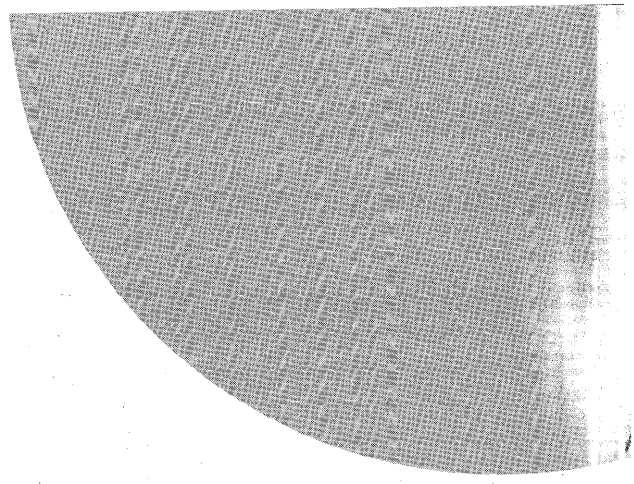
ObjectScripting Programmer's Guide

VERSION 5

Borland® C++

for Windows 95 & Windows NT



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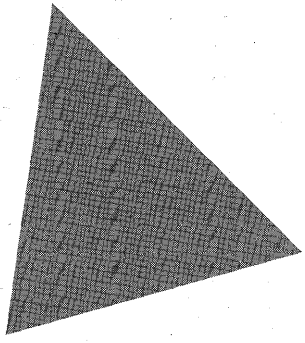

Borland® C++
for Windows 95 and Windows NT

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For a list of redistributable files, see the online documentation.

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Introduction

ObjectScripting allows you to programmatically customize the Borland C++ integrated development environment (IDE) using built-in classes and a scripting language called cScript, a language much like C++. This manual explains the cScript language and describes how to write scripts, load them, and run them.

What's in this book

The *ObjectScripting Programmer's Guide* is organized into three parts:

Part I, "User's guide," introduces ObjectScripting and includes task-oriented information on writing, running, loading, and debugging script files. It includes a quick tutorial to help you become familiar with writing and running scripts.

Part II, "Language reference," explains the basics of the cScript language and includes information on keywords and functions, operators, and preprocessor directives.

Part III, "Class reference," provides reference material on the built-in cScript classes you use in a script file to customize the IDE.

Manual conventions

This manual uses the typefaces and symbols described in Table 1.1 to indicate special text.

Table 1.1 Typefaces and symbols in this manual

Typeface or symbol	Meaning
`Monospace type`	Monospaced text represents text as it appears on screen or in code. It also represents anything you must type.
[ ]	Square brackets in text or syntax listings enclose optional items. If using the optional item, do not type the brackets.
Boldface	Boldfaced words in text represent reserved words.
Italics	Italicized words in text represent identifiers, such as variables, components, properties, methods, and events.

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Part

I

User's guide

Chapter

2

ObjectScripting overview

With ObjectScripting, you can customize the Borland C++ IDE programatically using built-in classes and a scripting language called cScript, a language much like C++. cScript supports classes, late binding, object-specific method overriding, and dynamic variable typing. Using cScript requires C++ or other object-oriented language experience.

Through an object called *IDEApplication*, which is instantiated when Borland C++ first starts up, you can access most parts of the IDE, including the Editor, the debugger, the keyboard, and the Project Manager. You can customize them to suit you, as well as add your own new features.

About running a script

By convention, the source files for scripts have the extension .SPP. When you load a script for the first time, it is compiled into an interpreted tokenized format called pcode. By default, the tokenized file is created with the same name using the extension .SPX in the same directory as the script. The header in the .SPX file contains the original name of the file from which it was generated (the .SPP file) and the date/time stamp of the .SPP file when it was generated. Before executing a .SPP file, the dates are compared to ensure the source file has not changed. If it has, the. SPX file is regenerated.

If the script affects the display (for example, it contains **print** statements), you see something onscreen immediately. If you define new behavior for the IDE, you will see that behavior when you use that part of the IDE. The script remains loaded until you unload it.

You can use the following commands to run scripts:

Table 2.1 Scripting commands

Command	Description
Script	Run	Opens the Script Run window at the bottom of the IDE desktop, into which you enter a single script command. Executing a single script statement is useful when you are developing and testing a script.
Script	Compile	Compiles the file in the active Edit window. If the compile is successful, the script is loaded into the IDE and runs.
Script	Run File	Compiles, loads, and runs the file in the active Edit window. Use Script	Run File if your script contains a **breakpoint** statement.

Use Script | Commands to open the Script Commands dialog box which displays a list of the available script commands and variables, including classes, functions, and global objects. If an object is an instance of a class, its properties and methods are also displayed.

To run a script command,

1 Double-click a command from the list.
2 Enter the argument, if any, next to the selected command.
3 Click Run.

About script loading

You can load a script in any of the following ways:

- Choose the Script | Modules command. In the Script Modules dialog box, choose the module, or script, you want to load. Click Load. All loaded modules and all modules on your script path are listed in the Script Modules dialog box.
- Enter the name of the script in the Startup Scripts field in the Scripting Options dialog box. For example, enter `test`. To specify multiple scripts, separate script names with spaces.
- Specify a script on the BCW command line with the `-s` switch. The script is loaded after the complete processing of scripts specified in Scripting Options dialog box.
  - Script names require no quotation marks.
  - If you include script parameters, put the script name and parameters in quotation marks, or put the parameters in parentheses.
  - To pass string parameters, enclose the strings in backslash-quotation combinations.
  - To start multiple scripts, use the `-s` parameter for each script.

- Modify the source code of STARTUP.SPP (or any of the files that it loads). Note that when you update to a new version of Borland C++, you need to redo the changes to STARTUP.SPP.
- Create a script called PERSONAL.SPP in the Script directory. This script is automatically loaded after STARTUP.SPP finishes processing. PERSONAL.SPP can load other scripts, allowing multiple scripts to be loaded whenever the IDE starts. Using PERSONAL.SPP protects your script from being overwritten by new releases of Borland C++.

Note To run a loaded script that has either an **_init()** function or a function with the same name as the script, choose the function name from the Script Commands dialog box.

Example

```
//Starts three scripts from the BCW command line using the
//-s switch.
//Script3 shows how to start a script from the command line
//with optional parameters. Note that the script name and
//parameters are in quotation marks.
bcw -sScript1 -sScript2 -s"Script3 Param1 Param2"

//MyScript shows how to pass string parameters using
//backslash-quotation combinations.
bcw -sMyScript(\"string\", \"string\")
```

The advantage to starting the script from the command line is that the script will not be affected whenever you update to a new version of Borland C++.

Example

```
//Starts three scripts - "test", "MyScript" and "bar" -
//from the Startup Scripts field of the Scripting
//Options dialog box.
test MyScript bar
```

The advantage of loading a script from the Startup Scripts field of the Scripting Options dialog box is that script names can be shared by multiple Borland C++ users. Since a script's path is stored as part of the .SPX file, the script directory must be mapped to the same path for all users using the script.

However, every time you install a new version of Borland C++, you have to reenter script names.

About script initialization

When you load a module into the IDE, script initialization takes place as follows: global commands are processed first, followed by the **_init()** function, if one exists. If an autocall function exists, it is processed last.

Initialization is the order in which script commands and functions are processed.

Order processed	Description
Global commands	Script commands not in a function block.
_init() function	If a module contains an **_init()** function, it runs automatically, immediately after the global commands. If a series of scripts are loaded at the same time, first all the **_init()** functions are processed (left to right).
Autocall function	If a module contains a function with the same name as the file in which it resides (an autocall function), it will execute automatically, immediately after the global commands and the **_init()** function (if any).

The script initialization process lets you implement functionality without changing the STARTUP script, the IDE command line, or the Borland C++ configuration files.

Example Assume you have written a script called HELLO.SPP that contains a function called **hello** declared as follows:

```
hello()
 {
   print "Hello World";
 }
```

When you load the script HELLO.SPP for the first time, the message `Hello World` displays in the Script page of the Message window and the **hello()** function stays in memory. If you subsequently choose Script | Run and type `hello()` in the Script Run window and press Enter, the script processor calls the function **hello()** which displays `Hello World` in the Message window.

About script function referencing

When a function is referenced in a script, it is processed as follows:

1. All loaded modules (scripts) are searched for a matching function name. Searches are case sensitive (Test is not the same as test). The search starts with the module most recently loaded. If unsuccessful, the search continues to the next most recently loaded module.
2. If found, the function executes. If the function exists in more than one loaded module, the function located in the most recently loaded module is executed and other instances are ignored.
3. If the function is not found, the IDE checks an internal table constructed by calls to *ScriptEngine.SymbolLoad*. This table contains a list of scripts and the predefined symbols they contain. If the function is found in the table, the associated module is loaded into the IDE and the script runs.

4 If no matching function is found, the IDE searches the script path defined in the Scripting Options dialog box for a script file name that matches the function name.

- If a matching script file name is found, it is loaded into the IDE and the script runs.
- If no matching script file name is found, the IDE displays a message in the Script page of the Message window indicating that the function was not found.

Note After the module is loaded, a second search for a function may be successful when the first search was not. For example, assume that a script file is found in the symbol table and gets loaded as a result of a function reference. The first search does not find the function, so the function does not execute. After the module is loaded, however, a second search finds the function in memory and it executes.

About script debugging

You can debug scripts using one of the following techniques:

- Built-in diagnostics
- The breakpoint statement
- The print statement
- The Script | Run command

Built-in diagnostics

To force the cScripting environment to provide diagnostic messages and stop at breakpoints, you need to set the Scripting options Stop at Breakpoint and Diagnostic Messages. Stop at Breakpoint halts execution of a script at a **breakpoint** statement. Diagnostic Messages displays messages in the Script page of the Message window. For information on setting Scripting options, see "Setting scripting options" on page 2-10.

The breakpoint statement

When you enter a **breakpoint** statement into your script and the Scripting option Stop at Breakpoint is on, script execution halts and the Script Breakpoint Tool is displayed. The Script Breakpoint Tool allows:

- Stepping over or into function calls
- Evaluation of the values of expressions or script variables

The print statement

Use the **print** statement to display a value. Output from a **print** statement is displayed in the Script page of the Message window. Printed messages are placed into a queue which, when time allows, is moved into the view.

The Script|Run command

The Script | Run command opens the Script Run window at the bottom of the IDE desktop, into which you can enter a single script command. The results of the command are immediately displayed in the IDE, making results immediately available.

About example scripts

Choose Script | Install/Uninstall Examples to load all examples in the BC5\SCRIPT\EXAMPLES directory. This command loads:

- All example scripts and makes them available in the Script Commands dialog box
- The Script Manager, a script that helps you work with the example scripts

To unload example scripts or the Script Manager, choose Script | Install/Uninstall Examples again and restart BCW.

Once the example scripts are loaded, choose the menu item Example Scripts to see a list of all example scripts. Choose the Example Scripts | Script Directory command to display the Script Directory window, where you can load, edit, and unload an example script, as well as edit the Script Manager data file.

Example scripts

The script examples directory contains the following types of scripts and script applets:

Script management	Editing
Coding	Debugging
Project management	Miscellaneous
Support classes and routines	Demonstration

Table 2.2 Script management examples

Script	Description
LOADLAST.SPP	Load Last Script. Loads the last-loaded script. Useful for frequently reloading a script under development (before it is assigned to a hot key, menu, or some other quick trigger).
SPPMAN.SPP	Script Manager. Allows you to specify scripts for autoloading. Adds scripts to IDE menus. Displays the Script Directory window.
TEST.SPP	Test Harness. A template for inserting test code.

Table 2.3 Editing examples

Script	Description
ALIGNEQ.SPP	Align at Equals. Aligns a block of assignments by positioning the equals operators one space after the longest lvalue in the current block.
APIEXP.SPP	API Expander. Expands current word in editor to the matching Windows API or C RTL signiture. Provides selection list if seed string has multiple matches. If the match is an RTL member, API Expander indicates if the corresponding header file needs to be added to the source file.
COMMENT.SPP	Commenter. Comments the selected block, or removes the comment if the lines are already commented.
EDITSIZE.SPP	Editor Size. Allows easy customization of Edit window size and position without changing default values in STARTUP.SPP. CONFIG.SPP provides a different but more comprehensive approach to positioning IDE windows.
EDONLY.SPP	Edit Only. Temporarily shows only those lines in the current buffer that contain a specified string. Useful for seeing how an identifier is being used, making changes without searching and replacing, isolating strings for spell-checking, etc.
SHIFTBLK.SPP	Shift Block. Shifts the current block right or left a column at a time.
SRCHALL.SPP	Search All. Searches and replaces across files in the current project.
TEMPLATE.SPP	BRIEF Template Support. Causes the IDE to use BRIEF template support. This support is used in all editor emulation.

Table 2.4 Coding examples

Script	Description
CODELIB.SPP	Code Library. Displays libraries of code snippets you can insert in the current buffer. You can also edit code library data files, and create library entries from selected text. You can create as many code libraries as you want.
FILEINSR.SPP	File Insert. Inserts a file into the current buffer.
FINDTABS.SPP	Find Tabs. Searches all .C, .H, .CPP, .HPP, and .SPP files in the specified directory and reports all lines that have at least one tab character to the message database. Double-click a message to edit the referenced file. Useful for coding styles that don't use tab characters.

Table 2.4 Coding examples (continued)

Script	Description
LONGLINE.SPP	Long Line Finder. Searches all .C, .H, .CPP, .HPP, and .SPP files in the specified directory and reports all lines that are longer than a given threshold value to the message database. Double-click a message to edit the referenced file.
OPENHDR.SPP	Open Header. Opens the .H or .HPP file corresponding to the current source file. Optionally creates a header file if one does not exist.
REVISIT.SPP	Code Revisit Tool. Quickly lists occurrences of a configurable "revisit this code" marker in all files in the specified directory.

Table 2.5 Debugging examples

Script	Description
EVALTIPS.SPP	Evaluation Tips. When the debugger has a process loaded, evaluates the item under the cursor and displays the result in a mouse tip.
VIEWLOCS.SPP	View Locals. Inspects local variables if the debugger has a process.

Table 2.6 Project management examples

Script	Description
LOADPROJ.SPP	Load Project. Opens the last project on startup.
PRJNOTES.SPP	Project Notes. For new projects, creates a notes text file in the project directory and adds it to the project.

Table 2.7 Miscellaneous examples

Script	Description
AUTOSAVE.SPP	Autosave. Saves files, environment, desktop, project, and/or messages at the specified interval.
CONFIG.SPP	Configure Windows. Resizes and positions IDE windows as they are created. Also maps keys in the default and classic keyboards for buffer manipulation.
DIRTOOL.SPP	Directory Tool. Creates a new tool called Directory Listing, which takes a file specification and generates a directory listing in the Message window.
DIRVIEW.SPP	File Maintenance. Displays a directory listing and loads the following commands:

Command	Description
Backspace	Backs up one directory
Delete	Deletes selected file or directory
Enter	Changes to selected directory or opens selected file
Insert	Creates a new file in the current directory
Escape	Exits the directory listing.

To make these commands the default, add the following to STARTUP.SPP:

```
scriptEngine.Load("dirview");
```

Table 2.7 Miscellaneous examples (continued)

Script	Description
FASTOPEN.SPP	Fast Open. Opens files and projects based on a search path, so you don't have to navigate directories.
KEYASSGN.SPP	Key Assignments. Shows what commands are assigned to a given key sequence.
NETHELP.SPP	Internet Help. Opens an URL with Netscape Navigator by selecting from a list of programming pages, FTP sites, and newsgroups.
SOUND.SPP	Sound Enabler. Plays WAV files on specified IDE events, such as Build Failure.

Table 2.8 Support classes and routines

Script	Description
FILE.SPP	File Classes. Includes configuration file management.
FOREACH.SPP	For Each. Calls a function for all the nodes of the given type in a project.
MSG.SPP	Message Class. Provides methods to simplify and standardize user messages. Message captions automatically indicate the calling module.
MISC.SPP	Miscellaneous. Miscellaneous script.
SORT.SPP	Sort. Quick sorting routines.

Table 2.9 Demonstration examples

Script	Description
AUTO.SPP	Automation. Demonstrates the IDE as an OLE automation controller and server.
CRTL.SPP	CRTL. Demonstrates script access to the CRTL by writing to a file.
INTNATL.SPP	International. Demonstrates the use of FormatString for localization of strings in scripts.
MODLIST.SPP	Module List. Demonstrates how to handle events from other objects to maintain the contents of a list. Implements some of the functionality provided by the Script Modules dialog box.
MLIST.SPP	Multi-select list window. Demonstrates a simple multiple-selection list window. Also shows how to position a popup window in the list.
LIST.SPP	List Window. Demonstrates a simple sorted list window.
POPUP.SPP	SpeedMenu. Demonstrates a simple SpeedMenu.

Script Directory window

To display the Script Directory window, choose Example Scripts | Script Directory.

Note To display the Example Scripts menu bar item, choose Script | Install/ Uninstall Examples.

The Script Directory window consists of four columns of information:

Table 2.10 Script Directory window

Column	Description
Script Name	The name of script file in the BC5\SCRIPT\EXAMPLES directory.
Description	A brief description of what the script does.
Autoload Status	Indicates whether the script is automatically loaded when BCW is started up.
Load Status	Indicates whether the script is currently loaded.

Click a script to display the Script Directory SpeedMenu. Commands on the SpeedMenu let you load, edit, and unload script files; edit the Script Manager script file; cancel the SpeedMenu; and close the directory.

Table 2.11 Script Directory SpeedMenu

Column	Description
Load	Loads the selected script file.
Edit	Loads the selected script file into an Edit window.
Unload	Unloads the selected script file.
Edit Script Manager Data File	Loads the Script Manager data file, SPPMAN.DAT, into an Edit window.
Cancel	Cancels the SpeedMenu.
Close Directory	Closes the Script Directory window.

Setting scripting options

To set options for the scripting environment,

1 Choose Options | Environment | Scripting. The Scripting Options dialog box is displayed.

2 Set the following options:

Table 2.12 Scripting options

Option	Description
Stop at Breakpoint	Stops the script when the keyword **breakpoint** appears. Loads the script debugger's Breakpoint Tool.
Diagnostic Messages	Specifies whether or not to display all script processor messages in the Script page of the Message window. By default, this option is off.

Table 2.12 Scripting options (continued)

Option	Description
Startup Scripts	Specifies the script to load and execute as part of the IDE startup procedure. (Borland C++ always tries to load STARTUP.SPP from the SCRIPT subdirectory or any path you specify for scripts.) Use spaces to separate multiple script names. You can specify script parameters by enclosing the script name and its arguments in quotation marks. For example, `MyStartup DisplayCurProj "Ascript Param1"`
Script Path	Specifies the path to search when loading a script. During a load, every entry on the path is searched for a file with the .SPX extension. If that fails, the same directories is searched a second time for files with the .SPP extension. Starting the path with . ; causes the current directory to be searched first.

Executing a script statement

To execute a script **print** statement and view it in the Script page of the Message window,

1 Choose View | Message. Click the Script tab to open the Message window Script page, where the output of all script **print** statements is directed.

   To start with a blank page, delete the existing messages by right clicking in the Script page and choosing Delete All.

2 Choose Options | Environment | Scripting and click Diagnostic Messages to send all scripting messages to the Script page.

3 Choose Script | Run. The Script Run window opens at the bottom of the IDE desktop.

4 Enter the following statement:

```
print "Hello World";
```

5 Press Enter.

   `Hello World` is displayed at the end of the Message window.

   If you made an error entering the statement, error messages appear in the Script page of the Message window.

Displaying output in a message box

To display output in a message box, instead of in the Script page of the Message window,

1 Choose Options | Environment | Scripting and click Diagnostic Messages to send all scripting messages to the Script page.

2 Choose Script | Run. The Script Run window opens at the bottom of the IDE desktop.

3 Enter the following statement:

```
IDE.Message("Hello World");
```

The method *IDEApplication.Message* displays output in a message box instead of in the Message window.

4 Press Enter.

`Hello World` is displayed in an information dialog box.

If you made an error entering the statement, error messages appear in the Script page of the Message window.

5 Click OK to close the message box.

Writing a script

Scripts are simply ASCII text files. You can use any text editor to write a script, then save it to a file with an .SPP extension. Header files for scripts typically have the extension .H. (Header files are used to define constants and provide for conditional compilation.)

Follow these steps to write a simple script:

1 Choose Options | Environment | Scripting.

2 Add your script directory to the Script Path so the IDE can find your scripts. For example, if your path already contains `.;C:\BC5\SCRIPT`, it would look like this after you add a directory called C:\MYSCRPTS:

```
.;C:\BC5\SCRIPT;C:\MYSCRPTS
```

Do not insert any spaces before your path name. Doing so will stop the search at the previous path.

3 While you're in the Scripting options dialog box, click Diagnostic Messages to send scripting error messages and **print** statement output to the Script page of the Message window.

4 Press Enter to exit the Scripting Options dialog box.

5 Choose View | Message and click the Script tab to open the Message window Script page.

To start with a blank page, delete the existing messages by right clicking in the Script page and choosing Delete All.

6 Choose File | New | Text Edit to open a new file in the IDE editor. Enter the following script:

```
import IDE;//Use the IDE object and any of its methods
hello()
{
IDE.Message ("Hello World");
}
```

7 Choose File | Save and save the file with an .SPP extension in a directory of your choice (for example, C:\MYSCRPTS\HELLO.SPP).

Running a script

To run the script you just created,

1 Choose Script | Run File.

Script | Run File compiles the script, runs it, and loads it into the IDE.

2 `Hello World` is displayed in a message box.

If you made an error entering the statement, error messages appear in the Script page of the Message window.

3 Click OK to close the message box.

Debugging a script

To add a debug statement to a file and use the script debugger,

1 Choose View | Message. Click the Script tab to open the Message window Script page, where the output of all script **print** statements is directed.

To start with a blank page, delete the existing messages by right clicking in the Script page and choosing Delete All.

2 Choose Options | Environment | Scripting and click Stop at Breakpoint to stop the script at the **breakpoint** statement and open the Script Breakpoint Tool.

3 Click Diagnostic Messages to send all scripting messages to the Script page.

4 Choose File | Open and open the Hello World file.

The file should look like this:

```
import IDE;//Use the IDE object and any of its methods
hello()
{
IDE.Message ("Hello World");
}
```

5 Embed the keyword **breakpoint** in your source code before line that starts with *IDE.Message*. The file should now look like this:

```
import IDE;//Use the IDE object and any of its methods
hello()
{
breakpoint;
IDE.Message ("Hello World");
}
```

6 Choose File | Save.

7 Choose Script | Run File.

8 The Script Breakpoint Tool is displayed.

- Click Step Over to execute the call to *IDE.Message* without stepping into and executing it. Note that nothing happens since you are stepping over the line that displays output. Press Run to run the script to the end.
- Click Step Into to step into and execute *IDE.Message*. `Hello Word` is displayed in a message box. Press OK to close the message box.
- Click Run to continue full-speed execution of the script until the next **breakpoint** statement is encountered, or the script ends.
- Click Abort to cancel script execution and close the Script Breakpoint Tool.
- To immediately execute a line of code, enter the code into the Statement(s) edit box and click Execute. This lets you test code before you add it to your script.

Script Breakpoint Tool

The Script Breakpoint Tool is a script debugging tool that lets you step through cScript statements and evaluate the values of expressions or script variables. The Tool is displayed when a breakpoint statement is encountered in an executing script.

Note To display the Script Breakpoint Tool, the Stop at Breakpoint option in the Scripting Options dialog must be on.

Script function calls can either be stepped over or into, and the value of any variable visible within the context of the actively executing script can be evaluated. The name of the running script is displayed as well as the next statement to be executed and its line number.

When the Script Breakpoint Tool is active, output from print statements in the script itself continue to be sent to the Script page of the Message window.

However, you can enter a **print** statement in the Immediate Mode Statement(s) edit box whose output is displayed in the Output box.

Table 2.13 Script Breakpoint Tool options

Option	Description
Immediate Mode Statement(s)	The cScript statement to execute. Immediate Mode statements are executed in the context of the active script, as if the statement entered were actually in the script before the next line of the script about to be executed. Variables must be within scope in that context to be available for evaluation. In-scope variables can be both read and their values changed, although caution must be taken in changing them. Any function available to script at the time of execution can also be called, whether a local cScript function, an IDE object method, or an external library function from an active dynamic library. Care must be taken to ensure that the method is appropriate in a given context. If the statement is a print statement, its output is displayed in the Output box. In this way, an Immediate Mode Statement can be used to inspect the current value of script variables.
Execute	Executes the cScript statement in the Immediate Mode Statement(s) edit box.
Output	Displays the results of the statement executed in the Immediate Mode Statement(s) edit box. Output is displayed only if the statement is valid or if you have pressed the Execute button.
Run	Continues full-speed execution of the script until the next **breakpoint** statement is encountered or the script ends.
Abort	Stops script execution and closes the Script Breakpoint Tool.
Step Over	When the next executable statement is a call to a cScript function, executes the function call without stepping into and executing the function's statements.
Step Into	When the next executable statement is a call to a cScript function, steps into and executes the function's statements.
Help	Displays Help.

Unloading a script

Scripts are not unloaded automatically. To unload a script,

1 Choose Script | Modules.

2 In the Script Modules dialog box, choose the name of the script you want to unload.

3 Click Unload.

Scripts can also be unloaded by using **unload**.

When a script unloads, it looks for a function in the script called **~()** (the name of the function is simply a tilde). If this function is found, it is executed as part of the script unloading process and acts as a destructor for the script.

Chapter

3

ObjectScripting tutorial

This tutorial teaches you how to use the cScript language to add menu items to the Help menu. The tutorial consists of four parts:

Part 1 Adds an item to the Help menu that prints text in the Script page of the Message window. This part takes approximately 10 minutes to complete.

Part 2 Adds the menu item OWL Help to the Help menu and launches the OWL Help file when the menu item is selected. This part takes approximately 10 minutes to complete.

Part 3 Adds two new items, ObjectScripting Help and Standard Template Library Help, to the Help menu using two different methods. Launches the appropriate Help file when a menu item is selected. This part takes approximately 15 minutes to complete.

Part 4 Adds all of the Borland C++ Help files to the Help menu. Launches the appropriate Help file when a menu item is selected. This part takes approximately 20 minutes to complete.

About this tutorial

Each part of this tutorial teaches how to accomplish a unique task, building on knowledge learned in the previous part(s). It is recommended that you follow the tutorial from beginning to end. You are not required to complete the tutorial in one sitting, however. You can choose to complete only one part and return at another time to complete another part or parts.

Note When entering sample code, type it exactly as shown, noting indentations and curly braces. Press *Enter* at the end of each line you add.

ObjectScripting Tutorial: Part 1

This part of the tutorial teaches you how to:

- Start the script file (step 1)
- Create a local instance of an object (step 2)
- Create a class (step 3)
- Load MENUHOOK.SPP (step 4)
- Declare a method that adds a menu item (step 5)
- Execute the method (step 6)
- Run the script file (step 7)

Sample code for Tutorial Part 1

```
// ObjectScripting example
// Copyright (c) 1996 by Borland International, All Rights Reserved
// STEP1.SPP: Add an item to the Help menu that prints text
//            in the Script page of the Message window.

declare ScriptEngine scriptEngine;

class HelpMenu()
 {
// Load "MENUHOOK.SPP", necessary for adding menu items.
    if(!scriptEngine.IsLoaded("menuhook.spp"))
         {
         scriptEngine.Load("menuhook.spp");
         }
// Declare a method to add a menu item and execute the associated script.
    AddMenu(menu_text, script_text)
    {
    assign_to_view_menu("IDE", menu_text, script_text, menu_text);
    }
 };

// At load time, create a Print Text menu item on the Help menu.
// When Print Text is selected, print "A message from the Help menu!"
// in the Script page of the Message window.

declare x = new HelpMenu();
x.AddMenu("&Help|Print Text", "print(\"A message from the Help menu!\")");
```

Starting the script file

Part 1, step 1 of 7

To start a script file in Borland C++,

1 Choose File | New | Text Edit.

2 To name the file, choose File | Save As.

3 In the Save File As dialog box, choose the following directory:

```
C:\BC5\SCRIPT\EXAMPLES
```

4 In the File Name box, enter the name `STEP1.SPP`.

5 Click OK.

You have just started a script file called STEP1.SPP.

In the next step, you will start adding code to your script file.

Creating a local instance of an object — Part 1, step 2 of 7

A *ScriptEngine* object loads, unloads, executes, maintains modules and keeps error information on scripts. In this step, you will create a local instance of the object.

To create a local instance of a *ScriptEngine* object,

1 Enter the following text in STEP1.SPP:

```
declare ScriptEngine scriptEngine;
```

You have just created a local instance of a *ScriptEngine* object. Creating the script engine locally provides slightly better performance than importing the symbol of the system-wide instance.

In the next step, you will create a class called *HelpMenu*.

Creating a class — Part 1, step 3 of 7

Use the **class** keyword to define a cScript class. A class is a collection of properties, methods, and events that affect the behavior of the IDE.

To create a cScript class,

1 Add the following line to your script file:

```
class HelpMenu()
```

You have just created a class called *HelpMenu*. You will use this class in your script file when you add a menu item to the Help menu.

In the next step, you will load the file MENUHOOK.SPP.

Loading MENUHOOK.SPP — Part 1, step 4 of 7

MENUHOOK.DLL, in the BC5\BIN directory, contains the functionality you need to add menu items to menus, menu items to SpeedMenus, and buttons to the SpeedBar. To use this functionality, you need to load the associated script file, MENUHOOK.SPP.

When you load MENUHOOK.SPP, the following functions become available:

Function	Description
assign_to_view_menu()	Adds a menu item to a menu
remove_view_menu_item()	Removes a menu item that was added with **assign_to_view_menu()**
define_button()	Defines a button that can be added to the SpeedBar

To load MENUHOOK.SPP,

1 Add the following lines to your script file:

```
{
if(!scriptEngine.IsLoaded("menuhook.spp"))
   {
   scriptEngine.Load("menuhook.spp");
   }
```

The first line uses the **if** keyword with the ! logical operator and the *ScriptEngine.IsLoaded* method to determine if MENUHOOK.SPP has already been loaded. If it has not been loaded, the *ScriptEngine.Load* method loads it.

Note Case is important when loading and running script files. For more information, see "About script initialization" on page 2-3 and "About script function referencing" on page 2-4.

You have just loaded MENUHOOK.SPP.

In the next step, you will declare a method that adds a menu item.

Declaring a method that adds a menu item — Part 1, step 5 of 7

This step declares a method, **AddMenu()**, that adds a new menu item to the Help menu.

To declare **AddMenu()**,

1 Add the following lines to your script file:

```
AddMenu(menu_text, script_text)
   {
   assign_to_view_menu("IDE", menu_text, script_text, menu_text);
   }
};
```

The first line declares a method called **AddMenu()** with the parameters *menu_text* and *script_text*. **AddMenu()** uses **assign_to_view_menu**, a function defined in MENUHOOK.SPP, to assign a menu item to a menu.

You have just declared the **AddMenu()** method.

In the next step, you will execute the method when the menu item is selected.

Executing the method

Part 1, step 6 of 7

To execute **AddMenu()** when the menu item is selected,

1 Add these lines to your script file:

```
declare x = new HelpMenu();
x.AddMenu("&Help|Print Text", "print(\"A message from the Help menu!\")");
```

The *declare* keyword declares the variable *x*. This line also assigns the variable *x* to a *new* instance of the *HelpMenu* class.

x.AddMenu displays the string `Print Text` on the Help menu. `A message from the Help menu!` is displayed on the Script page of the Message window when Help | Print Text is selected.

You have just executed a method that prints a message on the Script page of the Message window.

In the next step, you will run the script file.

Running the script file

Part 1, step 7 of 7

To run the script file you've been working on,

1 Choose File | Save to save the script file.

2 To run the script, right click in the Edit window and choose Run File.

3 To see the results, go to the Help menu. Note that the menu item Print Text has been appended to the bottom of the Help menu. Click Print Text.

4 Display the Message window by choosing View | Message. Choose the Script tab. Scroll to the bottom of the message display, where the following text is displayed:

```
A message from the Help menu!
```

5 To remove the Print Text command from the Help menu, exit Borland C++. When you load Borland C++ again, Print Text will no longer display.

You have now finished Part 1 of the tutorial.

In Part 2, you will add the menu item OWL Help to the Help menu and launch the OWL Help file when the menu item is selected.

ObjectScripting Tutorial: Part 2

This part of the tutorial teaches you how to:

- Import the *IDE* object (step 1)
- Import a symbol of a system-wide instance of a *ScriptEngine* object (step 2)
- Declare a method that adds a menu item to the Help menu (step 3)
- Execute the method (step 4)

Sample code for Tutorial Part 2

```
// ObjectScripting example
// Copyright (c) 1996 by Borland International, All Rights Reserved
// STEP2.SPP: Add the menu item OWL Help to the Help menu. Launch the
//            OWL Help file when OWL Help is selected.

import IDE;
import scriptEngine;

class HelpMenu()
{
// Load "MENUHOOK.SPP", necessary for adding menu items.
    if (!scriptEngine.IsLoaded("menuhook.spp"))
         {
         scriptEngine.Load("menuhook.spp");
         }
// Declare a method to add a menu item and execute the associated script.
    AddMenu(menu_text, script_text)
    {
    assign_to_view_menu("IDE", "&Help|" + menu_text, script_text, menu_text);
     }
  };

// At load time, create an OWL Help menu item on the Help menu.
// When OWL Help is selected, launch the help file OWL.HLP.

declare helpMenu = new HelpMenu();
helpMenu.AddMenu("OWL Help", "IDE.HelpOWLAPI()");
```

Importing the IDE object

Part 2, step 1 of 4

When you start the Borland C++ IDE, the object *IDE*, in *IDEApplication*, is automatically created as a global object. *IDE* gives you control over the system. All items contained in the Borland C++ IDE menu structure can be accessed through the *IDE* object.

First, start a script file and call it STEP2.SPP. If you don't know how to do this, see Part 1, step 1.

To import the *IDE* object,

1 Enter the following text in the script file.

```
import IDE;
```

You have just started a script file and imported the *IDE* object.

In the next step, you will import a symbol of a system-wide instance of the *ScriptEngine* object.

Importing a symbol of the system-wide instance of an object

Part 2, step 2 of 4

A *ScriptEngine* object loads, unloads, executes, maintains modules and keeps error information on scripts. You can import a symbol of a system-wide instance of the *ScriptEngine* object (note that a local instance can also be created).

To import a symbol of a system-wide instance of a *ScriptEngine* object,

1 Enter the following text in your script:

```
import scriptEngine;
```

You have just imported a symbol of a system-wide instance of a *ScriptEngine* object. Importing the symbol as system-wide makes the script engine's functionality available to all scripts. In Part 1, step 2, you created the script engine as a local instance, which slightly increases performance.

In the next step, you will create a class called *HelpMenu*, load MENUHOOK.SPP, and declare a method that adds a menu item.

Declaring a method that adds a menu item

Part 2, step 3 of 4

This step declares a method, **AddMenu()**, that adds a menu item to the Help menu.

As you learned in Part 1, create a class called *HelpMenu*, then load MENUHOOK.SPP. If you need more information, go to Part 1, step 3 and step 4.

To declare **AddMenu()**,

1 Add the following lines to your script:

```
AddMenu(menu_text, script_text)
   {
   assign_to_view_menu("IDE", "&Help|" + menu_text, script_text, menu_text);
   }
};
```

The first line declares a method called **AddMenu()** with the arguments *menu_text* and *script_text*. **AddMenu()** uses **assign_to_view_menu**, a function that is defined in MENUHOOK.SPP, to add a menu item to a menu. In this case, the new menu item is being added to the Help menu of the IDE view.

Note In Part 1, step 5, you performed a similar task, but specified the Help menu when the method was loaded. These two examples represent two different ways to use the **assign_to_view_menu** function.

You have just created *HelpMenu* class, loaded MENUHOOK.SPP, and declared the **AddMenu()** method.

In the next step, you will execute the method and run the script.

Executing the method

Part 2, step 4 of 4

To execute **AddMenu()** when the associated menu item is selected,

1 Add these lines to your script:

```
declare helpMenu = new HelpMenu();
helpMenu.AddMenu("OWL Help", "IDE.HelpOWLAPI()");
```

The **declare** keyword declares the variable *helpMenu*. This line also assigns the variable *helpMenu* to a **new** instance of the *HelpMenu* class. (Note the difference in case; cScript is a case-sensitive language.) *helpMenu.AddMenu* displays OWL Help on the Help menu and launches the associated Help file when Help | OWL Help is selected.

2 Save the script file and run it. For more information, see Part 1, step 7.

To see the results, go to the Help menu. Note that the menu item OWL Help is now on the Help menu.

3 Click OWL Help.

The Contents topic of the OWL Help file is displayed.

4 To remove the OWL Help command from the Help menu, exit Borland C++. When you load Borland C++ again, OWL Help will no longer display.

You have just learned how to execute a method that launches the OWL Help file when the menu item OWL Help is selected.

You have now finished Part 2 of the tutorial. In Part 3, you will use two different methods to add two new items, ObjectScripting and Standard Template Library, to the Help menu.

ObjectScripting Tutorial: Part 3

This part of the tutorial teaches you how to:

- Locate the Borland C++ Help directory and store it (step 1)
- Declare two methods that add menu items to the Help menu (step 2)
- Assign a menu item to the Help menu (step 3)
- Declare a function that adds a backslash to the Help directory path name (step 4)
- Launch a Help file when the associated Help menu item is selected (step 5)

Sample code for Tutorial Part 3

```
// ObjectScripting example
// Copyright (c) 1996 by Borland International, All Rights Reserved
// STEP3.SPP: Add two menu items to the Help menu. Launch Help files
//            when menu item is selected.
```

```
import IDE;
import scriptEngine;

class HelpMenu()

{
// Find the help directory and store it in the static sHelpDir
declare sProgram = new String();
  sProgram.Text = IDE.ModuleName;
  declare breakIndex = sProgram.Index("\\BIN\\", SEARCH_BACKWARD);
  declare sHelpDir = sProgram.SubString(0, breakIndex - 1).Text + "\\HELP\\";

// Load "MENUHOOK.SPP", necessary for adding menu items.
    if(!scriptEngine.IsLoaded("menuhook.spp"))
        {
        scriptEngine.Load("menuhook.spp");
        }

// Add a menu item under "Help" menu, launch the Help file
// associated with it. The helpFile parameter is the file name
// without the path.
    AddHelpFile(menuText, helpFile)
       {
       AddHelpFileFullPath(menuText, sHelpDir + helpFile);
       }
   AddHelpFileFullPath(menuText, helpFile)
       {
       declare menuCmd =
          "IDE.Help(\"" + AddBackSlash(helpFile) + "\", "
          + "3, " + "\"\"" + ");";
        assign_to_view_menu("IDE", "&Help|" + menuText,
          menuCmd, menuText);
       }

// Important note!
// The command text passed to assign_to_view_menu
// should be IDE:Help("C:\\BC5\\HELP\\...", ...).
// When cScript compiles, it compiles the double backslash
// as a single backslash. This routine adds a backslash to
// the directory path name.

AddBackSlash(fileName)
    {
    declare origFileName = new String();
    origFileName.Text = fileName;
    declare targetFileName = "";
    declare breakIndex = origFileName.Index("\\");
    while (breakIndex > 0)
       {
       targetFileName += origFileName.SubString(0, breakIndex - 1).Text
          + "\\\\";
       origFileName = origFileName.SubString(breakIndex);
       breakIndex = origFileName.Index("\\");
       }
    targetFileName += origFileName.Text;
    return targetFileName;
    }
```

```
};
// At load time, create two new menu items on the Help menu:
// ObjectScripting for SCRIPT.HLP, and Standard Template
// Library for STL.HLP.
// These two menu items show two different ways to add a help item.
declare helpMenu = new HelpMenu();
helpMenu.AddHelpFile("ObjectScripting", "SCRIPT.HLP");
helpMenu.AddHelpFileFullPath("Standard Template Library",
  "C:\\BC5\\HELP\\STL.HLP");
```

Finding the Help directory

Part 3, step 1 of 5

This step shows you how to find the name of the Borland C++ Help directory and store it. You use the stored name when you add the Help file name to the Help menu.

First, start a script file and call it STEP3.SPP. Then, as previously learned:

- Import the *IDE* object (Part 2, step 1)
- Import a symbol of a system-wide instance of *ScriptEngine* (Part 2, step 2)
- Create a class called *HelpMenu* (Part 1, step 3)

To find the name of the Help directory,

1 Add the following lines to your script:

```
{
declare sProgram = new String();
 sProgram.Text = IDE.ModuleName;
 declare breakIndex = sProgram.Index("\\BIN\\", SEARCH_BACKWARD);
```

The **declare** keyword declares the variable *sProgram*. This line also assigns the variable *sProgram* to a **new** instance of the *String* class. *sProgram.Text* is assigned the value returned by *IDE.ModuleName* (the name of the currently executing module).

The next line declares the variable *breakIndex*. This line also assigns *breakIndex* to the string returned by the *Index* method (the occurrence of the specified substring).

2 Enter the following code to store the path name in *sHelpDir*.

```
declare sHelpDir = sProgram.SubString(0, breakIndex - 1).Text + "\\HELP\\";
```

This line declares the variable *sHelpDir*. It also assigns *sHelpDir* to the value returned by *SubString (breakIndex* using the specified starting and ending positions) plus the value in *sProgram.Text* plus the value `"\\HELP\\"`.

You have just imported the *IDE* object, imported a symbol of a system-wide instance of *ScriptEngine*, created a class called *HelpMenu*, and added code that will find the name of the Help directory and store it in *sHelpDir*.

In the next step, you will load MENUHOOK.SPP and declare two methods that add menu items to the Help menu.

Declaring methods that add menu items

Part 3, step 2 of 5

This step declares two methods:

- **AddHelpFile()** adds the Help file name to the Help menu and launches the Help file.
- **AddHelpFileFullPath()** uses *sHelpDir* to locate the full path name of the Help directory, then adds the Help file name to the Help menu and launches the Help file.

