSrc	Pixel is a combination of the colors common to both the source and the pix
%mix_NotXorSrc	Pixel is the inverse of the XorSrc color.
%mix_Nop	Pixel remains unchanged.
%mix_MergeNotSrc	Pixel is a combination of the source color and the inverse of the pixel color.
%mix_CopySrc	Pixel is the source color (default).
%mix_MergeSrcNot	Pixel is a combination of the source color and the inverse of the pixel color.
%mix_MergeSrc	Pixel is a combination of the source color and the pixel color.
%mix_Whiteness	Pixel is always 1 (white).

Stretch If the Stretch parameter is included, it is one of the values in the following table. If not included, or it is th mode is unchanged. An appropriate choice of stretch mode can substantially enhance the quality of bitm size. The stretch mode equates are predefined in PowerBASIC.

%BLACKONWHITE	1	This is the default Windows stretch mode, and is most appropriate or those with blocks of color. Performs a boolean OR of eliminated preserves black pixels at the expense of white pixels.
%WHITEONBLACK	2	Performs a boolean OR of eliminated and existing pixels. It preserv expense of black pixels.
%COLORONCOLOR	3	Deletes eliminated lines of pixels without trying to preserve their info
%HALFTONE	4	This provides the highest quality for complex color bitmaps. The av destination pixel block is kept approximately the same as the sourc

See also XPRINT COPY, XPRINT RENDER, XPRINT SET MIX, XPRINT SET STRETCHMODE

XPRINT STRETCH PAGE statement

XPRINT STRETCH statement IMPROVED

Purpose Copy and resize a

to the XPRINT page.

Syntax

```
XPRINT STRETCH hBmp, ID, (x1,y1)-(x2,y2) TO (x3,y3)-(x4,y4) [,Mix, Stretch]
XPRINT STRETCH PAGE hBmp, ID [, Mix, Stretch]
```

Remarks You can copy a complete bitmap, or a portion of it, to the XPRINT page, while resizing it to a larger or sm variable *hBmp* specifies the handle of the source bitmap or window. The parameter *ID* is the control ident with CONTROL ADD GRAPHIC. *ID* must be zero (0) for a GRAPHIC WINDOW or a

. The destination of the stretch operation is always the attached XPRINT page. The bitmap is auto

destination parameters. You must use care that your parameters are valid for the specified bitmaps, o
undefined.

The second form, XPRINT STRETCH PAGE, is a shortcut for copying a complete bitmap to the clip or cli
page. The image is automatically stretched or condensed to fit the target appropriately.

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drawing location. The mix mode equates are predefined in PowerBASIC.

%mix_Blackness	Pixel is always 0 (black).
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%mix_NotMaskSrc	Pixel is the inverse of the MaskSrc color.
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%mix_NotXorSrc	Pixel is the inverse of the XorSrc color.
%mix_Nop	Pixel remains unchanged.
%mix_MergeNotSrc	Pixel is a combination of the source color and the inverse of the pixel color.
%mix_CopySrc	Pixel is the source color (default).
%mix_MergeSrcNot	Pixel is a combination of the source color and the inverse of the pixel color.
%mix_MergeSrc	Pixel is a combination of the source color and the pixel color.
%mix_Whiteness	Pixel is always 1 (white).

Stretch If the Stretch parameter is included, it is one of the values in the following table. If not included, or it is th
mode is unchanged. An appropriate choice of stretch mode can substantially enhance the quality of bitm
size. The stretch mode equates are predefined in PowerBASIC.

%BLACKONWHITE	1	This is the default Windows stretch mode, and is most appropriate f or those with blocks of color. Performs a boolean OR of eliminated preserves black pixels at the expense of white pixels.
%WHITEONBLACK	2	Performs a boolean OR of eliminated and existing pixels. It preserv expense of black pixels.
%COLORONCOLOR	3	Deletes eliminated lines of pixels without trying to preserve their info
%HALFTONE	4	This provides the highest quality for complex color bitmaps. The av destination pixel block is kept approximately the same as the sourc

See also XPRINT COPY, XPRINT RENDER, XPRINT SET MIX, XPRINT SET STRETCHMODE

XPRINT STYLE statement

XPRINT STYLE statement

Purpose Set the line style to be used by various statements.

Syntax `XPRINT STYLE linestyle&`

Remarks XPRINT STYLE determines the line style which will be used when drawing various graphical objects, while the width value is set to 1. When the width value is greater than one, Windows always interprets the style as 0 (solid).

Available line styles are:

0	Solid (default)
1	Dash
2	Dot
3	DashDot

4 DashDotDot

See also XPRINT ARC, XPRINT ATTACH, XPRINT BOX, XPRINT ELLIPSE, XPRINT LINE, XPRINT PIE, XPRINT WIDTH

Example

```
' Draw a square box with blue, dotted lines
XPRINT WIDTH 1
XPRINT STYLE 2
XPRINT BOX (10, 10) - (110, 110), 0, %BLUE
```

XPRINT TEXT SIZE statement

XPRINT TEXT SIZE statement IMPROVED

Purpose Calculate the size of text to be printed on a host printer.

Syntax

```
XPRINT TEXT SIZE txt$ To nWidth!, nHeight!
Function Form:
WidthVar!  = XPRINT(TEXT.SIZE.X, txt$)
HeightVar! = XPRINT(TEXT.SIZE.Y, txt$)
```

Remarks This statement calculates the total size of the printed text, based upon the current font for the host printer. The sizes returned are specified in Page Units.

This allows you to easily calculate the appropriate print position, particularly when using a proportional font. If this statement is executed without a host printer attached, error 57 is generated.

See also XPRINT CELL SIZE, XPRINT CHR SIZE, XPRINT SET FONT

Example

```
FUNCTION PBMAIN
  ' The following example draws the text both horizontally
  ' and vertically centered on the host printer page

  LOCAL x, y, w, h, w2, h2 AS LONG
  LOCAL sText AS STRING
  sText = "PowerBASIC"

  XPRINT ATTACH "Lexmark C750"
  XPRINT COLOR %BLUE, -2  ' blue text, clear background
  XPRINT FONT "Times New Roman", 18, 3  ' 18p, bold, italic

  XPRINT GET CLIENT TO w, h  ' get client size
  XPRINT TEXT SIZE sText TO w2, h2      ' get text size
  x = (w-w2) / 2                        ' centered x-pos
  y = (h-h2) / 2                        ' centered y-pos

  XPRINT SET POS (x, y)                 ' set position
  XPRINT sText                          ' draw the text
  XPRINT CLOSE
END FUNCTION
```

XPRINT WIDTH statement

XPRINT WIDTH statement

Purpose Set the graphic line width to be used by various statements..

Syntax

```
XPRINT WIDTH ncPixels&
```

Remarks XPRINT WIDTH determines the line width which will be used when drawing various graphical objects. The default width is 1 pixel. The width is always specified in pixels, regardless of any XPRINT SCALE option. When the width is set to a value greater than 1, XPRINT STYLE parameters are always interpreted as 0 (solid).

See also XPRINT ARC, XPRINT ATTACH, XPRINT BOX, XPRINT ELLIPSE, XPRINT LINE, XPRINT PIE, XPRINT STYLE

Example

```
FUNCTION PBMAIN
  XPRINT ATTACH "Lexmark C750"
  ' Draw a square box with thick, red lines
  XPRINT WIDTH 10
  XPRINT BOX (10, 10) - (110, 110), 0, %RED
  XPRINT CLOSE
END FUNCTION
```

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Technical Support

Technical Support

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