First, as you learned in Part 1, add code to load MENUHOOK.SPP. (For more information, see Part 1, step 4; however, in your code, do not include the first curly brace shown in that step.)

To define **AddHelpFile()** and **AddHelpFileFullPath()**,

1 Add the following lines to your script:

```
AddHelpFile(menuText, helpFile)
    {
    AddHelpFileFullPath(menuText, sHelpDir + helpFile);
    }
```

The first line declares **AddHelpFile()**, passing the arguments *menuText* and *helpFile*. The third line declares **AddHelpFileFullPath()**, passing the arguments *menuText* and *sHelpDir* plus *helpFile*. In both cases, *helpFile* is the Help file name without the path.

2 Add:

```
AddHelpFileFullPath(menuText, helpFile)
```

Here, the parameter *helpFile* now includes the path.

You have just declared methods that will add menu items to the Help menu.

In the next step, you assign a menu item to the Help menu.

Assigning a menu item

Part 3, step 3 of 5

This step shows how to use the **assign_to_view_menu** function to assign a new menu item to the Help menu.

Note When you load MENUHOOK.SPP, the **assign_to_view_menu** function automatically becomes available.

To assign a menu item to the Help menu,

1 Add the following lines to your script:

```
{
declare menuCmd =
"IDE.Help(\"" + AddBackSlash(helpFile) + "\", "
   + "3, " + "\"\"" + ");";
assign_to_view_menu("IDE", "&Help|" + menuText,
```

```
    menuCmd, menuText);
}
```

The first statement invokes a Help file using the *IDE.Help* method. The name of the invoked Help file is assigned to *menuCmd*. The second statement uses the **assign_to_view_menu** function to assign the new menu item to the Help menu.

You have just assigned a menu item to the Help menu.

In the next step, you will declare the **AddBackSlash()** function.

Adding a backslash to the path name

Part 3, step 4 of 5

Because cScript compiles a double backslash as a single backslash when it sends a file path to WinHelp, you need to add code that will add a double backslash to your script. This step declares the **AddBackSlash()** function, used in *menuCmd* (defined in the previous step).

To declare **AddBackSlash()**,

1 Add the following lines to your script:

```
AddBackSlash(fileName)
    {
    declare origFileName = new String();
    origFileName.Text = fileName;
    declare targetFileName = "";
    declare breakIndex = origFileName.Index("\\");
    while (breakIndex > 0)
    {
       targetFileName += origFileName.SubString(0, breakIndex - 1).Text
       + "\\\\";
    origFileName = origFileName.SubString(breakIndex);
 breakIndex = origFileName.Index("\\");
 }
 targetFileName += origFileName.Text;
 return targetFileName;
 }
};
```

The first **declare** statement declares the variable *origFileName*. This line also assigns *origFileName* to a **new** instance of a *String* object. In the next line, *origFileName.Text* is assigned to *fileName*.

The next **declare** statement declares the variable *targetFileName*. This line also assigns *targetFileName* an empty value. The last **declare** statement declares the variable *breakIndex*. This line also assigns *breakIndex* to the string returned by the *Index* method (the occurrence of the specified substring).

The **while** loop says that while *breakIndex* is greater than zero, give *targetFileName* the current value of *targetFileName* plus the value returned in *SubString* (the value of *breakIndex* specified by the starting and ending positions) plus `"\\\\"`. Then, assign *origFileName* the value returned by the *SubString* method (the value of the substring specified by *breakIndex)*. The last line of the **while** loop assigns *breakIndex*

the value returned by the *Index* method. If this value is greater than 0, the **while** loop executes again.

When *breakIndex* is equal to 0, *targetFileName* equals *targetFileName* plus the value returned by the *Text* property. The **return** statement exits the **AddBackSlash()** function, returning the value of *targetFileName*.

You have just declared the **AddBackSlash()** function used in the **AddHelpFilePath()** method.

In the next step, you will add the Help file names to the Help menu and run the script.

Executing Help menu methods

Part 3, step 5 of 5

This step shows how to execute **AddHelpFile()** and **AddHelpFileFullPath()**.

To execute these methods,

1 Add the following lines to your script file,

```
declare helpMenu = new HelpMenu();
helpMenu.AddHelpFile("ObjectScripting", "SCRIPT.HLP");
helpMenu.AddHelpFileFullPath("Standard Template Library",
 "C:\\BC5\\HELP\\STL.HLP");
```

The **declare** keyword declares the variable *helpMenu*. This line also assigns *helpMenu* to a **new** instance of the *HelpMenu* class. (Note the difference in case; cScript is a case-sensitive language.)

helpMenu.AddHelpFile assigns the value "ObjectScripting" to the parameter *menuText*. SCRIPT.HLP is assigned to the *helpFile* parameter. SCRIPT.HLP is launched when the Help | ObjectScripting menu item is selected.

helpMenu.AddHelpFileFullPath assigns the value "Standard Template Library" to the parameter *menuText*. STL.HLP (and the full path name) is assigned to the *helpFile* parameter. STL.HLP is launched when the Help | Standard Template Library menu item is selected.

2 Save the script file and run it. For more information, see Part 1, step 7.

To see the results, go to the Help menu. Note that the menu items ObjectScripting and Standard Template Library have been appended to the bottom of the Help menu. Click Standard Template Library.

The Contents topic of the Standard Template Library Help file is displayed.

3 To remove the Help files from the Help menu, exit Borland C++. When you load Borland C++ again, these help files will no longer display on the Help menu.

You have just assigned new menu items to the Help menu, executed the associated Help files, and run the script file.

You have now finished Part 3 of the tutorial.

In Part 4, you will add all the Borland C++ Help files to the Help menu.

ObjectScripting Tutorial: Part 4

This part of the tutorial teaches you how to:

- Declare a function that adds all Borland C++ Help files to the Help menu (step 1)
- Execute the function (step 2)

Sample code for Tutorial Part 4

```
// ObjectScripting example
// Copyright (c) 1996 by Borland International, All Rights Reserved
// STEP4.SPP: Add all menu items to the Help menu. Launch Help file
//            when menu item is selected.

import IDE;
import scriptEngine;

class HelpMenu()

{
// Find the help directory and store it in the static sHelpDir.
declare sProgram = new String();
  sProgram.Text = IDE.ModuleName;
  declare breakIndex = sProgram.Index("\\BIN\\", SEARCH_BACKWARD);
  declare sHelpDir = sProgram.SubString(0, breakIndex - 1).Text + "\\HELP\\";

// Load "MENUHOOK.SPP", necessary for adding menu items.
    if(!scriptEngine.IsLoaded("menuhook.spp"))
         {
         scriptEngine.Load("menuhook.spp");
         }

// Add a menu item on the Help menu, launch the Help file
// associated with it. The helpFile parameter is the file name
// without the path.
    AddHelpFile(menuText, helpFile)
       {
       AddHelpFileFullPath(menuText, sHelpDir + helpFile);
       }
    AddHelpFileFullPath(menuText, helpFile)
       {
       declare menuCmd =
          "IDE.Help(\"" + AddBackSlash(helpFile) + "\", "
          + "3, " + "\"\"" + ");";
       assign_to_view_menu("IDE", "&Help|" + menuText,
          menuCmd, menuText);
       }

// Important note!
// The command text passed to assign_to_view_menu
// should be IDE:Help("C:\\BC5\\HELP\\...", ...).
// When cScript compiles, it compiles the double backslash
// as a single backslash. This routine adds a backslash to
// the directory path name.
```

```
AddBackSlash(fileName)
     {
     declare origFileName = new String();
     origFileName.Text = fileName;
     declare targetFileName = "";
     declare breakIndex = origFileName.Index("\\");
     while (breakIndex > 0)
        {
        targetFileName += origFileName.SubString(0, breakIndex - 1).Text
           + "\\\\";
        origFileName = origFileName.SubString(breakIndex);
        breakIndex = origFileName.Index("\\");
        }
     targetFileName += origFileName.Text;
     return targetFileName;
     }
// This is a list of all the Help files in BC5.
// Comment out the ones you don't need.
AddStandardHelpFiles()
  {
  AddHelpFile("Borland C++ Tools", "BCTOOLS.HLP");
  AddHelpFile("Borland C++ User's Guide", "BCW.HLP");
  AddHelpFile("Borland Custom Controls", "BWCC.HLP");
  AddHelpFile("C++ Programmer's Guide", "BCPP.HLP");
  AddHelpFile("Class Library Reference", "CLASSLIB.HLP");
  AddHelpFile("Control 3D", "CTL3D.HLP");
  AddHelpFile("DOS Reference", "BCDOS.HLP");
  AddHelpFile("Error Messages", "BCERRMSG.HLP");
//   AddHelpFile("Formula One Visual Tools", "VTSS.HLP");
//   AddHelpFile("Help Author's Guide", "HCW.HLP");
//   AddHelpFile("Hot Spot Editor", "SHED.HLP");
//   AddHelpFile("HeapWatch32", "HW32.HLP");
//   AddHelpFile("MAPI Programmer's Reference", "MAPI.HLP");
//   AddHelpFile("Message Compiler for NT", "MC.HLP");
//   AddHelpFile("MicroHelp Customer Controls", "VBT300.HLP");
//   AddHelpFile("OCF Reference", "OCF.HLP");
  AddHelpFile("ObjectScripting", "SCRIPT.HLP");
//   AddHelpFile("OLE 2 Reference", "OLE.HLP");
//   AddHelpFile("OLE 2.0 Object Viewer", "OLE2VIEW.HLP");
//   AddHelpFile("OLE Knowledge Base", "KBASE.HLP");
//   AddHelpFile("Open GL", "OPENGL.HLP");
  AddHelpFile("OpenHelp", "OPENHELP.HLP");
  AddHelpFile("OWL 5.0 Examples", "OWLEX.HLP");
  AddHelpFile("OWL 5.0 Reference", "OWL50.HLP");
//   AddHelpFile("Remote Procedure Call Reference", "RPC.HLP");
//   AddHelpFile("Resource Compiler for NT", "RC.HLP");
//   AddHelpFile("Resource Localization Manager", "RLMAN.HLP");
//   AddHelpFile("Resource Reference", "RC32.HLP");
  AddHelpFile("Resource Workshop", "WORKSHOP.HLP");
  AddHelpFile("TDWINI.EXE Information", "TDWINI.HLP");
  AddHelpFile("Standard Template Library", "STL.HLP");
  AddHelpFile("Visual Database Tools", "BCVDTREF.HLP");
  AddHelpFile("Windows 16 API", "WIN31WH.HLP");
```

```
  AddHelpFile("Windows 32 API", "WIN32.HLP");
  AddHelpFile("Windows 32s Reference", "WIN32S.HLP");
  AddHelpFile("Windows Developer's Guide", "95GUIDE.HLP");
  AddHelpFile("Windows Interface Guidelines", "UIGUIDE.HLP");
  AddHelpFile("Windows System Class", "WINSYS.HLP");
//   AddHelpFile("WinSight", "WINSIGHT.HLP");
//   AddHelpFile("WinSpector", "WINSPCTR.HLP");
  }
};

// At load time, load a list of help files.
// Customize the list by modifying AddStandardHelpFiles() function.
declare helpMenu = new HelpMenu();
helpMenu.AddStandardHelpFiles();
```

Declaring a method

Part 4, step 1 of 2

This step declares the **AddStandardHelpFiles()** method that adds all Borland C++ Help files to the Help menu. Because there are many Help files, you may want to comment out any Help files you don't think you'll use frequently.

First, start a script file and call it STEP4.SPP. Then, as previously learned:

- Import the *IDE* object (Part 2, step 1)
- Import a symbol of a system-wide instance of *ScriptEngine* (Part 2, step 2)
- Create a class called *HelpMenu* (Part 1, step 3)
- Find the location of the Borland C++ Help directory and store it (Part 3, step 1)
- Load MENUHOOK.SPP. (Part 1, step 4). In your code, do not include the first curly brace shown in this step.
- Declare two functions that add menu items to the Help menu (Part 3, step 2)
- Assign a menu item to the Help menu (Part 3, step 3)
- Add a backslash to the Help directory path name (Part 3, step 4). In your code, do not include the final curly brace and semi-colon shown in this step.

To declare the **AddStandardHelpFiles()** method,

1 Add the following lines to your script file:

```
AddStandardHelpFiles()
 {
 AddHelpFile("Borland C++ Tools", "BCTOOLS.HLP");
 AddHelpFile("Borland C++ User's Guide", "BCW.HLP");
 AddHelpFile("Borland Custom Controls", "BWCC.HLP");
 AddHelpFile("C++ Programmer's Guide", "BCPP.HLP");
 AddHelpFile("Class Library Reference", "CLASSLIB.HLP");
 AddHelpFile("Control 3D", "CTL3D.HLP");
 AddHelpFile("DOS Reference", "BCDOS.HLP");
 AddHelpFile("Error Messages", "BCERRMSG.HLP");
 AddHelpFile("Formula One Visual Tools", "VTSS.HLP");
 AddHelpFile("Help Author's Guide", "HCW.HLP");
```

```
    AddHelpFile("Hot Spot Editor", "SHED.HLP");
    AddHelpFile("HeapWatch32", "HW32.HLP");
    AddHelpFile("MAPI Programmer's Reference", "MAPI.HLP");
    AddHelpFile("Message Compiler for NT", "MC.HLP");
    AddHelpFile("MicroHelp Customer Controls", "VBT300.HLP");
    AddHelpFile("OCF Reference", "OCF.HLP");
    AddHelpFile("ObjectScripting", "SCRIPT.HLP");
    AddHelpFile("OLE 2 Reference", "OLE.HLP");
    AddHelpFile("OLE 2.0 Object Viewer", "OLE2VIEW.HLP");
    AddHelpFile("OLE Knowledge Base", "KBASE.HLP");
    AddHelpFile("Open GL", "OPENGL.HLP");
    AddHelpFile("OpenHelp", "OPENHELP.HLP");
    AddHelpFile("OWL 5.0 Examples", "OWLEX.HLP");
    AddHelpFile("OWL 5.0 Reference", "OWL50.HLP");
    AddHelpFile("Remote Procedure Call Reference", "RPC.HLP");
    AddHelpFile("Resource Compiler for NT", "RC.HLP");
    AddHelpFile("Resource Localization Manager", "RLMAN.HLP");
    AddHelpFile("Resource Reference", "RC32.HLP");
    AddHelpFile("Resource Workshop", "WORKSHOP.HLP");
    AddHelpFile("TDWINI.EXE Information", "TDWINI.HLP");
    AddHelpFile("Standard Template Library", "STL.HLP");
    AddHelpFile("Visual Database Tools", "BCVDTREF.HLP");
    AddHelpFile("Windows 16 API", "WIN31WH.HLP");
    AddHelpFile("Windows 32 API", "WIN32.HLP");
    AddHelpFile("Windows 32s Reference", "WIN32S.HLP");
    AddHelpFile("Windows Developer's Guide", "95GUIDE.HLP");
    AddHelpFile("Windows Interface Guidelines", "UIGUIDE.HLP");
    AddHelpFile("Windows System Class", "WINSYS.HLP");
    AddHelpFile("WinSight", "WINSIGHT.HLP");
    AddHelpFile("WinSpector", "WINSPCTR.HLP");
    }
};
```

The **AddStandardHelpFiles()** method uses the **AddHelpFile()** method. Each **AddHelpFile()** method identifies:

- The Help file to display on the Help menu (the *menuText* parameter)
- The filename of the file to launch when the Help menu item is selected (the *helpFile* parameter)

You have just declared a method that adds all Borland C++ Help files to the Help menu.

In the next step, you will execute the method and run the script file.

Executing the Help menu method

Part 4, step 2 of 2

This step executes **AddStandardHelpFiles()**.

To execute the Help menu method,

1 Add the following lines to your script file:

```
declare helpMenu = new HelpMenu();
helpMenu.AddStandardHelpFiles();
```

The **declare** keyword declares the variable *helpMenu*. This line also assigns the variable *helpMenu* to a **new** instance of the *HelpMenu* class. (Note the difference in case; cScript is a case-sensitive language.) *helpMenu.AddStandardHelpFiles* adds all Borland C++ Help files to the Help menu. A Help file is launched when a menu item is selected.

2 Save the script file and run it.

To see the results, go to the Help menu. Note that many menu items have been appended to the bottom of the Help menu. Choose one.

The Contents topic of the selected Help file is displayed.

3 To remove the help files from the Help menu, exit Borland C++. When you load Borland C++ again, these help files will no longer display.

You have now finished Part 4 of the tutorial.

For more information on ObjectScripting, click the Contents tab of the Help system (SCRIPT.HLP) and browse through the Help topics. You can also look at the example programs in BC5\SCRIPT\EXAMPLES.

Part

II

Language reference

Chapter

About cScript

The cScript language is a late-bound, object-oriented language that supports syntax and constructs familiar to the C++ developer; you declare classes and provide them with properties and member functions.

cScript offers C++ programmers a familiar environment for customizing the IDE. It has many of the same constructs as C++ and on the surface looks and feels like C++.

But under the hood the two languages are very different: They address two separate problem domains, the early-bound environment versus late-bound, and as a result there are some major semantic differences.

About late-bound languages

cScript is a late-bound, object-oriented language, which is roughly analogous to being an interpreted language. This gives cScript programs more flexibility than early-bound programs, such as those written in C++. In C++, everything about a program is known at compile time. The types of the variables, the return types and number of parameters to functions, the classes that will be used as well as all their properties and behaviors are all known when the program is compiled.

cScript is very different. While the syntax looks very similar to C++, you cannot declare a variable's type at compile time. Variables are generic and can hold any type of data needed at runtime. In fact, the same variable can hold different types of data as the program executes.

Just as in C++, you create classes with properties and methods and create objects which are instances of those classes. But in cScript, you are free to override the methods for a given object (not the class, just the object itself) at runtime with a new implementation of the method or a method "borrowed" from another object.

This means that an object of one class can use the methods of an object of another class without having to know anything about the second object at compile time. Existing objects can have their functionality extended without the need for the source code to the object's class, and without recompiling.

The benefits of late-binding

Late-binding provide important practical benefits. Let's say that you want to create a program to extend the functionality of the Borland C++ IDE. For example, you want to create a script that automatically saves changed source files to a central repository on the network as well as in your project directory. You want to add this functionality to the IDE and have it behave like a built-in feature.

The Borland C++ IDE is represented by a cScript object called *IDE* of the cScript class *IDEApplication*. If the object IDE was instead created from a C++ class, you would have to alter that C++ class and add your repository methods to it directly, through multiple inheritance, function pointers, or through some other mechanism. Then you would need to recompile the source for the class to create the extended object IDE. In cScript, you do not need to touch the definition of *IDEApplication* (the class) at all. You can use cScript to attach your repository methods to the IDE object at runtime. There are no changes to the *IDEApplication* class and no recompilation is necessary.

So late-binding means that you can alter and extend the behavior of objects without having to know the details of how they are implemented, without having access to the source code, and without having to recompile.

Differences between cScript and C++

cScript differs from C++ in the following ways:

- All class members are public. There is no way to make members private or protected as part of their declaration. You can use **on** statements to make members inaccessible.
- cScript programs have no **main()** or **WinMain()** function.
- Globally scoped statements are allowed and will be executed when the script is run.
- Executable statements are allowed within a class definition, and in conjunction with optional initialization arguments passed when the class is instantiated, constitute the class's constructor. There is no constructor function per se in cScript.The implementation of a class's methods are defined within the class. That is, the definition (not just the declaration) of a member function must always occur in the class declaration.
- Arrays are objects in cScript. When deallocating an array with the **delete** command, the square brackets are not needed.

- Functions may have varying numbers of parameters. cScript truncates or pads argument lists as necessary.
- Compound logical expressions do not short circuit. For example, in the expression `if(TRUE || Foo())...`, the function `Foo()` will always be called even though the constant **TRUE** insures that the expression will always evaluate to true.
- cScript does not have the following C++ features (this is not a complete list):
  - Type checking (but there are type conversions with some operations). See "cScript and types" on page 4-4 for more information.
  - Type casting
  - Multiple inheritance
  - C++-style exceptions
  - Class constructor functions
  - Function overloading
  - Character arrays (cScript directly supports strings)
  - Default arguments to functions
  - Templates
  - Default parameters in method declarations
  - Pointers
  - Direct memory access
  - Function declarations that support default parameters
  - Enums
  - Unions
  - Structs or typedefs
  - Bitfields
  - Operator overloading
  - The **const** keyword (except in DLL imports)
  - The **static** keyword
  - Global scope resolution. You can access globally scoped variables, using the **module** function
  - The **#if** preprocessor directive **(#ifdef** is supported)
  - The following operators: `->  *  ->*  .*`

cScript objects

All objects in the IDE are exposed through the global object called *IDE*, in the class *IDEApplication*. This object is created in STARTUP.SPP, a script that is automatically executed when Borland C++ is started. You use *IDEApplication* to access many parts of the IDE. Additional classes provide access to the debugger, the search engine, the Editor, and the Keyboard Manager. Classes are also provided to create and manage list windows and pop-up menus.

In the Borland C++ IDE, all user commands are directly mapped to corresponding scripts. Every IDE window that uses the keyboard API has each keystroke mapped to a script. All main menu commands have a mapping to a script. These scripts, supplied by Borland, provide standard behavior that you can use to customize your environment. If you want to modify the behavior of the IDE, you can write scripts that interact with the exposed IDE components.

cScript and types

cScript is not an explicitly typed language and does not allow you to declare variables with C++ base types. When the parser encounters an unknown identifier, it makes it a new variable (unless the identifier is immediately followed by an open parenthesis, which might indicate it's a function). New variables created this way are local to the current scope.

The only declarators you can use are **declare**, **import**, and **export**, which are not types but declarators that indicate a new variable. Declaring variables discusses **declare**, **import**, and **export**.

Identifiers do have types, but the type of an identifier is determined by its value. For example, *x* in the following code is an integer because it is assigned an integer:

```
declare x = 25;
```

x can become any other cScript native type, depending on what is assigned to it. In the following example, *x* is of type *IDEApplication* because an object of that class is assigned to it:

```
declare MyIDE = new IDEApplication;
x = MyIDE;
```

Use the intrinsic function **typeid** to determine the type of an identifier.

Type conversions

When you use operators with variables of different types, the simple conversion rule with binary operators (such as + and /) is that the operand on the left determines the type of the expression. For example,

```
declare x = 4;
declare y = 4.0;
print x/3; // output is 1
print y/3; // output is 1.333333
```

The rule becomes more complicated with conversions between strings and numbers because cScript does some interpretation.

- When converting from a number to a string, cScript represents digits as numeric strings (3 becomes "3").
- When converting from a string to a number, the string is converted to a number if the string can be interpreted as a number. If the string evaluates to anything but a number, it is converted to zero ("33" becomes 33, "33abc" also becomes 33, but "abc33" becomes 0). For example,

```
declare x = 10;
print "String" + x;  // prints "String10"
print x + "String";  // prints the result of 10 + 0 which is "10"
```

- If an object is converted to a string, it becomes the string "[OBJECT]". For example,

```
declare a = new IDEApplication;   // create a new
                                  // IDEApplication object
declare b = "Hello";              // create a new string variable
                                  // add the object to the string
                                  // converting the object to a string
declare c = b + a;
print c;                          // prints "Hello[OBJECT]"
```

Comments

cScript supports C++ comment syntax, including:

- `// This is a comment to the end of the physical line`
- `/* This is a comment to the closing */`

Nested comments are permitted in cScript.

Identifiers

Identifier names are made up of letters, digits and underscores (_). The first character of an identifier name cannot be a digit. Identifier names can be up to 64 characters in length.

cScript is case-sensitive. Therefore foo, Foo, and FOO are three different identifiers. Keywords, operators, and intrinsic function names are also case-sensitive.

Declaring variables

A cScript source file (an .SPP file) is a module. A variable declared or used for the first time at the module level is global to that module, and a variable declared or used for the first time inside a block is local to that block.

Because you don't have to declare variables as you do in C++, it's easy to mistakenly use a global variable in a function or class when you intend it to be local. It's safest to use **declare** with variables that you intend to be local.

Variables created at the module level (not in a function, method, class, control structure, or block) are global variables of the module. They are not normally accessible to other modules. To access a variable defined in module A from module B, three things must occur:

- Both module A and module B must be loaded.
- The variable must be declared **export** in Module A, at module scope.
- Module B must contain an **import** statement for the variable, at module scope.

Example

```
// This is an example of declaring a local variable
declare X = 2;          // Module scope X
declare Y = 4;          // Module scope Y

Func1(X){               // Parameter (local variable) X
 Y = "hello";           // modifies global Y.
}
Func2(X){               // Parameter (local variable) X
 declare Y = "hello";   // New local variable Y created
                        // and set to "hello".
}
```

Example

```
//This example shows how to declare a variable export in Module A
//and import in Module B.
Module A
      declare varOne;     //A global variable accessible only in Module A.
      export varTwo;      //A variable accessible outside Module A.

Module B
      import varOne;      //Trying to link with exported varOne. Will fail
                          //unless some other module exports varOne.
      import varTwo;      //Trying to link with varTwo in Module A.

      varOne = 33;        //Causes the runtime warning "Cannot locate

                          //external variable varOne".
      varTwo = 33;        //Changes the value of varTwo in Module A to 33.
```

Statements

As in C++, statements must terminate with a semicolon. You can group multiple statements by surrounding them with braces. Variables declared within braces are local to those braces and go out of scope when the closing brace is reached.

You can chain expressions with the comma operator.

Strings

cScript strings (note the lowercase "s") work much the same as C++ strings. A string is a series of characters delimited by quotation marks. In cScript, a string's length is limited to 4096. cScript automatically keeps track of the ends of strings; appending \0 (**NULL**) is unnecessary.

Unlike C or C++, you cannot access each character of the array independently using an offset of [] operators, as a string is not a pointer to memory. Internally, the variable assigned to the string represents the entire group of characters as a string. To access characters independently of each other, use a *String* object.

Because strings are stored as an entire group of characters you can:

- Add text together
- Check for equality, inequality, greater than, and less than

String formatting characters

cScript recognizes many C++ formatting characters within strings such as new line (\n) and horizontal tab (\t).

Besides the alphanumeric and other printable characters, you can designate hexadecimal and octal escape sequences much as you can in C++. These escape sequences are interpreted as ASCII characters, allowing you to use characters outside the printable range (ASCII decimal 20–126).

The format of a hexadecimal escape sequence is \x<hexnum>, where <hexnum> is up to 2 hexadecimal digits (0–F). For example, the string "R3" can be written as "\x523" or "\x52\x33".

Octals are a backslash followed by up to three octal digits (\ooo). For example, "R3" in octal could be written "\1223" or "\122\063".

Prototyping

Forward referencing for functions and methods is not supported. Because scripts are interpreted in a single pass at runtime, classes and the methods in them, must be defined before they can be used.

cScript does not provide a function prototype mechanism. This is because when the parser sees a function call, it needs to know the implementation at that time. At compile time, however, a C++ compiler only needs to be able to match the name, number of parameters, the types of the parameters, and the return values, but does not really need to know anything internally about the function.

Parameter counting and type conversions are performed at runtime. cScript will pad (with NULLS) or truncate the argument list as necessary at runtime to ensure that the correct number of arguments is available on the stack.

Flow control statements

The following flow control statements work in cScript as they do in C++:

break	**continue**
do	**else**
if	**for**
return	**while**

The behavior of **switch** is slightly different. Because cScript is not a compiled language, the expression is checked against each case exactly as if evaluating an **if-else-if** construct. This means that the cases need not be constants; they may be any expression (including function calls). It also means that if a **default** case is desired, it must be the last case.

Example

```
// Switch example
switch( someNumber ) {
  case 3:             //Execution continues to case bar()
  case MyFunc():
     DoSomeStuff();
                      // No break. Even if this case executes,
                      // the next case is still evaluated.
  case W.Y.Z:
     DoSomethingElse();
     break;           // If this case executes, switch ends here.
  case 42:
     DoItAll();
  default:
  // Anything not matching previous cases comes through here
}
```

Pass by reference

Parameters passed to methods and functions are passed by value unless explicitly made to be passed by reference. (Passing by value does not allow

changes to the value of the caller's variable, while passing by reference does.) For example,

```
PassByValueFunction(aValueParameter){
 aValueParameter = 100; // Value of aValueParameter changed to
                        // 100. Caller's value unmodified.
}
PassByReferenceFunction(&aReferenceParameter){
 aReferenceParameter = 100; // Value of aReferenceParameter
}                           // changed to 100. Caller's value
                           // also updated
```

If you want to pass a variable by value in a pass-by-reference parameter, put it in parentheses. For example,

```
x = 10;
PassByReferenceFunction((x));
print x;   // Prints 10
PassByReferenceFunction(x);
print x;   // Prints 100
```

Built-in functions

The cScript language provides the following built-in functions:

Table 4.1 Built-in functions

Function	Description
attach	Links a method of an instance of one class to a method of an instance of another class.
call	Directly invokes a closure.
detach	Detaches a method instance of one class from a method instance of the same or another class when the two were previously linked using **attach**.
FormatString	Formats strings at runtime.
initialized	Indicates if a variable has ever been initialized.
load	Opens and parses the specified script.
module()	Gets access to any loaded module.
pass	Used in an **on** handler to invoke the original function that is being overridden.
print	Prints the specified expression in the Script page of the Message window.
reload	Does an **unload** followed by a **load**.
run	Loads and runs the module indicated.
select	Creates a special global variable, **selection**,that refers to the selected variable.
typeid	Gets runtime identification of variables or the resulting value of expressions.

Table 4.1 Built-in functions (continued)

Function	Description
unload	Unloads the specified module.
yield	Forces cScript to check if the abort (*Esc*) key has been pressed.

Reserved identifiers

cScript reserves identifier names starting with two underscores as internal to the language. The following identifiers cannot be used in your scripts:

__break	**__const**	**__cdecl**
__error	**__pascal**	**__refc**
__rundebug	**__runimmediate**	**__stack**
__stdcall	**__warn**	**event**
Factory	**false**	**FALSE**
library	**method**	**NULL**
object	**property**	**system**
true	**TRUE**	

cScript and DLLs

Because all needed functionality is not directly available through the language or exposed by an object in the system, cScript allows you to access a function in a DLL directly through cScript by using code similar to the following:

```
// expose DLL entry points
import "foo.dll" {

int __pascal FooFunc(short, char, unsigned, long);
void DoIt();
}
// directly access the DLL calls
if (FooFunc(1, "hello there",2,3))

 print "FooFunc() succeeded";
else
 DoIt();
```

This DLL call uses the data type keywords **short**, **char**, **unsigned**, and **long**. Other data type keywords available for use in DLL calls are **void**, **int**, **bool**, and **const**.

This form of the **import** command allows you to declare a prototype for the external DLL functions, including their return types and arguments.

Unlike normal cScript functions, variable numbers of arguments are not supported when using functions from DLLs. You can pass dummy integer arguments for enums and pointers, since cScript does not support these types. There is no support for passing structs.

Note When possible, declaring arguments of DLL calls with the **const** modifier will improve performance.

cScript supports the calling conventions **__cdecl**, **__pascal**, and **__stdcall**.

cScript and OLE2

cScript to OLE2 interaction

If an automatable object has been exposed in the OLE2 registry, its functionality may be accessed from cScript by using the special *OleObject* class. For example,

```
// Creates an object with all the methods of
// Microsoft Word BASIC
wordBasic = new OleObject("word.basic");

// Call the Word BASIC function AppInfo() to find out
// what version of Word is installed
print wordBasic.AppInfo(2);     // Returns "7.0" for Word version 7.0
```

OLE2 to cScript interaction

The IDE registers the automation name *BorlandIDE.Application* with the OLE2 registry during initialization. From any automation controller, the IDE's functionality may be accessed by creating a *BorlandIDE.Application* object and using it. For example, from a *Visual* dBASE program you could do the following:

```
* Visual dBASE syntax:
BorCppIDE = NEW OleAutoClient("BorlandIDE.Application")
BorCppIDE.ProjectOpenProject("foo.ide")

IF(BorCppIDE.ProjectBuildAll())
 BorCppIDE.FileSend("success notification")

ELSE
 BorCppIDE.FileSend("failure notification")
ENDIF
```

Arrays

cScript supports two types of arrays:

- Bounded arrays
- Associative arrays

Bounded arrays

cScript bounded arrays are similar to C++ arrays and are declared with a size specifier. Runtime warnings occur if you attempt to access a bounded array out of bounds. Bounded arrays use a zero-based index; that is, the first element of an array is element 0 and the last element is element *size* – 1.

You can declare a bounded array by using either of the following syntax variations:

```
x = new array [10];
array x[10];
```

Access is then as you would expect:

```
x[0] = 5;
x[1] = "a string";
x[2] = Foo;
x[3] = x[2];
```

You can also declare and initialize a bounded array using the following:

```
z[] = {"one", "two", x};  //Note the use of braces, {},
                          //rather than brackets, [].
```

In this case, *one*, *two*, and the value of *x* are the values in the array, and the array indexes start at 0 and go to 2. For example,

```
print z[0];   //Prints one
print z[1];   //Prints two
print z[2];   //Prints the value of x
```

You cannot initialize variables in an array initialization list: You must initialize them elsewhere. For example, you cannot define an array as follows:

```
z = {x=1, y=3, slogan="No more woe"} //Illegal syntax
```

In this array definition, assignments to *x*, *y*, and *slogan* must be elsewhere in your code.

Note Be careful not to unintentionally overwrite an existing array with a new one during initialization. The following example declares an array "a", but then overwrites it with the elements *1*, *red* and *2*.

```
declare array a[10];  // declares an array with 10 elements
// The next line destroys the array "a" and declares
// a new array with three initialized elements
a = {1, "red", 2};
```

You can assign values beyond array bounds. Such an assignment does not increase the size of the bounded array to match the new index, but rather declares an associative array that is attached to the original bounded array. You can use any value as the new index.

Note You cannot use a negative number to index into an array. Doing so causes a runtime warning.

Example

```
// This script generates no errors or warnings. It declares
// and initializes a bounded array with 4 elements (0 - 3)
declare a = new array[4];
a[0] = "Able";
a[1] = "Baker";
a[2] = "Charlie";
a[3] = "Delta";
print a[0];  // prints Able
print a[1];  // prints Baker
print a[2];  // prints Charlie
print a[3];  // prints Delta

// The following lines seem to add an element to the bounded array
// on the fly, but are actually declaring an associative array and
// appending it to the bounded array. Since the index is contiguous
// with the indices of the bounded array, the new element can be
// used as if it were part of the bounded array.
a[4] = "Edward";
print a[0];  // prints Able
print a[1];  // prints Baker
print a[2];  // prints Charlie
print a[3];  // prints Delta
print a[4];  // prints Edward

// The following lines add an element to the associative array.
// The new element's index is not contiguous with the existing
// elements. Note: adding element a[6] does NOT declare element a[5].
a[6] = "Frank";
print a[0];  // prints Able
print a[1];  // prints Baker
print a[2];  // prints Charlie
print a[3];  // prints Delta
print a[4];  // prints Edward
print a[5];  // prints [UNINITIALIZED]
print a[6];  // prints Frank

// The following lines add an element to the associative array using
// a string as an index. Adding this element has no effect on the rest
// of the array.
a["Bob"] = "Robert";
print a[0];      // prints Able
print a[1];      // prints Baker
print a[2];      // prints Charlie
print a[3];      // prints Delta
print a[4];      // prints Edward
print a[5];      // prints [UNINITIALIZED]
print a[6];      // prints Frank
print a["Bob"];  // prints Robert

return;
```

Associative arrays

You declare associative arrays without a size specifier and access them on demand. They grow as required. Associative arrays are typically sparse and do not perform as well as bounded arrays.

To declare a new associative array, use one of the following syntax variations:

```
z = new array[];
array z[];
```

Associative arrays can take string as their indexes as well as numbers. Typically, the index of an associative array element is something which is related to the data the element holds. For example,

```
History = new array[];
History["President"] = "Bill Clinton"
History["Vice President"] = "Al Gore"
History[1776] = "U.S. Independence"
History[1789] = "U.S. Constitution"
```

You also declare an associative array when you make assignments beyond the bounds of a bounded array. For more information, see "Bounded arrays" on page 4-12.

Note You cannot use a negative number to index into an array. Doing so causes a runtime warning.

Classes

cScript supports single inheritance. There is no support for overloaded methods (member functions). In addition, there is no hiding of members: all properties (member data) and methods are public and virtual. You can override an instance of a class (an object) with **on** and **pass**, and you can bind objects' events (function calls) together in an event handling chain using **attach**. For more information, see "Event handling" on page 4-18.

Defining methods

All methods must be defined entirely in the class definition. A class definition may be nested in another class definition. The name of that nested class exists in the scope of the outer class, and is thus protected from accidental collision with identifier names in the module and global scopes. You can instantiate a nested class with the following syntax:

```
// Class Inner is nested in class Outer
class Outer {
  class Inner {}
}
declare Outer outerInstance;
declare innerInstance = new Inner from outerInstance;
```

Modifying the behavior of methods and properties

You can modify the behavior of methods in script classes:

- Derive a new class from the script class, overriding the methods whose behavior you want to change. Use this technique when you want to provide new behavior for a collection of objects.
- Override an instance of a class by using an **on** handler or **attach** to hook one of the object's methods. Use this technique when you want to tweak the behavior of a particular instance of a class.

You can also modify the behavior of properties in script classes:

- Derive a new class from the script class, overriding the properties whose values you want to change. Use this technique when you want to provide new behavior data values for a collection of objects.
- Override an instance of a property by using getters and setters. Use this technique when you want to tweak the behavior of a particular instance of a class.

Declaring a class

There are no constructors in cScript as there are in C++. (Defining a method with the same name as the class, as you do in C++, does not make it a constructor.) Instead, code embedded in the class declaration that is not part of a method declaration is executed for each object instantiated from the class, and is therefore treated as constructor code. For this reason, constructor arguments must be defined in the class declaration.

Member functions must be defined entirely in the class declaration. You cannot declare a member function in a class and then define it later in the program.

There are destructors in cScript, and they work as they do in C++. (Defining a method that starts with a tilde (~) and has the same name as the class makes it a destructor.) Destructors are called when the object is being destroyed.

Example

```
// The following class is declared without parameters
class noParams{
 declare aMember;
 declare anotherMember;
 // Constructor code is any code outside of class methods
 Func1();                    // call to a module-level method
 for (declare y=1; y<10; y++) // more constructor code
    print "hello";

// Here is the destructor:
 ~noParams(){
    print "A noParams has been destroyed.";

 }
```

```
 // More constructor code.
 print "noParams construction completed";
};

x = new noParams;  // declare instance, run constructor code
x = 0;             // calls destructor
```

Example

```
// The following class is declared with parameters
class Base(parmOne, parmTwo)
 print "parmOne=", parmOne;
 print "parmTwo=", parmTwo;
 declare X = parmOne;
 declare Y = parmTwo;
 MethodOne() {
   X = X + Y;
 }
 AnotherMethod() {
 }
}

// aParm and cParm are passed through to
// Base as ParmOne and parmTwo.
class Derived(aParm, bParm, cParm): Base(aParm, cParm) {
 declare Z = bParm;
};

declare d;
d = new Derived (1,2,3);
print "d.X = ", d.X;
print "d.Y = ", d.Y;
print "d.Z = ", d.Z;
```

Example

```
//The following class is inherited from the class Base
// aParm and cParm are passed through to Base
class Derived(aParm, bParm, cParm): Base(aParm, cParm) {
 declare Z = bParm;
};
```

Note Initialization arguments must be explicitly passed to the base class. They must also be stated in the derived class parameter list because that is the list referenced when a derived class object is instantiated.

Creating instances of cScript classes

Objects in script are created in one of two ways (assuming an already defined class Foo):

```
x = new Foo();
```

or

```
Foo x();
```

As with any declaration, you can use the **declare** and **export** keywords when you create objects. For example,

```
declare x = new Foo();
export Foo y();
```

cScript has automatic garbage collection. When an object goes out of scope, it is deallocated. Objects can be explicitly deallocated using the **delete** command. For example,

```
declare x = new Foo(); // allocate new object
delete x;              // explicitly delete object
```

Because cScript is untyped, you can destroy an object by assigning it another value. For example, cScript does not complain when you assign 0 to the object *x* as follows:

```
declare x = new MyClass();  // create an object of class MyClass
x = 0;                      // object overwritten and replaced with 0
```

Note The object is only actually destroyed if the reassigned variable is the only reference to that object. If there are additional references to the object, the object will continue to exist when one of its reference variables is reassigned.

Discovering class and array members

You can use ?? and **iterate** to discover the contents of classes and associative arrays.

- With ?? you can test if a particular property exists in an object or if a particular index exists in an array.
- With **iterate**, you can see all members of a class or array.

Closures

Closures let you obtain a reference to a method or property without invoking it. They are analogous to function pointers in C++.

Closures are powerful features of cScript. You can pass a closure as a function argument, for example. Since it represents a member of a class instance (an object), it carries a **this** pointer for that object with it and has all of the object's context information.

Use the closure operator (**:>**) in the following situations:

- To bind a class instance (an object) with one of its methods in a single reference.
- To assign a closure to a variable and use that variable anywhere you would use the closure.
- To dynamically expand or change the interface or behavior of a particular object, in ways not specified in the class of which the object is an instance.

- To declare arrays of closures to use like arrays of function pointers. The functions need not do anything unless they happen to be defined. Calling an undefined closure is not an error - nothing happens because there's nothing to call.
- In **on** handlers and **attach** and **detach** statements to handle a method call.

  In both cases, you can use **pass** to call the original method (if any) from within the attached method, and control the parameters passed to the original method. Overriding or adding an object method using an **on** handler or an **attach** statement affects only the one object instance. It does not affect the class, or any existing or new objects instantiated from that class. Only when **on** handlers are defined within a class definition itself using the **this** reference do all objects of that type inherit that event handling behavior.

Event handling

cScript uses an event handling model to override class behavior. Given an instance of a class, you can modify its behavior by hooking a specified method and supplying an alternative implementation. You can use either an **on** handler or **attach** and **detach** to accomplish this. For more information, see the next section "On handlers," and "Attach and detach" on page 4-19.

On handlers

You can use an **on** handler to hook method call events for an instance of a class and override, or enhance, its functionality. You need not call the hooked method inside the **on** handler: Any code in the **on** handler will be executed instead of the hooked method. If you want to invoke the original method, use **pass**. If the hooked method returns a value, that or any other value can be returned by assigning the return value of **pass** to a local variable, including a **return** statement in the event handler.

In the **on** handler header, you use the closure operator (:>) to bind a class instance (an object) with a method of the object as a closure reference. For example,

```
declare AClass MyObject;  // or MyObject = new Aclass;
// Given this instance of class AClass, you
// can intercept one of its methods.
on MyObject:>Method1(parm1){
 // Programmer may provide some preprocessing here.
 // Programmer may delegate to original implementation
 // or get original return value with pass().
 declare rv = pass(parm1); // call MyObject.Method1(parm1)
 // Programmer may provide some postprocessing here.
 return rv;
}
```

Note To be bound to an existing object method, the number of parameters in the **on** handler definition must match the hooked method. Once invoked, however, **pass** will call the hooked event regardless of how many arguments it passes. As with all function calls, cScript will ensure that the proper number of arguments are passed, truncating or padding as needed.

While inside an **on** handler, keep the following in mind:

- You aren't actually in a method of the object. Simple function calls resolve to their global counterparts, not to the object's methods. If you want to call the method *bar* from the *Method1* **on** handler, you must explicitly denote the object. For example,

```
on MyObject:>Method1(){
   MyObject.bar();
}
```

- Another way to explicitly denote a method of this object is to use the shorthand *dot notation*, which relies on the fact that, in an **on** handler, the dot is a shortcut for the controlling object. For example (given an object *MyObject* that has methods *Method1* and *bar*):

```
on MyObject:>Method1(){
 .bar();
}
```

Attach and detach

If you want to make dynamic changes to class instances, you can set up dynamic **on** handlers using the closure operator with **attach** and **detach**. An on handler is not dynamic, but stays in effect once established as long as the module in which it is defined remains loaded and as long as the object exists.

Attached closures are used to set up a linkage between any member (method or property) of an instance of one class with any member from an instance of another class.

Example

```
// attach and detach example
x = new Foo();                          // Create an instance of Foo called x
                                        // and assume Color() is a method.
x.Color();                              // Call x.Color().
y = new Bar();                          // Create an instance of Bar called y
                                        // and assume Notify() is a method.
y.Notify();                             // Call y.Notify().
attach y:>Notify to x:>Color;           // When x.Color() is called,
                                        // instead call y.Notify().
x.Color();                              // Call y.Notify().
// NOTE: In y.Notify() a pass() will
// now delegate back to x.Color().
detach y:>Notify from x:>Color;         // unlink the two objects
x.Color();                              // Call x.Color().
```

Accessing cScript properties

You can use **on** handlers to control what happens when users get (read) or set (write) the values of properties. These two types of **on** handlers are called **getters** and **setters**. This feature allows you to execute some code when a property is accessed instead of having to implement the property as a method.

Using getters

You can use a **getter:**

- To restrict access to a property
- To execute related methods or modifying related properties
- To perform computations on a value before returning it

The syntax for a **getter** is:

```
on object:>property{
 [optional pre-processing statement(s)]
 return [pass()|SomeValue];
}
```

Since no value is passed to the on handler, no parameter is needed. You need a **return** statement because a **getter** is always invoked when the object's property is used in a statement that needs to obtain its current value. When you access the property (for example, on the right side of an assignment operator or as an argument in a print statement), the on-read property event handler is called and its statements are executed.

Example

```
// The following getter hides the property Hidden1:
import IDE;                  //Import IDE, an IDEApplication object
class MyClass () {
declare Hidden1 = "Hidden: can't see this one";
declare Public1 = "Public: can see this one";

// Getter
on this:>Hidden1 {
  return NULL;
}
} // End MyClass declaration

getter() {
declare MyClass myobj;
IDE.Message (myobj.Hidden1);
     //Prints nothing
IDE.Message (myobj.Public1);
     //Prints "Public: can see this one"
}
```

Using setters

You can use a **setter:**

- To restrict values of a property to a certain range
- To limit access to a property (or even make it read-only)
- To execute related methods or modify related properties
- To perform computations on a value before setting it
- To convert user-supplied data to an internal format

The syntax for a setter is:

```
on ClassInstance:>property(parameter){
[optional pre-processing statement(s)]
[pass(parameter | SomeValue);]
[optional post-processing statement(s)]
}
```

Unlike the **getter** syntax, parentheses and a parameter are required for the **setter** to obtain the value intended to be assigned to the hooked object property. If you want the handler to be able to set the property (rather than simply block write access to it), you need a **pass** statement that sets the property's value. When you try to set the property (for example, when the property is used on the left side of the assignment operator `object.property = 1`), the on handler code executes.

Example

```
// In the following example, the setter uses the value set
// in radius to calculate and set the values of circumference
/  and area. It then passes the user's value on to radius.

import IDE;    //Import IDE, an IDEApplication object
declare PI = 3.141592654;

class Circle(rad) {
declare radius = rad;
declare circumference;
declare area;

// Setter
on this:>radius(x) {
if (x > 0) {
  circumference = PI * 2 * x;
  area = PI * x * x;
  pass(x);
 }
 else
  IDE.Message("Error: Radius must be greater than zero.");
}

// Methods
}
```

```
ShowProperties() {
  IDE.Message("radius = " + radius +
              ",     circumference = "
                  + circumference +
              ",     area = " + area);
}
}     // End of Circle class declaration

declare Circle obj(1);     //Initialize radius to 1.
obj.ShowProperties();

//Call the IDEApplication method SimpleDialog to prompt
//the user for input and get a value for radius.
declare radius = IDE.SimpleDialog("Enter a radius", "10");

obj.radius = 0 + radius; //Convert string to integer
obj.ShowProperties();
```

Adding menu items and buttons to the IDE

Through cScript, you can add menu items to a view's SpeedMenu or to menus on the main IDE menu, and define buttons that can be added to the IDE SpeedBar. This functionality is contained in the file MENUHOOK.DLL, located in the Borland C++ BIN directory. A script called MENUHOOK.SPP is provided in the Borland C++ SCRIPT directory to enable these capabilities through cScript.

To use its functions, MENUHOOK.SPP must be loaded using the **load** command or through the Script Modules dialog box. To automatically load MENUHOOK.SPP each time you start the IDE, add the following line to STARTUP.SPP:

```
scriptEngine.Load("menuhook");  // load the MenuHook functions
```

MENUHOOK functions

The following table lists the MENUHOOK functions:

Function	Description
assign_to_view_menu()	Adds a menu item to a menu
remove_view_menu_item()	Removes a menu item from a menu
define_button()	Defines a button that can be added to the SpeedBar

assign_to_view_menu

Creates a new menu item on a SpeedMenu or on a main IDE menu.

Syntax int assign_to_view_menu(string view_type, string menu_text, string script_text, string hint_text);

view_type Defines the type of view to attach this menu item to. Supported values are: IDE, Editor, and Project. Passing IDE creates a new menu bar item on the main IDE menu. The other values attach the menu item to the SpeedMenus of views of the given type.

menu_text The words that will appear on the menu item. If you include an ampersand (&) in the string, the character following the ampersand will be underlined and will be the selection character for the menu item. Menu items can be nested by putting a pipe (|) between the words of the menu items.

script_text cScript statement(s) to be executed when the menu item is selected.

hint_text The text to display in the status bar when the menu item is highlighted.

Return value 1 if the menu item is successfully added, 0 otherwise.

Description *menu_text* should be unique for the menu. Built-in menu items cannot be replaced using this function. Defining a menu item with *view_text* identical to that of a menu item previously defined with **assign_to_view_menu()** will replace the original menu item with the new one.

A one-level submenu can be created by specifying a *menu_text* with a pipe (|) character between the menu text and the menu item text. By using the same menu text to the left of the pipe with different menu item text to the right of the pipe in several calls to **assign_to_view_menu()**, you can create a submenu with several menu items.

Editor or project views that are visible when **assign_to_view_menu()** is executed will not have their menus updated. By adding calls to **assign_to_view_menu()** in STARTUP.SPP, you can customize the IDE's menu system from the time it starts up, and assure that all views will have the customized menus.

Menu items can be removed from SpeedMenus using **remove_view_menu_item()**. Menus created on the IDE menu bar cannot be removed without exiting the IDE.

Example

```
// Loads the MENUHOOK functions if not loaded in STARTUP.SPP
load("menuhook");

// This function call adds a single menu item
// to the editor view's SpeedMenu.
assign_to_view_menu("Editor", "&Click Me",
                    "IDE.Message(\"I'm clicked!\");",
                    "Click this menu item to see a message");

// These function calls add a submenu to the project
// view's SpeedMenu with three menu items.
```

```
assign_to_view_menu("Project", "Ne&w Menu | &First Item",
                    "IDE.Message(\"Clicked the first item\");",
                    "This is the first submenu item");
assign_to_view_menu("Project", "Ne&w Menu | &Second Item",
                    "IDE.Message(\"Clicked the second item\");",
                    "This is the first submenu item");
assign_to_view_menu("Project", "Ne&w Menu | &Third Item",
                    "IDE.Message(\"Clicked the third item\");",
                    "This is the first submenu item");

// These function calls add a menu pad to the
// main IDE menu bar with three menu items.
assign_to_view_menu("IDE", "E&xample | &First Item",
                    "IDE.Message(\"Clicked the first item\");",
                    "This is the first submenu item");
assign_to_view_menu("IDE", "E&xample | &Second Item",
                    "IDE.Message(\"Clicked the second item\");",
                    "This is the first submenu item");
assign_to_view_menu("IDE", "E&xample | &Third Item",
                    "IDE.Message(\"Clicked the third item\");",
                    "This is the first submenu item");
```

remove_view_menu_item

Removes a menu item from the specified view's SpeedMenu.

Syntax int remove_view_menu_item(string view_type, string menu_text);

view_type Defines the type of view the menu item is attached to. Supported values are: Editor and Project.

menu_text The words that appear on the menu item to be removed. This includes the ampersand (&) denoting the selection character, if any. If a menu and menu item were defined using a pipe (|) in *menu_text* in the call to **assign_to_view_menu()** that created the menu / menu item, then the exact same text, including the pipe, are required in this function as well.

Return value 1 if the menu item is successfully removed, 0 otherwise.

Description *menu_text* must exactly match the string used in the *menu_text* argument in **assign_to_view_menu()**.

Menus and menu items created with **assign_to_view_menu( )** can be removed. Menus and menu items on the IDE menu bar can also be removed.

When removing menus with multiple menu items, **remove_view_menu_item()** must be called for each item in the menu.

Example

```
// These function calls remove the SpeedMenu menus and menu
// items created with the assign_to_view_menu() example.
```

```
// Removes menu item from the editor view's SpeedMenu
remove_view_menu_item("Editor", "&Click Me");

// Removes the submenu from the project view's SpeedMenu
remove_view_menu_item("Project", "Ne&w Menu | &First Item");
remove_view_menu_item("Project", "Ne&w Menu | &Second Item");
remove_view_menu_item("Project", "Ne&w Menu | &Third Item");
```

define_button

Defines a new SpeedBar button.

Syntax int define_button(string button_name, string script_text, string hint_text, string tooltip_text, int button_index);

button_name	Defines a name for this button. The name should not conflict with any of the built-in button names. Multiple buttons with the same name can be defined.
script_text	cScript statement(s) to be executed when the button is selected.
hint_text	The text to display in the status bar when the mouse pointer rests on the button.
tooltip_text	The tip text to display when the mouse pointer rests on the button.
button_index	The index of the glyph to show for the button. MENUHOOK.DLL contains a built-in set of 38 glyphs (numbered 0 through 37) that can be used for buttons.

Return value 1 if the button successfully added, 0 otherwise.

Description Defining a button with **define_button()** adds the button to the Available Buttons list in the Options | Environment | SpeedBar | Customize dialog box. Use this dialog to add the button to the button bar.

User-created button definitions are automatically saved to the IDE configuration file when the IDE shuts down, and reloaded when the IDE starts.

Example

```
// Creates a new button definition and adds it to the
// Available Buttons list so it can be added to the
// SpeedBar.
define_button("Example Button",
 "IDE.Message(\"You pressed the example button\");",
 "This is the example button",
 "Example Button", 4);
```

Chapter

5

Keywords and functions

Keywords and functions are reserved for use in the cScript language and cannot be used as names of variables, methods, or classes or as any other identifier names.

array

Declares an array.

Syntax 1

```
declare array_var = new array[ [size] ];
declare array array_var[ [size] ];
```

size The number of elements in the bounded array. If *size* is omitted, the array is associative.

Syntax 2

```
array_var[ [size] ] = {element1[, element2[, ...]] };
```

size An array created with this syntax always takes the number of elements in the declaration list. *size* is ignored.

element1... Creates a bounded array with contents *element1*, *element2*, and so on. Element numbering starts at 0 and continues to *size* – 1. The number of elements determines the size of the array and overrides *size* if it is specified.

Description In cScript, you can create two types of arrays, bounded and associative:

- Bounded arrays are similar to C++ arrays. As in C++, they use a zero-based index. (The first element is 0 and the last is *size* – 1.) If you create an array with a list of elements, as in Syntax 2, it is a bounded array and its size is the number of elements.

- Associative arrays are grown as needed. If you assign more members to a bounded array than its *size*, the rest of the array becomes an associative array.

Arrays can contain data of any cScript type, including objects and other arrays. An array with other arrays as elements is multidimensional. Elements of the contained arrays are accessed using additional sets of square brackets as shown in the example.

Example

```
// Creates a bounded array of 10 elements
declare myArray;
myArray = new array[10];
myArray[1] = "Hello";
myArray[2] = "World";
print myArray[0], myArray[1];      // prints "Hello World"

// Creates an associative array
declare myAssocArray;
myAssocArray = new array[]         // no size declared
myAssocArray["Element1"] = "One";
myAssocArray["Element2"] = "Two";
print myAssocArray["Element2"]     // prints "Two"

// Creates a multidimensional array
declare array multiArray[] = {{1,2,3}, myArray, myAssocArray};
print multiArray[0][2], multiArray[1][0], multiArray[2]["Element2"];
// Prints: 3 Hello Two
```

attach

Links a method of an instance of one class to a method of an instance of another class.

Syntax attach ClassInst1:>method1 to ClassInst2:>method2

Description To make dynamic changes to class instances, you can set up dynamic function call event handlers (also called **on** handlers) using the closure operator with **attach**. This technique allows you to supply an alternative implementation for an instance method.

In other words, you can override an object's method and provide an alternate implementation of that method at runtime, without affecting the class from which the object was instantiated. The override remains in effect for the lifetime of the object or until the link is broken using **detach**.

This binding is on a per-instance basis unless you use the **attach** statement in the class definition with the **this** reference in place of a specific instance name.

Example

```
// Attaches a method belonging to a String object (myStr1)
// to an EditStyle object (myStyle);
declare myStr1, myStr2, myStyle;
```

```
myStr1 = new String("HELLO WORLD");
myStyle = new EditStyle("Example");

// Attaches myStr1's Lower() method to myStyle
attach myStr1:>Lower to myStyle:>Lower;

// Calls Lower() from myStyle
myStr2 = myStyle.Lower();
print myStr2.Text;              // prints "hello world"

// Detaches Lower() from myStyle
detach myStr1:>Lower from myStyle:>Lower;
myStr2 = myStyle.Lower();
print myStr2.Text;             // prints [UNINITIALIZED]
```

break

Passes control to the first statement following the innermost enclosing brace.

Syntax break;

Description Use **break** within a:

- **do** loop
- **while** loop
- **for** loop
- **iterate** loop
- **switch** construct

The implementation of **break** in cScript is identical to the implementation in C++.

breakpoint

Stops the program and passes control to the script debugger Breakpoint Tool.

Syntax breakpoint;

Description If the Breakpoint Tool is not active, **breakpoint** is ignored.

call

Directly invokes a closure.

Syntax call ClosureName(argumentList);

ClosureName The name of the closure.

argumentList The arguments for the method or property being invoked.

Description The closure is invoked using the same arguments as the method normally uses. There is no method for obtaining a return value when calling through closures. If the method returns a value, it will be ignored.

Example

```
// Shows creating a closure and assigning it to a
// variable, then calling the closure directly.

Class MyClass {
      method1(p1, p2)
      {
         print p1, p2;
      }
};

declare MyClass instance;
declare closure = instance:>method1; // declare the closure
call closure("Hello", "world");  // output is Hello world
```

case

Determines which statements to execute in a **switch** statement.

Syntax

```
switch ( switch_expression ){
 case expression :
   [statement1;]
   [statement2;]
   ...
   [break;]
 [default :
   [statement1;]
   [statement2;]
   ...]
}
```

switch_expression Any valid cScript expression, including a function call. Unlike C++, the *switch_expression* is evaluated for each **case** in a top-down fashion until a match is found or no more **case** statements remain.

expression Any valid cScript expression, including a function call.

statement One or more statements to execute.

Description A **case** statement is the branch condition of a **switch** statement. If the value of the *expression* following **case** matches the value of *switch_expression*, the statements up to the next **break** or the end of the **switch** execute.

Note Because cScript is a late-bound language, *expression* does not have to be a literal as in C++, nor does the *expression* have to be of integral type. Otherwise, **case** behaves exactly as it does in C++.

class

Defines a cScript class.

Syntax

```
class className [(initializationList)]
    [:baseClassName[(initExpressionList)]]
    {memberList}[;]
```

className	The name of the class. *className* can be any name unique within its scope
initializationList	The initial constructor values for the class, if any.
baseClassName	The class that this class derives from (optional). **of** is a synonym for the : separator preceding this identifier.
initExpressionList	The initialization for the class instance.
memberList	Declarations of the class's properties, methods, and events.

Description A class declaration in cScript is similar to a class declaration in C++, with a few key differences.

For example, defining a method with the same name as the class, as you do in C++, does not make it a constructor. Instead, executable statements embedded in the class declaration that are not part of a method declaration is considered constructor code. For this reason, initialization parameters must be defined in the class declaration. The base class is always initialized first, before the child class.

Only one base class can be initialized in a derived class declaration because cScript does not support multiple inheritance. Where a class is defined as being derived from a base class and the base class requires initialization values, they must be passed to the base class through the derived class's declaration. The base class initializer is essentially an implicit constructor call, and as such, expressions are allowed for its arguments.

When instantiated, the number and type of initializers is not checked (function overloading is not supported in cScript). Arguments are padded and/or truncated the same as they are with functions.

Methods must be defined entirely in the class declaration. You can't just declare a member function in a class and then define it later in the program. All properties and methods of the class are public.

Destructors in cScript work as they do in C++. Defining a method that starts with a tilde (~) and has the same name as the class makes it a destructor. Destructors are called when the object is being destroyed. Destructors may not have parameters.

Where inheritance is used, the access method for base class members is the same as for those of the derived class. However, if a derived class member has the same name as one of the base class, you must use **super** to clearly specify the reference.

Note You cannot instantiate a class as part of its declaration as in traditional C structs, so a semicolon is optional at the end of the declaration.

Example 1

```
//The following class is declared without parameters:
class noParams{
 declare aMember;
 declare anotherMember;
 Func1();          // constructor code
 for (y = 1; y < 10; y++) // more constructor code
  print "hello";

 ~noParams(){
  print "A noParams has been destroyed.";

 }
}
// The following class is declared with parameters:
class Base(parmOne, parmTwo){
 declare X = parmOne;  // a member variable
 declare Y = parmTwo;  // a member variable
 MethodOne(){
  X = X + Y;
 }
 AnotherMethod(){
 }
}
```

Example 2

```
// The following class is inherited from the class Base:
// aParm and cParm are passed through to
// Base as parmOne and parmTwo.
class Derived(aParm, bParm, cParm) : Base(aParm, cParm) {
 declare Z = bParm;
}
// example using the Derived class:
declare obj = new Derived(1, 2, 3)// 1&3 passed to Base
                                  // Base constructed before
                                  // Derived
```

continue

Passes control to the end of the innermost enclosing brace, allowing the loop to skip intervening statements and re-evaluate the loop condition immediately.

Syntax continue;

Description Use **continue** within a:

- **do** loop
- **while** loop
- **for** loop
- **iterate** loop

The implementation of **continue** in cScript is identical to the implementation in C++.

declare

Declares a variable and ensures that it is local to the current scope and does not override a variable from an enclosing scope.

Syntax declare identifier [optional identifier_syntax][, identifier...];

identifier	The variable being declared.
identifier_syntax	The variable's default values. *identifier_syntax* is optional.

Description The scope of a variable is the block in which it is first used and any blocks nested in that block. While in a nested block, it is possible that a variable you think you are using for the first time has already been used in the enclosing block. What happens in that case is that you override the enclosing block's variable value (and possibly its type as well) with what you mistakenly think is a local variable.

To ensure that this doesn't happen, use **declare** with any variables that are local to a block. Although not needed, **declare** can also be used in conjunction with the **export** and **import** declarators. Note that you can declare multiple basic variables, objects, and arrays in a single statement, but you cannot mix them in the same statement.

See "array" on page 5-1 and "new" on page 5-17 for specifics on declaring arrays and class objects.

Example

```
// Examples of declare
declare x;
declare x = 1;
declare x, y, z;
declare x = 1, y, z = 2;
```

default

Provides statements to process in a **switch** statement when none of the **case** conditions apply.

Syntax

```
switch ( switch_expression ){
 case expression :
  [statement_list;]
  ...
  [break;]
 [default :
  [statement_list;]
  ...]
}
```

switch_expression Any valid cScript expression, including a function call. Unlike C++, the *switch_expression* is evaluated for each **case** in a top-down fashion until a match is found or no more **case** statements remain.

expression Any valid cScript expression, including a function call.

statement_list A list of statements to execute.

Description **default** is optional. If you include a **default** statement, it must be the last condition in the **switch**. If you do not include a **default** statement and none of the **case** conditions apply, none of the statements in the **switch** are executed. The behavior of **default** in cScript is the same as C++.

delete

Deallocates an object and causes the object destructor, if any, to be called.

Syntax 1

```
delete object_name;
```

object_name The name of the object to delete.

Syntax 2

```
delete array_name;
```

array_name The name of the array to delete. Deleting an array does not require square brackets in the **delete** command, as it does in C++.

Description Unlike C++, cScript has automatic garbage collection. Therefore, objects are automatically deleted when there are no longer any references to them, or when they go out of scope. Use **delete** only when you need to explicitly deallocate an object before the references to that object have been destroyed.

detach

Detaches a method instance of one class from a method instance of the same or another class when the two were previously linked using **attach**.

Syntax detach ClassInst1:>method1 from ClassInst2:>method2

Description To make dynamic changes to class instances, you can set up dynamic function call event handlers (also called **on** handlers) using the closure operator with **attach**. This technique allows you to supply an alternative implementation for an instance method.

In other words, you can override an object's method and provide an alternate implementation of that method at runtime without affecting the class from which the object was instantiated. The override remains in effect for the lifetime of the object or until the link is broken using **detach**.

Example

```
// Attaches a method belonging to a String object (myStr1)
// to an EditStyle object (myStyle);
declare myStr1, myStr2, myStyle;
myStr1 = new String("HELLO WORLD");
myStyle = new EditStyle("Example");

// Attaches myStr1's Lower() method to myStyle
attach myStr1:>Lower to myStyle:>Lower;

// Calls Lower() from myStyle
myStr2 = myStyle.Lower();
print myStr2.Text;                  // prints "hello world"

// Detaches Lower() from myStyle
detach myStr1:>Lower from myStyle:>Lower;
myStr2 = myStyle.Lower();
print myStr2.Text;                 // prints [UNINITIALIZED]
```

do

Executes the specified statement until the value of the specified condition becomes **FALSE**.

Syntax do statement while (condition);

statement The statement to be executed. *statement* executes repeatedly as long as the value of *condition* remains **TRUE**.

condition Either **TRUE** or **FALSE**. When **FALSE**, *statement* stops executing.

Description The behavior of **do** in cScript is the same as C++. **break** terminates loop execution, while **continue** evaluates *condition* immediately without executing any intervening statements.

Note Because *condition* is tested after *statement* is executed, the loop executes at least once.

export

Provides access to a variable across modules.

Syntax export variable_name;

variable_name The name of the variable to export.

Description Declare the variable as **export** in the module that declares it and **import** in another module that needs access to it.

Variables created at the module level (not in a function, method, class, or control structure) are global variables of the module, but are not accessible to any other modules. To access module scope variables defined in module A from module B, three things must occur:

- Both module A and module B must be loaded.
- The module scope (global) variable must be declared **export** in Module A.
- Module B must contain an **import** statement for the variable.

Example

```
// Example of export and import
// FILE1.SPP
export myExVar;// export variable for use in other modules
myLocal = 10;
myExVar = 10;

// FILE2.SPP
import myExVar;// import variable exported by another module
print myLocal;// prints [UNINITIALIZED]
print myExVar;// prints 10
```

for

Executes the specified statement as long as the condition is **TRUE**.

Syntax for ([initialization] ; [condition] ; [expression]) statement

initialization Initializes variables for the loop. *initialization* can be an expression or a declaration. Variables are initialized before the first iteration of the loop.

condition Must evaulate to either **TRUE** or **FALSE**. When **FALSE**, *statement* stops executing.

expression The expression to evaluate after each iteration of the loop. *expression* usually increments or decrements the initialization variable in some way.

statement The statement to be executed. *statement* executes repeatedly as long as the value of *condition* remains **TRUE**.

Description The behavior of **for** in cScript is the same as C++. *statement* executes repeatedly as long as *condition* is **TRUE**. The scope of any identifier declared within the **for** loop extends to the end of the script module.

Note Because *condition* is tested before *statement* is executed, the loop may never execute.

The cScript **for** statement works the same as a C++ **for** statement.

All the parameters are optional. If *condition* is left out, it is assumed to be always **TRUE**. **break** will cause loop execution to be terminated, while **continue** will cause the condition to be evaluated immediately without executing any intervening statements.

FormatString

Formats strings at run time.

Syntax FormatString("formatString" [, expression1 [, expression2...]]);

formatString Literal text, placeholders for values, or a combination of the two. A placeholder is in the format of "%*n*", where *n* is the number representing the place of the expression in the list following the format string.

expression Any valid cScript expression (literals, variables, function calls, and so on). Note that numeric values are automatically converted to strings.

Return value The string created by combining the *formatString* and the variable list.

Description Use **FormatString** to build strings at runtime using a formatting string and a list of cScript expressions.

For example,

```
declare str = "Hello";
declare value = 10;
print FormatString("str = %1, value = %2", str, value);
// the string "str = Hello, value = 10" is printed
```

In the above example, the value of *str*, the first variable in the list, was substituted for %1 in the output string. Likewise, the value of *value*, the second variable in the list, was substituted for %2 in the output string.

The number of variables in the variable list must match the number of placeholders in *formatString*.

from

Used in a **detach** statement or when instantiating nested classes.

Syntax 1 innerObject = new Inner from ClassInstance;

Inner The nested class.

ClassInstance Instance of the enclosing class.

Syntax 2 detach ClassInst1:>method1 from ClassInst2:>method2;

Example

```
// Attaches a method belonging to a String object (myStr1)
// to an EditStyle object (myStyle);
declare myStr1, myStr2, myStyle;
myStr1 = new String("HELLO WORLD");
myStyle = new EditStyle("Example");

// Attaches myStr1's Lower() method to myStyle
attach myStr1:>Lower to myStyle:>Lower;

// Calls Lower() from myStyle
myStr2 = myStyle.Lower();
print myStr2.Text;                    // prints "hello world"

// Detaches Lower() from myStyle
detach myStr1:>Lower from myStyle:>Lower;
myStr2 = myStyle.Lower();
print myStr2.Text;                  // prints [UNINITIALIZED]
```

if

Implements a conditional statement. **if** works exactly as it does in C++.

Syntax 1 if (condition) statement;

condition Must evaulate to either **TRUE** or **FALSE**. When **FALSE**, *statement* stops executing.

statement The statement to be executed. *statement* executes repeatedly as long as the value of *condition* remains **TRUE**.

Syntax 2 if (condition) statement;
else statement2;

condition Must evaulate to either **TRUE** or **FALSE**. When **TRUE**, *statement* executes. When **FALSE**, *statement2* executes.

statement The statement to execute. *statement* executes repeatedly as long as the value of *condition* remains **TRUE**.

else An optional keyword. If you use nested **if** statements, any **else** statement is associated with the closest preceding **if** unless you force association with braces.

statement2 The second statement to execute. *statement2* executes when the value of *condition* is **FALSE**. *statement2* can be another **if** statement.

Description Use **if** to implement a conditional statement.

You can declare variables in the condition expression. For example,

```
if (int val = func(arg))
```

is valid syntax. The variable *val* is in scope for the **if** statement and extends to an **else** block when it exists.

The condition statement must convert to a bool type. Otherwise, the condition is ill-formed.

When <condition> evaluates to **TRUE**, <statement1> executes.

If <condition> is **FALSE**, <statement2> executes.

The **else** keyword is optional, but no statements can come between an **if** statement and an **else**.

import

Allows access to a variable across modules.

Syntax 1 import variableName;

variableName The name of the variable to import.

Description 1 Declare the variable as **export** in the module that declares it and **import** in another module that needs access to it.

Variables created at the module level (not in a function, method, class, or control structure) have module scope. They are not accessible to any other modules. To access a variable defined in module A from module B, three things must occur:

- Both module A and module B must be loaded.
- The variable must be declared **export** in Module A.
- Module B must contain an **import** statement for the variable.

import is also used to make functionality contained within a Windows DLL file available from within cScript.

Example 1

```
// Example of export and import
// FILE1.SPP
export myExVar;// export variable for use in other modules
```

```
myLocal = 10;
myExVar = 10;

// FILE2.SPP
import myExVar;// import variable exported by another module
print myLocal;// prints [UNINITIALIZED]
print myExVar;// prints 10
```

Syntax 2 **import** "DLL_Name" {functionPrototypes}

DLL_Name	The name of the DLL you wish to use. The path can be included if necessary.
functionPrototypes	Each external function must be prototyped according to general C++ prototype conventions. DLL calls use the data type keywords **char**, **short**, **int**, **unsigned**, **long**, **bool**, **void** and **const**.

Description 2 Makes functions contained in external DLLs available to cScript.

Unlike normal cScript functions, variable numbers of arguments are not supported when using functions from DLLs. You can pass **int** arguments for **enums**, and **long** for **pointers**, since cScript does not support these types. There is no support for passing **structs**.

cScript supports the calling conventions **__cdecl**, **__pascal**, and **__stdcall**.

Example 2

```
// This example exposes DLL entrypoints using import
import "foo.dll" {
int __pascal FooFunc(short, char, unsigned, long);
void DoIt();
}
// directly access the DLL calls
if (FooFunc(1, "hello there", 2, 3))
 print "FooFunc() succeeded";
else
 DoIt();
```

initialized

Indicates if a variable has ever been initialized.

Syntax initialized(x);

x The name of the variable to check.

Return values **TRUE** if the value has ever been initialized, **FALSE** otherwise

Description **initialized** is an intrinsic function that provides a means for determining the state of a variable before using it. Using an uninitialized variable is almost never as dangerous as in C++, but is also usually not what was intended.

initialized is particularly useful in determining the state of arguments passed to functions on call, and in class instantiation, and can also be used to prevent unintended divide by zero errors because of an uninitialized divisor.

Example

```
// Example of initialized
declare x, y;  // declares variables,
               // but does not initialize them!
x = 10;        // initialized!
print initialized(x);// returns TRUE
print initialized(y); // returns FALSE
```

iterate

Use an **iterate** loop to cycle through the members of a class object or an associative array in first to last order.

Syntax iterate(outputvar; object[;keyvar]) [statement];

outputvar	A variable to hold a copy of the contents of the array or class data member.
object	The array or class object to iterate.
keyvar	Variable to hold the index or key into the array, or class object data member name.
statement	The statement to be executed.

Description **iterate** is a loop structure that allows some action, such as printing, to be performed on each member of the array or property of a class object.

You can use **continue** and **break** to control execution inside the loop. Like a **for** loop, curly braces ({}) must be used to enclose multiple loop statements.

iterate can also be used to determine the number of properties in an object or the number of elements in an array.

Example

```
//Prints all the members of associative array z
//using the variable x
iterate( x; z ) {
print x;
}

//Prints all the members and the key values of
//associative array z using the variable x
iterate( x; z; k ) {
print "Key = " + k + "Value = " + x;
}
```

load

Opens and parses the specified script file.

Syntax moduleHandle = load(fileName);

fileName The name of the script file to open and parse.

Return value A module handle (module object reference) if successful, or **NULL** if not.

Description Once the script file is opened and parsed, **load** executes the file using **run**. Although classes and functions defined in a module come into existence when the module is loaded, variables declared in the module are not defined, nor are any other statements executed, until the script is run.

If there is an **_init** function, the module executes that code first. If there is a function with the same name as the module, that function is then executed.

Example

```
//Loads and runs a script file
declare myModule;
myModule = load("demo.spp");  // loads module and gets a handle
if (myModule) {// if loaded
 run(myModule);// run the module
unload(myModule);// unloads the module
}
```

module command

Provides an alternative internal name, or alias, for a module.

Syntax module ["newName"];

newName The module's alternative name.

Description After being parsed, every script file loaded into the IDE is assigned a module name. The name defaults to the file name without its path or file extension. This name may be used by other modules to explicitly access functionality in the module.

You can alter a module's name by embedding the following anywhere in the file:

```
module "newname";
```

module function

Gets access to any loaded module.

Syntax module (["moduleName"]);

moduleName The name of the module to get.

Return value If *moduleName* is not specified, returns one of the following:

- A reference to an object
- The module handle associated with the named module
- The module handle associated with the current module

If *moduleName* is specified and no matching module is available or no parameter is entered, it returns **NULL**.

Description Use **module** to get access to any loaded module. If you use it with the current module, *moduleName* has the same value as **this** used at the module level.

One use for this function is to access a globally scoped variable from a local scope. For example,

```
// Modtest.spp
declare x = 1;
declare ModRef = this;
local x = 2;
print (module()).x; // prints 1
print ModRef.x;     // prints 1
```

new

Creates a new object or array.

Syntax 1 objectname = new className[([initializerList])] [from outerClassName[([initializerList])]]

initializerList The list of objects used for initializing this class.

Syntax 2 arrayname = new array [[arraySize]];

arraySize The size of the array.

Description Use **new** as an alternate syntax for creating new class objects or arrays. For more information, see "class" on page 5-5, "array" on page 5-1, and "declare" on page 5-7.

Unlike C++, cScript does not distinguish between static and dynamic memory allocation. The difference between the standard declaration syntax and that using **new** is syntactic only.

cScript has automatic garbage collection. Therefore, objects created with **new**, or otherwise, are automatically deleted when there are no longer references to them (that is, when these objects and any variables that reference them go out of scope). Use **delete** only when you need to explicitly deallocate an object before the references to that object have been destroyed.

of

A synonym for the colon (:) separator used when defining a **class** that derives from a base class.

Syntax class classname [(initialization_list)] [of baseClass[(initialization_list)]] { member_list }

initializationList	The initial constructor values for the class, if any.
member_list	Declarations of the class's properties, methods, and events.

on

Sets up one of the following:

- A dynamic object method call event handler, also called an **on handler** (syntax 1)
- An object read-property **getter** (syntax 2)
- A write-property **setter** (syntax 3)

Syntax 1

```
on ClassInstance:>{xe ">"}Method([argumentList]){
   [pre-processing statement(s)]
   [pass([argumentList]);]
   [post-processing statement(s)]
   [return [value];]
}
```

This syntax is used for an object method call event handler. This form of dynamic event handling allows processing to occur both before and after the optional call, through **pass** to the hooked method. It also allows alternate values to be both passed to the hooked method and returned by the event handler.

Note In order to be bound to an existing object method, the number of parameters in an **on** handler definition must match the hooked method. Once invoked, **pass** will call the hooked method regardless of how many arguments it passes. As with all function calls, cScript will ensure that the proper number of arguments are passed, truncating or padding as needed.

Syntax 2

```
on ClassInstance:>property{
   [pre-processing statement(s)]
   return [pass() | value];
}
```

This syntax is used for a property **getter** and would be triggered by any subsequent statement that references that object's property for read access, such as on the right hand side of an assignment statement.

This form of the syntax allows **pass** to return the actual value, or, alternatively, any specified value.

Syntax 3

```
on ClassInstance:>property(parameter){
   [pre-processing statement(s)]
   [pass(parameter | value);]
   [post-processing statement(s)]
}
```

This syntax is used for a property **setter**. The setter is triggered when the object's property is used as an lvalue, such as on the left hand side of an assignment statement. The value to be assigned to the property is what is passed to the **setter** as its parameter. The value passed in **pass** sets the value of the property.

Description

Use **on** handlers (also referred to as object method call event handlers) to create new methods, or redefine existing methods, on an object of a given class.

Unlike **attach**, methods overriden with **on** cannot be detached. To call the original method from within the overriden version with the same name, invoke the **pass** function. **on** handlers can be defined to control both read and write access to an object's properties.

Note If the global reference variable selection has been set using **select**, its reference will not be affected, but is superseded with the **with** block.

Example

```
import editor;
// Create a new Debugger object called debug
declare debug = new Debugger();

// Create a new method called RunToCurrent()
// on the object debug (not the class!)
on debug:>RunToCurrent()
{
  declare fileName = editor.TopBuffer.FullName;
  declare row = editor.TopBuffer.TopView.Position.Row;
  .RunToFileLine(fileName, row);
}
```

pass

Used in an **on** handler to invoke the original function that is being overridden.

Syntax varname = pass([param1[,param2[,...]]);

print

Prints the specified expression in the Script page of the Message window.

Syntax print [expression_list];

expression_list The list of expressions to print.

Description **print** takes any string, expression, or variable as a parameter. To concatenate expressions, separate them with commas. For example:

```
print "hello world";
print "the number is", x;
print "My name is", name, "and I'm", years, "years old";
```

A space is printed for each comma in the expression list. If no expressions are passed, **print** does nothing.

- An uninitialized value outputs [UNINITIALIZED].
- A variable initialized to NULL outputs [NULL].
- An object outputs [OBJECT].

reload

Does an **unload** followed by a **load**.

Syntax reload (moduleName);

moduleName The name of the module to unload and load.

Return value A module handle if successful or **NULL** if not

Description **reload** searches the module list for a matching module. If found, **reload** removes it and then loads it again. If it does not find a module to unload, it simply loads the module for the first time.

Note If when reloaded, the module references global objects, these references continue to refer to the older objects. (The module is not destroyed, but is stored to maintain these references.) Global module values that are not part of an object are destroyed and then reloaded.

return

Exits from the current function, **on** handler, or module, optionally returning a value.

Syntax return [*expression*];

Description A module, by default, returns **TRUE** if successfully run. However, an explicit **return** statement can be provided to return a customized return value, or simply to terminate execution prior to the end of the script.

Example

```
//Example of return
sqr(x)
{
 return (x*x);
}
```

run

Loads and runs the module indicated.

Syntax run (moduleName)

moduleName The name of the module to load and run.

Return value By default, **run** returns **TRUE** if successful or **FALSE** if not. If the module has a global **return** statement, **run** returns that value if the module successfully runs and then displays a warning that the standard return value for **run** has been overridden.

Description **run** runs the module if it is already loaded. The module remains loaded until explicitly unloaded using **unload**.

Example

```
//Loads and runs a script file
declare myModule;
myModule = load("demo.spp");  // loads module and gets a handle
if (myModule) {// if loaded
 run(myModule);// run the module
unload(myModule);// unloads the module
}
```

select

Creates a special global variable, **selection**,that refers to the selected variable.

Syntax select objectName;

objectName The name of the object to select.

Description You can call **select** on any variable that is loaded in any script. Doing so sets **selection** to reference that variable for all scripts in the session. You then have access to that variable from any script by using the alias **selection** as the name of the variable. Variables so selected can also be referenced using the shorthand dot (".") notation.

Because the variable is global to all loaded scripts, only one **selection** can be active in an IDE session at a time. If you call **select** and there is already a **selection**, you override the current **selection** with your new one.

Example

```
// Example of select and selection
// SELECT1.SPP
class C0 (p1, p2, p3) {
  declare v1 = p1;
  declare v2 = p2;
  declare v3 = p3;
}
class C1 (p1, p2, p3) {
  declare v1 = p1;
  declare v2 = p2;
  declare v3 = p3;
}
declare C0 obj1("One", "Two", "Three");
declare C1 obj2(1, 2, 3);

// Select the first object
select obj1;

// Iterate across the selected object
// using selection, then dot notation.
iterate(iterator; selection; key)
  print typeid(selection), "property", key, "=", iterator;

iterate(iterator; . ; key)
  print typeid(.), "property", key, "=", iterator;

// Note that the dot within the with
// block refers to its own local selection.
with(obj2)
  iterate(iterator; . ; key)
    print typeid(.), "property", key, "=", iterator;

// But the global selection has not changed.
print .v1;
print selection.v2;
print ". and selection still refer to", typeid(.);
```

selection

Defines a special global reference variable created by calling **select** on a variable.

Syntax selection.Member

Member The class member for which the global variable is created.

Description Once the **selection** has been made, you can use **selection** in any way that you normally use the variable it refers to. You can access members of the referenced object with **selection**.*member*. The dot (".") shorthand syntax can

also be used instead of selection outside a **with** or **iterate** block or an **on** handler. In those situations, the dot has local context and refers to the controlling variable for that block (usually an object).

Because the selection variable is global to all loaded scripts, only one **selection** can be active in an IDE session at a time.

Example

```
// Example of select and selection
// SELECT1.SPP
class C0 (p1, p2, p3) {
  declare v1 = p1;
  declare v2 = p2;
  declare v3 = p3;
}
class C1 (p1, p2, p3) {
  declare v1 = p1;
  declare v2 = p2;
  declare v3 = p3;
}
declare C0 obj1("One", "Two", "Three");
declare C1 obj2(1, 2, 3);

// Select the first object
select obj1;

// Iterate across the selected object
// using selection, then dot notation.
iterate(iterator; selection; key)
  print typeid(selection), "property", key, "=", iterator;

iterate(iterator; . ; key)
  print typeid(.), "property", key, "=", iterator;

// Note that the dot within the with
// block refers to its own local selection.
with(obj2)
  iterate(iterator; . ; key)
     print typeid(.), "property", key, "=", iterator;

// But the global selection has not changed.
print .v1;
print selection.v2;
print ". and selection still refer to", typeid(.);
```

super

Provides access to a member of the base class with the same name as a member of a derived class.

Syntax objectName.super[.super...].member

objectName The name of the object to access.

Description Base class members can be directly accessed without using **super** where the member name is unique within the class definition.

cScript does not support function overloading or the :: operator. However, you can use **super** to get access to overridden class members as follows:

```
class C1 {
 declare x = "C1";
 Method1() {
  print x;
 }
}
class C2:C1 {
 Method1() {
  print "C2 derived from ", x;
 }
}
MyObj = new C2;
MyObj.Method1();       //Prints C2 derived from C1
MyObj.super.Method1(); //Prints C1
```

If a base class is itself a derived class and you want to access one of its overridden members, use **super.super** (and so on for further access up the inheritance hierarchy). For example:

```
class C3:C2 {
 Method1() {
  print "C3 derived from C2";
 }
}
MyObj3 = new C3;
MyObj3.Method1();              //Prints C3 derived from C2
MyObj3.super.Method1();        //Prints C2 derived from C1
dMyObj3.super.super.Method1(); //Prints C1
class C3:C2 {
 Method1() {
   print "C3 derived from C2";
 }
}
MyObj3 = new C3;
MyObj3.Method1();              //Prints C3 derived from C2
MyObj3.super.Method1();        //Prints C2 derived from C1
MyObj3.super.super.Method1(); //Prints C1
```

switch

Chooses one of several alternatives.

Syntax

```
switch (switch_expression){
 case expression :
  [statement1;]
  [statement2;]
  ...
```

```
  [break;]
 [default :
  [statement1;]
  [statement2;]
  ...]
}
```

switch_expression	Any valid cScript expression, including a function call. Unlike C++, the *switch_expression* is evaluated for each **case** in a top-down fashion until a match is found or no more **case** statements remain.
expression	Any valid cScript expression, including a function call.
statement	The statement to execute.

Description The value of the *switch_expression* is checked against the value of each **case** *expression* until a match is found or until either **default** or the end of the switch statement is reached.

As in C++, all statements but **case** or **default** following the matching case are executed until **break** or the end of the switch statement is reached. If no case *expression* matches *switch_expression*, the statements following default, if any, are executed.

If you insert a **default** case, it must be the last case.

Note If you don't use **break** as the last statement in the case that executes, all remaining statements (except **case** or **default)** in the **switch** execute until either a **break** is encountered or the end of the **switch** is reached. If you do use a **break** that executes, the **switch** statement ends there.

this

Provides an object reference within a class definition.

Syntax this:>method1() {}

Description The cScript **this** keyword is analogous to the C++ **this** pointer. It is used to provide an object reference within a class definition. **this** is primarily needed to define closures used in event handlers that will apply to all instances of that class.

For example, given the class definition:

```
class MyClass {
 method1() {}
 on this:>method1() {}
}
```

all objects of that class will have a default method call event **on** handler defined (rather than on a per-instance basis as when the on handler is defined outside of the class).

When **this** is used outside of a class definition, it refers to the current module object since a script module can actually be treated as an object. You can use it to create an event handler for a global function.

For example,

```
DoNothing (){}                          //Globally scoped function
on this:>DoNothing() {                  // method of current object
print "Did something else first";
pass();
}
```

Note Calls to module scope functions for which an event handler has been defined will only trigger the handler when they are called in the same way as defined in the **on** handler. For example,

```
this.DoNothing();  // Triggers the event handler
DoNothing();       // Does not trigger an event
```

Example The following example shows how to use **this** in a class definition in conjunction with **on** handlers or **attach** to bind a method across all instances of that class.

Event handlers normally provide a binding to a specific object or instance, and not to all instances of a class.You can bind an event handler to a class when you want to do either of the following:

- Ensure that some default processing occurs as the very first action regardless of how many other event handlers are subsequently chained to a method of a specific class
- Use more complex pre-processing and post-processing of method calls

```
class C0 {
  declare property1 = 0;
  GetProperty1() {
   return property1;
  }
  on this:>GetProperty1() {  // Increments property1 before call
   property1++;
   return pass();
  }
}

declare C0 myObj;
print myObj.property1;        // Prints 0
print myObj.GetProperty1();   // Prints 1
```

typeid

Gets runtime identification of variables or the resulting value of expressions.

Syntax typeid(name_expn);

name_expn Any legal variable name or expression.

Return value A string representing the type. Possible return values are:

- [ARRAY]
- *classname*
- [CLOSURE]
- [INTEGER]
- [NULL]
- [REAL]
- [STRING]
- [UNINITIALIZED]

Description If the variable or expression value is a built-in type, **typeid** returns the type in brackets [ ]. If it is an object, **typeid** returns the class name. If the expression is a function or method, **typeid**() indicates the type of the return value of the function.

unload

Unloads the specified module.

Syntax unload (moduleName);

*moduleName*The name of the module to unload.

Return value **TRUE** if successful, otherwise **FALSE**

Description **unload** searches the module list for a matching module. If found, **unload** removes it, causing all functions, classes, and local variables that were defined in the module to become invalid. However, if an object within the script is referenced from another active script (for example, where a function in the unloaded script returned a reference to an object), that object will not be destroyed.

Example

```
//Loads and runs a script file
declare myModule;
myModule = load("demo.spp");  // loads module and gets a handle
if (myModule) {// if loaded
 run(myModule);// run the module
unload(myModule);// unloads the module
}
```

while

Repeats one or more statements until *condition* is **FALSE**.

Syntax while [(condition)] [{statement_list}]

condition	Either **TRUE** or **FALSE**. When **FALSE**, *statement_list* stops executing.
statement_list	The list of statements to execute.

Description If no condition is specified, the **while** clause is equivalent to **while(TRUE)**. Because the test takes place before any statements execute, if *condition* evaluates to **FALSE** on the first pass, the loop does not execute.

break will cause loop execution to be terminated, while **continue** will cause the *condition* to be evaluated immediately without executing any intervening statements.

Example

```
// Example of while loop
i = 0
while (p[i] < 50) {
 p[i] += 10;
 i += 1;
}
```

with

Creates a shorthand reference to a variable.

Syntax **with** (variable){member_list}

variable	The variable being referenced.
member_list	Declarations of properties, methods, and events.

Description **with** is particularly useful when the variable is a deeply nested object.

For example, assume an object *z*, which is contained within an object *y*, which is contained within an object *x*. Access to *z*'s members can be cumbersome. For example,

```
x.y.z.DoSomething();
x.y.z.DoSomethingElse();
x.y.z.NowDoThis();
```

You can decrease syntactical complexity by assigning *x.y.z* to another variable. For example,

```
p = x.y.z;              // Assignment lookup
p.DoSomething();        // 1 lookup
p.DoSomethingElse();    // 1 lookup
p.NowDoThis();          // 1 lookup
```

If you use **with**, referencing can be made even simpler:

```
with (x.y.z){           // 1 lookup
 .DoSomething();        // No lookup
 .DoSomethingElse();    // No lookup
 .NowDoThis();          // No lookup
}
```

Scoping of **with** statements in functions is handled as you would expect: the scope is local to the current function and the correct member gets called. For example:

```
WFunc1(){
 with (x.y.z){
  .DoSomething();
 }
}

WFunc2(){
 with (MyClass){
  Wfunc1();             // WFunc1 calls x.y.z.DoSomething()
  .Func2();             // This call is to MyClass.Func2()
 }
}
```

Note Using the dot operator in a **with** block refers to the current **with** assignment. If the global reference variable **selection** has been set using **select**, its reference will not be affected, but is superseded with the **with** block.

yield

Forces cScript to check if the abort (Esc) key has been pressed.

Syntax yield;

Return value None

Description Imbedding **yield** in a time consuming process, such as a loop that executes many times, provides a way to break out of the process, if desired.

Chapter

6

Operators

Operators are tokens that trigger some computation when applied to variables and other objects in an expression. cScript uses many of the C++ operators. For the most part, these operators have the same precedence, associativity, and functionality as in C++.

Because cScript has no structs, unions, or references to memory locations, the following C++ operators do not exist in cScript:

```
->*  *  ->*  .*
```

For the same reason, the & operator can be used only to declare function parameters as pass-by-reference parameters (not to dereference variables).

Additionally, cScript does not provide the following C++ operators:

```
::  sizeof  const_cast  reinterpret_cast
```

cScript does provide two new operators:

`:>`	The closure operator, typically used in **on** statements to override functions.
`??`	The in operator, used to test members of arrays and classes.

Depending on context, the same operator can have more than one meaning. For example, the minus (–) can be interpreted as:

- subtraction (x – y)
- a unary negative (–y)

Note No spaces are allowed in compound operators (such as :>). Spaces change the meaning of the operator and will generate an error.

Operator precedence

Operators on the same line in the table below have equal precedence.

Table 6.1 Operator precedence

Operators											Associativity
()	[]										left to right
.											left to right
:>	??										left to right
!	~	+	–	++	––	&					right to left
*	/	%									left to right
+	–										left to right
<<	>>										left to right
<	<=	>	>=								left to right
==	!=										left to right
&											left to right
^											left to right
|											left to right
&&											left to right
||											left to right
?:											left to right
=	*=	/=	%=	+=	–=	&=	^=	|=	<<=	>>=	right to left
,											left to right

Binary operators

The binary cScript operators are as follows:

Table 6.2 Binary operators

Type	Operator	Description
Arithmetic	+	Binary plus (add)
	–	Binary minus (subtract)
	*	Multiply
	/	Divide
	%	Remainder (modulus)
Bitwise	<<	Shift left
	>>	Shift right
	&	Bitwise AND
	^	Bitwise XOR (exclusive OR)
	|	Bitwise inclusive OR
Logical	&&	Logical AND
	||	Logical OR

Table 6.2 Binary operators (continued)

Type	Operator	Description
Assignment	=	Assignment
	*=	Assign product
	/=	Assign quotient
	%=	Assign remainder (modulus)
	+=	Assign sum
	–=	Assign difference
	<<=	Assign left shift
	>>=	Assign right shift
	&=	Assign bitwise AND
	^=	Assign bitwise XOR
	|=	Assign bitwise OR
Relational	<	Less than
	>	Greater than
	<=	Less than or equal to
	>=	Greater than or equal to
	==	Equal to
	!=	Not equal to
Conditional	? :	Actually a ternary operator
	a ? x : y	"if a then x else y"
Comma	,	Evaluate

Arithmetic operators

The arithmetic operators are:

```
+  -  *  /  %  ++  --
```

Syntax

```
+ expression
– expression
expression1 + expression2
expression1 – expression2
expression1 * expression2
expression1 / expression2
expression1 % expression2
postfix-expression ++        (postincrement)
++ unary-expression          (preincrement)
postfix-expression --        (postdecrement)
-- unary-expression          (predecrement)
```

Description Use the arithmetic operators to perform mathematical computations. *expression1* determines the type of the result when variables of different types are used.

Table 6.3 Arithmetic operators

Operator	Description
+ (unary expression)	Assigns a positive value to *expression.*
– (unary expression)	Assigns a negative value to *expression.*
+ (addition)	Adds all data typs.
– (subtraction)	Subtracts data types.
* (multiplication)	Multiplies data types.
/ (division)	Divides data types.
% (modulus operator)	Returns the remainder of integer division.
+ + (increment)	Adds one to the value of the expression. Postincrement adds one to the value of the expression after it evaluates; while preincrement adds one before it evaluates.
– – (decrement)	Subtracts one from the value of the expression. Postdecrement subtracts one from the value of the expression after it evaluates; while predecrement subtracts one before it evaluates.

Assignment operators

The assignment operators are:

```
=    *=    /=    %=    +=    -=
<<=  >>=   &=    ^=    |=
```

Syntax unary-expr assignment-op assignment-expr

Description The = operator is the only simple assignment operator, the others are compound assignment operators.

In the expression `E1 = E2`, *E1* must be a modifiable lvalue. The assignment expression itself is not an lvalue.

The expression

```
E1 op = E2
```

has the same effect as

```
E1 = E1 op E2
```

except the lvalue *E1* is evaluated only once. The expression's value is *E1* after the expression evaluates.

For example, the following two expressions are equivalent:

```
x += y;
x = x + y;
```

Any assignment can change the cScript native type of the value on the left of the assignment, depending on the type of the value assigned.

Note Do not separate compound operators with spaces. For example, do not enter:

```
+<space>=
```

This generates errors.

Bitwise operators

Use bitwise operators to modify individual bits of a number rather than the whole number.

Syntax

AND-expression & equality-expression
exclusive-OR-expr ^ AND-expression
inclusive-OR-expr exclusive-OR-expression
~expression
shift-expression << additive-expression
shift-expression >> additive-expression

Table 6.4 Bitwise operators

Operator	Description
&	Bitwise AND: compares two bits and generates a 1 result if both bits are 1; otherwise, it returns 0.
|	Bitwise inclusive OR: compares two bits and generates a 1 result if either or both bits are 1; otherwise, it returns 0.
^	Bitwise exclusive OR: compares two bits and generates a 1 result if the bits are complementary; otherwise, it returns 0.
~	Bitwise complement: inverts each bit. (~ is also used to create destructors.)
>>	Bitwise shift right: moves the bits to the right, discards the far right bit and assigns the leftmost bit to 0.
<<	Bitwise shift left: moves the bits to the left, it discards the far left bit and assigns the rightmost bit to 0.

Both operands in a bitwise expression must be of an integral type.

Bit value		Results of &, ^, | operations		
E1	E2	E1 & E2	E1 ^ E2	E1 | E2
0	0	0	0	0
1	0	0	1	1
0	1	0	1	1
1	1	1	0	1

Comma (,) punctuator and operator

A comma acts as a punctuator and operator. It is used as follows:

- Separates elements in a function argument list
- Acts as an operator in comma expressions

Mixing the two uses of comma is legal, but you must use parentheses to distinguish them.

Syntax expression , assignment-expression

Description If the left operand *E1* is evaluated as a void expression, then the right operand *E2* is evaluated to give the result and type of the comma expression. By recursion, the expression

```
E1, E2, ..., En
```

results in the left-to-right evaluation of each *Ex*, with the value and type of *En* giving the result of the whole expression.

To avoid ambiguity with the commas in function argument and initializer lists, use parentheses. The following example calls `func` with three arguments: `i`, `5`, and `k`.

```
func(i, (j = 1, j + 4), k);
```

Conditional (?:) operator

The conditional operator (?:) is a ternary operator used as a shorthand for **if-else** statements.

Syntax logical-OR-expr ? expr : conditional-expr

Description This operator allows you to use a shorthand for

```
if (expression)
  statement1;
else
  statement2;
```

In the expression

```
E1 ? E2 : E3
```

E1 evaluates first. If its value is nonzero (**TRUE**), then *E2* evaluates and *E3* is ignored. If *E1* evaluates to zero (**FALSE**), then *E3* evaluates and *E2* is ignored. The result of the statement is the value of either *E2* or *E3*, depending upon which evaluates.

Example

```
//if-else statement:
if (x < y)
  z = x;
else
  z = y;

//Equivalent:
z = (x < y) ? x : y;
```

Logical operators

Use logical operators to evaluate an expression to **TRUE** or **FALSE**.

Syntax logical-AND-expr && inclusive-OR-expression
logical-OR-expr || logical-AND-expression
! expression

Table 6.5 Logical operators

Operator	Description
&&	Logical AND returns **TRUE** (1) only if both expressions evaluate to a nonzero value; otherwise it returns **FALSE** (0). Unlike C++, if the first expression evaluates to **FALSE**, the second expression is still evaluated.
||	Logical OR returns **TRUE** (1) if either of the expressions evaluates to a nonzero value; otherwise it returns **FALSE** (0). Unlike C++, if the first expression evaluates to **TRUE**, the second expression is still evaluated.
!	Logical negation returns **TRUE** (1) if the entire expression evaluates to a nonzero value; otherwise it returns **FALSE** (0). The expression *!E* is equivalent to `(0 == E)`.

Reference operator

Passes arguments in a function definition header by reference.

Syntax methodName(&parameter[,...]){statementList}

Description In cScript as in C++, the default function calling convention is to pass by value. The reference operator can be applied to parameters in a function definition header to pass the argument by reference instead.

cScript reference types created with the & operator, create aliases for objects and let you pass arguments to functions by reference.

When a variable *x* is passed by reference to a function, the matching formal argument in the function receives an alias for *x*, (similar to an address pointer in C++). Any changes to this alias in the function body are reflected in the value of *x*.

When a variable *x* is passed by value to a function, the matching formal argument in the function receives a copy of *x*. Any changes to this copy

within the function body are not reflected in the value of *x* itself. Of course, the function can return a value that could be used later to change *x*, but the function cannot directly alter a parameter passed by value.

Note The reference operator is only valid when used in function definitions as applied to one or more of its parameters. The address of operator is not supported in cScript as it is in C++, where it can be used to obtain the address of (create a pointer to) a variable.

Example

```
// Example of reference operator
func1 (i){i=5;}
func2 (&Ir){i=5;}
// It is a reference variable
   ...
sum = 3;
func1(sum);      // sum passed by value
print sum;       // Prints 3
func2(sum);      // sum passed by reference
print sum;       // Prints 5
```

sum, passed by reference to *func2*, has its value changed when the function exits. *func1*, on the other hand, gets a copy of the *sum* argument (passed by value), so *sum* itself cannot be altered by *func1*.

Relational operators

Relational operators test equality or inequality of expressions.

Syntax

```
equality-expression   == relational-expression
equality-expression   != relational-expression
relational-expression <  shift-expression
relational-expression >  shift-expression
relational-expression <= shift-expression
relational-expression >= shift-expression
```

Description If the statement evaluates to **TRUE** it returns a nonzero value; otherwise, it returns **FALSE** (0).

Table 6.6 Relational operators

Operator	Description
==	equal
!=	not equal
>	greater than
<	less than
>=	greater than or equal
<=	less than or equal

Enclosing operators

The enclosing operators are:

[ ] (brackets)
[[ ]] (double-brackets)
( ) (parentheses)
{ } (braces)

Syntax

(expression-list)
function (arg-expression-list)
array-name [expression]
{statement-list}
compound-statement {statement-list}
OLEObject.indexedProperty[[expression]]

Table 6.7 Enclosing operators

Operator	Description
[ ]	Array subscript operator. Indicates single and multidimensional array subscripts.
[[ ]]	OLE index operator. Indicates the index of an indexed OLE property.
( )	Parentheses operator. Groups expressions, isolates conditional expressions, or indicates function calls and function parameters.
{ }	Braces. Starts and ends compound statements and indicates a code block.

Array subscript ([ ]) operator

The array subscript operator ([ ]) indicates single and multidimensional array subscripts.

Syntax

[expression-list]

Description

Use the array subscript operator to declare an array or to access individual array components.

For example,

```
declare myArray = new array [10];
myArray[0] = 5;
myArray[1] = "Cheers";
declare array multiArray[] = {myArray};
print multiArray[0][1];// prints "Cheers"
```

OLE index ([[ ]]) operator

The OLE index operator ([[ ]]) indicates an OLE object's indexed property index.

Syntax [[expression]]

Description Use double-brackets to access individual indexed entries of an OLE object's indexed property:

```
// create an OLEObject of class OLEGeneric
// which contains an indexed property called foo
declare myObj = new OleObject("OLEGeneric");
print myObj.foo[[3]]; // print the third element of foo
```

Note This operator is only to be used for accessing elements of an OLE indexed property.

Parentheses ( ) operator

Use the parentheses operator () to:

- Group expressions
- Isolate conditional expressions
- Indicate function calls and function parameters

Syntax 1 (expression-list)

Description Syntax 1 groups expressions or isolates conditional expressions.

Syntax 2 postfix-expression (arg-expression-list)

arg-expression-list A comma-delimited list of expressions of any type representing the actual (real) function arguments.

Description Syntax 2 describes a call to the function given by the postfix expression. The value of the function call expression, if it has a value, is determined by the **return** statement in the function definition.

Object-oriented operators

The cScript object-oriented operators are:

Table 6.8 Object-oriented operators

Operator	Description
:>	Closure operator. Binds a class instance and a method as a single closure reference.
??	In operator. Tests for the existence of a class object property or array index.
.	Member selector. Access a class object member.

In addition, there is a colon (:) punctuator:

: Refers to a base class in a derived class declaration.

Closure (:>) operator

Binds a class instance with a class member.

Syntax 1 on handler:

```
on ClassInstance:>Method{[code_to_replace_method_code]}
```

Syntax 2 attach:

```
attach ClassInst1:>method1 to ClassInst2:>method2;
```

Syntax 3 detach:

```
detach ClassInst1:>method1 from ClassInst2:>method2;
```

Syntax 4 getter:

```
on ClassInstance:>property{
 // your code here
 return [pass()|SomeValue];
}
```

Syntax 5 setter:

```
on ClassInstance:>property(parm){
// your code here
[pass(SomeValue);]
}
```

Syntax 6 closure variable:

```
declare closureVar = classInstance:>methodName;
```

Note A closure variable as declared above can subsequently be used wherever a closure is needed. For example, an alternative to the **attach** statement (Syntax 2) using closure variables would be:

```
declare closureVar1 = classInst1:>method1;
declare closureVar2 = classInst2:>method2;
attach closureVar1 to closureVar2;
```

Description Use the closure operator (:>) in an **on** handler, an **attach** statement, or a **detach** statement to bind a class instance with a class member as a single closure reference.

Example

```
// Example of closure
import scriptEngine;
import IDE;
:
modList = new ListWindow(50, 5, 100, 300, "Module List",
          TRUE, FALSE, loadedModules);
```

```
// Hook the Accept event in order to do nothing.
// Default behavior is to put the list away.
on modList:>Accept(){}
```

Member (.) selector operator

Use the member selector operator (.) to access class members.

Syntax class-instance.class-member

Description Suppose that the object *a* is of class A and *b* is a property declared in A. The expression:

```
a.b
```

represents the property *b* in *a*.

Note Although the precedence of the . operator is the same as C++ in most respects, one place where it is not is in cScript native function calls that do not use parentheses. For example, `print module "MyModule".Data1` does not print the *Data1* member of *MyModule*. To print this reference, you must use parentheses with the **module** function, as follows:

```
print module ("MyModule").Data1
```

Example

```
// Example of member selector (.) operator
class myClass {
  i = 0;
}
s = new myClass();
s.i = 3;              // assign 3 to the i property of myClass s
```

In (??) operator

Use the in operator (??) to test for the existence of an object property or for an array index.

Syntax 1 string-expression | "string" ?? objectname |arrayname

Syntax 2 integer-expression | integer ?? arrayname

Description Use a quoted string, or an expression that evaluates to a string, to test for the existence of an object property or an associative array index.

Use an integer, or an integer expression, to test for the existence of an index value in an indexed array. For example,

```
class MyClass {
 declare property1 = 0;
 declare property2 = 1;
}

declare MyClass instance;
if ("property1" ?? instance)
 print "property1 is a property of instance.";

declare array a1[];
a1[0] = "a";
a1["Hello"] = 1;
if (0 ?? a1)
 print "Array a1 has an index 0.";
if ("Hello" ?? a1)
 print "Array a1 has an index \"Hello\".";
```

Unary operators

Syntax unary-operator unary-expression

Description cScript provides the following unary operators:

Table 6.9 Unary operators

Operator	Description
++	Increment
--	Decrement
+	Plus
-	Minus
!	Logical negation
~	Bitwise complement

Increment and decrement operators

The increment and decrement operators are ++ and --. They can be used either to change the value of the operand expression before it is evaluated (pre) or change the value of the whole expression after it is evaluated (post). The increment or decrement value is appropriate to the type of the operand.

Syntax 1 pre:

postfix-expression ++ (postincrement)
postfix-expression -- (postdecrement)

Description The value of the whole expression is the value of the postfix expression before the increment or decrement is applied. After the postfix expression is evaluated, the operand is incremented or decremented by 1.

Syntax 2 post:

```
++ unary-expression    (preincrement)
-- unary-expression    (predecrement)
```

unary-expression The operand, which must be a modifiable lvalue.

Description The operand is incremented or decremented by 1 before the expression is evaluated. The value of the whole expression is the incremented or decremented value of the operand.

Plus and minus operators

The plus (+) and minus (–) operators can operate in either a unary or binary fashion on any type of variable.

Syntax 1 Unary:

```
+ unary-expression
- unary-expression
```

+ unary-expression Value of the operand after any required integral promotions.

– unary-expression Negative of the value of the operand after any required integral promotions.

Syntax 2 Binary:

```
expression1 + expression2
expression1 - expression2
```

expression1 Determines the type of the result.

expression2 Is converted if necessary to a type matching *expression1*, and then the operation is carried out.

Multiplicative operators

There are three multiplicative operators:

Table 6.10 Multiplicative operators

Operator	Description
*	Multiplication
/	Division
%	Modulus or remainder

Syntax multiplicative-expr * unary-expression
multiplicative-expr / unary-expression
multiplicative-expr % unary-expression

Description The usual type conversions are made on the operands.

`(op1 * op2)` Product of the two operands

`(op1 / op2)` Quotient of the two operands (op1 divided by op2)

`(op1 % op2)` Remainder of the two operands (op1 divided by op2)

For / and %, *op2* must be a nonzero value. If *op2* is zero, the operation results in an error. Note that division of a number by a string can result in this divide by zero error.

When *op1* is an integer, the quotient must be an integer. If the actual quotient would not be an integer, the following rules are used to determine its value:

1 If *op1* and *op2* have the same sign, *op1* / *op2* is the largest integer less than the true quotient, and *op1* % *op2* has the sign of *op1*.

2 If *op1* and *op2* have opposite signs, *op1* / *op2* is the smallest integer greater than the true quotient, and *op1* % *op2* has the sign of *op1*.

Note Rounding is always toward zero.

Punctuators

The cScript punctuators (also known as separators) are:

Table 6.11 Punctuators

Punctuator	Description
( )	Parentheses (see "Parentheses ( ) operator" on page 6-10)
{ }	Braces
,	Comma (see "Comma (,) punctuator and operator" on page 6-6)
;	Semicolon
:	Colon
=	Equal sign
#	Pound sign

Most of these punctuators also function as operators.

Braces ({ }) punctuator

Braces ({ }) indicate the start and end of a compound statement.

Semicolon (;) punctuator

The semicolon (;) is a statement terminator.

Any legal cScript expression (including the empty expression) followed by ; is interpreted as a statement. The expression is evaluated and its value is discarded. If the statement has no side effects, cScript can ignore it. Semicolons are often used to create an empty statement.

Colon (:) punctuator

Use the colon when declaring a child class or a class with a label.

Syntax 1 class childClass:parentClass

Use this version to indicate the parent class when declaring a child class. For an example of this syntax, see "class" on page 5-5.

Syntax 2 case expression:

Use this version to indicate the end of a case expression. For example:

```
switch (a) {
  case 1:
     print "One";
     break;
  case 2:
     print "Two";
     break;
  default: print "None of the above!";
}
```

Equal sign (=) punctuator

The equal sign (=) separates variable declarations from initialization lists and determines the type of the variable.

Syntax

```
array x[] = { 1, 2, 3, 4, 5 };
x = 5;
```

Description In cScript, declarations of any type can appear (with some restrictions) at any point within the code. In a cScript function argument list, the equal sign indicates the default value for a parameter:

```
MyFunc(i = 0){...} //Parameter i has default value of zero
```

The equal sign is also used as the assignment operator.

Pound sign (#) operator

The pound sign (#) indicates a preprocessor directive when it occurs as the first non-whitespace character on a line. It signifies a compiler action not necessarily associated with code generation.

lvalues and rvalues

lvalues

An lvalue is an identifier or expression that can be accessed as an object and legally changed in memory. A constant, for example, is not an lvalue. A variable, array member, or property is an lvalue.

Historically, the l stood for left, meaning that an lvalue could legally stand on the left (the receiving end) of an assignment statement. Only modifiable lvalues can legally stand on the left of an assignment statement.

For example, if *a* and *b* are variables, they are both modifiable values and assignments. The following are legal:

```
a = 1
b = a + b
```

rvalues

An rvalue (short for "right value") is an expression that can be assigned to an lvalue. It is the "right side" of an assignment expression. While an lvalue can also be an rvalue, the opposite is not the case. For example, the following expression cannot be an lvalue:

```
a + b
```

`a + b = a` is illegal because the expression on the left is not related to an object that can be accessed and legally changed in memory.

However, `a = a + b` is legal, because *a* is a variable (an lvalue) and *a* + *b* is an expression that can be evaluated and assigned to a variable (an rvalue).

Chapter

7

Preprocessor directives

Preprocessor directives are usually placed at the beginning of your source code, but they can legally appear at any point in a program.

The cScript preprocessor, unlike a C++ preprocessor, supports preprocessor directives in the expansion side of a macro definition. It detects the following preprocessor directives and parses the tokens embedded in them:

#define	**#ifndef**
#else	**#include**
#endif	**#undef**
#ifdef	**#warn**

Any line with a leading # is considered as a preprocessor directive unless the # is part of a string literal, is in a character constant, or is embedded in a comment. The initial # can be preceded or followed by one or more spaces (excluding new lines).

#define

Defines a macro.

Syntax #define macro_identifier <token_sequence>

macro_identifier The identifier for the macro. Each occurrence of *macro_identifier* in your source code following the **#define** is replaced with *token_sequence* (with some exceptions). Such replacements are known as macro expansions.

token_sequence The sequence to replace *macro_identifier* with. The token sequence is sometimes called the body of the macro. If *token_sequence* is empty, the macro identifier is removed wherever it occurs in the source code.

Description The **#define** directive defines a macro. Macros provide a mechanism for token replacement with or without a set of formal, function-like parameters. Unlike C++ preprocessors, cScript allows you to continue a line with a backslash (\). You cannot use cScript keywords as macros.

After each individual macro expansion, the preprocessor scans the newly expanded text to see if there are further macro identifiers that are subject to replacement (nested macros).

cScript imposes these restrictions on macro expansion:

- Any occurrences of the macro identifier found within literal strings, character constants, or comments in the source code are not expanded.
- A macro is not expanded during its own expansion (so **#define** A A won't expand indefinitely).

Examples

```
// Examples of #define
#define HI "Have a nice day!"
#define empty
#define NIL ""
#define GETSTD #include <stdio.h>
```

#ifdef, #ifndef, #else, and #endif

Tests whether an identifier is currently defined or not.

Syntax

```
#ifdef/#ifndef identifier [logical-operator identifier [...]]
<section-1>
[#else
<final-section>]
#endif
<next-section>
```

Description Assume that **#ifdef** tests **TRUE** for the defined condition; so the line

```
#ifdef identifier
```

means that if *identifier* is defined, include the code up to the next **#else** or **#endif**. If *identifier* is not defined, ignore that code and skip to the next **#else** or **#endif**.

The line

```
#else
```

means that if *identifier* is not defined, include the code up to the next **#endif**.

The line

```
#ifndef
```

tests **TRUE** for the not-defined condition; so

```
#ifndef identifier
```

means that if *identifier* is not defined, include the code up to the next **#else** or **#endif**. If *identifier* is defined, ignore that code.

In this case, **#else** means that if *identifier* is defined, include the code up to the next **#endif**.

In the true case, after *section – 1* has been preprocessed, control passes to the matching **#endif** (which ends this conditional sequence) and continues with next-section. In the **FALSE** *case,* control passes to the next **#else** line (if any), which is used as an alternative condition for which the previous test proved false. The **#endif** ends the conditional sequence.

The processed section can contain further conditional clauses, nested to any depth; each **#ifdef or #ifndef** must be matched with a closing **#endif**.

The net result of the preceding scenario is that only one section (possibly empty) is passed on for further processing. The bypassed sections are relevant only for keeping track of any nested conditionals, so that each **#ifdef** or **#ifndef** can be matched with its correct **#endif**.

The **#ifdef** and **#ifndef** conditional directives let you test whether an identifier is currently defined or not; that is, whether a previous **#define** command has been processed for that identifier and is still in force. You can combine identifiers with logical operators.

An identifier defined as **NULL** is considered to be defined.

cScript supports conditional compilation by replacing the lines that are not to be compiled as a result of the directives with blank lines. All conditional compilation directives must be completed in the source or include file in which they begin.

#include

Pulls other cScript files into the source code.

Syntax 1 #include <file_name>

Syntax 2 #include "file_name"

Syntax 3 #include macro_identifier

Description The **#include** syntax has three formats:

- The first and second formats imply that no macro expansion will be attempted; in other words, *file_name* is never scanned for macro identifiers. *file_name* must be a valid file name with an optional path name and path delimiters.
- The third format does not allow < or " to appear as the first non-whitespace character following **#include**. A macro definition that expands the macro identifier into a valid delimited file name with either of the *<file_name>* or *"file_name"* formats must follow the **#include**.

The preprocessor removes the **#include** line and replaces it with the entire text of the cScript source file at that point in the source code. The source code itself is not changed, but the compiler processes the enlarged text. The placement of the **#include** can therefore influence the scope and duration of any identifiers in the included file.

If you place an explicit path in the *file_name*, only that directory will be searched.

Unlike the C++ **#include**, there is no difference between the *<file_name>* and *"file_name"* formats. With both versions, the file is sought first in the current directory (usually the directory holding the source file being compiled). If the file is not found there, the search continues in the script directories in the order in which they are defined in the Options | Environment | Scripting | Script Path dialog box. If the file is not located in any of the default directories, an error message is issued.

Example This **#include** statement causes the preprocessor to look for MYINCLUD.H in the current directory, then in default directories.

```
#include "myinclud.h"
```

or

```
#include <myinclud.h>
```

After expansion, this **#include** statement causes the preprocessor to look in C:\BC5\SCRIPT\INCLUDE\MYSTUFF.H. Note that you must use double backslashes in the **#define** statement.

```
#define myinclud "C:\\BC5\\SCRIPT\\INCLUDE\\MYSTUFF.H"
#include  myinclud

/* macro expansion */
```

#undef

Undefines a macro.

Syntax #undef macro_identifier

Description **#undef** detaches any previous token sequence from the macro identifier; the macro definition is forgotten, and the macro identifier is undefined. No macro expansion occurs within **#undef** lines.

The state of being defined or undefined is an important property of an identifier, regardless of the actual definition. The **#ifdef** and **#ifndef** conditional directives, used to test whether any identifier is currently defined or not, offer a flexible mechanism for controlling many aspects of a compilation.

After a macro identifier is undefined, it can be redefined with **#define**, using the same or a different token sequence.

Attempting to redefine an already defined macro identifier will result in a warning unless the new definition is exactly the same token-by-token definition as the existing one. The preferred strategy where definitions might exist in other header files is as follows:

```
#ifndef BLOCK_SIZE
  #define BLOCK_SIZE 512
#endif
```

The middle line is bypassed if BLOCK_SIZE is currently defined; if BLOCK_SIZE is not currently defined, the middle line is invoked to define it.

No semicolon (;) is needed to terminate a preprocessor directive. Any character found in the token sequence, including semicolons, will appear in the macro expansion. The token sequence terminates at the first non-backslashed new line encountered. Any sequence of whitespace, including comments in the token sequence, is replaced with a single-space character.

Example

```
// Example of #undef
#define BLOCK_SIZE 512
⋮
#undef BLOCK_SIZE
/* use of BLOCK_SIZE now would be an illegal "unknown" identifier */
⋮
#define BLOCK_SIZE 128   /* redefinition */
```

#warn

Sets the warning level.

Syntax #warn *warning_level*

warning_level Ranges from 0 (suppress all warnings) to 3 (show all warnings).

Description For example, the following statement causes all warnings to be shown when the script is compiled:

```
#warn 3
```

Macros with parameters

The following syntax is used to define a macro with parameters:

```
#define macro_identifier(<arg_list>) token_sequence
```

Any comma within parentheses in an argument list is treated as part of the argument, not as an argument delimiter.

There can be no whitespace between the macro identifier and the (. The optional *arg_list* is a sequence of identifiers separated by commas, not unlike the argument list of a C function. Each comma-delimited identifier plays the role of a formal argument or placeholder.

Such macros are called by writing

```
macro_identifier<whitespace>(<actual_arg_list>)
```

in the subsequent source code. The syntax is identical to that of a function call. However, there are some important semantic differences, side effects, and potential pitfalls.

The optional *actual_arg_list* must contain the same number of comma-delimited token sequences, known as actual arguments, as found in the formal *arg_list* of the **#define** line. There must be an actual argument for each formal argument. An error will be reported if the number of arguments in the two lists is different.

A macro call results in two sets of replacements. First, the macro identifier and the parenthesis-enclosed arguments are replaced by the token sequence. Next, any formal arguments occurring in the token sequence are replaced by the corresponding real arguments appearing in the *actual_arg_list*.

As with simple macro definitions, rescanning occurs to detect any embedded macro identifiers eligible for expansion.

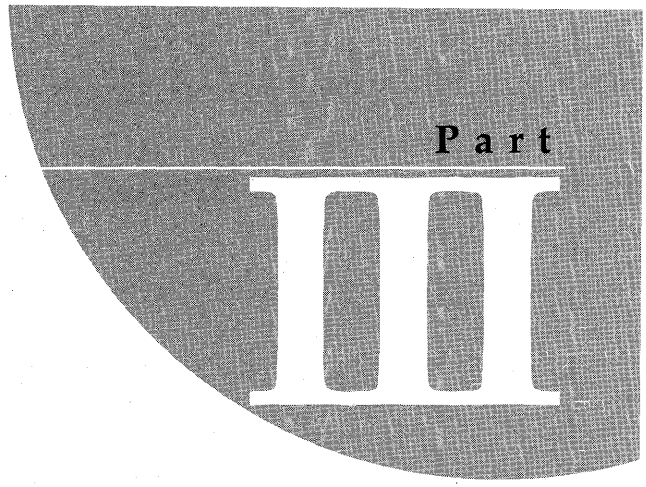
Note The similarities between function and macro calls can obscure their differences. A macro call can give rise to unwanted side effects, especially when an actual argument is evaluated more than once.

Nesting parentheses and commas

The *actual_arg_list* can contain nested parentheses provided that they are balanced; also, commas appearing within quotes or parentheses are not treated like argument delimiters.

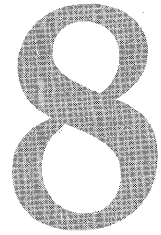
Using the backslash (\) for line continuation

Along token sequence can straddle a line by using a backslash (\). The backslash and the following newline are both stripped to provide the actual token sequence used in expansions.



Class reference

Chapter



BufferOptions class

This class is one of the editor classes. *BufferOptions* objects hold data controlling the characteristics of edit buffers.

Syntax BufferOptions()

Properties

bool CreateBackup	Read-write
bool CursorThroughTabs	Read-write
bool HorizontalScrollBar	Read-write
bool InsertMode	Read-write
int LeftGutterWidth	Read-write
int Margin	Read-write
bool OverwriteBlocks	Read-write
bool PersistentBlocks	Read-write
bool PreserveLineEnds	Read-write
bool SyntaxHighlight	Read-write
string TabRack	Read-write
string TokenFileName	Read-write
bool UseTabCharacter	Read-write
bool VerticalScrollBar	Read-write

Methods

void Copy(BufferOptions source)

Events

None

BufferOptions class description

This class holds buffer options settings, such as scroll bars, right margin setting, tab rack, syntax highlighting, cursor shape, gutter width, block style and tabbing modes.

An instance of this class exists as a member of the global editor options accessible via *Ediitor.Options*. This class controls the settings of all edit buffers. Any change to this object changes the settings of all edit buffers. The properties are initialized during construction to match the global defaults.

You can instantiate a member of this class to store buffer options. They are not applied to any edit buffers until you copy them into *Editor.Options*, at which point the settings affect all edit buffers.

For example, in a *BufferOptions* object, you can store a set of options that you want to apply to a buffer when it is activated (such as tab stops, syntax highlighting and color). Applying these values to *Editor.Options* sets the buffer options for the new buffer and all other edit buffers as well.

CreateBackup property

Automatically creates a backup of the source file loaded in the active Edit window when you choose File | Save. The backup file has the extension .BAK.

Access Read-write

Type expected boolCreateBackup

Description In the IDE, *CreateBackup* is set with the Create Backup option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | File.

CursorThroughTabs property

Causes the cursor to move uniformly through the line as you press arrow keys for horizontal movement.

Access Read-write

Type expected bool CursorThroughTabs

Description When *CursorThroughTabs* is **FALSE**, the cursor jumps several columns when moved over a tab.This setting has no effect unless tabs are set with the *TabRack* property.

In the IDE, *CursorThroughTabs* is set with the Cursor Through Tabs option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | Options.

HorizontalScrollBar property

Set to **TRUE** to display a horizontal scroll bar in the active Edit window. Set to **FALSE** to hide the horizontal scroll bar.

Access Read-write

Type expected bool HorizontalScrollBar

Description In the IDE, *HorizontalScrollBar* is set with the Horizontal Scroll Bar option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | Display.

InsertMode property

Sets or clears text insert mode.

Access Read-write

Type expected bool InsertMode

Description Set to **TRUE** to put the buffer in Insert mode. This pushes the existing text to the right as you type.

Set to **FALSE** to put the buffer in Overwrite mode. This writes over the existing text.

In the IDE, *InsertMode* is set with the Insert Mode option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | Options.

LeftGutterWidth property

The width of the Edit window's left gutter.

Access Read-write

Type expected int LeftGutterWidth

Description The gutter width represents pixels. It is a positive decimal measurement (for example 16). The default setting is 32.

In the IDE, *GutterWidth* is set with the Gutter Width option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | Display.

Margin property

The column number to use for the Edit window's right margin.

Access Read-write

Type expected int Margin

Description Valid entries are from 1 to 1024.

In the IDE, *Margin* is set with the Right Margin option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | Display.

OverwriteBlocks property

Deletes selected text as you type.

Access Read-write

Type expected bool OverwriteBlocks

Description Works in conjunction with *PersistentBlocks* to delete selected text as you type. If you mark a block of text and type a letter, the letter you type replaces the entire marked block.

If you press...	OverwriteBlocks will...
DEL or Backspace	Clear the entire block of selected text
Any key or choose Edit	Paste	Replace the entire block of selected text

Note When this property is **FALSE** and *PersistentBlocks* is **TRUE**, text entered in a marked block is added at the insertion point.

In the IDE, *OverwriteBlocks* is set with the OverwriteBlocks option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | Options.

PersistentBlocks property

Allows marked blocks to remain selected until they are deleted or unmarked, or until another block is selected.

Access Read-write

Type expected bool PersistentBlocks

Description When *PersistentBlocks* is **FALSE** and you move the cursor after a block is selected, the text does not stay selected.

In the IDE, *PersistentBlocks* is set with the Persistent Blocks option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | Options.

PreserveLineEnds property

Saves files with their original line ends. When *PerserveLineEnds* is **FALSE**, files are saved with the Borland C++ default value for line ends.

Access Read-write

Type expected bool PreserveLineEnds

Description Use this option to specify how the line ends are written when a file is saved: you can use the Borland C++ default value, or you can write the original line end of the file.

Line ends usually consist one of the following combination of characters:

- *LF*
- *CR*
- *LF CR*
- *CR LF* (Borland C++ default)

where *LF* = Line Feed (ASCII value 10) and *CR* = Carriage Return (ASCII value 13).

In the IDE, *PerseveLineEnds* is set with the Perserve Line Ends option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | File.

SyntaxHighlight property

Indicates if the editor displays code with syntax highlighting.

Access Read-write

Type expected bool SyntaxHighlight

Description You can specify your own keywords, functions, or other language elements that you want highlighted. These elements are stored in token (.TOK) files. Use *TokenFileName* to open the .TOK file.

In the IDE, *SyntaxHighlighting* is set with the Use Syntax Highlighting option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Syntax Highlighting.

TabRack property

The buffer's tab settings.

Access Read-write

Type expected string TabRack

Description The tab settings are indicated as a space-delimited sequence of tab stops in ascending order. For example, "3 7 12" sets tab stops at 3", 7" and 12".

In the IDE, *TabRack* is set with the Tab Stops option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | Options.

TokenFileName property

The name of the token file (.TOK) to use for syntax highlighting.

Access Read-write

Type expected string TokenFileName

Description In the IDE, *TokenFileName* is set with the Syntax Extensions option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Syntax Highlighting.

UseTabCharacter property

If **TRUE**, inserts a true tab character (ASCII 9) when you press Tab. If **FALSE**, replaces tabs with spaces.

Access Read-write

Type expected bool UseTabCharacter

Description *TabRack* determines the number of spaces used to replace a tab.

In the IDE, *UseTabCharacter* is set with the Use Tab Character option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | Options.

VerticalScrollBar property

Set this property to **TRUE** to display a vertical scroll bar in the active Edit window. Set to **FALSE** to hide the vertical scroll bar.

Access Read-write

Type expected bool VerticalScrollBar

Description In the IDE, *VerticalScrollBar* is set with the Vertical Scroll Bar option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | Display.

Copy method

Copies the values from the source *BufferOptions* object into this *BufferOptions* object.

Types expected void Copy(BufferOptions source)

source The name of the buffer to copy from.

Return value None

Chapter

9

Debugger class

Debugger class members let you debug a cScript program. You can set breakpoints, single step through code, and inspect variables.

Syntax Debugger()

Properties

bool HasProcess Read-only

Methods

bool AddBreakpoint()

bool AddBreakpointFileLine(string fileName, int lineNum)

bool AddWatch(string symbolName)

bool Animate()

bool Attach(string processID)

bool BreakpointOptions()

string Evaluate(string symbol)

bool EvaluateWindow(string symbol)

bool FindExecutionPoint()

bool Inspect(string symbol)

bool InstructionStepInto()

bool InstructionStepOver()

bool IsRunnable(int processID)

bool Load(string exeName)

bool PauseProgram()

bool Reset()

bool Run()

bool RunToAddress(string addr)

bool RunToFileLine(string fileName, int lineNum)

bool StatementStepInto()

bool StatementStepOver()

bool TerminateProgram()

bool ToggleBreakpoint(string fileName, int lineNum)

bool ViewBreakpoint()

bool ViewCallStack()

bool ViewCpu([address])

bool ViewCpuFileLine(string fileName, int lineNum)

bool ViewProcess()

bool ViewWatch()

Events

void DebugeeAboutToRun()

void DebugeeCreated()

void DebugeeStopped()

void DebugeeTerminated()

Debugger class description

No matter how careful you are when you code, your script is likely to have errors (bugs) that prevent it from running the way you intended. Debugging is the process of locating and fixing errors that prevent your script from operating correctly.

The *Debugger* class lets you:

- Add breakpoints to your script file
- Add a watch on a symbol name
- Watch your script's execution in slow motion

- Evaluate expressions
- Inspect symbols
- Step over and step into function calls
- Pause, reset and run the current process
- View the call stack
- View the CPU register

HasProcess property

TRUE when the debugger has a process loaded, **FALSE**, otherwise.

Access Read-only

Type expected bool HasProcess

AddBreakpoint method

Opens the Add Breakpoint dialog.

Types expected bool AddBreakpoint()

Return value **TRUE** if successful, **FALSE**, otherwise

AddBreakpointFileLine method

Adds a breakpoint on the specified line of the specified file.

Types expected bool AddBreakpointFileLine(string fileName, int lineNum)

fileName The name of the file to add the breakpoint to.

lineNum The number of the line on which to add the breakpoint.

Return value **TRUE** if successful, **FALSE**, otherwise

Description If the arguments are **NULL**, *AddBreakpointFileLine* opens the Add Breakpoint dialog.

AddWatch method

Adds a watch on the specified *symbolName*.

Types expected bool AddWatch(string symbolName)

symbolName The name of the symbol on which to place the watch.

Return value **TRUE** if successful, **FALSE**, otherwise

Description If *symbolName* is **NULL**, *AddWatch* opens the Add Watch dialog.

Animate method

Lets you watch your script execute in "slow motion."

Types expected bool Animate()

Return value **TRUE** if successful, **FALSE**, otherwise

Description *Animate* performs a continuous series of *StatementStepInto* commands.

To interrupt animation, invoke one of the following *Debugger* methods either by menu selections or by keystrokes tied to the script:

- *Run*
- *RunToAddress*
- *RunToFileLine*
- *PauseProgram*
- *Reset*
- *TerminateProgram*
- *FindExecutionPoint*

Attach method

Invokes the debugger for the currently executing process.

Types expected bool Attach(string processID)

processID The process to debug.

Return value **TRUE** if successful, **FALSE**, otherwise

BreakpointOptions method

Opens the Breakpoint Condition/Action Options dialog.

Types expected bool BreakpointOptions()

Return value **TRUE** if successful, **FALSE**, otherwise

Evaluate method

Evaluates the given expression, such as a global or local variable or an arithmetic expression.

Types expected string Evaluate(string expression)

expression The expression to evaulate.

Return value The result of the evaluation

EvaluateWindow method

Opens the Evaluator window.

Types expected bool EvaluateWindow(string expression)

expression The expression to evaluate.

Return value **TRUE** if successful, **FALSE**, otherwise

Description When *EvaluateWindow* opens the Evaluator window, *expression* is pasted into the Expression field of the window.

FindExecutionPoint method

Displays the current execution point.

Types expected bool FindExecutionPoint()

Return value **TRUE** if successful, **FALSE**, otherwise

Description The current execution point is indicated by the EIP register. If the current execution point is in source, the execution point is shown in an Edit window. (The appropriate source file is opened if necessary.)

If the current execution point is at an address which has no source associated with it, the execution point is shown in a CPU view. (One is opened if necessary.)

Inspect method

Opens an inspector for the specified *symbol*.

Types expected bool Inspect(string symbol, EditView view, int row, int column)

symbol The symbol to inspect.

view The view on which to place the Inspector window.

row The number of the row at which to place the top of the Inspector window.

column The number of the column at which to place the left side of the Inspector window.

Return value **TRUE** if successful, **FALSE**, otherwise

InstructionStepInto method

Executes the next instruction, stepping into any function calls.

Types expected bool InstructionStepInto()

Return value **TRUE** if successful, **FALSE**, otherwise

Description If a process is not loaded, *InstructionStepInto* first loads the executable for the current project.

InstructionStepOver method

Executes the next instruction, running any functions called at full speed.

Types expected bool InstructionStepOver()

Return value **TRUE** if successful, **FALSE**, otherwise

Description If a process is not loaded, *InstructionStepOver* first loads the executable for the current project.

IsRunnable method

Indicates if the specified process can be run or single stepped.

Types expected bool IsRunnable(int processID)

processID The process you wish to query. If that process is not runnable or does not exist, the current process is used.

Return value **TRUE** if the EXE is runnable or can be single stepped; **FALSE**, otherwise

Load method

Loads the specified executable into the debugger.

Types expected bool Load(string exeName)

exeName The name of the executable to load. If *exeName* is **NULL**, *Load* opens the Load Program dialog.

Return value **TRUE** if successful, **FALSE**, otherwise

Description Upon loading, the process runs to the starting point specified in the Options | Environment | Debugger | Debugger Behavior dialog.

PauseProgram method

Pauses the current process.

Types expected bool PauseProgram()

Return value **TRUE** if successful, **FALSE**, otherwise

Description *PauseProgram* has an effect only if the current process is running or is animated.

Reset method

Reset the current process to its starting point.

Types expected bool Reset()

Return value **TRUE** if successful, **FALSE**, otherwise

Description The starting point is specified in the Options | Environment | Debugger | Debugger Behavior dialog.

Run method

Causes the debugger to run the current process.

Types expected bool Run()

Return value **TRUE** if successful, **FALSE**, otherwise

Description If no process is loaded, *Run* first loads the executable associated with the current project.

RunToAddress method

Runs the current process until the instruction at the given *address* is encountered.

Types expected bool RunToAddress(string address)

address The address at which to stop execution. *address* must be given as a hexidecimal value (i.e. it must begin with "0x").

Return value **TRUE** if successful, **FALSE**, otherwise

Description If no process is loaded, *Run* first loads the executable associated with the current project.

RunToFileLine method

Runs the current process until the source at the specified line in the specified file is encountered.

Types expected bool RunToFileLine(string fileName, int lineNum)

fileName The name of the file to execute.

lineNum The number of the line at which to halt execution.

Return value **TRUE** if successful, **FALSE**, otherwise

Description If no process is loaded, *RunToFileLine* will first load the executable associated with the current project.

StatementStepInto method

Executes the next source statement and steps through the source of any function calls.

Types expected bool StatementStepInto()

Return value **TRUE** if successful, **FALSE**, otherwise

Description If a process is not loaded, *StatementSetpInto* first loads the executable for the current project.

StatementStepOver method

Executes the next source statement and does not step into any functions called, but rather runs them at full speed.

Types expected bool StatementStepOver()

Return value **TRUE** if successful, **FALSE**, otherwise

Description If a process is not loaded, *StatementStepOver* first loads the executable for the current project.

TerminateProgram method

Terminates the current process.

Types expected bool TerminateProgram()

Return value **TRUE** if successful, **FALSE**, otherwise

Description If no process is loaded, *TerminateProgram* has no effect.

ToggleBreakpoint method

If no breakpoint exists, *ToggleBreakpoint* adds a breakpoint on the specified line of the specified file. If a breakoint exists, *ToggleBreakpoint* deletes it.

Types expected bool ToggleBreakpoint(string fileName, int lineNum)

fileName The name of the file to add the breakpoint to.

lineNum The number of the line on which to add the breakpoint.

Return value **TRUE** if successful, **FALSE**, otherwise

Description If the arguments are **NULL**, *ToggleBreakpoint* opens the Add Breakpoint dialog.

ViewBreakpoint method

Opens the Breakpoints window.

Types expected bool ViewBreakpoint()

Return value **TRUE** if successful, **FALSE**, otherwise

ViewCallStack method

Opens the Call Stack window.

Types expected bool ViewCallStack()

Return value **TRUE** if successful, **FALSE**, otherwise

Description *ViewCallStack* works only if a process is loaded.

ViewCpu method

Opens or selects the CPU window.

Types expected bool ViewCpu([address])

address The address at which to open the CPU window. address is optional. If it is not specified, the view opens for the current address.

Return value **TRUE** if successful, **FALSE**, otherwise

Description If the Allow Multiple CPU Views option is checked in the Debugger Behavior dialog, *ViewCpu* always opens a new CPU window. If the option is not checked, *ViewCpu* only opens a new CPU window if one is not already open.

ViewCpu works only if a process is loaded.

ViewCpuFileLine method

Opens or selects the CPU window.

Types expected bool ViewCpu(string fileName, int lineNum)

fileName The name of the file to view in the CPU window.

lineNum The number of the line to view in the CPU window.

Return value **TRUE** if successful, **FALSE**, otherwise

Description If the Allow Multiple CPU Views option is checked in the Debugger Behavior dialog, *ViewCpuFileLine* always opens a new CPU window. If the

option is not checked, *ViewCpuFileLine* opens a new CPU window only if one is not already open.

After opening or selecting a CPU window, the Disassembly pane is scrolled so that the disassembled code for the specified line of the specified file is visible.

If the parameters are **NULL** or if the line doesn't generate code, the window displays an error message. *ViewCpuFileLine* works only if a process is loaded.

ViewProcess method

Opens the Process window.

Types expected bool ViewProcess()

Return value **TRUE** if successful, **FALSE**, otherwise

ViewWatch method

Opens the Watches window.

Types expected bool ViewWatch()

Return value **TRUE** if successful, **FALSE**, otherwise

DebugeeAboutToRun event

Raised just before a process is run.

Types expected void DebugeeAboutToRun()

Return value None

DebugeeCreated event

Raised when a new process is loaded into the debugger.

Types expected void DebugeeCreated()

Return value None

DebugeeStopped event

Raised when a process stops.

Types expected void DebugeeStopped()

Return value None

Description A process can stop for any number of reasons:

- Upon normal termination
- After a step
- When a breakpoint is hit
- When an exception occurs
- When the user pauses, resets, or terminates a running application

DebugeeTerminated event

Raised when a process is terminated.

Types expected void DebugeeTerminated()

Return value None

Chapter

10

EditBlock class

This class is one of the editor classes. *EditBlock* class members provide area-marking features for an edit buffer or view.

Syntax

```
EditBlock(EditBuffer);
EditBlock(EditView);
```

Properties

bool IsValid	Read-only
int EndingColumn	Read-only
int EndingRow	Read-only
bool Hide	Read-only
int Size	Read-only
int StartingColumn	Read-only
int StartingRow	Read-only
int Style	Read-write
string Text	Read-only

Methods

void Begin()

void Copy([bool useClipboard, bool append])

void Cut([bool useClipboard, bool append])

bool Delete()

```
void End ()
bool Extend(int newRow, int newCol)
bool ExtendPageDown()
bool ExtendPageUp()
bool ExtendReal(int newRow, int newColumn)
bool ExtendRelative(int deltaRow, int deltaColumn)
void Indent(int magnitude)
void LowerCase()
bool Print()
void Reset()
void Restore()
void Save()
bool SaveToFile([string fileName])
void ToggleCase()
void UpperCase()
```

Events

None

EditBlock class description

EditBlock objects let you mark areas of text. Because *EditBlock* members exist in both the *EditView* and the *EditBuffer*, *EditView* and *EditBuffer* support different marked areas in different views on the same *EditBuffer*.

Although multiple *EditBlock*s can exist in script for an individual *EditBuffer* or *EditView*, they are mapped to the same internal representation of the *EditBlock*. Therefore, manipulations on one will affect the others.

Use of the following *EditBlock* members will cause the *EditPosition* for the owner to be updated appropriately:

- *Extend*
- *ExtendPageDown*
- *ExtendPageUp*
- *ExtendReal*
- *ExtendRelative*

IsValid property

Is **TRUE** if the block is valid. Becomes **FALSE** in any of the following cases:

- The owning *EditBuffer* or *EditView* is destroyed.
- A destructive operation, such as delete or cut, occurrs on the block.
- The ending point is not greater than the starting point.

Access Read-only

Type expected bool IsValid

EndingColumn property

Initialized to the current position in the *EditView* or *EditBuffer* upon construction. May be changed by a call to an external method.

Access Read-only

Type expected int EndingColumn

EndingRow property

Initialized to the current position in the *EditView* or *EditBuffer* upon construction. May be changed by a call to an external method.

Access Read-only

Type expected int EndingRow

Hide property

Visually disables the block without modifying its coordinates.

Access Read-write

Type expected bool Hide

Size property

If the area is not valid, the value is zero; otherwise, the value is the number of characters contained in the marked area. A newline (CR/LF) counts as one character.

Access Read-write

Type expected int Size

StartingColumn property

Initialized to the current position in the *EditView* or *EditBuffer* upon construction. May be changed by a call to an external method.

Access Read-only

Type expected int StartingColumn

StartingRow property

Initialized to the current position in the *EditView* or *EditBuffer* upon construction. May be changed by a call to an external method.

Access Read-only

Type expected int StartingRow

Style property

Sets the style of the *EditBlock*.

Access Read-write

Type expected int Style

Description *Style* can be set to one of the following values:

- INCLUSIVE_BLOCK
- EXCLUSIVE_BLOCK
- COLUMN_BLOCK
- LINE_BLOCK
- INVALID_BLOCK

An *EditBlock* is initially set to the *Style* EXCLUSIVE_BLOCK. It is also set to this style after a *Reset* is called.

If an *EditBlock* has a *Style* of INVALID_BLOCK, it was retained after the *EditBuffer* or *EditView* to which it was attached was destroyed.

Text property

If the marked block is valid, *Text* returns the marked text. If it is invalid, *Text* returns the empty string.

Access Read-only

Type expected string Text

Begin method

Resets the *StartingRow* and *StartingColumn* values to the current location in the owning *EditBuffer* or *EditView*.

Type expected void Begin()

Return value None

Copy method

Copies the contents of the marked block to the Windows Clipboard.

Types expected void Copy([bool append])

append Defaults to **FALSE**. If **TRUE**, the contents of the marked block are appended to the Clipboard.

Return value None

Cut method

Cuts the contents of the marked block to the Windows Clipboard and invalidates the marked block.

Types expected void Cut([bool append])

append Defaults to **FALSE**. If **TRUE**, the contents of the marked block are appended to the Clipboard.

Return value None

Delete method

Deletes the current block if it is valid. The cursor position is restored to the position it occupied prior to the delete.

Types expected bool Delete()

Return value **TRUE** if characters were deleted; **FALSE**, otherwise

End method

Resets the *EndingRow* and *EndingColumn* values to the current location in the owning *EditBuffer* or *EditView*.

Types expected void End()

Return value None

Extend method

Extends an existing *EditBlock* to encompass the text delimited by *newRow* and *newCol*.

Types expected bool Extend(int newRow, int newCol)

newRow	The row to extend the block to. Text delimited by this row is included in the block.
newCol	The column to extend the block to. Text delimited by this column is included in the block.

Return value **TRUE** if the *Extend* successfully completes; **FALSE**, otherwise

ExtendPageDown method

Updates the starting or ending points of the existing mark to extend the mark to the specified location.

Types expected bool ExtendPageDown()

Return value **TRUE** if the cursor move is successful; **FALSE**, otherwise

Description *ExtendPageDown* causes the position in the owning *EditBuffer* or *EditView* to be updated to the new location. *ExtendPageDown* only works if the block is

associated with an *EditView*. It is ignored if the block is associated with an *EditBuffer*.

ExtendPageUp method

Updates the starting or ending points of the existing mark to extend the mark to the specified location.

Types expected bool ExtendPageUp()

Return value **TRUE** if the cursor move is successful

Description *ExtendPageUp* causes the position in the owning *EditBuffer* or *EditView* to be updated to the new location. *ExtendPageUp* only works if the block is associated with an *EditView*. It is ignored if the block is associated with an *EditBuffer*.

ExtendReal method

Updates the starting or ending points of the existing mark to extend the mark to the specified location.

Types expected bool ExtendReal(int newRow, int newColumn)

newRow	The row to extend the block to. Text delimited by this row is included in the block.
newCol	The column to extend the block to. Text delimited by this column is included in the block.

Return value **TRUE** if the cursor move is successful

Description *ExtendReal* causes the position in the owning *EditBuffer* or *EditView* to be updated to the new location.

ExtendRelative method

Updates the starting or ending points of the existing mark to extend the mark to the specified relative location.

Types expected bool ExtendRelative(int deltaRow, int deltaColumn)

deltaRow The row to extend the block from. Text delimited by this row is included in the block.

newCol The column to extend the block from. Text delimited by this column is included in the block.

Return value **TRUE** if the cursor move is successful

Description *ExtendRelative* causes the position in the owning *EditBuffer* or *EditView* be updated to the new location.

Indent method

Moves the contents of the block.

Types expected void Indent(int magnitude)

magnitude The number of columns to move the block. Negative values move the block to the left, positive values move it to the right.

Return value None

LowerCase method

Converts all alphabetic characters enclosed within the *EditBlock* to lowercase.

Types expected void LowerCase()

Return value None

Print method

Prints the current block.

Types expected bool Print()

Return value **TRUE** if the print was successful, **FALSE** if there is no marked block or if the print failed.

Reset method

Unmarks the block. Implicitly invoked by the constructor.

Types expected void Reset()

Return value None

Description *Reset* also resets the *Style* to EXCLUSIVE_BLOCK and the starting and ending points to the current position in the owning *EditBuffer* or *EditView*.

Restore method

Restores a block from an internal stack. The block must have been saved with *Save*.

Types expected void Restore()

Return value None

Save method

Preserves the block attributes on an internal stack for future restoration using *Restore*.

Types expected void Save()

Return value None

SaveToFile method

Causes the contents of the marked block to be saved.

Types expected bool SaveToFile([string fileName])

fileName The name of the file to save the block to. If *fileName* is not supplied, the user will be prompted for one.

Return value **TRUE** if the save was successful or **FALSE** if it wasn't.

ToggleCase method

Converts all the uppercase alphabetic characters in the *EditBlock* to lowercase, and the lowercase characters to uppercase.

Types expected void ToggleCase()

Return value None

UpperCase method

Converts all the lowercase alphabetic characters in the *EditBlock* to uppercase.

Types expected void UpperCase()

Return value None

Chapter

11

EditBuffer class

This class is one of the editor classes. An edit buffer is associated with one file and any number of edit views.

Syntax EditBuffer(string fileName [, bool private, bool readOnly])

fileName The name of the file associated with the edit buffer.

private Implies that the buffer is a hidden system buffer. Undo information is not retained, and the *EditBuffer is* never attachable to an *EditView*. The file attached to the buffer cannot be viewed in the IDE until the private buffer is destroyed. When a private *EditBuffer* is no longer needed, you should always explicitly destroy it with *EditBuffer.Destroy*.

The default value of *private* is **FALSE**.

readOnly Marks the buffer as read-only. The default value is **FALSE**. Associating a read-only file with the *EditBuffer* does not make the *EditBuffer* read-only.

Properties

EditBlock Block	Read-only
TimeStamp CurrentDate	Read-only
string Directory	Read-only
string Drive	Read-only
string Extension	Read-only
string FileName	Read-only
string FullName	Read-only

TimeStamp InitialDate	Read-only
bool IsModified	Read-only
bool IsPrivate	Read-only
bool IsReadOnly	Read-only
bool IsValid	Read-only
EditPosition Position	Read-only
EditView TopView	Read-only

Methods

void ApplyStyle(EditStyle styleToApply)

EditBlock BlockCreate()

string Describe()

bool Destroy()

EditBuffer NextBuffer(bool privateToo)

EditView NextView(EditView)

EditPosition PositionCreate()

bool Print()

EditBuffer PriorBuffer(bool privateToo)

bool Rename(string newName)

int Save([string newName])

Events

void AttemptToModifyReadOnlyBuffer()

void AttemptToWriteReadOnlyFile()

void HasBeenModified()

EditBuffer class description

An *EditBuffer* is a representation of the contents of a file. An *EditView* is used to provide a visual representation of the *EditBuffer*. The same *EditBuffer* can be displayed simultaneously in different *EditViews* (for example, two edit windows can be open on the same file). *EditBuffer* objects provide functionality for a file being edited that is independent of the number of views associated with the buffer.

Edit buffers:

- Use the *NextView* method to to traverse the list of views containing the same *EditBuffer*.
- Maintain access to a list of bookmarks (position markers which track text edits).
- Can be queried for their time and date stamps.
- Have a *Position* member through which manipulation of the underlying *EditBuffer* is performed. Typically this member will be used when manipulating an *EditBuffer* through script.
- Can be specified as read-only.
- Can be created as private or system buffers. System buffers are not visible in the IDE or listed in the buffer list.

A single *EditBuffer* object exists internally for each file loaded into the buffer. If you create additional representations for an edit buffer, they are attached to the existing *EditBuffer* object. Any changes to one of these representations changes the others, since they refer to the same object. All representations inherit the *IsReadOnly* and *IsPrivate* attributes of the original, because these properties are set only when the object is first created.

You can make buffers private to provide raw data storage for script usage. No undo information is maintained for private buffers, nor are they attachable to an *EditView*. Private *EditBuffer* objects should be explicitly destroyed when no longer needed using the *Destroy* method. Otherwise, they remain in memory for the duration of the IDE session.

Block property

Contains a reference to the hidden *EditBlock*.

Access Read-only

Type expected EditBlock Block

CurrentDate property

Originally set to the same value as *InitialDate* but is updated when the buffer's contents are altered.

Access Read-only

Type expected TimeStamp CurrentDate

Directory property

NULL if the *EditBuffer* is invalid; otherwise, indicates the directory path in uppercase letters.

Access Read-only

Type expected string Directory

Drive property

NULL if the *EditBuffer* is invalid; otherwise, indicates the drive in uppercase with the associated colon (:).

Access Read-only

Type expected string Drive

Extension property

NULL if the *EditBuffer* is invalid; otherwise, indicates the file extension in uppercase including the period (.), if any.

Access Read-only

Type expected string Extension

FileName property

NULL if the *EditBuffer* is invalid; otherwise, indicates the file name in uppercase.

Access Read-only

Type expected string FileName

FullName property

The name of the *EditBuffer* or **NULL** if the *EditBuffer* is invalid.

Access Read-only

Type expected string FullName

InitialDate property

The date on which the file was first created.

Access Read-only

Type expected TimeStamp InitialDate

Description If the buffer was initialized from a disk file, *InitialDate* reflects the file's age. If the file does not reside on disk, *InitialDate* holds the time at which the buffer was created. It is a read-only property.

IsModified property

Indicates if the buffer was changed since it was last opened or saved, whichever occurred most recently.

Access Read-only

Type expected bool IsModified

IsPrivate property

TRUE if the buffer was created with the *private* parameter set to **TRUE**; **FALSE**, otherwise.

Access Read-only

Type expected bool IsPrivate

IsReadOnly property

TRUE if the buffer was created with the *readOnly* parameter set to **TRUE**; **FALSE** otherwise.

Access Read-only

Type expected bool IsReadOnly

IsValid property

FALSE if the *EditBuffer* is destroyed, otherwise, **TRUE**.

Access Read-only

Type expected bool IsValid

Position property

Provides access to the *EditPosition* instance for this *EditBuffer*.

Access Read-only

Type expected EditPosition Position

TopView property

The topmost *EditView* that contains this *EditBuffer*. **NULL** if no view is associated with the buffer.

Access Read-only

Type expected EditView TopView

ApplyStyle method

Updates the *EditOptions.BufferOptions* property with the contents of *styleToApply*.

Types expected void ApplyStyle(EditStyle styleToApply)

styleToApply The *EditStyle* object to apply.

Return value None

BlockCreate method

Creates an edit block for the *EditBuffer*.

Types expected EditBlock BlockCreate()

Return value The edit block.

Describe method

Invoked during buffer list creation by an *Editor* object. Returns a text description of the buffer, as in:

- FOO.CPP(modified)
- BAR.CPP

Types expected string Describe()

Return value None

Destroy method

Removes the buffer from the IDE's buffer list and does not save any changes.

Types expected bool Destroy()

Return value **TRUE** if the buffer was actually destroyed, or **FALSE** if views relying on it still exist.

Description When private *EditBuffer* objects are longer needed, you should always explicitly destroy them.

NextBuffer method

Finds the next edit buffer in the buffer list.

Types expected EditBuffer NextBuffer(bool privateToo)

privateToo **TRUE** if private buffers are to be included in the buffer list, **FALSE** otherwise.

Return value The edit buffer found or **NULL** if none is found.

Description The buffer list is circular, so if a buffer exists, it will be found. However, if all buffers are private and if *privateToo* is set to **FALSE**, no buffer will be found.

NextView method

Returns the next *EditView* containing this *EditBuffer*.

Types expected EditView NextView(EditView next)

next The view to use in getting the next associated view for this edit buffer. Start traversing the view list by passing the value of *TopView* to this method.

Return value None

Description An *EditBuffer* is a representation of the contents of a file. An *EditView* is used to provide a visual representation of the *EditBuffer*. The same *EditBuffer* can be displayed simultaneously to the user in different *EditViews* (for example, two edit windows can be open on the same file). This method enables you to cycle through all the *EditViews* representing this *EditBuffer*.

PositionCreate method

Creates an *EditPosition* object.

Types expected EditPosition PositionCreate()

Return value None

Print method

Prints this buffer.

Types expected bool Print()

Return value **TRUE** if the print was successful or **FALSE** if the print failed.

PriorBuffer method

Finds the previous edit buffer in the buffer list.

Types expected EditBuffer PriorBuffer(bool privateToo)

privateToo **TRUE** if private buffers are to be included in the buffer list, **FALSE** otherwise.

Return value The edit buffer found or **NULL** if none is found

Description The buffer list is circular, so if a buffer exists, it will be found. However, if all buffers are private and if *privateToo* is set to **FALSE**, no buffer will be found.

Rename method

Changes the *EditBuffer* name.

Types expected bool Rename(string newName)

newName The new name of the buffer.

Return value **TRUE** if the operation succeeded or **FALSE** if it failed

Description *Rename* fails when an *EditBuffer* with the new name is already in the buffer list. If a file with the new name already exists on disk, it is overwritten when this buffer is saved.

Save method

Writes the file associated with the buffer to disk.

Types expected int Save([string newName])

newName The new name of the file.

Return value The number of bytes written or 0 if the save was unsuccessful.

Description Saves the file whether it was modified or not. *Save* uses the current name of the file or *newName* if it is specified.

AttemptToModifyReadOnlyBuffer event

Triggered when an attempt is made to modify a read-only buffer.

Note For the *EditBuffer* to be read-only, it must be created with the *readOnly* parameter set to **TRUE**. Creating an *EditBuffer* from a read-only file does not create a read-only buffer.

Types expected void AttemptToModifyReadOnlyBuffer()

Return value None

AttemptToWriteReadOnlyFile event

Triggered when an attempt is made to write the contents of an *EditBuffer* to a read-only file. The buffer may or may not have been created as read-only.

Types expected void AttemptToWriteReadOnlyBuffer()

Return value None

HasBeenModified event

Triggered when a buffer has been modified for the first time.

Types expected void HasBeenModified()

Return value None

Chapter

12

EditOptions class

This class is one of the editor classes. *EditOptions* class members hold editor characteristics of a global nature.

Syntax EditOptions()

Properties

string BackupPath	Read-write
int BlockIndent	Read-write
BufferOptions BufferOptions	Read-only
string MirrorPath	Read-write
string OriginalPath	Read-write
string SyntaxHighlightTypes	Read-write
bool UseBRIEFCursorShapes	Read-write
bool UseBRIEFRegularExpression	Read-write

Methods

None

Events

None

EditOptions class description

The *EditOptions* object holds editor characteristics of a global nature, such as:

- Whether to create backups
- The destination paths for backups
- The insert/overtype setting
- The optimal fill setting
- Handling of blocks cut or copied from the buffer (scrap manipulation)
- The default regular expression language

Property values are initialized from global defaults during construction.

BackupPath property

Contains the path where the editor stores back ups.

Access Read-write

Type expected string BackupPath

Description In the IDE, *BackupPath* is set with the BackupPath option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | File.

BlockIndent property

Indents or outdents a block of characters.

Access Read-write

Type expected int BlockIndent

Description *BlockIndent* indicates the number of characters to indent or outdent a block of characters. The value must be between 1 and 16.

In the IDE, *BlockIndent* is set with the Block Indent option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | Options.

BufferOptions property

Holds the buffer options settings for all edit buffers.

Access Read-only

Type expected BufferOptions BufferOptions

MirrorPath property

Holds the path where the editor stores mirror copies of files.

Access Read-write

Type expected string MirrorPath

Description In the IDE, *MirrorPath* is set with the Mirror Path option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | File.

OriginalPath property

Holds the path where the editor stores the original files.

Access Read-write

Type expected string OriginalPath

Description In the IDE, *OriginalPath* is set with the Original Path option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | File.

SyntaxHighlightTypes property

Holds the file extensions, or file names, of the file types for which syntax highlighting is to be enabled in the editor.

Access Read-write

Type expected string SyntaxHighlightTypes

Description Wild cards are permitted. Separate multiple names/extensions with a semicolon.

In the IDE, *SyntaxHighlightTypes* is set with the Syntax Extensions option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Syntax Highlighting.

Example

```
//Example of SyntaxHighlightTypes
JavaSyntaxHighlight( yes ) {
 if ( yes ) {
   IDE.Editor.Options.BufferOptions.TokenFileName = "java.tok";
   // enable syntax highlighting for .java files
   IDE.Editor.Options.SyntaxHighlightTypes = "*.java";
 }
 else {
   IDE.Editor.Options.BufferOptions.TokenFileName = ""; // C++
   // enable syntax highlighting for standard C++ files
   IDE.Editor.Options.SyntaxHighlightTypes =
     "*.cpp;*.c;*.h;*.hpp;*.rh;*.rc";
 }
 //-- redraw with new option settings --
 declare EditStyle es;
 IDE.Editor.ApplyStyle( es );
}
```

UseBRIEFCursorShapes property

When **TRUE**, the editor uses the default cursor shapes that Brief provides for insert mode and overtype mode.

Access Read-write

Type expected bool UseBRIEFCursorShapes

Description In the IDE, *UseBRIEFCursorShapes* is set with the BRIEF Cursor Shapes option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | Display.

UseBRIEFRegularExpression property

When **TRUE**, complex search and search/replace operations can be performed using the Brief regular expression syntax.

Access Read-write

Type expected bool UseBRIEFRegularExpression

Description In the IDE, *UseBRIEFRegularExpressions* is set with the BRIEF Regular Expressions option of the Environment Options dialog. To display this dialog box, choose Options | Environment | Editor | Options.

Chapter

13

EditPosition class

This is one of the editor classes. *EditPosition* class members provide positioning functionality related to the active location in an *EditView* or *EditBuffer*.

Syntax EditPosition(EditBuffer)
EditPosition(EditView)

Properties

int Character	Read-only
int Column	Read-only
bool IsSpecialCharacter	Read-only
bool IsWhiteSpace	Read-only
bool IsWordCharacter	Read-only
int LastRow	Read-only
int Row	Read-only
SearchOptions SearchOptions	Read-only

Methods

void Align(int magnitude)

bool BackspaceDelete([int howMany])

bool Delete([int howMany])

int DistanceToTab(int direction)

bool GotoLine(int lineNumber)

void InsertBlock(EditBlock block)

void InsertCharacter(int characterToInsert)

void InsertFile(string fileName)

void InsertScrap()

void InsertText(string text)

bool Move([int row, int col])

bool MoveBOL()

bool MoveCursor(moveMask)

bool MoveEOF()

bool MoveEOL()

bool MoveReal([int row, int col])

bool MoveRelative([int deltaRow, int deltaCol])

string Read([int numberOfChars])

bool Replace([string pat, string rep, bool case, bool useRE, bool dir, int reFlavor, bool global, EditBlock block])

bool ReplaceAgain()

void Restore()

string RipText(string legalChars [,int ripFlags])

void Save()

int Search([string pat, bool case, bool useRE, bool dir, int reFlavor, EditBlock block])

int SearchAgain()

void Tab(int magnitude)

Events

None

EditPosition class description

An *EditPosition* object is the point at which operations occur within the *EditBuffer*. One *EditPosition* object exists for each *EditBuffer* and each *EditView*. In the *EditView*, the cursor location visually represents the *EditPosition*'s current location.

Since each *EditView* can have its own *EditPosition* object, you can have multiple *EditViews* at multiple locations. Additionally, the *EditBuffer*'s *EditPosition* object maintains its own location information.

Character property

Integer value of the character at this position or one of the following values:

VIRTUAL_TAB

VIRTUAL_PAST_EOF

VIRTUAL_PAST_EOL

Access Read-only

Type expected int Character

Column property

The current column position in the buffer. To change, use one of the following *EditPosition* methods:

Move	*MoveBOL*	*MoveCursor*	*MoveEOF*
MoveEOL	*MoveReal*	*MoveRelative*	

Access Read-only

Type expected int Column

IsSpecialCharacter property

TRUE if the character at the current edit position is not an alphanumeric or whitespace character; **FALSE** otherwise.

Access Read-only

Type expected bool IsSpecialCharacter

IsWhiteSpace property

TRUE if the character at the current edit position is a *Tab* or *Space*; **FALSE**, otherwise.

Access Read-only

Type expected bool IsWhiteSpace

IsWordCharacter property

TRUE if the character at the current edit position is an alphabetic character, numeric character or underscore. Otherwise, **FALSE**.

Access Read-only

Type expected bool IsWordCharacter

LastRow property

The line number of the last line in the edit buffer.

Access Read-only

Type expected int LastRow

Row property

The current row position in the buffer. To change, use one of the following *EditPosition* methods:

Move	*MoveBOL*	*MoveCursor*	*MoveEOF*
MoveEOL	*MoveReal*	*MoveRelative*	

Access Read-only

Type expected int Row

SearchOptions property

Contains an instance of the *SearchOptions* class, the options currently in place for searching.

Access Read-only

Type expected SearchOptions SearchOptions

Align method

Positions the insertion point on the current line, aligning it with columns calculated from prior lines in the file.

Types expected void Align(int magnitude)

magnitude If positive, enough characters are inserted to align the character position as follows:

- Starting with the column defined by the current character position on the current line, the character is aligned with the first character after the first white space on the previous line after the column position.
- If the previous line is too short to calculate a position on the current line, previous lines are scanned until finding one that is long enough to calculate a column position.

If negative, the column position is moved to the left.

Return value None

Example Assume that two lines of code contain the text "Leaning over the console, she stuck out her hand and said," and "'Hello there, buddy.'" The cursor (^) is in column 2 on the current line.

```
Leaning over the console, she stuck out her hand and said,
"How are you, buddy"
 ^
```

Calling `Align(1)` results in:

```
Leaning over the console, she stuck out her hand and said,
"How are you, buddy."
      ^
```

Calling `Align(1)` again results in:

```
Leaning over the console, she stuck out her hand and said,
"How are you, buddy."
          ^
```

Calling `Align(1)` again results in:

```
Leaning over the console, she stuck out her hand and said,
"How are you  buddy."
              ^
```

Calling `Align(-1)` results in:

```
Leaning over the console, she stuck out her hand and said,
"Hello there, buddy."
           ^
```

BackspaceDelete method

Deletes characters to the left of the current position.

Types expected bool BackspaceDelete([int howMany])

howMany The number of characters to delete. The default is 1.

Return value **TRUE** if any characters are deleted; **FALSE** if there are no characters to the left.

Delete method

Deletes characters to the right of the current position.

Types expected bool Delete([int howMany])

howMany The number of characters to delete. The default is 1.

Return value **TRUE** if any characters are deleted; **FALSE** if there are no characters to the right.

DistanceToTab method

Retrieves the number of character positions between the current cursor position and the next/previous tab stop.

Types expected int DistanceToTab(int direction)

direction Either SEARCH_FORWARD or SEARCH_BACKWARD. SEARCH_FORWARD is the default.

Return value Number of character positions between the current cursor position and the next/previous tab stop.

GotoLine method

Moves the cursor to the specified line, without changing column position.

Types expected bool GotoLine(int lineNumber)

lineNumber The number of the line to change to. If *lineNumber* is not specified, the user is prompted for a line number.

Return value **TRUE** if the move was successful, **FALSE**, otherwise.

InsertBlock method

Inserts the last marked block at the current cursor position.

Types expected void InsertBlock(EditBlock block)

block Restricts the search to the indicated block.

Return value None

InsertCharacter method

Inserts a character at the current cursor position.

Types expected void InsertCharacter(int characterToInsert)

characterToInsert The integer value of the character to insert.

Return value None

InsertFile method

Inserts the contents of the specified file at the current cursor position.

Types expected void InsertFile(string fileName)

fileName The name of the file to insert.

Return value None

InsertScrap method

Insert text in the Windows Clipboard at the current cursor position.

Types expected void InsertScrap()

Return value None

InsertText method

Inserts the specified string at the current cursor position.

Types expected void InsertText(string text)

text The string to insert.

Return value None

Move method

Moves the cursor to the specified row and column.

Types expected bool Move([int row, int col])

row The number of the row to move to.

col The number of the column to move to.

Return value The return value, **TRUE** or **FALSE**, indicates whether the position actually changed.

Description *Move* attempts to position:

- The column at 0 or less
- The column at 1025 or more
- The row at 0 or less

MaxLineNumber + 1 or more are invalid. *MaxLineNumber* depends on the computer's capacity.

MoveBOL method

Moves the cursor to the first character on the current line.

Types expected bool MoveBOL()

Return value The return value, **TRUE** or **FALSE**, indicates whether the position actually changed.

Description *MoveBOL* attempts to position:

- The column at 0 or less
- The column at 1025 or more
- The row at 0 or less

MaxLineNumber + 1 or more are invalid. *MaxLineNumber* depends on the computer's capacity.

MoveCursor method

Moves the current position forward or backward in the buffer.

Types expected bool MoveCursor(moveMask)

moveMask The position to move the cursor to. The value of *moveMask* can be built from the one of the following:

SKIP_WORD (default)

SKIP_NONWORD

SKIP_WHITE

SKIP_NONWHITE

SKIP_SPECIAL

SKIP_NONSPECIAL.

These masks can be combined with SKIP_LEFT (default) or SKIP_RIGHT. SKIP_STREAM can also be used with any of these combinations if line ends are ignored.

Return value The return value, **TRUE** or **FALSE**, indicates whether the position actually changed.

Description *MoveCursor* attempts to position:

- The column at 0 or less
- The column at 1025 or more
- The row at 0 or less

MaxLineNumber + 1 or more are invalid. *MaxLineNumber* depends on the computer's capacity.

MoveEOF method

Moves the current position to the last character in the file.

Types expected bool MoveEOF()

Return value The return value, **TRUE** or **FALSE**, indicates whether the position actually changed.

Description *MoveEOF* attempts to position:

- The column at 0 or less
- The column at 1025 or more
- The row at 0 or less

MaxLineNumber + 1 or more are invalid. *MaxLineNumber* depends on the computer's capacity.

MoveEOL method

Moves the current position to the last character on the line.

Types expected bool MoveEOL()

Return value The return value, **TRUE** or **FALSE**, indicates whether the position actually changed.

Description *MoveEOL* attempts to position:

- The column at 0 or less
- The column at 1025 or more
- The row at 0 or less

MaxLineNumber + 1 or more are invalid. *MaxLineNumber* depends on the computer's capacity.

MoveReal method

The position assumes that the file is unedited. If edits have been made to the file, the move is relative to the original, unedited file.

Types expected bool MoveReal([int row, int col])

row The number of the row to move the cursor to. *row* is relative to the line numbers in the original, unedited file.

col The number of the column to move the cursor to. *column* is relative to the column numbers in the original, unedited file.

Return value The return value, **TRUE** or **FALSE**, indicates whether the position actually changed.

Description *MoveReal* attempts to position:

- The column at 0 or less
- The column at 1025 or more
- The row at 0 or less

MaxLineNumber + 1 or more are invalid. *MaxLineNumber* depends on the computer's capacity.

For example, assume that the original, unedited file is a two-line file with the word ONE on the first line and the word TWO on the second line. The user

subsequently inserts 100 lines of text after line 1. `MoveReal(2,1)` moves the cursor to the "T" in "TWO".

MoveRelative method

Moves the cursor the specified number of rows and columns from the current row and column position.

Types expected bool MoveRelative([int deltaRow, int deltaCol])

deltaRow	The number of rows to move the cursor. *deltaRow* is relative to the current row number.
deltaCol	The number of columns to move the cursor. *deltaCol* is relative to the current column number.

Return value The return value, **TRUE** or **FALSE**, indicates whether the position actually changed.

Description *MoveRelative* attempts to position:

- The column at 0 or less
- The column at 1025 or more
- The row at 0 or less

MaxLineNumber + 1 or more are invalid. *MaxLineNumber* depends on the computer's capacity.

Read method

Reads the specified number of characters.

Types expected string Read([int numberOfChars])

numberOfChars	The number of characters to read from the current cursor position. If omitted, it reads to the end of the line.

Return value A string containing the characters read

Replace method

Searches *EditBuffer* in the indicated direction for the search expression. The expression is replaced with the specified expression.

Types expected bool Replace([string pat, string rep, bool case, bool useRE, bool dir, int reFlavor, bool global, EditBlock block])

pat	The string to search for.
rep	The string to replace with.
case	Indicates if the case of *pat* is significant in the search.
useRE	Indicates whether or not to interpret *pat* as a regular expression string.
dir	One of the following: SEARCH_FORWARD (default) SEARCH_BACKWARD
reFlavor	The type of regular expression being used; it may be one of the following: IDE_RE (default) BRIEF_RE BRIEF_RE_FORWARD_MIN BRIEF_RE_SAME_MIN BRIEF_RE_BACK_MIN BRIEF_RE_FORWARD_MAX BRIEF_RE_SAME_MAX BRIEF_RE_BACK_MAX
block	If given, restricts the search to the indicated block.

Return value **TRUE** if the replace operation was successful, **FALSE**, otherwise.

ReplaceAgain method

Repeats the most recently performed *Replace* operation.

Types expected bool ReplaceAgain()

Return value **TRUE** if the replace operation was successful, **FALSE**, otherwise.

Restore method

Restores the cursor position to the position saved by the last call to the *Save* method.

Types expected void Restore()

Return value None

RipText method

Performs an edit rip operation. This routine can rip an entire line.

Types expected string RipText(string legalChars [,int ripFlags])

legalChars Determines the legal characters to include in the edit rip. If *legalChars* is omitted,

INCLUDE_ALPHA_CHARS

INCLUDE_NUMERIC_CHARS

INCLUDE_SPECIAL_CHARS

are all automatically added to the *ripFlags* argument, making any character beween ASCII decimal 32 and 128 a legal character. A rip can be halted by specifying a character in *legalChars* then using INVERT_LEGAL_CHARS as the *ripFlags* parameter.

ripFlags A mask built by combining any or all of the following values:

Value	Description
BACKWARD_RIP	Rip from left to right.
INVERT_LEGAL_CHARS	Interpret the *legalChars* string as the inverse of the string you wish to use for *legalChars*. In other words, specify `t` to mean any ASCII value between 1 and 255 except `t`.
INCLUDE_LOWERCASE_ALPHA_CHARS	Append the characters `abcdefghijklmnopqrstuvwxyz` to the *legalChars* string.
INCLUDE_UPPERCASE_ALPHA_CHARS	Append the characters `ABCDEFGHIJKLMNOPQRSTUVWXYZ` to the *legalChars* string.
INCLUDE_ALPHA_CHARS	Append both uppercase and lowercase alpha characters to the *legalChars* string.
INCLUDE_NUMERIC_CHARS	Append the characters `1234567890` to the *legalChars* string.
INCLUDE_SPECIAL_CHARS	Append the characters `` `-=[]\;',./~!@#$%^&*()_+{}|:"<>? `` to the legalChars string.

Return value The string copied from the edit buffer.

Save method

Save the current cursor position. Use *Restore* to later restore the cursor to this position.

Types expected void Save()

Return value None

Search method

Searches the edit buffer for the search expression.

Types expected int Search(string pat [, bool case, bool useRE, bool dir, int reFlavor, EditBlock block])

pat	The string to search for.
case	Indicates if the case of *pat* is significant in the search.
useRE	Indicates whether or not to interpret *pat* as a regular expression.
dir	One of the following: SEARCH_FORWARD (default) SEARCH_BACKWARD
reFlavor	The type of regular expression in use; it may be one of the following: IDE_RE (default) BRIEF_RE BRIEF_RE_FORWARD_MIN / / same as BRIEF_RE BRIEF_RE_SAME_MIN BRIEF_RE_BACK_MIN BRIEF_RE_FORWARD_MAX BRIEF_RE_SAME_MAX BRIEF_RE_BACK_MAX
block	If given, restricts the search to the indicated block.

Note If *case*, *useRE*, or *reFlavor* is not supplied, the value is determined by querying the *Editor* object.

Return value The size (in characters matched) of the match.

SearchAgain method

Repeats the most recently performed *Search* operation.

Types expected int SearchAgain()

Return value The number of matches found.

Tab method

Moves the current cursor location to the next or previous tab stop.

Types expected void Tab(int magnitude)

magnitude If positive, moves the cursor to the next tab stop. If negative, moves to the previous tab stop.

Return value None

Chapter

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EditStyle class

This class is one of the editor classes. *EditStyle* applies styles that overrride settings for a buffer or for the entire editor.

Syntax EditStyle(string styleName[,EditStyle styleToInitializeFrom])

styleName	The name of the style to create.
styleToInitializeFrom	The name of the style to initialize from.

Properties

EditOptions EditMode	Read-write
int Identifier	Read-only
string Name	Read-write

Methods

None

Events

None

EditStyle class description

EditStyle objects provide a mechanism to collect *EditOptions*, name them, and apply them across buffers, across the entire Editor, or both. You can store all

your preferred settings for the editor in an *EditStyle* object and apply them to an editor all at once.

EditStyle objects contain:

- An *EditOptions* member
- A name
- An internal filter that indicates the characteristics that the style controls

EditStyles are implicitly persistent. The list of available styles may be traversed from the *Editor* object.

EditMode property

Contains an *EditOptions* object that defines the options for the style.

Access Read-write

Type expected EditOptions EditMode

Identifier property

Identifies styles with a unique integer.

Access Read-only

Type expected int Identifier

Name property

A unique name for this *EditStyle,* taken from the *styleName* parameter.

Access Read-write

Type expected string Name

Chapter

15

EditView class

This class is one of the editor classes. *EditView* class members provide the visual representation of the *EditBuffer*.

- Each edit view has only one edit buffer.
- Each edit view is in an edit window.

Syntax EditView (EditWindow parent[, EditBuffer buffer])

parent	The edit window.
buffer	The currently active buffer. If *buffer* is omitted, the parent's currently active *EditBuffer* is used.

Properties

EditBlock Block	Read-write
int BottomRow	Read-only
EditBuffer Buffer	Read-only
int Identifier	Read-only
bool IsValid	Read-only
bool IsZoomed	Read-write
int LastEditColumn	Read-only
int LastEditRow	Read-only
int LeftColumn	Read-only
EditView Next	Read-only
EditPosition Position	Read-only

EditView Prior	Read-only
int RightColumn	Read-only
int TopRow	Read-only
EditWindow Window	Read-only

Methods

EditBuffer Attach(EditBuffer buffer)

bool BookmarkGoto(int bookmarkIDorPrevRef)

int BookmarkRecord(int bookmarkIDorPrevRef)

void Center([int row, int col])

void MoveCursorToView()

void MoveViewToCursor()

void PageDown()

void PageUp()

void Paint()

int Scroll(int deltaRow[, int deltaCol])

void SetTopLeft(int topRow, int leftCol)

Events

None

EditView class description

EditView objects provide an editing window for the current buffer. The frame of an *EditView* is an *EditWindow*. Each view has a direct relationship to an *EditBuffer*. During creation, the *EditView*'s *Position* member is initialized from the *EditBuffer*'s *Position* member.

Edit views:

- Have methods that traverse their sibling views.
- Can be queried to find the associated *EditWindow* or *EditBuffer*.
- Have a *Position* member that manipulates the underlying *EditBuffer*. Typically this member is used by scripts and primitives tied to the user interface.

The underlying *EditBuffer* object owns the list of bookmarks (position markers that track text edits). Use *EditView.BookmarkRecord* and

EditView.BookmarkGoto to provide access to those bookmarks. A common list of bookmarks is maintained for the same buffer regardless of the view being used.

Block property

Provides access to the instance of the *EditBlock* class attached to this *EditView*.

Access Read-write

Type expected EditBlock Block

BottomRow property

Row number displayed at the last line in the view.

Access Read-only

Type expected int BottomRow

Buffer property

Returns the *EditBuffer* to which the view is attached.

Access Read-only

Type expected EditBuffer Buffer

Identifier property

A unique identifier for each view.

Access Read-only

Type expected int Identifier

IsValid property

TRUE if the view is valid, **FALSE** if it is not.

Access Read-only

Type expected bool IsValid

Description The view will be invalidated if it is destroyed by the user.

IsZoomed property

Zooms the view.

Access Read-write

Type expected bool IsZoomed

Description A zoomed *EditView* expands to occupy the entire *EditWindow* client space. If an *EditView* is zoomed in an *EditWindow*, you cannot manipulate sibling views by creating, resizing or deleting them.

LastEditColumn property

Identifies the position of the most recent edit.

Access Read-only

Type expected int LastEditColumn

Description *LastEditColumn* works in conjunction with *LastEditRow* to identify the character position of the most recent edit. An edit modifies the contents of the buffer and occurs as a character or block insertion or deletion.

LastEditRow property

Identifies the position of the most recent edit.

Access Read-only

Type expected int LastEditRow

Description *LastEditRow* works in conjunction with *LastEditColumn* to identify the character position of the most recent edit. An edit modifies the contents of the buffer and occurs as a character or block insertion or deletion.

LeftColumn property

Column number displayed at the left edge of the view.

Access Read-only

Type expected int LeftColumn

Next property

The next *EditView* embedded in the same window.

Access Read-only

Type expected EditView Next

Position property

Provides access to the instance of the *EditPosition* class attached to this *EditView*.

Access Read-only

Type expected EditPosition Position

Prior property

The previous *EditView* embedded in the same window.

Access Read-only

Type expected EditView Prior

RightColumn property

Column number displayed at the right edge of the view.

Access Read-only

Type expected int RightColumn

TopRow property

Row number displayed at the first line in the view.

Access Read-only

Type expected int TopRow

Window property

Returns the window in which this view is embedded.

Access Read-only

Type expected EditWindow Window

Attach method

Attaches the view to a new *EditBuffer*.

Types expected EditBuffer Attach(EditBuffer buffer)

buffer The name of the buffer to attach to.

Return value The previous edit buffer

Description *Attach* replaces the currently attached edit buffer. When a view is created, it is associated with an *EditBuffer*. The purpose of the view is to provide a visual representation of the edit buffer to which it is attached.

For example, to display a current view in a different edit buffer, use *Attach* to switch its associated buffer to another edit buffer.

BookmarkGoto method

Updates the *EditBuffer* position with the value from the specified marker.

Types expected bool BookmarkGoto(int bookmarkIDorPrevRef)

bookmarkIDorPrevRef Either an index (range 0–19) to the list of bookmarks in the buffer or a reference to a bookmark that was returned from a previous call to *BookmarkRecord*.

Return value **TRUE** if the marker is valid, **FALSE** otherwise.

BookmarkRecord method

Returns a value suitable for passing to *BookmarkGoto*. Returns zero if there was an error.

Types expected int BookmarkRecord(int bookmarkIDorPrevRef)

bookmarkIDorPrevRef Either an index (range 0–19) to the list of bookmarks in the buffer or a reference to a bookmark that was returned from a previous call to *BookmarkRecord*.

Return value None

Description Use *BookmarkRecord* to store a known location in a buffer. The bookmark moves with edit inserts and deletes.

For example, if you insert a bookmark using `BookMarkRecord(1)` at the `a` in *are* in the following line, you could move around and then return to that location with *BookmarkGoto(1)*:

```
hello how are you?
```

If the word *how* were deleted, you would still return to the *a* in *are*.

Center method

Scrolls the *EditView* as necessary to center the character in the view window.

Types expected void Center([int row, int col])

row The number of the row to center the character to. A 0 does not change the row number.

col The number of the column to center the character to. A 0 does not change the column number.

Return value None

Description *Center* centers the character at the specified position vertically or horizontally or both. If the character is already centered, nothing happens.

MoveCursorToView method

Ensures that the cursor is visible in the view by altering the cursor's position, if necessary.

Types expected void MoveCursorToView()

Return value None

MoveViewToCursor method

Ensures that the cursor is visible in the view by altering the view's coordinates, if necessary.

Types expected void MoveViewToCursor()

Return value None

PageDown method

Advances the row position by the number of visible rows in the *EditView*.

Types expected void PageDown()

Return value None

PageUp method

Moves the cursor toward the top of the buffer by the number of lines in the visible rows in the *EditView*.

Types expected void PageUp()

Return value None

Paint method

Forces a screen refresh. During normal script execution, screen updates are suppressed.

Types expected void Paint()

Return value None

Scroll method

Scrolls in the direction indicated and returns the number of lines actually scrolled.

Types expected int Scroll(int deltaRow[, int deltaCol])

deltaRow The direction in which to scroll.

- A value less than 0 means scroll up by the specified number of lines.
- A value greater than 0 means scroll down by the specified number of lines.

deltaCol The magnitude of the scroll.

- A value less than 0 means scroll left by the specified number of columns.
- A value greater than 0 means scroll down by the specified number of columns.

Return value Number of lines and columns scrolled.

SetTopLeft method

Attempts to position the character at the specified position in the upper left corner of the *EditView*. Might fail if the position is outside the window's bounds.

Types expected void SetTopLeft(int topRow, int leftCol)

topRow The row number of the upper left corner of the *EditView*. A 0 ignores the position request and sets only the column number.

leftCol The column number of the upper left corner of the *EditView*. A 0 ignores the position request and sets only the row number.

Note A zero in both parameters causes the method to be ignored altogether.

Return value None

Chapter

16

EditWindow class

This class is one of the editor classes. *EditWindow* class members provide control of editor views.

Syntax EditWindow(EditBuffer buffer)

buffer The name of the EditBuffer to create.

Properties

int Identifier	Read-only
bool IsHidden	Read-write
bool IsValid	Read-only
EditWindow Next	Read-only
EditWindow Prior	Read-only
string Title	Read-write
EditView View	Read-only

Methods

void Activate()

void Close()

void Paint()

EditView ViewActivate(int direction[, EditView srcView])

EditView ViewCreate(int direction[, EditView srcView])

bool ViewDelete(int direction[, EditView srcView])

EditView ViewExists(int direction[, EditView srcView])

void ViewSlide(int direction[, int magnitude, EditView srcView])

Events

None

EditWindow class description

EditWindow objects manage window panes (also known as views). An *EditWindow* can contain one or more views in which each *EditView* represents different buffers.

Creation of an *EditWindow* does not cause a window to appear; it provides an object to which a view may be attached. As soon as the first view is attached to an *EditWindow*, it can be displayed.

Views can be zoomed, in which case they expand to fill the client area of their *EditWindow*. A zoomed view hides all sibling views. Sibling views are those embedded in the same *EditWindow*. As long as an *EditWindow* contains a zoomed view, views can't be created, destroyed or resized.

EditWindows can be hidden and unhidden to allow the user to free screen space and preserve the view layout.

Identifier property

Identifies views with a unique value.

Access Read-write

Type expected int Identifier

IsHidden property

Indicates if the current *EditWindow* is hidden.

Access Read-write

Type expected bool IsHidden

IsValid property

TRUE if the current *EditWindow* is ready for edit operations, **FALSE** if the window is not available (for example, it is closed).

Access Read-only

Type expected bool IsValid

Next property

Indicates the next *EditWindow*, if any.

Access Read-only

Type expected EditWindow Next

Prior property

Indicates the previous *EditWindow*, if any.

Access Read-only

Type expected EditWindow Prior

Title property

Indicates the title of the current *EditWindow*.

Access Read-write

Type expected string Title

View property

Indicates the current *EditView*.

Access Read-only

Type expected EditView View

Activate method

Brings this window to the top and gives it focus.

Types expected void Activate()

Return value None

Close method

Closes the current window.

Types expected void Close()

Return value None

Paint method

Forces a screen refresh. During normal script execution screen updates are suppressed.

Types expected void Paint()

Return value None

ViewActivate method

Makes an existing view the current, active view.

Types expected EditView ViewActivate(int direction[, EditView srcView])

direction Relative to the current *EditView* in an *EditWindow*. If *direction* is 0, and a *srcView* is specified, the specified *srcView* is activated. *direction* can be one of the following values:

UP
DOWN
LEFT
RIGHT

srcView The view to activate. If omitted, the *EditWindow*'s current *EditView* is activated.

Return value The newly activated view or NULL if no view exists

ViewCreate method

Creates an *EditView*.

Types expected EditView ViewCreate(int direction[, EditView srcView])

direction Relative to the existing *EditView(s)* in an *EditWindow*. Ignored for the first view. *direction* can be one of the following values:

UP
DOWN
LEFT
RIGHT

srcView The view to create. If omitted, the *EditWindow*'s current *EditView* is used. By default, the newly created *EditView* is not activated.

Return value The new *EditView* or **NULL** if creation failed

ViewDelete method

Deletes the view in the *direction* relative to the *srcView*, if any.

Types expected bool ViewDelete(int direction[, EditView srcView])

direction Relative to the existing *EditView(s)* in an *EditWindow* and ignored for the first view. Can be one of the following values:

UP
DOWN
LEFT
RIGHT

srcView The view to delete. If omitted, the *EditWindow*'s current *EditView* is deleted. The target view (if any) is then removed from the *EditWindow*. *srcView* is then resized to occupy the space previously held by the target view.

Return value **TRUE** if the view was deleted, **FALSE** otherwise

ViewExists method

Gets a reference to an adjoining *EditView*, if the adjoining *EditView* exists.

Types expected EditView ViewExists(int direction[, EditView srcView])

direction Relative to the current *EditView* in an *EditWindow*. Can be one of the following values:

UP
DOWN
LEFT
RIGHT

srcView If omitted, the *EditWindow*'s current *EditView* is used.

Return value The *EditView* or NULL if the *EditView* does not exist

ViewSlide method

Moves the view in the direction indicated.

Types expected void ViewSlide(int direction[, int magnitude,
EditView srcView])

direction Relative to the existing *EditView* in an *EditWindow*. Can be one of the following values:

UP
DOWN
LEFT
RIGHT

magnitude The direction (+ or –) and amount to move

srcView If omitted, the *EditWindow*'s current *EditView* is used.

Return value None

Chapter

17

Editor class

This class provides access to the IDE's internal editor. *Editor* is associated with other classes which provide the editor with its functionality.

Syntax Editor()

Properties

EditStyle FirstStyle	Read-only
EditOptions Options	Read-only
SearchOptions SearchOptions	Read-only
EditBuffer TopBuffer	Read-only
EditView TopView	Read-only

Methods

void ApplyStyle(EditStyle newOptions)

void BufferList()

BufferOptions BufferOptionsCreate()

bool BufferRedo(EditBuffer buffer)

bool BufferUndo(EditBuffer buffer)

EditBuffer EditBufferCreate(string fileName [, bool private, bool readOnly])

EditOptions EditOptionsCreate()

EditStyle EditStyleCreate(string styleName[,EditStyle toInheritFrom])

EditWindow EditWindowCreate(EditBuffer buffer)

string GetClipboard()

int GetClipboardToken()

EditWindow GetWindow([bool getLast])

bool IsFileLoaded(string filename)

EditStyle StyleGetNext(EditStyle)

bool ViewRedo(EditView view)

bool ViewUndo(EditView view)

Events

void BufferCreated(EditBuffer buffer)

void MouseBlockCreated()

void MouseLeftDown()

void MouseLeftUp()

string MouseTipRequested(EditView theView, int line, int column)

void OptionsChanged(EditorOptions newOptions)

void OptionsChanging(EditorOptions newOptions)

void ViewActivated(EditView view)

void ViewCreated(EditView newView)

void ViewDestroyed(EditView deadView)

Editor class description

The IDE instantiates an *Editor* object, which maintains undo and redo data and has methods allowing access to the list of all buffers and edit windows. Editors have a member of type *EditOptions* that controls global editor characteristics.

Although multiple instances of *Editor* objects may be created in script, they all refer to the same instance of a single C++ object internal to the IDE. Modification of one *Editor* object's options will be reflected in all *Editor* objects.

Manipulating the Editor

The Editor's functionality is accessible at a low enough level that you can mimic in script the behavior of popular editors (such as BRIEF, Epsilon, vi, and WordStar). The Editor itself is accessed through an object instantiated from the *Editor* class. Because the IDE instantiates an *Editor* object itself, any *Editor* objects you instantiate point to this internal IDE object; therefore, modifications in one *Editor* object's options are reflected in all *Editor* objects.

Further editor access is provided through the following classes:

BufferOptions	Controls characteristics of the *EditBuffer*, such as margin, tab rack, syntax highlighting, and bookmarks.
EditBlock	Cut, copy, delete, dimensions, and style.
EditBuffer	Access status, save, describe, time/date stamp.
EditOptions	Holds characteristics of a global nature, such as the insert/overtype setting, optimal fill, and scrap settings (how to handle blocks cut or copied from Editor buffers).
EditPosition	Location-dependent operations in a view or buffer: cursor movement, text rip, search, insert.
EditStyle	Provide named styles that overrride settings in a buffer or the entire editor.
EditView	Access to buffer, visual cursor manipulations, zoom.
EditWindow	Pane control, access to views.

FirstStyle property

Contains the first style in the list of editor styles.

Access Read-only

Type expected EditStyle FirstStyle

Description *FirstStyle* is usually used with the *StyleGetNext* method. At least one *EditStyle* must exist for this property to contain a valid value.

Options property

Holds the buffer options settings.

Access Read-only

Type expected EditOptions Options

Description *Options* holds the options settings for all edit buffers. Changing an option in this property affects all edit buffers.

SearchOptions property

Provides access to the instance of *SearchOptions* associated with this editor.

Access Read-only

Type expected SearchOptions SearchOptions

TopBuffer property

The current edit buffer.

Access Read-only

Type expected EditBuffer TopBuffer

TopView property

The current view.

Access Read-only

Type expected EditView TopView

Description *TopView* provides a quick way to get at the top view associated with the current edit buffer. When you create a script which operates on the current view, obtain *TopView* from the editor as outline below:

```
//Import the instance of the IDE's editor
import editor;
PrintCurrentLineAneRow()
{
   //Get the current view's EditPosition object
   declare ep=editor.TopView.Position;
   print "Row=",ep.Row,"Column=",ep.Column
}
```

ApplyStyle method

Updates the edit options.

Types expected void ApplyStyle(EditStyle newOptions)

newOptions The options for the *EditStyle* object.

Return value None

BufferList method

A text description of the buffer list.

Types expected void BufferList()

Return value None

Description The description returned in *BufferList* comes from the *EditBuffer.Describe* method.

BufferOptionsCreate method

Creates a new instance of the *BufferOptions* class.

Types expected BufferOptions BufferOptionsCreate()

Return value A *BufferOptions* object

BufferRedo method

Reapplies the last operation on the buffer or view regardless of whether the operation was performed on the *EditBuffer*, the *EditView*, an *EditBlock*, or an *EditPosition*.

Types expected bool BufferRedo(EditBuffer buffer)

buffer The name of the buffer or view to reapply the operation to.

Return value **TRUE** if there are more operations to redo, or **FALSE** if there are not

BufferUndo method

Undoes the last operation on the buffer or view regardless of whether the operation was performed on the *EditBuffer*, the *EditView*, an *EditBlock*, or an *EditPosition*.

Types expected bool BufferUndo(EditBuffer buffer)

buffer The name of the buffer or view from which to undo the operation.

Return value **TRUE** if there are more operations to undo or **FALSE** if there are not

EditBufferCreate method

Creates an edit buffer.

Types expected EditBuffer EditBufferCreate(string fileName [, bool private, bool readOnly])

fileName The name of the file associated with the edit buffer.

private Implies that the buffer is a hidden system buffer. Undo information is not retained, and the *EditBuffer is* never attachable to an *EditView*. The default value is **FALSE**.

readOnly Marks the buffer as read-only. The default value is **FALSE**. Associating a read-only file with the *EditBuffer* does not make the *EditBuffer* read-only.

Return value The edit buffer created, or **NULL** if none could be created

EditOptionsCreate method

Creates a new instance of the *EditOptions* class.

Types expected EditOptions EditOptionsCreate()

Return value An *EditOptions* object

EditStyleCreate method

Creates an edit style.

Types expected EditStyle EditStyleCreate(string styleName[,EditStyle toInheritFrom])

styleName The name of the style to create.

toInheritFrom The name of the *EditStyle* object to inherit from.

Return value The edit style created, or **NULL** if none could be created

EditWindowCreate method

Creates an edit window.

Types expected EditWindow EditWindowCreate(EditBuffer buffer)

buffer The name of the buffer to associate with this edit window.

Return value The edit window created, or **NULL** if none could be created

GetClipboard method

Returns the contents of the Windows Clipboard in a string.

Types expected string GetClipboard()

GetClipboardToken method

Returns the memory address of the Windows Clipboard contents.

Types expected int GetClipboardToken()

GetWindow method

Returns an *EditWindow*.

Types expected EditWindow GetWindow([bool getLast])

getLast The name of the window to get.

- If *getLast* is **FALSE**, *GetWindow* returns the top level window.
- If it is **TRUE**, *GetWindow* returns the last *EditWindow* in the Z-order.

getLast defaults to **FALSE**.

Return value None

IsFileLoaded method

Verifies if the specified file is loaded.

Types expected bool IsFileLoaded(string fileName)

fileName The name of the file to check for.

Return value **TRUE** if a buffer by that name exists, or **FALSE** if one doesn't.

StyleGetNext method

Gets the next style in the list of editor styles.

Types expected EditStyle StyleGetNext(EditStyle)

Return value The editor style that was found, or **NULL** if no editor style is found.

Description Use with *FirstStyle* to access the circularly linked list representing all the editor styles. At least one *EditStyle* must exist for this property to contain a valid value.

ViewRedo method

Reapplies the last operation that was undone on the buffer or view regardless of whether the operation was performed on the *EditBuffer*, the *EditView*, an *EditBlock*, or an *EditPosition*.

Types expected bool ViewRedo(EditView view)

view The name of the buffer or view to reapply the operation to.

Return value **TRUE** if there are more operations to redo, or **FALSE** if there are not

ViewUndo method

Undoes the last operation on the buffer or view regardless of whether the operation was performed on the *EditBuffer*, the *EditView*, an *EditBlock*, or an *EditPosition*.

Types expected bool ViewUndo(EditView view)

view The name of the buffer or view from which to undo the operation.

Return value **TRUE** if there are more operations to undo, or **FALSE** if there are not

BufferCreated event

Triggered when a new *EditBuffer* is created. The default action is to do nothing.

Types expected void BufferCreated(EditBuffer buffer)

buffer The name of the buffer to create.

Return value None

MouseBlockCreated event

Triggered when the user selects a block with the mouse in the top view.

Types expected void MouseBlockCreated()

Return value None

MouseLeftDown event

Triggered when the mouse left button is pressed in an Edit window.

Types expected void MouseLeftDown()

Return value None

MouseLeftUp event

Triggered when the mouse left button is released in an Edit window.

Types expected void MouseLeftUp()

Return value None

MouseTipRequested event

Raised when the mouse has remained idle over an editor window for a period of time.

Types expected string MouseTipRequested(EditView theView, int line, int column)

theView The *EditView* object describing the edit window that contains the idle mouse.

line, column The position in the edit buffer of the character the cursor is on.

Return value If this routine returns a string, it displays the string to the user as a help hint. The default implementation returns a NULL.

OptionsChanged event

Raised when the *OptionsChanging* event handler has completed and the global values have been changed.

Types expected void OptionsChanged(EditorOptions newOptions)

newOptions The new global editor options to apply.

Return value None

Description *OptionsChanged* notifies a script that needs to update the global options that those options have changed.

OptionsChanging event

Raised when leaving one of the editor MPD pages with accept.

Types expected void OptionsChanging(EditorOptions newOptions)

newOptions The new global editor options.

Return value None

Description *OptionsChanging* contains a copy of the new values for the global editor options. An event handler may examine these values and determine if any of the values need to be overridden with any values from *newOptions*.

ViewActivated event

Triggered when the *EditView* represented by *view* is activated. There is no default action for this event.

Types expected void ViewActivated(EditView view)

view The name of the view to activate.

Return value None

ViewCreated event

Triggered when the *EditView* represented by *newView* is created. There is no default action for this event.

Types expected void ViewCreated(EditView newView)

newView The name of the view to activate.

Return value None

ViewDestroyed event

Triggered when the *EditView* represented by *deadView* is destroyed. There is no default action for this event.

Types expected void ViewDestroyed(EditView deadView)

deadView The name of the view to destroy.

Return value None

Chapter

18

IDEApplication class

This class represents the Borland C++ Integrated Development Environment (IDE). An *IDEApplication* object called *IDE* is instantiated when Borland C++ starts up. You typically use this class to determine how to use or extend this IDE object.

Syntax IDEApplication()

Properties

string Application	Read-only
string Caption	Read-write
string CurrentDirectory	Read-only
string CurrentProjectNode	Read-only
string DefaultFilePath	Read-write
Editor Editor	Read-only
string FullName	Read-only
int Height	Read-write
int IdleTime	Read-only
int IdleTimeout	Read-write
int LoadTime	Read-only
string KeyboardAssignmentFile	Read-write
KeyboardManager KeyboardManager	Read-only
int Left	Read-write
string ModuleName	Read-only

string Name	Read-only
string Parent	Read-only
bool RaiseDialogCreatedEvent	Read-write
string StatusBar	Read-write
int Top	Read-write
bool UseCurrentWindowForSourceTracking	Read-write
int Version	Read-only
bool Visible	Read-write
int Width	Read-write

Methods

void AddToCredits()

bool CloseWindow()

bool DebugAddBreakpoint()

bool DebugAddWatch()

bool DebugAnimate()

bool DebugAttach()

bool DebugBreakpointOptions()

string DebugEvaluate()

bool DebugInspect()

bool DebugInstructionStepInto()

bool DebugInstructionStepOver()

bool DebugLoad()

bool DebugPauseProcess()

bool DebugResetThisProcess()

bool DebugRun()

bool DebugRunTo()

bool DebugSourceAtExecutionPoint()

bool DebugStatementStepInto()

bool DebugStatementStepOver()

bool DebugTerminateProcess()

int DirectionDialog(string prompt)

string DirectoryDialog(string prompt, string initialValue)

```
void DisplayCredits()
bool DoFileOpen(string filename, string toolName [, ProjectNode node])
bool EditBufferList()
bool EditCopy()
bool EditCut()
bool EditPaste()
bool EditRedo()
bool EditSelectAll()
bool EditUndo()
void EndWaitCursor()
void EnterContextHelpMode()
void ExpandWindow()
bool FileClose()
string FileDialog(string prompt, string initialValue)
bool FileExit( [int IDEReturn] )
bool FileNew([string toolName, string fileName])
bool FileOpen([string name, string toolName])
bool FilePrint(bool suppressDialog)
bool FilePrinterSetup()
bool FileSave()
bool FileSaveAll()
bool FileSaveAs([string newName])
bool FileSend()
int GetRegionBottom(string RegionName)
int GetRegionLeft(string RegionName)
int GetRegionRight(string RegionName)
int GetRegionTop(string RegionName)
bool GetWindowState()
void Help(string helpFile, int command, string  helpTopic)
bool HelpAbout()
bool HelpContents()
bool HelpKeyboard()
bool HelpKeywordSearch([string keyword])
```

bool HelpOWLAPI()

bool HelpUsingHelp()

bool HelpWindowsAPI()

string KeyPressDialog(string prompt, string default)

string[ ] ListDialog(string prompt, bool multiSelect, bool sorted, string [ ] initialValues)

void Menu()

bool Message(string text, int severity)

int MessageCreate(string destinationTab, string toolName, int messageType, int parentMessage, string filename, int lineNumber, int columnNumber, string text, string helpFileName, int helpContextId)

bool NextWindow(bool priorWindow)

bool OptionsEnvironment()

bool OptionsProject()

bool OptionsSave()

bool OptionsStyleSheets()

bool OptionsTools()

bool ProjectAppExpert()

bool ProjectBuildAll([bool suppressOkay, string nodeName])

bool ProjectCloseProject()

bool ProjectCompile([string nodeName])

bool ProjectGenerateMakefile([string nodeName])

bool ProjectMakeAll([bool suppressOkay, string nodeName])

bool ProjectManagerInitialize()

bool ProjectNewProject([string pName])

bool ProjectNewTarget([string nTarget, int targetType, int platform, int libraryMask, int modelOrMode])

bool ProjectOpenProject([string pName])

void Quit()

bool SaveMessages(string tabName, string fileName)

bool ScriptCommands()

bool ScriptCompileFile(string fileName)

bool ScriptModules()

bool ScriptRun([string command])

bool ScriptRunFile([string filename])

bool SearchBrowseSymbol([string sName])

bool SearchFind([string pat])

bool SearchLocateSymbol([string sName])

bool SearchNextMessage()

bool SearchPreviousMessage()

bool SearchReplace([string pat, string rep])

bool SearchSearchAgain()

bool SetRegion(string RegionName, int left, int top, int right, int bottom)

bool SetWindowState(int desiredState)

string SimpleDialog(string prompt, string initialValue [, int maxNumChars])

void SpeedMenu()

void StartWaitCursor()

string StatusBarDialog(string prompt, string initialValue [, int maxNumChars])

bool StopBackgroundTask()

bool Tool([string toolName, string commandstring])

void Undo()

bool ViewActivate(int direction)

bool ViewBreakpoint()

bool ViewCallStack()

bool ViewClasses()

bool ViewClassExpert()

bool ViewCpu()

bool ViewGlobals()

bool ViewMessage([string tabName])

bool ViewProcess()

bool ViewProject()

bool ViewSlide(int direction [, int amount])

bool ViewWatch()

bool WindowArrangeIcons()

bool WindowCascade()

bool WindowCloseAll([string typeName])

bool WindowMinimizeAll([string typeName])

bool WindowRestoreAll([string typeName])

bool WindowTileHorizontal()

bool WindowTileVertical()

string YesNoDialog(string prompt, string default)

Events

void BuildComplete(bool status, string inputPath, string OutputPath)

void BuildStarted()

void DialogCreated(string dialogName, int dialogHandle)

void Exiting()

void HelpRequested(string filename, int command, int data)

void Idle()

void KeyboardAssignmentsChanged(string newFilename)

void KeyboardAssignmentsChanging(string newFilename)

void MakeComplete(bool status, string inputPath, string outputPath)

void MakeStarted()

void ProjectClosed(string projectFileName)

void ProjectOpened(string projectFileName)

void SecondElapsed()

void Started(bool VeryFirstTime)

void SubsytemActivated(string systemName)

bool TransferOutputExists(TransferOutput output)

void TranslateComplete(bool status, string inputPath, string outputPath)

IDEApplication class description

When you start the Borland C++ IDE, the object *IDE*, in *IDEApplication*, is automatically created as a global object. IDE gives you control over the system. All items contained in menu commands can be accessed through the IDE object.

The *IDE* object is registered as a Windows automation server, so any automation controller can programmatically run the full IDE.

IDEApplication function groups

This table shows the main function groups, according to the menu they correspond to:

Table 18.1 IDEApplication function groups

Group	Description
Debug	Corresponds to the Debug menu. Use these functions to load the debugger, run it, set breakpoints, add watches, and inspect variables.
Edit	Corresponds to the Edit menu. Use these functions to undo, redo, cut, copy, paste and select text in an edit window.
File	Corresponds to the File menu. Use these functions to create, open, close, save and print files.
Help	Corresponds to the Help menu. Use these functions to display the Help contents, perform keyword searches, get help about the keyboard and get help about using help.
Options	Corresponds to the Options menu. Use these functions to set options for the project and the working environment, to customize the Tools menu and to create and edit style sheets.
Project	Corresponds to the Project menu. Use these functions to open and close a project, compile a file, build the project or rebuild the entire project.
Search	Corresponds to the Search command. Uses these functions to search for text, replace text and search for symbols.
Script	Corresponds to the Script command. Use these functions to load, run and compile script files.
View	Corresponds to the View menu. Use these commands to display the Project window, Message window, the Classes window, the Globals window, the CPU window, the Processes window, the Watches window, the Breakpoint window and the Stack window.
Window	Corresponds to the Window menu. Use these commands to arrange editor windows, close windows, minimize and maximize windows and restore them.

Application property

Contains the *IDEApplication* object's internal name.

Access Read-only

Type expected string Application

Description The internal name is used by Windows. Its presence is required by Microsoft guidelines for automation servers. It serves as a starting place for an automation controller, like Word or Excel.

Caption property

Gets and sets the caption of the Borland C++ IDE main window.

Access Read-write

Type expected string Caption

CurrentDirectory property

The application's current directory.

Access Read-only

Type expected string CurrentDirectory

Description Whenever a project file is opened, the value of *CurrentDirectory* changes to the directory containing the project file.

CurrentProjectNode property

The name of the node currently selected in the Project window.

Access Read-only

Type expected string CurrentProjectNode

Description If the Project window is closed, or if multiple nodes are selected in the Project window, *CurrentProjectNode* contains an empty string (" ").

DefaultFilePath property

The default file path for the Borland C++ IDE.

Access Read-only

Type expected string DefaultFilePath

Editor property

An instance of the Borland C++ IDE editor.

Access Read-only

Type expected Editor Editor

FullName property

Contains the string, "Borland C++ for Windows, vers. 5.02".

Access Read-only

Type expected string FullName

Height property

The height of the Borland C++ IDE main window.

Access Read-only

Type expected int Height

IdleTime property

The number of seconds since the last user-generated event.

Access Read-only

Type expected int IdleTime

IdleTimeout property

The number of seconds the IDE must remain idle before an idle event will be generated.

Access Read-write

Type expected int IdleTimeout

Description *IdleTimeOut* defaults to 180 (3 minutes).

LoadTime property

The number of milliseconds it takes for the IDE to load.

Access Read-only

Type expected int LoadTime

Description *LoadTime* reflects time through the processing of the startup script. Thereafter it remains fixed.

KeyboardAssignmentFile property

The name of the keyboard file (.KBD) most recently selected from the Options | Environment | Editor dialog.

Access Read-write

Type expected string KeyboardAssignmentFile

KeyboardManager property

An instance of the Borland C++ IDE keyboard manager.

Access Read-only

Type expected KeyboardManager KeyboardManager

Left property

The left coordinate of the IDE main window.

Access Read-write

Type expected int Left

ModuleName property

The module name of the running application, including its path. For example:

```
c:\bc5\bin\bcw.exe
```

Access Read-only

Type expected string ModuleName

Name property

The name of the Borland C++ IDE, BCW.

Access Read-only

Type expected string Name

Parent property

A value required by Windows.

Access Read-only

Type expected string Parent

Description *Parent* is required by Microsoft conventions.

RaiseDialogCreatedEvent property

Initialized to **FALSE**. Setting it to **TRUE** causes the *DialogCreated* event to be raised whenever a new dialog is created.

Access Read-write

Type expected bool RaiseDialogCreatedEvent

StatusBar property

Gets or sets the text displayed in the IDE's status bar.

Access Read-write

Type expected bool StatusBar

Top property

The top coordinate of the IDE main window.

Access Read-write

Type expected int Top

UseCurrentWindowForSourceTracking property

If **TRUE**, the IDE replaces the contents of the active Edit window whenever a new file is loaded. If **FALSE**, the IDE opens a new Edit window.

Access Read-write

Type expected bool UseCurrentWindowForSourceTracking

Version property

The value 502 for Borland C++ version 5.02.

Access Read-only

Type expected int Version

Visible property

If **TRUE**, makes the IDE visible to the user. If **FALSE**, the IDE is not visible on the screen.

Access Read-write

Type expected bool Visible

Width property

The width of the IDE main window.

Access Read-write

Type expected int Width

AddToCredits method

Adds a name to the list of developer credits in the About dialog box.

Types expected void AddToCredits()

Return value None

Description *AddToCredits* adds the new name to the end of the existing list.

Note To display developer credits, choose Help | About and press *Alt-I*.

CloseWindow method

Closes the currently selected IDE child window.

Types expected bool CloseWindow()

Return value **TRUE** if the window closed, **FALSE** if unable to close the window

DebugAddBreakpoint method

Opens the Add Breakpoint dialog.

Types expected bool DebugAddBreakpoint()

Return value **TRUE** if successful, **FALSE**, otherwise

Description *DebugAddBreakpoint* corresponds to the Debug | Add Breakpoint command.

DebugAddWatch method

Adds a watch on the current symbol.

Types expected bool DebugAddWatch()

Return value **TRUE** if successful, **FALSE**, otherwise

Description When you call *DebugAddWatch* from an active Edit window, the Add Watch dialog box contains selected text, or if no text is selected, it contains the word at the cursor.

After you add the watch, the Watches window is displayed.

DebugAddWatch corresponds to the Debug | Add Watch command.

DebugAnimate method

Lets you watch your program's execution in "slow motion."

Types expected bool DebugAnimate()

Return value **TRUE** if successful, **FALSE**, otherwise

Description *DebugAnimate* performs a continuous series of *StatementStepInto* commands.

To interrupt animation, invoke one of the following *Debugger* methods either by menu selections or by keystrokes tied to the script:

- *Run*
- *RunToAddress*
- *RunToFileLine*
- *PauseProgram*
- *Reset*
- *TerminateProgram*
- *FindExecutionPoint*

DebugAttach method

Invokes the debugger for the currently executing process.

Types expected bool DebugAttach()

Return value **TRUE** if successful, **FALSE**, otherwise

Description Use *DebugAttach* to begin a debugging session on a process that is already running. This is useful when you know approximately when the problem occurs during program execution, but you are not sure of the corresponding location in the program source code.

DebugAttach opens the Attach to Program dialog box.

DebugBreakpointOptions method

Opens the Breakpoint Condition / Action Options dialog.

Types expected bool DebugBreakpointOptions()

Return value **TRUE** if successful, **FALSE**, otherwise

Description *DebugBreakpointOptions* corresponds to the Debug | Breakpoint Options command.

DebugEvaluate method

Evaluates the current expression, such as a global or local variable or an arithmetic expression.

Types expected string DebugEvaluate()

Return value The result of the evaluation.

DebugInspect method

Opens the Inspect Expression dialog box for the current symbol.

Types expected bool DebugInspect()

Return value **TRUE** if successful, **FALSE**, otherwise

Description *DebugInspect* has effect only when the integrated debugger is paused in a program you are debugging.

DebugInspect corresponds to the Debug | Inspect command.

DebugInstructionStepInto method

Executes the next instruction, stepping into any function calls.

Types expected bool DebugInstructionStepInto()

Return value **TRUE** if successful, **FALSE**, otherwise

Description If a process is not loaded, *DebugInstructionStepInto* first loads the executable for the current project.

DebugInstructionStepOver method

Executes the next instruction, running any functions called at full speed.

Types expected bool DebugInstructionStepOver()

Return value **TRUE** if successful, **FALSE**, otherwise

Description If a process is not loaded, *DebugInstructionStepOver* first loads the executable for the current project.

DebugLoad method

Loads the current executable into the debugger.

Types expected bool DebugLoad()

Return value **TRUE** if successful, **FALSE**, otherwise

Description Upon loading, the process is run to the starting point as specified in the Options | Environment | Debugger | Debugger Behavior dialog.

If the parameter is **NULL**, this method opens the Load Program dialog.

DebugPauseProcess method

Causes the debugger to pause the current process.

Types expected bool DebugPauseProcess()

Return value **TRUE** if successful, **FALSE**, otherwise

Description *DebugPauseProcess* has an effect only if the current process is running or is animated. It corresponds to the Debug | Pause Process command.

DebugResetThisProcess method

Resets the current process to its starting point as specified in the Options | Environment | Debugger | Debugger Behavior dialog.

Types expected bool DebugResetThisProcess()

Return value **TRUE** if successful, **FALSE**, otherwise

Description *DebugResetThisProcess* corresponds to the Debug | Reset This Process command.

DebugRun method

Causes the debugger to run the current process.

Types expected bool DebugRun()

Return value **TRUE** if successful, **FALSE**, otherwise

Description If no process is loaded, *DebugRun* first loads the executable associated with the current project.

DebugRun corresponds to the Debug | Run command.

DebugRunTo method

Causes the debugger to run the current process.

Types expected bool DebugRunTo()

Return value **TRUE** if successful, **FALSE**, otherwise

Description If *DebugRunTo* is called while working with an *EditView*, the current process runs until the source at the current line in the current file is encountered.

If the current object is not an *EditView*, *DebugRunTo* runs the current process until the instruction at the current address is encountered.

If no process is loaded, *DebugRunTo* first loads the executable associated with the current project.

DebugSourceAtExecutionPoint method

Displays the source code at the current execution point.

Types expected bool DebugSourceAtExecutionPoint()

Return value **TRUE** if successful, **FALSE**, otherwise

Description The current execution point is indicated by the EIP register. If the current execution point is in source code, the execution point is shown in an Edit window. (The appropriate source file is opened if necessary.)

If the current execution point is at an address that has no source associated with it, the execution point is shown in a CPU view. (One is opened if necessary.)

DebugSourceAtExecutionPoint corresponds to the Debug | Source At Execution Point command.

DebugStatementStepInto method

Executes the next source statement and steps through the source of any function calls.

Types expected bool DebugStatementStepInto()

Return value **TRUE** if successful, **FALSE**, otherwise

Description If a process is not loaded, *DebugStatementSetpInto* first loads the executable for the current project.

DebugStatementStepOver method

Executes the next source statement and does not step into any functions called, but runs them at full speed.

Types expected bool DebugStatementStepOver()

Return value **TRUE** if successful, **FALSE**, otherwise

Description If a process is not loaded, *DebugStatementStepOver* first loads the executable for the current project.

DebugTerminateProcess method

Terminates the current process.

Types expected bool DebugTerminateProcess()

Return value **TRUE** if successful, **FALSE**, otherwise

Description *DebugTerminateProcess*:

- Stops the current debugging session
- Releases memory your program has allocated and some of the memory used by the debugger
- Closes any open files that your program was using

If no process is loaded, *DebugTerminateProcess* has no effect.

DebugTerminateProcess corresponds to the Debug | Terminate Process command.

DirectionDialog method

Invokes a dialog that allows the user to specify a direction.

Types expected int DirectionDialog(string prompt)

prompt The value to place in the caption of the dialog.

Return value One of the following values: CANCEL, RIGHT, LEFT, UP, DOWN

DirectoryDialog method

Invokes a directory-browsing dialog box that lets the user choose a directory.

Types expected string DirectoryDialog(string prompt, string initialValue)

prompt The value to place in the caption of the dialog.

initialValue The directory in which to start browsing.

Return value If successful, this method returns a fully qualified directory name. If the user cancels, it returns the empty string (" ").

DisplayCredits method

Displays the list of developer credits in the About dialog box.

Types expected void DisplayCredits()

Return value None

Description To display developer credits, choose Help | About and press *Alt-I*.

DoFileOpen method

Opens the specified file.

Types expected bool DoFileOpen(string fileName, string toolName [,ProjectNode node])

fileName The name of the file to open. If the specified file does not exist, it is created.

toolName The name of the tool to be associated with the file to open. Tools can be stand-alone programs (like GREP, Turbo Debugger, or an alternate editor), or they can be translators that are used for each file (or node) in a project. You can run a DOS program with the Windows IDE transfer. If *toolName* is not provided, a default is used.

node The *node* argument is passed if the file is to be associated with a specific node in the project.

Return value **TRUE** is successful, **FALSE**, otherwise

Description *DoFileOpen* is used internally by the *FileOpen* method to open files.

EditBufferList method

Displays the Buffer List dialog.

Types expected bool EditBufferList()

Return value **TRUE** if the buffer list was successfully edited, **FALSE** if no edit buffers exist

Description The Buffer List displays a list of buffers. If a file has been changed since it was last saved, the label **(modified)** appears after the file name.

Use *EditBufferList* to replace the contents of an Edit window without closing the original file. If the file you replace is not loaded in another Edit window, it is hidden. You can then later use the buffer list to load the hidden buffer into an Edit window.

EditBufferList corresponds to the Edit | Buffer List command.

EditCopy method

Copies selected text from the current edit buffer to the Windows Clipboard.

Types expected bool EditCopy()

Return value **TRUE** if the topmost window is an *EditView* with a valid marked block, **FALSE**, otherwise

Description *EditCopy* leaves the selected text intact. To paste the copied text into any other document or somewhere else in the same document, use *EditPaste*.

EditCopy is only available if an Edit window is currently active and text has been marked for selection.

EditCopy corresponds to the Edit | Copy command.

EditCut method

Copies selected text from the current edit buffer to the Clipboard and deletes the selected text.

Types expected bool EditCut()

Return value **TRUE** if the topmost window is an *EditView* with a valid marked block, **FALSE**, otherwise

Description *EditCut* removes the selected text from the Edit window. To paste the cut text into any other document or somewhere else in the same document, use *EditPaste*.

EditCut is only available if an Edit window is currently active and text has been marked for selection.

You can paste the cut text as many times as you want until you choose *EditCut* again or *EditCopy*.

EditCut corresponds to the Edit | Cut command.

EditPaste method

Copies selected text from the Clipboard to the current edit position in the current edit buffer.

Types expected bool EditPaste()

Return value **TRUE** if the topmost window is an *EditView* with a valid marked block, **FALSE**, otherwise

Description *EditPaste* inserts the contents of the Clipboard into the current window at the cursor position.

EditPaste is available only if an Edit or Resource Editor window is currently active and there is something to paste.

EditPaste corresponds to the Edit | Paste command.

EditRedo method

Reapplies the operation that was undone with the last *EditUndo*.

Types expected bool EditRedo()

Return value **TRUE** if the operation was successful, **FALSE**, otherwise

Description *EditRedo* only has an effect immediately after an *EditUndo* or another *EditRedo*.

A series of *EditRedo* calls reverses the effects of a series of *EditUndo* calls.

EditRedo is available only if an Edit window is currently active and there is something to redo.

EditRedo corresponds to the Edit | Redo command.

EditSelectAll method

Selects all the text in the current edit buffer.

Types expected bool EditSelectAll()

Return value **TRUE** if the select was successful, **FALSE**, otherwise

Description *EditSelectAll* selects the entire contents of the active Edit window.

You can then use *EditCopy* or *EditCut* to copy it to the Clipboard, or perform any other editing action.

EditSelectAll is available only if an Edit or Resource Editor window is currently active.

EditSelectAll corresponds to the Edit | Select All command.

EditUndo method

Undoes the last edit operation.

Types expected bool EditUndo()

Return value **TRUE** if the operation was successful, **FALSE**, otherwise

Description *EditUndo* restores the file in the current window to the way it was before your most recent edit or cursor movement.

EditUndo inserts any characters you deleted, deletes any characters you inserted, replaces any characters you overwrote, and moves your cursor back to a prior position.

If you undo a block operation, your file will appear as it was before you executed the block operation.

EditUndo will not change an option setting that affects more than one window or reverse any toggle setting that has a global effect; for example, Ins/Ovr.

EditUndo is available only if an Edit window is currently active and there is something to undo.

EditUndo corresponds to the Edit | Undo command.

EndWaitCursor method

Stops the display of the Windows wait cursor (by default, an hourglass).

Types expected void EndWaitCursor()

Return value None

EnterContextHelpMode method

Puts the IDE in help context mode.

Types expected void EnterContextHelpMode()

Return value None

Description After *EnterContextHelpMode* is called, the next click of the mouse generates a help event for whatever the mouse pointer is on.

ExpandWindow method

Increases the size of the currently selected window to its maximum view managed size, defined by calls to *SetRegion*.

Types expected void ExpandWindow()

Return value None

Description After the window has been expanded with *ExpandWindow*, there is no way to decrease its size.

FileClose method

Closes the file that is currently open and selected.

Types expected bool FileClose()

Return value **TRUE** if the file was successfully closed, **FALSE**, otherwise

Description If the project window is active, this command unloads the current project and closes the project tree including all project nodes.

FileClose corresponds to the File | Close command.

FileDialog method

Invokes an Open a File dialog box and lets the user choose a file.

Types expected string FileDialog(string prompt, string initialValue)

prompt The value to place in the caption of the dialog.

initialValue The value to initialize the edit field with.

Return value Returns a fully qualified file name if successful. If the user cancels, the method returns the empty string (" ").

FileExit method

Closes the application after first ensuring that all files are saved.

Types expected bool FileExit([int IDEReturn])

IDEReturn The return value of the IDE application when it exits. By default, this value is 0.

Return value **TRUE** if the application was closed, **FALSE**, otherwise

Description *FileExit* corresponds to the File | Exit command.

FileNew method

Creates a new file with the extension .CPP.

Types expected bool FileNew([string toolName, string fileName])

toolName The name of the tool to associate with the file to open. Tools can be stand-alone programs (like GREP, Turbo Debugger, or an alternate editor), or they can be translators that are used for each file (or node) in a project. You can run a DOS program with the Windows IDE transfer. If *toolName* is not provided, a default is used.

fileName The name of the new file.

Return value **TRUE** if the file was created, **FALSE**, otherwise

Description *FileNew* opens a blank Edit window and loads a file with the default name NONAMExx.CPP (where xx stands for a number). It automatically makes the new Edit window active. NONAME files are used as a temporary edit buffer and the Borland C++ IDE prompts you to supply a new name when saved. If you load a file into an active Edit window that contains an empty NONAME file, the contents of the Edit window is replaced.

FileNew corresponds to the File | New | Text Edit command.

FileOpen method

Opens a file. Internally, this method uses *DoFileOpen*.

Types expected bool FileOpen([string name, string toolName])

name The name of the file to open. If the specified file doesn't exist, the user is prompted for a file name.

toolName The name of the tool to associate with the file being opened. Tools can be standalone programs (like GREP, Turbo Debugger, or an alternate editor), or they can be translators that are used for each file (or node) in a project. You can run a DOS program with the Windows IDE transfer. If *toolName* is not provided, a default is used.

Return value **TRUE** if the file was opened, **FALSE**, otherwise

Description *FileOpen* displays the Open a File dialog box that lets you select a file to load into the Borland C++ IDE. Use this command to open a project (.PRJ or IDE), source file (.C or CPP), resource (.RC), script (.SPP or SPX), or any other type of file. The IDE automatically loads the file into the default viewer.

FileOpen corresponds to the File | Open command.

FilePrint method

Prints the contents of the active edit window.

Types expected bool FilePrint(bool suppressDialog)

suppressDialog If set to **TRUE**, *FilePrint* does not display the Printer Options dialog prior to performing the print operation but reuses the last print options specified.

Return value **TRUE** if the print operation was successful, **FALSE**, otherwise

Description *FilePrint* corresponds to the File | Print command.

FilePrinterSetup method

Displays the Printer Setup dialog box.

Types expected bool FilePrinterSetup()

Return value **TRUE** if the dialog sets the options or **FALSE** if the user exits with Cancel

Description *FilePrinterSetup* displays the system Printer Setup dialog box where you select which printer you want to use for printing with the Borland C++ IDE. *FilePrinterSetup* does not have an effect if no printer is detected.

FilePrinterSetup corresponds to the File | Printer Setup command.

FileSave method

Saves the file in the active Edit window.

Types expected bool FileSave()

Return value **TRUE** if the file was saved, **FALSE**, otherwise

Description If the file in the active Edit window has as a default name (such as NONAME00.CPP), *FileSave* opens the Save File As dialog box so you can rename the file as well as save it in a different directory or on a different drive.

If you use an existing file name to name the file, the IDE asks if you want to overwrite the existing file.

FileSave corresponds to the File | Save command.

FileSaveAll method

Saves all open editor files.

Types expected bool FileSaveAll()

Return value **TRUE** if all files were saved, **FALSE** if a file could not be saved

Description *FileSaveAll* works just like *FileSave* except that it saves the contents of all modified files loaded into an Edit window, not just the file in the active Edit window.

FileSaveAll corresponds to the File | Save All command.

FileSaveAs method

Displays the standard File Save As dialog box so the user can save the currently active editor file.

Types expected bool FileSaveAs([string newName])

newName The new name of the file. If supplied, *FileSaveAs* attempts to save the file under that name in the current directory.

Return value **TRUE** if the file was saved, **FALSE**, otherwise

Description *FileSaveAs* displays the Save File As dialog box, where you can save the file in the active Edit window under a different name, in a different directory, or on a different drive.

You can enter the new file name, including the drive and directory.

All windows containing this file are updated with the new name.

If you choose an existing file name, the Borland C++ IDE asks if you want to overwrite the existing file.

FileSaveAs corresponds to the File | Save As command.

FileSend method

Instructs the Windows MAPI to send files to another MAPI client.

Types expected bool FileSend()

Return value **TRUE** if the file was sent, **FALSE**, otherwise

Description *FileSend* has an effect only if you have a mail message service (MAPI) installed on your system.

FileSend corresponds to the File | Send command.

GetRegionBottom method

Gets the bottom value of the specified region.

Types expected int GetRegionBottom(string RegionName)

RegionName The name of the region to examine. Valid region names are:

- Breakpoint
- CPU
- Debugger
- Editor
- Evaluator
- Event Log
- Inspector
- Message
- Processes
- Project
- Stack
- Thread Count
- Watches

Return value The bottom value of the specified region in display units (0 – 10000) or –1 if no such region exists.

Description *GetRegionBottom* can be used with *SetRegion* to position a window.

GetRegionLeft method

Gets the left value of the specified region.

Types expected int GetRegionLeft(string RegionName)

RegionName The name of the region to examine. Valid region names are:

- Breakpoint
- CPU
- Debugger
- Editor
- Evaluator
- Event Log
- Inspector
- Message
- Processes
- Project
- Stack
- Thread Count
- Watches

Return value The left value of the specified region in display units (0 – 10000) or –1 if no such region exists

Description *GetRegionLeft* can be used with *SetRegion* to position a window.

GetRegionRight method

Gets the right value of the specified region.

Types expected int GetRegionRight(string RegionName)

RegionName The name of the region to examine. Valid region names are:

- Breakpoint
- CPU
- Debugger
- Editor
- Evaluator
- Event Log
- Inspector
- Message
- Processes
- Project
- Stack
- Thread Count
- Watches

Return value The right value of the specified region in display units (0 – 10000) or –1 if no such region exists

Description *GetRegionRight* can be used with *SetRegion* to position a window.

GetRegionTop method

Gets the top value of the specified region.

Types expected int GetRegionTop(string RegionName)

RegionName The name of the region to examine. Valid region names are:

- Breakpoint
- CPU
- Debugger
- Editor
- Evaluator
- Event Log
- Inspector
- Message
- Processes
- Project
- Stack
- Thread Count
- Watches

Return value The top value of the specified region in display units (0 – 10000) or –1 if no such region exists

Description *GetRegionTop* can be used with *SetRegion* to position a window.

GetWindowState method

Retrieves the state of the currently focused window.

Types expected bool GetWindowState()

Return value One of the following:

SW_NORMAL

SW_MINIMIZE

SW_MAXIMIZE

Help method

Invokes the Windows Help system with the specified Help file and context ID.

Types expected void Help (string helpFile, int helpCommand, string helpTopic)

helpFile	The name (with optional path) of the Windows Help file to open.
helpCommand	A constant representing a command passed to the Windows Help engine. The *helpCommand* constants begin with HELP_ and are defined in the C++ header file WINUSER.H. See the *Windows API Reference* for details on these constants.
helpTopic	The name of the Help topic to display.

Return value None

HelpAbout method

Displays the Help About dialog box.

Types expected bool HelpAbout()

Return value **TRUE** if the dialog box displays, **FALSE**, otherwise

Description *HelpAbout* corresponds to the Help | About command.

HelpContents method

Displays the default Help contents screen. For Windows 95 Help systems, this window is the Help Topics Contents page.

Types expected bool HelpContents()

Return value **TRUE** if the Help window can be displayed, **FALSE**, otherwise

Description *HelpContents* corresponds to the Help | Contents command.

HelpKeyboard method

Displays a Help window describing how to map the keyboard in the IDE.

Types expected bool HelpKeyboard()

Return value **TRUE** if the Help window can be displayed, **FALSE**, otherwise

Description *HelpKeyboard* corresponds to the Help | Keyboard command.

HelpKeywordSearch method

Displays the Help Topics Index page with the specified keyword selected.

Types expected bool HelpKeywordSearch([string keyword])

keyword The entry selected in the Help Topics Index page.

Return value **TRUE** if the Help window can be displayed, **FALSE**, otherwise

Description *HelpKeyboardSearch* corresponds to the Help | Keyboard Search command.

HelpOWLAPI method

Displays the Help Contents page for the ObjectWindows Library Help.

Types expected bool HelpOWLAPI()

Return value **TRUE** if the Help window can be displayed, **FALSE**, otherwise

Description *HelpOWLAPI* corresponds to the Help | OWL API command.

HelpUsingHelp method

Displays a Help window describing how to use Help.

Types expected bool HelpUsingHelp()

Return value **TRUE** if the Help window can be displayed, **FALSE**, otherwise

Description *HelpUsingHelp* corresponds to the Help | Using Help command.

HelpWindowsAPI method

Displays the Help Contents page for the Microsoft Windows API Help.

Types expected bool HelpWindowsAPI()

Return value **TRUE** if the Help window can be displayed, **FALSE**, otherwise

Description *HelpWindowsAPI* corresponds to the Help | Windows API command.

KeyPressDialog method

Displays a dialog and records the keys pressed.

Types expected string KeyPressDialog(string prompt, string default)

prompt	The string to display in the caption of the dialog.
default	The value to display as a default. If *default* is empty, no value is displayed.

Return value The key pressed by the user or the empty string (" ") if the user presses *Esc* or Cancel.

Description *KeyPressDialog* records the keys pressed in a mnemonic format suitable for using with key assignments.

ListDialog method

Displays a modal list dialog.

Types expected string[ ] ListDialog(string prompt, bool multiSelect, bool sorted, string [ ] initialValues)

prompt	The value to place in the caption of the dialog.
multiSelect	Indicates if multiple selection of items in the list is allowed.
sorted	Indicates how the list is to be sorted.
initialValues	The strings to display in the dialog.

Return value An array containing the strings that were selected.

Menu method

Activates the main menu.

Types expected void Menu()

Return value None

Message method

Displays messages to the user in a message box.

Types expected bool Message(string text, int severity)

text The message to display.

severity One of the following values: INFORMATION, WARNING, ERROR. The value specified also determines the text for the caption.

Return value **TRUE** if the message box successfully opened, **FALSE**, otherwise

Description The message box contains the following buttons: CANCEL, ABORT, RETRY, and OK.

MessageCreate method

Adds messages to the Message window.

Types expected

```
int MessageCreate(string destinationTab, string toolName,
    int messageType, int parentMessage, string filename,
    int lineNumber, int columnNumber, string text,
    string helpFileName, int helpContextId)
```

destinationTab The name of the tab on the page of the Message window on which this message should appear. The default supported values for this parameter are Buildtime, Runtime, and Script. If a non-existent tab name is given, a new tab will be created.

toolName The name of the tool to be associated with the file to open. Tools can be standalone programs (like GREP, Turbo Debugger, or an alternate editor), or they can be translators that are used for each file (or node) in a project. You can also use the tool name: AddOn. You can run a DOS program with the Windows IDE transfer. If *toolName* is not provided, a default is used.

messageType The severity to be associated with the message. The values supported are:

INFORMATION (default)

WARNING

ERROR

FATAL

parentMessage The message that this message should be stored under. A value of 0 creates a new top-level message.

fileName Provides navigation for the message. When the message is selected, the user will be taken to this file.

lineNumber	Provides navigation for the message. When the message is selected, the user will be taken to this line in the specified file.
columnNumber	Provides navigation for the message. When the message is selected, the user will be taken to this column in the specified line of the specified file.
helpFile	Specifies where the user can find Windows Help for the message. When set to a valid value, the specified *helpContext* in this file will display.
helpContext	Specifies where the user can find Windows Help for the message. When set to a valid value, this help topic in the specified help file will display.

Return value The message ID of the generated message

NextWindow method

Advances focus and activation to the next MDI child window from the currently selected window.

Types expected bool NextWindow(bool priorWindow)

priorWindow	If **TRUE**, focus and activation go to the previous window. *priorWindow* defaults to **FALSE**.

Return value **TRUE** if focus changes to another window, **FALSE**, otherwise

OptionsEnvironment method

Displays the Environment Options dialog box where you set IDE options.

Types expected bool OptionsEnvironment()

Return value **TRUE** if the dialog box can be displayed, **FALSE**, otherwise

Description *OptionsEnvironment* corresponds to the Options | Environment command.

OptionsProject method

Displays the Project Options dialog box where you set project options.

Types expected bool OptionsProject()

Return value **TRUE** if the dialog box can be displayed, **FALSE**, otherwise

Description *OptionsProject* corresponds to the Options | Project command.

OptionsSave method

Opens the Options Save dialog box, where you save the contents of the project and the desktop, the messages in the Message window, and the Environment settings.

Types expected bool OptionsSave()

Return value **TRUE** if the dialog can be opened, **FALSE** if it cannot

Description *OptionsSave* corresponds to the Options | Save command.

OptionsStyleSheets method

Displays the Style Sheets dialog box where you specify default compile and run-time option settings associated with a project.

Types expected bool OptionsStyleSheets()

Return value **TRUE** if the dialog box can be opened, **FALSE**, otherwise

Description Style sheets are predefined sets of options that can be associated with a node.

OptionsStyleSheets corresponds to the Options | Style Sheets command.

OptionsTools method

Displays the Tools dialog box where you install, delete or modify the tools listed on the Tool menu.

Types expected bool OptionsTools()

Return value **TRUE** if the dialog box can be opened, **FALSE**, otherwise

Description The Tool menu lets you run programming tools of your choice without leaving the Borland C++ IDE.

OptionsTools corresponds to the Options | Tools command.

ProjectAppExpert method

Starts the AppExpert.

Types expected bool ProjectAppExpert()

Return value **TRUE** if AppExpert was successfully started, **FALSE**, otherwise

ProjectBuildAll method

Builds all the files in the current project, regardless of whether they are out of date.

Types expected bool ProjectBuildAll([bool suppressOkay, string nodeName])

suppressOkay Builds the project without requiring the user to respond with OK to continue.

nodeName The node to build.

Return value **TRUE** if the build was successful, **FALSE**, otherwise

Description *ProjectBuildAll:*

1. Deletes the appropriate precompiled header (.CSM) file, if it exists.
2. Deletes any cached autodependency information in the project.
3. Does a rebuild of the node.

If you abort a *ProjectBuildAll* by pressing *Esc* or choosing Cancel, or if you get errors that stop the build, you must explicitly select the nodes to be rebuilt.

ProjectBuildAll corresponds to the Project | Build All command.

ProjectCloseProject method

Closes the current project.

Types expected bool ProjectCloseProject()

Return value **TRUE** if the project was successfully closed, **FALSE**, otherwise

Description *ProjectCloseProject* unloads your current project including all project files (nodes) and closes the project tree window, if it is open.

ProjectCloseProject corresponds to the Project | Close Project command.

ProjectCompile method

Compiles the current project.

Types expected bool ProjectCompile([string nodeName])

nodeName The name of the node to compile. Compilation depends on the type of node:

- A .CPP node causes the C++ compiler to be called.
- A .RC node causes resource compiler to be called.
- An .EXE node causes the linker to be called.
- A .LIB node causes the librarian to be called.
- An .SPP node causes the cScript compiler to be called.

Return value **TRUE** if the project was successfully closed, **FALSE**, otherwise

Description *ProjectCompile* corresponds to the Project | Compile command.

ProjectGenerateMakefile method

Generates a make file for the current project.

Types expected bool ProjectGenerateMakefile([string nodeName])

nodeName If specified, the generated makefile contains only the commands necessary to build that node. Otherwise, commands are generated to build the entire project.

Return value **TRUE** if the makefile was successfully generated, **FALSE**, otherwise

Description *ProjectGenerateMakefile* generates a makefile for the current project. It gathers information from the currently loaded project and produces a makefile named <projectfilename>.MAK. You cannot convert makefiles to project files.

The IDE displays the new makefile in an Edit window.

ProjectGenerateMakefile corresponds to the Project | Generate Makefile command.

ProjectMakeAll method

Makes all targets for the current project, rebuilding only those files that are out of date.

Types expected bool ProjectMakeAll([bool suppressOkay, string nodeName])

suppressOkay Makes the project without requiring the user to respond with OK to continue.

nodeName Makes only the specified node.

Return value **TRUE** if the targets were successfully made, **FALSE**, otherwise

Description *ProjectMakeAll* MAKEs all targets. It checks file dates and times to see if they have been updated. If so, *ProjectMakeAll* rebuilds those files, then moves up the project tree and checks the next nodes' file dates and times. *ProjectMakeAll* checks all the nodes in a project and builds all of the out-of-date files.

The .EXE file name is fully spelled out in the project tree for target names. If no project is loaded, the .EXE name is derived from the name of the file in the Edit window.

ProjectMakeAll corresponds to the Project | Make All command.

ProjectManagerInitialize method

ProjectManagerInitialize is called once during IDE initialization to ensure that the IDE Project Manager is in a stable state prior to the occurrence of any major events, such as the opening of files or creation of new targets.

Types expected bool ProjectManagerInitialize()

Return value **TRUE** if the Project Manager has successfully initialized, **FALSE**, otherwise

ProjectNewProject method

Creates a new project.

Types expected bool ProjectNewProject([string pName])

pName If specified, the project is created with *pName* as its name. Otherwise, the user is prompted for a project name.

Return value **TRUE** if the project was successfully created, **FALSE**, otherwise

ProjectNewTarget method

Creates a new target for the specified node.

Types expected bool ProjectNewTarget ([string nTarget, int targetType, int platform, int libraryMask, int modelOrMode])

nTarget The name of the node.

targetType One of the following target values:

TE_APPLICATION (default)	TE_EASYWIN
TE_DLL	TE_IMPORTLIB
TE_DOSCOM	TE_STATICLIB
	TE_WINHELP

platform One of the following platform values:

TE_WIN32 (default)	TE_DOSOVERLAY
TE_DOS16	TE_WIN16

libraryMask Indicates which libraries to link. One or more of the following values:

TE_STDLIBS (default: same as TE_STDLIB_BIDS | TE_STDLIB_RTL | TE_STDLIB_EMU)

TE_STDLIB_BGI	TE_STDLIB_BIDS
TE_STDLIB_BWCC	TE_STDLIB_CODEGUARD
TE_STDLIB_C0F	TE_STDLIB_CTL3D
TE_STDLIB_EMU	TE_STDLIB_MATH
TE_STDLIB_NOEH	TE_STDLIB_OCF
TE_STDLIB_OLE2	TE_STDLIB_OWL
TE_STDLIB_RTL	TE_STDLIB_TVISION
TE_STDLIB_VBX	

modelOrMode One of the following values:

TE_NT_GUI (default if platform is TE_WIN32)

TE_MM_LARGE (default if platform is not TE_WIN32)

TE_MM_TINY	TE_MM_SMALL
TE_MM_MEDIUM	TE_MM_COMPACT
TE_MM_HUGE	TE_NT_WINCONSOLE
TE_NT_FSCONSOLE	

Return value **TRUE** if the target was successfully created, **FALSE**, otherwise

Description The new node is added to the current project and placed at the bottom of the project tree. This is created as a stand alone target. You can move it or make it a child of another node in the project tree by using the *Alt*+UpArrow / *Alt*+DownArrow, or *Alt*+LeftArrow / *Alt*+RightArrow keys.

ProjectNewTarget corresponds to the Project | New Target command.

ProjectOpenProject method

Displays the Open a Project dialog box, where you select and load an existing project file.

Types expected bool ProjectOpenProject([string pName])

pName If specified, *ProjectOpenProject* opens the project. If not, it displays the Open a Project dialog box and prompts the user for a project name.

Return value **TRUE** if the project opened, **FALSE**, otherwise

Description You can load and use projects from previous versions of Borland C++ (.PRJ files for example). If you load an old Borland C++ project, it is converted to the new project format.

ProjectOpenProject corresponds to the Project | Open Project command.

Quit method

Shuts down the IDE and exits, without saving files or prompting the user.

Types expected void Quit()

Return value None

Description To exit and prompt the user to save changes, use *FileExit*.

SaveMessages method

Saves the contents of the specified Message window tab page to the specified file.

Types expected bool SaveMessages(string tabName, string fileName)

tabName One of the following values:

- Buildtime
- Runtime
- Script

Return value **TRUE** if the messages are saved, **FALSE**, otherwise

ScriptCommands method

Displays the Script Commands dialog.

Types expected bool ScriptCommands()

Return value **TRUE** if the users chooses a command and clicks Run, **FALSE**, otherwise

Description The Script Commands dialog lists the currently available script commands and variables, including classes, functions, and global objects. If an object is an instance of a class, its properties and methods are also displayed.

ScriptCommands corresponds to the Script | Commands command.

ScriptCompileFile method

Compiles the specified script file.

Types expected bool ScriptCompileFile(string fileName)

fileName The name of the script file to compile.

Return value **TRUE** if the compile was successful, **FALSE**, otherwise

Description *ScriptCompileFile* corresponds to the Script | Compile File command.

ScriptModules method

Displays the Script Modules dialog box. The dialog box lists the modules loaded (.SPP or .SPX files) and modules in the Script Path.

Types expected bool ScriptModules()

Return value **TRUE** if a module is selected, **FALSE**, otherwise

Description *ScriptModules* corresponds to the Script | Modules command.

ScriptRun method

Executes the specified script command.

Types expected bool ScriptRun(string command)

command The script command to execute. If no *command* is given, the Script Run window is displayed.

Return value **TRUE** if the command is executed, **FALSE**, otherwise

Description *ScriptRun* corresponds to the Script | Run command.

ScriptRunFile method

Executes the specified script file.

Types expected bool ScriptRunFile([string fileName])

fileName The name of the script file to execute. If no *fileName* is given, *ScriptRunFile* attempts to execute the commands in the current *EditView*.

Return value **TRUE** if a file is executed or an *EditView* is found, **FALSE**, otherwise

Description *ScriptRunFile* corresponds to the Script | Run File command.

SearchBrowseSymbol method

Searches for the specified symbol.

Types expected bool SearchBrowseSymbol([string sName])

sName The name of the symbol to search for. If *sName* is not provided, the Browse Symbol dialog box is displayed. If *sName* is not provided and an edit window is active, the Browse Symbol dialog box contains the word at the cursor.

Return value **TRUE** if the symbol is found, **FALSE**, otherwise

Description *SearchBrowseSymbol* corresponds to the Search | Browse Symbol command.

SearchFind method

Searches the *EditBuffer* for the specified pattern.

Types expected bool SearchFind([string pat])

pat The string to search for. If *pat* is found, the cursor is moved to the occurrence of *pat*. The pattern can be a simple string or a search expression.

Return value **TRUE** if the expression is found, **FALSE**, otherwise

Description If the Edit window is active, *SearchFind* searches the Edit window for *pat*. If the Message window is active, Search Find searches the Message window.

SearchFind corresponds to the Search | Find command.

SearchLocateSymbol method

Searches through the current target of the current project for the specified symbol.

Types expected bool SearchLocateSymbol([string sName])

sName The name of the symbol to search for. If *sName* is not provided, the user will be prompted for it.

Return value **TRUE** if the expression is found, **FALSE**, otherwise

Description *SearchLocateSymbol* uses the Browser's symbol information to locate a symbol's definition.

On success, *SearchLocateSymbol* opens the source file and line where the symbol name *sName* is defined. If *sName* is **NULL**, *SearchLocateSymbol* rips the current word out of the editor and searches for that symbol. *SearchLocateSymbol* works only with globally defined symbols

For a function symbol, *SearchLocateSymbol* locates the line where the function begins. For a class or typedef symbol, it locates the line where the typedef or class is defined. For a variable, it locates the line where the variable is defined.

SearchLocateSymbol corresponds to the Search | Locate Symbol command.

SearchNextMessage method

Displays an active Edit window and places the cursor on the line in your source code that generated the next error or warning.

Types expected bool SearchNextMessage()

Return value **TRUE** if the next message is displayed, or **FALSE** if there is no message to display

Description *SearchNextMessage* works only if a Message window is displayed and another message exists.

SearchNextMessage corresponds to the Search | Next Message command.

SearchPreviousMessage method

Displays an active Edit window and places the cursor on the line in your source code that generated the previous error or warning.

Types expected bool SearchPreviousMessage()

Return value **TRUE** if the source line is found, **FALSE**, otherwise

Description *SearchPreviousMessage* works only if a Message window is displayed and a previous message exists.

SearchPreviousMessage corresponds to the Search | Previous Message command.

SearchReplace method

Searches the *EditBuffer* for the specified pattern and replaces it with the specified string.

Types expected bool SearchReplace([string pat, string rep])

pat The string to search for. The pattern can be a simple string or a search expression.

rep The string to replace the found string with.

Return value **TRUE** if the text is found, **FALSE**, otherwise

Description If *pat* or *rep* is not specified, *SearchReplace* opens the Replace Text dialog box and prompts the user for input.

SearchReplace corresponds to the Search | Replace command.

SearchSearchAgain method

Repeats the last *SearchFind* or *SearchReplace*.

Types expected bool SearchSearchAgain()

Return value **TRUE** if the text is found, **FALSE**, otherwise

Description *SearchSearchAgain* corresponds to the Search | Search Again command.

SetRegion method

Determines how windows tile and cascade on the IDE desktop and their initial position when they are created.

Types expected bool SetRegion(string RegionName, int left, int top, int right, int bottom)

RegionName The name of the region to examine. Valid region names are:

- Breakpoint
- CPU
- Debugger
- Editor
- Evaluator
- Event Log
- Inspector
- Message
- Processes
- Project
- Stack
- Thread Count
- Watches

left, top, right, bottom The dimensions of the window in display units of 1–9999.

Return value **TRUE** if the region was successfully set, **FALSE** otherwise

Description *SetRegion* is used with the following *IDEApplication* class methods:

GetRegionBottom

GetRegionTop

GetRegionLeft

GetRegionRight

These methods change the area where windows are placed when tiled and cascaded.

For example, the default configuration of the IDE is to have all Editor windows in the upper two-thirds of the screen when you tile, and the Message window and the Project window in the lower one-third. You could change this default with the script statement

```
IDE.SetRegion("Editor", 1, 1, 5000, 5000);
```

After executing this statement, the editors are in the upper left quarter of the IDE desktop after tiling. Look at STARTUP.SPP for other examples.

SetWindowState method

Changes the style of the currently focused window.

Types expected bool SetWindowState(int desiredState)

desiredState The style to change the window to. One of the following values:

- SW_MINIMIZE
- SW_MAXIMIZE
- SW_RESTORE

Return value **TRUE** if the state was successfully set, **FALSE**, otherwise

SimpleDialog method

Invokes a simple dialog containing a single text field, an OK button, and a Cancel button.

Types expected string SimpleDialog(string prompt, string initialValue [,int maxNumChars])

prompt The caption of the dialog.

initialValue The value that initializes the edit field.

maxNumChars The maximum number of characters allowed in the edit field.

Return value The value in the edit field if the user clicks OK or presses *Enter*, or the empty string (" ") if the user clicks Cancel.

SpeedMenu method

Activates the SpeedMenu for the current subsystem.

Types expected void SpeedMenu()

Return value None

StartWaitCursor method

Displays the Windows wait cursor (by default, the hourglass).

Types expected void StartWaitCursor()

Return value None

StatusBarDialog method

Displays a dialog on top of the status bar.

Types expected string StatusBarDialog(string prompt, string initialValue [,int maxNumChars])

prompt	The caption of the dialog.
initialValue	The value that initializes the edit field.
maxNumChars	The maximum number of characters allowed in the edit field.

Return value The value in the edit field if the user clicks OK or presses *Enter*, or the empty string (" ") if the user clicks Cancel.

StopBackgroundTask method

Terminates the background task of a compile, link, make or build when the task is in asynchronous compile mode.

Types expected void StopBackgroundTask()

Return value None

Tool method

Runs the specified tool specified using the specified command string.

Types expected bool Tool([string toolName, string commandString])

toolName	The name of the tool to be associated with the file to open. Tools can be standalone programs (like GREP, Turbo Debugger, or an alternate editor), or they can be translators that are used for each file (or node) in a project. You can run a DOS program with the Windows IDE transfer. If *toolName* is not provided, a default is used.
commandString	The name of the command to run.

Return value **TRUE** if the tool successfully ran, **FALSE**, otherwise

Description If no parameters are specified, *Tool* displays a dialog box prompting the user for a tool.

Undo method

Undoes the last edit operation.

Types expected void Undo()

Return value None

Description *Undo* does the same thing as *EditUndo*. *Undo* is included for compliance with Microsoft conventions.

ViewActivate method

Activates the IDE pane that is adjacent to the currently selected pane.

Types expected bool ViewActivate(int direction)

direction The direction of the adjacent pane to activate, relative to the current pane. The supported values are:

UP
DOWN
LEFT
RIGHT

Return value **TRUE** if there was a valid current pane and the method was able to activate an adjacent pane in the direction indicated by direction, **FALSE**, otherwise

ViewBreakpoint method

Opens the Breakpoints window.

Types expected bool ViewBreakpoint()

Return value **TRUE** if breakpoints can be found, **FALSE**, otherwise

Description *ViewBreakpoint* corresponds to the View | Breakpoint command.

ViewCallStack method

Opens the Call Stack window.

Types expected bool ViewCallStack()

Return value **TRUE** if the Call Stack window can be displayed, **FALSE**, otherwise

Description *ViewCallStack* corresponds to the View | Call Stack command.

ViewClasses method

Opens the Browsing Objects window, which displays all the classes in your application.

Types expected bool ViewClasses()

Return value **TRUE** if the Browsing Objects window can be displayed, **FALSE**, otherwise

Description *ViewClasses* corresponds to the View | Classes command.

ViewClassExpert method

Displays the ClassExpert window, where you can add and manage classes in an AppExpert application.

Types expected bool ViewClassExpert()

Return value **TRUE** if the Class Expert can be run or **FALSE** if it cannot be run (for example, because the current target was not generated with the AppExpert).

Description *ViewClassEpxert* does not work unless the current target is an AppExpert target.

ViewClassEpxert corresponds to the View | Class Expert command.

ViewCpu method

Opens or selects the CPU window.

Types expected bool ViewCpu()

Return value **TRUE** if the CPU window can be displayed, **FALSE**, otherwise

Description *ViewCpu* corresponds to the View | CPU command.

ViewGlobals method

Opens the Browsing Globals window, which lists every variable in the program in the current Edit window or the first file in the current project.

Types expected bool ViewGlobals()

Return value **TRUE** if the Browse Globals window can be displayed, **FALSE**, otherwise

Description If the program has not been compiled, the IDE must first compile it before invoking the Browser.

ViewGlobals corresponds to the View | Globals command.

ViewMessage method

Displays the specified page of the Message window.

Types expected bool ViewMessage([string tabName])

tabName The name of the Message window page to select. If *tabName* is not found, the currently selected tab remains unchanged. *tabName* can be set to one of the following values:

- Buildtime
- Runtime
- Script

tabName can also be the name of a user-defined tab.

Return value **TRUE** if the Message window can be displayed or **FALSE** if it cannot. If *tabName* is not found, the method returns **FALSE** even if the Message window is successfully displayed.

Description *ViewMessage* corresponds to the View | Message command.

ViewProcess method

Opens the Process window.

Types expected bool ViewProcess()

Return value **TRUE** if the Process window can be displayed, **FALSE**, otherwise

Description *ViewProcess* corresponds to the View | Process command.

ViewSlide method

Moves the border of the currently selected IDE pane the number of specified characters in the specified direction.

Types expected bool ViewSlide(int direction [, int amount])

direction The direction in which to move the border of the currently selected IDE pane. *direction* can be one of:

UP
DOWN
LEFT
RIGHT

amount The number of characters to move the currently selected IDE pane. The size of a character is determined by the number of pixels high and wide a character is in the font used by the pane. If *amount* is not given, the border moves until the user presses the *Enter* or *Esc* keys.

Return value **TRUE** if there is a valid current IDE pane, and it was successfully moved, **FALSE**, otherwise

ViewProject method

Displays the Project window for the currently open project.

Types expected bool ViewProject()

Return value **TRUE** if the Project window can be displayed, **FALSE**, otherwise

Description *ViewProject* corresponds to the View | Project command.

ViewWatch method

Displays the Watches window for the current program.

Types expected bool ViewWatch()

Return value **TRUE** if the Watches window can be displayed, **FALSE**, otherwise

Description *ViewWatch* corresponds to the View | Watch command.

WindowArrangeIcons method

Rearranges any minimized window's icons on the desktop. The rearranged icons are evenly spaced, beginning at the lower left corner of the desktop.

Types expected bool WindowArrangeIcons()

Return value **TRUE** if there are icons to rearrange, **FALSE**, otherwise

Description *WindowArrange* corresponds to the Window | Arrange Icons command.

WindowCascade method

Stacks all open windows and overlaps them, making all windows the same size and showing only part of each underlying window.

Types expected bool WindowCascade()

Return value **TRUE** if there are windows to cascade, **FALSE**, otherwise

Description *WindowCascade* corresponds to the Window | Cascade command.

WindowCloseAll method

Closes all windows of the specified type.

Types expected bool WindowCloseAll([string typeName])

typeName The type of window to close. *typeName* can be one of the following values:

- Browser
- Debugger
- Editor

If *typeName* is not specified, *WindowCloseAll* closes all open windows.

Return value **TRUE** if all windows successfully close, **FALSE**, otherwise

Description *WindowCloseAll* corresponds to the Window | Close All command.

WindowMinimizeAll method

Minimizes all windows of the specified type.

Types expected bool WindowMinimizeAll([string typeName])

typeName The type of window to minimize. *typeName* can be one of the following values:

- Browser
- Debugger
- Editor

If *typeName* is not specified, *WindowMinimizeAll* minimizes all open window.

Types expected bool WindowMinimizeAll([string typeName])

Return value **TRUE** if all windows successfully minimize, **FALSE**, otherwise

Description *WindowMinimizeAll* corresponds to the Window | Minimize All command.

WindowRestoreAll method

Restores all minimized windows of the specified type.

Types expected bool WindowRestoreAll([string typeName])

typeName The type of minimized window to restore. *typeName* can be one of the following values:

- Browser
- Debugger
- Editor

If *typeName* is not specified, *WindowRestoreAll* restores all minimized window.

Return value **TRUE** if all windows successfully restore or **FALSE** if at least one does not

Description *WindowRestoreAll* corresponds to the Window | Restore All command.

WindowTileHorizontal method

Stacks all open windows horizontally.

Types expected bool WindowTileHorizontal()

Return value **TRUE** if all windows successfully tile, **FALSE**, otherwise

Description *WindowTileHorizontal* corresponds to the Window | Tile Horizontal command.

WindowTileVertical method

Stacks all open windows vertically.

Types expected bool WindowTileVertical()

Return value **TRUE** if all windows successfully tile, **FALSE**, otherwise

Description *WindowTileVertical* corresponds to the Window | Tile Vertical command.

YesNoDialog method

Displays a dialog box that prompts the user for a yes or no response.

Types expected string YesNoDialog(string prompt, string default)

prompt	The prompt that displays in the dialog box
default	The button that is to be selected by default. Valid values are Yes and No.

Return value Yes or No

BuildComplete event

Raised at the end of a build.

Types expected void BuildComplete(bool status, string inputPath, string outputPath)

status	Indicates if the build was successful. *status* is **TRUE** if successful, **FALSE** if there were errors.
inputPath	The source directory.
outputPath	The directory where files created as a result of the build are created.

Return value None

BuildStarted event

Raised at the beginning of a build.

Types expected void BuildComplete()

Return value None

DialogCreated event

Raised as new dialogs are presented to the user.

Types expected void DialogCreated(string dialogName, int dialogHandle)

dialogName The name of the dialog's caption.

dialogHandle An environment-specific identifier used by the system when referring to the dialog. For Microsoft Windows the *dialogHandle* is the HWND of the dialog. This value is supplied in case you need your script to interact directly with the system.

Return value None

Description Use *DialogCreated* in conjunction with the *KeyboardManager.SendKeys* method to simulate user entries to dialogs and drive the dialog.

DialogCreated is only raised if the property *RaiseDialogCreatedEvent* is set to **TRUE**.

Exiting event

Raised as the IDE is closing. Default action is to do nothing.

Types expected void Exiting()

Return value None

HelpRequested event

Raised when one of the *IDEApplication* class Help methods is invoked:

Types expected void HelpRequested(string fileName, int command, int data)

fileName The name (with optional path) of the Windows Help file to open.

Command A constant representing a command passed to the Windows Help engine. The *command* constants begin with HELP_ and are defined in the C++ header file WINUSER.H. See the *Windows API Reference* for details on these constants.

data The data to display.

Return value None

Description *HelpRequested* is raised when one of the following *IDEApplication* class methods are invoked:

- *EnterContextHelpMode*
- *Help*
- *HelpAbout*
- *HelpContents*
- *HelpKeyboard*
- *HelpKeywordSearch*
- *HelpOWLAPI*
- *HelpUsingHelp*
- *HelpWindowsAPI*

HelpRequested passes the appropriate parameters to the Windows Help engine. Default action is to do nothing.

Idle event

Raised when the number of seconds specified by *IdleTimeout* has elapsed without a significant event occurring (like a user event). Default action is to do nothing.

Types expected void Idle()

Return value None

KeyboardAssignmentsChanging event

Raised when the user exits the Options | Environment | Editor dialog after having modified the keyboard file (.KBD) option.

Types expected void KeyboardAssignmentsChanging(string newFileName)

newFileName The name of the new keyboard (.KBD) file.

Return value None

KeyboardAssignmentsChanged event

Raised after the keyboard file name (.KBD) is changed in the Options | Environment | Editor dialog.

Types expected void KeyboardAssignmentsChanged(string newFileName)

newFileName The name of the new keyboard (.KDB) file.

Return value None

MakeComplete event

Raised at the end of a make.

Types expected void MakeComplete(bool status, string inputPath, string outputPath)

status	Indicates if the make was successful. *status* is **TRUE** if the make was successful, **FALSE** if there were errors.
inputPath	The source directory.
outputPath	The directory where files created as a result of the make are created.

Return value None

MakeStarted event

Raised at the beginning of a make.

Types expected void MakeComplete()

Return value None

ProjectClosed event

Raised when a project file has been successfully closed.

Types expected void ProjectClosed(string projectFileName)

projectFileName	The absolute name of the project file.

Return value None

Description Since the IDE always has a project open (even if it is the default project: BCWDEF.IDE), *ProjectClosed* will always precede the *ProjectOpened* that it corresponds to.

ProjectOpened event

Raised when a project file has been successfully opened.

Types expected void ProjectOpened(string projectFileName)

projectFileName The absolute name of the project file.

Return value None

SecondElapsed event

Raised once every second. Default action is to do nothing.

Types expected void SecondElapsed()

Return value None

Started event

Raised after the IDE has been loaded and initialized and all startup scripts have been processed.

Types expected void Started(bool VeryFirstTime)

VeryFirstTime Indicates whether this is the first time the IDE has been loaded on a particular machine. Its value is determined by the presence or absence of the default configuration file (BCCONFIG.BCW). This file is created the first time you run the IDE and should be present only if the IDE has been run previously.

Return value None

SubsytemActivated event

Raised when the active subsystem is changed (usually in response to the user clicking on another window type).

Types expected void SubsytemActivated(string systemName)

systemName The name of the subsystem acquiring focus. Default action is to do nothing.

Return value None

TransferOutputExists event

Raised when a transfer tool has created output that needs processing (usually in a Make sequence). Default action is to do nothing.

Types expected bool TransferOutputExists(TransferOutput output)

output The data that needs to be processed by the transfer tool.

Return value **FALSE** if no error occurred, **TRUE** if there was an error parsing the data supplied by output.

TranslateComplete event

Raised at the end of a translation.

Types expected void TranslateComplete(bool status, string inputPath, string outputPath)

status Indicates if the translation was successful. *status* is **TRUE** if the translation was successful, **FALSE** if there were errors.

inputPath The source directory.

outputPath The directory where files created as a result of the translation are created.

Return value None

Chapter

19

Keyboard class

This class works with the *KeyboardManager* class to manage keyboards assigned to various IDE components, such as the Editor and the Project View.

Syntax Keyboard([bool transparent])

transparent Allows keystrokes with no assignment in this keyboard to be passed to the next keyboard on the current keyboard stack. This value defaults to **FALSE** if not supplied.

Properties

int Assignments	Read-only
string DefaultAssignment	Read-write

Methods

void Assign(string KeySequence, string CommandName, int ImplicitAssignments)

void AssignTypeables(string CommandName)

void Copy(Keyboard SourceKeyboard)

int CountAssignments(string CommandName)

string GetCommand(string KeySequence)

string GetKeySequence(string CommandName [,int whichOne])

bool HasUniqueMapping(string KeySequence)

void Unassign(string KeySequence)

Events

None

Keyboard class description

Keyboard objects administer key assignments and can be:

- Assigned to IDE components
- Pushed and popped from the keyboard manager's keyboard stack
- Queried on individual key assignments

KeyboardManager manipulates *Keyboard* objects.

Assignments property

Indicates the number of key assignments contained in this keyboard.

Access Read-only

Type expected int Assignments

DefaultAssignment property

Establishes the command to execute if no other commands are assigned to a keystroke. It returns an empty string ("") if no assignment exists.

Access Read-write

Type expected string DefaultAssignment

Assign method

Assigns a script to a keystroke.

Types expected void Assign (string KeySequence, string CommandName, int ImplicitAssignments)

KeySequence A mnemonic key name made up of a key description, such as `<a>`. Key descriptions can be augmented with any (or all) of the following: *Shift, Ctrl, Alt,* and *Keypad.*

CommandName The script to be executed when the key is pressed, for example, `editor.MarkWord(TRUE);`

implicitAssignments One or more of the following values:

Value	Definition
ASSIGN_EXPLICIT (default)	No implicit assignments should be created.
ASSIGN_IMPLICIT_KEYPAD	When an assignment is made to a sequence that has a numeric keypad (*Keypad*) equivalent, such as *Page Up,* a second assignment is implicitly made for the equivalent. Assignments are made to both the shifted and non-shifted versions at the same time, but only if the implicit assignment doesn't overwrite an existing explicit assignment.
ASSIGN_IMPLICIT_SHIFT	`<a> == <A>`
ASSIGN_IMPLICIT_MODIFIER	`<Ctrl-k><Ctlr-b> == <Ctrl-k><b>`

Return value None

Description Keys that do not map to a single character have names associated with them. Keys in this category are: *Enter, Backspace, Tab, Home, End, Page Up, Page Down, Left, Right, Up, Down, Insert, Delete, Escape, Space, Print Screen, Center, Pause, CapsLock, Scroll Lock,* and *Number Lock.*

Modifiers and names are separated by a hyphen (-). For example `<Ctrl-Enter>` is valid.

To assign the dash character in a key sequence, use the keyname `<Minus>`. Use the keyname `<Plus>` for the + character.

The *Assign* method has no effect on the default keyboard, which is returned from a call to *KeyboardManager.GetKeyboard.*

Example

```
// This example creates an explicit assignment to <Home>.
// It creates an implicit assignment to <Keypad-Home>.

Assign("<Home>","ToStart();",·ASSIGN_IMPLICIT_KEYPAD);

// Explicit assignment to <Keypad-End>.
Assign("<Keypad-End>","ToEnd();");

// Explicit assignment to <End>
Assign("<End>","ToEnd(TRUE);", ASSIGN_IMPLICIT_KEYPAD);

// Implicit assignment to <Keypad-End> thwarted due to
// existence of explicit assignment to <Keypad-End>.
```

AssignTypeables method

Assigns a script to the predefined typeable characters.

Types expected void AssignTypeables(string CommandName)

CommandName The command to assign and any parameters to the command.

Return value None

Description The *AssignTypeables* method has no effect on the default keyboard, which is returned from a call to *KeyboardManager.GetKeyboard*.

Predefined typeable characters

~	!	@	#	$	%	^	&	'*	'
(	')	'_	+	`	1	2	3	4	5
6	7	8	9	0	-	=	Q	W	E
R	T	Y	U	I	O	P	{	}	|
q	w	e	r	t	y	u	i	o	p
[	]	\\	A	S	D	F	G	H	J
K	L	:	"	'	a	s	d	f	g
h	j	k	l	;	\	Z	X	C	V
B	N	M	<	>	?	z	x	c	v
b	n	m	,	.	/				

Other keys include: *Enter, Delete* and *Backspace.*

Copy method

Copies all assignments made from *SourceKeyboard* into this keyboard, replacing any that already exist.

Types expected void Copy(Keyboard SourceKeyboard)

Keyboard The name of the keyboard to copy assignments into.

SourceKeyboard The name of the keyboard from which assignments are to be copied.

Return value None

Description The *Copy* method has no effect on the default keyboard, which is returned from a call to *KeyboardManager.GetKeyboard*.

CountAssignments method

Returns the number of key assignments tied to the specified command.

Types expected int CountAssignments(string CommandName)

CommandName The name of the command in which to count key assignments.

Return value None

GetCommand method

Returns the command assigned to the specified key code. *GetCommand* returns the empty string ("") if no script has been assigned.

Types expected string GetCommand (string KeySequence)

KeySequence The name of the key sequence to check for an assigned command.

Return value None

GetKeySequence method

Returns the key sequence tied to the specified command.

Types expected string GetKeySequence(string CommandName [,int whichOne])

CommandName The name of the command to check for a key sequence.

whichOne Finds *nth* occurrence of that assignment. If less than 1 or omitted, *whichOne* is assumed to be 1.

Return value None

HasUniqueMapping method

Determines if a key:

- Has no mapping
- Maps directly to a command
- Is the non-terminating key of a multikey assignment

Types expected bool HasUniqueMapping(string KeySequence)

KeySequence The name of the key sequence to check for mapping assignments.

Return value **TRUE** if a key either has no mapping or maps directly to a command. **FALSE** if the key is a non-terminating key of a multikey assignment.

For example, WordStar <Ctrl-K> would be **FALSE** since <Ctrl-K> signifies the beginning of a multikey assignment, such as <Ctrl-K><Ctrl-B> or <Ctrl-K><Ctrl-K>.

Unassign method

Restores a key assignment.

Types expected void Unassign(string KeySequence)

KeySequence The name of the key sequence to restore.

Return value None

Description The *Unassign* method has no effect on the default keyboard, which is returned from a call to *KeyboardManager.GetKeyboard*.

Chapter

20

KeyboardManager class

This class works with the *Keyboard* class to manage keyboards assigned to various IDE components, such as the Editor and the Project view.

Syntax KeyBoardManager()

Properties

bool AreKeysWaiting	Read-only
Record CurrentPlayback	Read-only
Record CurrentRecord	Read-write
int KeyboardFlags	Read-only
int KeysProcessed	Read-only
int LastKeyProcessed	Read-only
Record Recording	Read-only
string ScriptAbortKey	Read-write

Methods

string CodeToKey(int KeyCode)

void Flush()

Keyboard GetKeyboard([string ComponentName])

int KeyToCode(string KeyName)

void PausePlayback()

```
int Playback( [Record RecordObject] )
Keyboard Pop( string ComponentName )
bool ProcessKeyboardAssignments( string fileName, bool unassign )
void ProcessPendingKeystrokes()
void Push( Keyboard keyboard, string ComponentName, bool transparent )
int ReadChar( void )
void ResumePlayback()
bool ResumeRecord( Record RecordObject )
bool SendKeys(string keyStream)
bool StartRecord( Record RecordObject )
void StopRecord( )
```

Events

None

KeyboardManager class description

You access keyboard features through a keyboard manager, implemented by the global *KeyboardManager* object. The keyboard manager manipulates *Keyboard* objects (instantiations of the class *Keyboard*).

KeyboardManager manages individual component keyboards, such as that of the Editor and the Project view. This implementation allows support of BRIEF functionality through script simulation without predefined classes for each of the individual IDE components. Each component has a defineable keyboard. The desktop has a keyboard assignment that acts as a global assignment. If a key is not found in the local keyboard, the desktop keyboard is searched. If the key assignment is not in the desktop's keyboard, the default internal mapping is used.

The keyboard manager operates on the assumption of a set context. A derived class is used in a call to *SetContext*() to specify the current object to be used as a local scope. Since different macros may mean different things to different components, this mechanism provides a simple, straightforward approach to localizing functionality. For example, classes *A* and *B* both have a member function called *Search*(). If class *A* is the current context, class *A*'s *Search*() member is called. The same goes with class *B*. If no context is set, then a global *Search*() function is accessed.

The *IDE* object contains a *ReadOnly* member that holds the value of the *KeyboardManager*. New script instances may be created; however, they will all reference the same internal data and changes to one will be reflected in all.

AreKeysWaiting property

TRUE if any keys are waiting to be processed, **FALSE** otherwise.

Access Read-only

Type expected bool AreKeysWaiting

CurrentPlayback property

Plays back the current keystroke assignment. *CurrentPlayback* is only valid while the *Playback* method is active.

Access Read-only

Type expected Record CurrentPlayback

CurrentRecord property

Contains a reference to the *Record* object associated with this *KeyboardManager*.

Access Read-write

Type expected Record CurrentRecord

KeyboardFlags property

Returns a value whose bits indicate the state of *Num Lock, Caps, Ctrl, Alt,* and so on.

Access Read-only

Type expected int KeyboardFlags

Description The mask values returned are:

0x03	*Shift* pressed
0x04	*Ctrl* pressed
0x08	*Alt* pressed
0x10	*Scroll Lock* on

0x20	*Num Lock* on
0x40	*Caps Lock* on

KeysProcessed property

The total number of keys processed by any keyboard since the IDE was loaded.

Access Read-only

Type expected int KeysProcessed

LastKeyProcessed property

The keycode of the last key that was processed by any keyboard.

Access Read-only

Type expected int LastKeyProcessed

Recording property

TRUE if a keys are currently being recorded, **FALSE** otherwise.

Access Read-only

Type expected Record Recording

Description Only valid while in a *StartRecord*. Becomes invalid when *StopRecord* is called.

Note The return value matches Brief's *inq_kbd_flags*().

ScriptAbortKey property

Contains the key sequence of the key which, when pressed, causes the currently running script to abort.

Access Read-write

Type expected string ScriptAbortKey

Description The default value for ScriptAbortKey is <*Escape*>, except when Epsilon emulation is enabled in which case the default is <*Ctrl-G*>.

Key sequence

The key sequence is a mnemonic key name made up of a key description, such as <*a*>. Key descriptions can be augmented with any (or all) of the following: *Shift, Ctrl, Alt,* and *Keypad.*

To assign the dash character in a key sequence, use the keyname <*Minus*>. Use the keyname <*Plus*> for the + character.

Key mapping

Keys that do not map to a single character have names associated with them. Keys in this category are: *Enter, Backspace, Tab, Home, End, Page Up, Page Down, Left, Right, Up, Down, Insert, Delete, Escape, Space, Print Screen, Center, Pause, Caps Lock, Scroll Lock,* and *Num Lock.*

Modifiers and names are separated by a dash (-). For example,

<*Ctrl-Enter*>

CodeToKey method

Accepts the integer key code representation.

Types expected string CodeToKey(int KeyCode)

KeyCode An integer representation of a keystroke.

Return value The textual description of the key. It matches the Brief key naming conventions for *inq_assignment* and *assign_to_key*.

Flush method

Removes all waiting keystrokes from the IDE message queue.

Types expected void Flush()

Return value None

GetKeyboard method

This method finds the keyboard currently assigned to the IDE subsystem.

Types expected Keyboard GetKeyboard ([string ComponentName])

ComponentName The name of the IDE subsystem. To return the internal mapping, specify Default. Note that the default mapping cannot be remapped. If *ComponentName* is omitted, the method gets the current keyboard. Valid subsystems are:

- Browser
- ClassManager
- Default
- Desktop
- Editor
- Message
- Project

Return value The keyboard currently assigned to an IDE subsystem, or **NULL** if the subsystem is invalid.

KeyToCode method

Converts the name of a key into its integer key code equivalent.

Types expected int KeyToCode (string KeyName)

keyName The textual name of a key.

Return value The integer keycode of the key.

Description *KeyToCode* accepts single keystroke entries such as *<F>* and *<Ctrl-B>*, but not multikey sequences such as *Ctrl+K Ctrl+B*.

PausePlayback method

Pauses the playback of a *Record* object.

Types expected void PausePlayback()

Return value None

Description For *PausePlayback* to work, the play back must have been initiated with the *Playback* member. To resume playback, call *ResumePlayback*.

Playback method

Replays the series of keystrokes assigned to a *Record* object. If no *Record* object is specified, the last recording is replayed.

Types expected int Playback ([Record RecordObject])

RecordObject The name of the *Record* object from which keys are to be replayed.

Return value One of the following values:

0	No sequence to play back
1	Playback successful
–1	Sequence is paused or being remembered
–2	Error loading disk file (macros will handle this)
–3	Canceled by user with *ScriptAbortKey*

Pop method

Restores the previously assigned keyboard mapping after a call to *Push*.

Types expected Keyboard Pop(string ComponentName)

ComponentName The name of the IDE subsystem whose keyboard you want to restore. Valid IDE subsystem names are:

- Browser
- ClassManager
- Default
- Desktop
- Editor
- Message
- Project

Return value The keyboard that was restored or **NULL**, which indicates that no additional keyboard mappings were applied and the default keyboard desktop mapping is active

ProcessKeyboardAssignments method

Converts a .KBD file into a .KBP file.

Types expected bool ProcessKeyboardAssignments (string fileName, bool unassign)

fileName The name of the .KBD formatted file. Includes the path to the file.

unassign Specifies if the file contents should be used to unassign keys defined in the .KBD file. If TRUE, defined keys will be unassigned. If FALSE, defined keys will be assigned.

Return value **TRUE** if a .KBP file is loaded, **FALSE** otherwise.

Description *ProcessKeyboardAssignments* converts a .KBD file into a .KBP file, which is a preprocessed version of the .KBD file. If the .KBP file exists and is newer than the .KBD file, the .KBP file will be used without creating another .KBP file.

ProcessPendingKeystrokes method

Fine-tunes the behavior of *SendKeys*.

Types expected void ProcessPendingKeystrokes()

Return value None

Description If one or more calls to *SendKeys* indicated that key processing was to be delayed, these keystrokes are not processed until *ProcessPendingKeystrokes* is called or until the script completes execution.

Push method

Pushes a keyboard on the keyboard stack, making the new keyboard mapping current. A subsequent *Pop* operation restores the previously assigned keyboard mapping.

Types expected void Push (Keyboard keyboard, string ComponentName, bool transparent)

keyboard The name of the keybard to push onto the stack.

ComponentName The name of the IDE subsystem whose keyboard is to be pushed onto the stack. Valid IDE subsystem names are:

- Browser
- ClassManager
- Default
- Desktop
- Editor
- Message
- Project

transparent Determines the run-time behavior of keystrokes not found in the keyboard. If *transparent* is set, the next keyboard on the stack is searched. Otherwise, the key is ignored.

Return value None

ReadChar method

Reads the key that was pressed.

Types expected int ReadChar (void)

Return value This method returns either –1 (no key is waiting) or the scan value for the key that was pressed. The high-order byte is the scan code, and the low-order byte is the ASCII value.

Description *ReadChar* manages two queues, a local queue for *Push* and the queue for the standard Windows messaging system. It first checks the local queue for any waiting keys. If no keys are available in the local queue, it checks the Windows message queue.

ResumePlayback method

Resumes the playback of a *Record* object.

Types expected void ResumePlayback()

Return value None

Description For *ResumePlayback* to work, the playback must be initiated with the *Playback* member after suspending the recording with a call to *PausePlayback*.

ResumeRecord method

Initiates record mode on a *Record* object.

Types expected bool ResumeRecord (Record RecordObject)

RecordObject The name of the *Record* object to continue recording.

Return value **TRUE** if is able to resume recording, **FALSE** otherwise.

Description New keystrokes are appended to the end of the record buffer. The *Recording* member is updated.

SendKeys method

Simulates the pressing of the keys indicated in the *keyStream* parameter.

Types expected bool SendKeys(string keyStream[, bool suppressImmediateProcessing])

keystream	A series of key presses. The limit on the number of characters in Windows 95 is 715. There is no limit in Windows NT.
suppressImmediateProcessing	The default behavior is to process the keys immediately, before the next line of script is processed. If you include this parameter and set it to **TRUE**, *SendKeys* delays processing of the keys until *ProcessPendingKeystrokes* is called or until the script completes execution.

Return value **TRUE** if keyStream has valid syntax and can be interpreted or **FALSE** if *keyStream* could not be turned into a series of key presses.

Description *SendKeys* takes a key or series of keys as its parameter.

Simple displayable keys are just a string of characters that are the same as the keycaps. For example, the following is valid:

```
SendKeys("hello world");
```

There are two separate keyboard parsers: one for processing key assignments and the other for processing *SendKeys*. These processors accept different formats for the same keys. For example, *<Alt-a>* is the same as *%a*.

It is possible, though not probable, to accidentally send a key sequence to another application besides Borland C++ with *SendKeys*. This can occur if *SendKeys* is executed while BCW.EXE is not active. For example, if *SendKeys* is called by a timer event or while a user is in the process of task switching, the key sequence could be sent to another application.

Alt, Shift and Ctrl keys

Keys that do not have simple displayable counterparts, like *Alt+S*, have a special syntax.

The following table shows how to indicate *Alt+*keyname, *Shift+*keyname and *Ctrl+*keyname:

Key	Description	Example
Alt key modifier	Preface the key name with the percent character (%).	*Alt+s* is %s.
Shift key modifier	Either preface the key name with the plus character (+) or capitalize it.	*Shift+s* is either +s or S
Ctrl key modifier	Preface the key name with the carat character (^).	*Ctrl+s* is ^s.

Note The SendKeys parameter is case-sensitive. ^s is *Ctrl+S*, but ^S is *Ctrl+Shift+S*.

%, + and ^ keys

To indicate the %, + and ^ key, precede the key name with a backslash (\) as below. To indicate:

%, use +\\%

^, use +\\^

+, use +\\+

Non-displaying keys

To simulate non-displaying keys, use a key mnemonic and enclose it in braces ({ }).

For example, to simulate the key sequence *Alt+s* 1 + 2 [*Enter*], use the following syntax:

```
SendKeys("%s1\+2{VK_RETURN}");
```

Example

```
//Example of SendKeys

x = new KeyboardManager();

/* Sends Ctrl+S and processes it immediately
x.SendKeys("^S");

/* Sends Ctrl+S and processes it immediately
z.SendKeys("^S", FALSE);

/* Sends Ctrl+S and delays processing
x.SendKeys("...", TRUE);

/* Processes the delayed keystrokes
x.ProcessPendingKeystrokes();
```

Key mnemonics

VK_ADD	VK_F12	VK_NUMPAD2
VK_BACK	VK_F13	VK_NUMPAD3
VK_CAPITAL	VK_F14	VK_NUMPAD4
VK_CANCEL	VK_F15	VK_NUMPAD5
VK_CLEAR	VK_F16	VK_NUMPAD6
VK_CONTROL	VK_F17	VK_NUMPAD7
VK_DECIMAL	VK_F18	VK_NUMPAD8
VK_DELETE	VK_F19	VK_NUMPAD9
VK_DIVIDE	VK_F20	VK_PAUSE
VK_DOWN	VK_F21	VK_PRINT
VK_END	VK_F22	VK_PRIOR
VK_ESCAPE	VK_F23	VK_RBUTTON

VK_EXECUTE	VK_F24	VK_RETURN
VK_F1	VK_HELP	VK_RIGHT
VK_F2	VK_HOME	VK_SCROLL
VK_F3	VK_INSERT	VK_SELECT
VK_F4	VK_LBUTTON	VK_SEPARATOR
VK_F5	VK_LEFT	VK_SHIFT
VK_F6	VK_MBUTTON	VK_SNAPSHOT
VK_F7	VK_MENU	VK_SPACE
VK_F8	VK_MULTIPLY	VK_SUBTRACT
VK_F9	VK_NUMLOCK	VK_TAB
VK_F10	VK_NUMPAD0	VK_NEXT
VK_F11	VK_NUMPAD1	VK_UP

StartRecord method

Begins storing keystroke sequences in a *Record* object. Updates the *Recording* member.

Types expected bool StartRecord (Record RecordObject)

RecordObject The name of the *Record* object in which keys are to be recorded.

Return value **TRUE** if the key sequence is stored, **FALSE** otherwise.

Description *StartRecord* replaces any key sequences already stored in the *Record* object.

You can record to only one *Record* object at a time. If you attempt a *StartRecord* before calling a matching *StopRecord* for a previous recording, the *StartRecord* fails.

StopRecord method

Halts recording keystrokes previously started with *StartRecord*.

Types expected void StopRecord ( )

Return value None

Description *StopRecord* updates the *CurrentRecord* member and updates the *Recording* member to **FALSE**.

Chapter

21

ListWindow class

The *ListWindow* class implements and manages list windows.

Syntax ListWindow(int Top, int Left, int Height, int Width, string Caption, bool MultipleSelect, bool Sorted, string[] InitialValues)

Top, Left, Height, Width	Initial coordinates of the list.
Caption	Text to be displayed in the list title.
MultipleSelect	Determines whether the list will support multiple selections.
Sorted	Determines whether new additions to the list are put in their sorted order.
InitialValues	An array of strings specifying the initial contents of the list.

Properties

string Caption	Read-write
int Count	Read-only
int CurrentIndex	Read-only
[]Data	Read-only
int Height	Read-write
bool Hidden	Read-write
bool MultiSelect	Read-only

bool Sorted	Read-only
int Width	Read-write

Methods

void Add(string newEl, int offset)

void Clear()

void Close()

void Execute()

int FindString(string toFind)

string GetString(int offset)

void Insert()

bool Remove(int offset)

Events

void Accept()

void Cancel()

void Closed()

void Delete()

bool KeyPressed(string keyName)

void LeftClick(int xPos, int yPos)

void Move()

void RightClick(int xPos, int yPos)

ListWindow class description

ListWindow objects create a list window. A list window is a list view that displays a list of selectable items. *ListWindow* objects control:

- The size and position of the list
- The contents of the list
- The number of items in the list
- Finding and getting strings in the list
- Opening and closing the list

Caption property

The title of the list window.

Access Read-write

Type expected string Caption

Count property

The number of elements in the list.

Access Read-only

Type expected int Count

CurrentIndex property

Contains the zero-based index of the currently highlighted list element, or –1 if nothing is selected.

Access Read-only

Type expected int CurrentIndex

Data property

Contains an array of strings that represent the contents of the list.

Access Read-only

Type expected []Data

Height property

Contains the height of the list window in pixels.

Access Read-write

Type expected int Height

Hidden property

Determines whether the list window can be removed from the display.

Access Read-write

Type expected bool Hidden

Description *Hidden* only has meaning after the *Execute* method has been called and before the list window is closed.

MultiSelect property

If **TRUE**, allows multiple selections from the list. If **FALSE**, only a single selection can be made.

Access Read-only

Type expected bool MultiSelect

Sorted property

If **TRUE**, the elements in the list are sorted as new elements are added. If **FALSE**, elements appear at the offset given in the call to the *Add* method.

Access Read-only

Type expected bool Sorted

Width property

Contains the width of the list window in pixels.

Access Read-write

Type expected int Width

Add method

Adds the string *newEl* to the list at the position designated by *offset*.

Types expected void Add(string newEl, int offset)

newEl The string to add to the list.

offset The position to add the string to. *offset* is zero-based. *offset* should not be higher than *Count*, or else the new element will not appear in the list. *offset* is ignored if the list is sorted.

Return value None

Description *Add* only has an effect after the ListWindow has been opened using the *Execute* method.

Clear method

Removes all elements from the list.

Types expected void Clear()

Return value None

Close method

Removes the *ListWindow* from the screen.

Types expected void Close()

Return value None

Execute method

Creates and displays the *ListWindow*.

Types expected void Execute()

Return value None

FindString method

Finds the specified string.

Types expected int FindString(string toFind)

stringToFind The string to find.

Return value The one-based offset of the string or zero if not found.

Description *FindString* only has an effect after the *ListWindow* has been opened using the *Execute* method.

GetString method

Returns a string.

Types expected string GetString(int offset)

offset The location of the string to get.

Return value The string at the specified offset or " " if the offset is illegal.

Insert method

Invoked when the user presses *Insert*. The default action is to do nothing.

Types expected void Insert()

Return value None

Remove method

Removes the element from the specified offset.

Types expected bool Remove(int offset)

offset The position to remove the string from. *offset* is zero-based.

Return value **TRUE** if the element was removed, **FALSE** otherwise.

Description *Remove* only has an effect after the *ListWindow* has been opened using the *Execute* method.

Accept event

Raised when the user presses *Enter* or double-clicks on a list element. Default action is to close the list.

Types expected void Accept()

Return value None

Cancel event

Raised when the user presses *Escape*. Default action is to close the list.

Types expected void Cancel()

Return value None

Closed event

Raised when the *ListWindow* is destroyed.

Types expected void Closed()

Return value None

Delete event

Raised when the user presses *Delete*. Default action is to do nothing.

Types expected void Delete()

Return value None

KeyPressed event

Raised when the user presses a key other than *Delete, Insert, Accept,* or *Cancel.*

Types expected bool KeyPressed(string keyName)

keyName Indicates a key in the standard key format (<*a*> or <*Ctrl-a*>).

Return value **TRUE** indicates that the script has processed the key and that no further processing is desired; **FALSE** indicates that normal processing should take place.

LeftClick event

Raised when the user left-clicks the *ListWindow*.

Types expected void LeftClick(int xPos, int yPos)

xPos The x-position of the mouse at the time of the left-click.

yPos The y-position of the mouse at the time of the left-click.

Return value None

Move event

Raised when the selection in the list is changed. Default action is to do nothing.

Types expected void Move()

Return value None

RightClick event

Raised when the user right-clicks the *ListWindow*.

Types expected void RightClick(int xPos, int yPos)

xPos The x-position of the mouse at the time of the right-click.

yPos The y-position of the mouse at the time of the right-click.

Return value None

Chapter

22

PopupMenu class

The *PopupMenu* class manages pop-up menus. In the Borland C++ IDE, pop-up menus are known as SpeedMenus.

Syntax PopupMenu(int Top, int Left, string [] InitialValues)

Top, Left Initial coordinates of the pop-up menu.

InitialValues An array of strings specifying the initial contents of the pop-up menu.

Properties

[] Data Read-only

Methods

void Append(string newChoice)

int FindString(string toFind)

string GetString(int offset)

bool Remove(int offset)

string Track()

Events

None

PopupMenu class description

PopupMenu objects create create a pop-up menu. A pop-up menu pops up and displays a list of menu choices. *PopupMenu* objects control:

- The size and position of the pop-up menu
- The contents of the pop-up menu
- The number of items in the pop-up menu
- Finding and getting strings in the pop-up menu
- Opening and closing the pop-up menu

Data property

Contains an array of strings that specifies the choices that will be offered on the pop-up menu.

Access Read-only

Type expected [] Data

Append method

Appends a new choice to the pop-up menu.

Types expected void Append(string newChoice)

newChoice The name of the new menu choice.

Return value None

FindString method

Looks for the specified menu choice.

Types expected int FindString(string toFind)

toFind The name of the string to find.

Return value The one-based offset of the string found or zero if not found.

GetString method

Returns a menu choice.

Types expected string GetString(int offset)

offset The location of the string to get. *offset* is zero-based.

Return value The string at the specified offset or " " if the offset is illegal.

Remove method

Removes the specified menu choice.

Types expected bool Remove(int offset)

offset The location of the menu choice to remove. *offset* is zero-based.

Return value **TRUE** if the element is removed, **FALSE**, otherwise.

Track method

Displays the pop-up menu to the user and tracks responses.

Types expected string Track()

Return value The string selected or the empty string (" ") if the user cancels the menu.

Chapter

23

ProjectNode class

Manages the nodes of a project.

Syntax ProjectNode(nodeName, EditView associatedView)

nodeName	A string indicating the full name of the node (as in MyProg.exe). If no name is specified, *ProjectNode* uses the top level IDE node.
associatedView	*associatedView* is optional. If given and if the specified view is associated with a particular project node, the node that represents the *EditView* is used and *nodeName* is ignored. To associate an *EditView* with a *ProjectNode*, create the *EditView*. (To create an *EditView*, double-click the node or press *Enter* in the Project window.)

Properties

[] ChildNodes	Read-only
string IncludePath	Read-only
string InputName	Read-only
bool IsValid	Read-only
string LibraryPath	Read-only
string Name	Read-only
bool OutOfDate	Read-write
string OutputName	Read-only

string SourcePath	Read-only
string Type	Read-only

Methods

bool Add(string nodeName [, string type])

bool Build(bool suppressUI)

bool Make(bool suppressUI)

void MakePreview()

bool Remove([string nodeName])

bool Translate(bool suppressUI)

Events

void Built(bool status)

void Made(bool status)

void Translated(bool status)

ProjectNode class description

Each node has its own *ProjectNode* class instance. *ProjectNode* class members:

- Display child nodes
- Indicate the node's source, input, output, and library source paths
- Indicate if a specified node is valid
- Indicate the type of node
- Add nodes to and removes nodes from a project
- Build or make a node
- Translate a node

ChildNodes property

Indicates all the child nodes of the current node.

Access Read-only

Type expected [] ChildNodes

Description *ChildNodes* consists of an array of strings containing the *InputNames* of the child nodes.

IncludePath property

Indicates the path to use for include files for the currently loaded project.

Access Read-only

Type expected string IncludePath

InputName property

The node's relative path name of the input file including extension, as in Myfile.cpp or SOURCE\MYFILE.CPP.

Access Read-only

Type expected string InputName

IsValid property

Indicates whether a node is valid.

Note A node becomes invalid if the project file it is associated with is closed or if the node is deleted.

Access Read-only

Type expected bool IsValid

LibraryPath property

Indicates the path to use for libraries for the currently loaded project.

Access Read-only

Type expected string LibraryPath

Name property

Indicates the node's relative path name with an extension, as in Myfile.cpp or SOURCE\MYFILE.CPP.

Access Read-only

Type expected string Name

OutOfDate property

Can be checked, or set, to determine the date of a node.

Access Read-write

Type expected bool OutOfDate

Description *OutOfDate* is used by the Make engine to determine if a node needs to be rebuilt.

OutputName property

Indicates the relative path name of the output file including extension, as in MYFILE.CPP or Source\Myfile.cpp.

Access Read-only

Type expected string OutputName

Description You can always generate the absolute file name by prepending the result of *IDEApplication.CurrentDirectory* to *InputName*, as in:

```
absName = IDE.CurrentDirectory + node.InputName;
```

SourcePath property

Indicates the path where the source files for the currently loaded project reside.

Access Read-only

Type expected string SourcePath

Type property

Indicates the type of node (.CPP, .H, SourcePool, .LIB, and so on).

Access Read-only

Type expected string Type

Description When the node is invalid, *Type* contains the empty string ("").

Add method

Adds a node to this project node.

Types expected bool Add(string nodeName [, string type])

nodeName The name of the node to add.

type The type of the node, such as .CPP, .DEF or .RC. If *type* is omitted, it is derived from the *nodeName*.

Return value **TRUE** if the node is added, **FALSE**, otherwise

Build method

Causes the node to be built, made, or translated by the IDE's Make engine according to the rules of the node.

Types expected bool Build(bool suppressUI)

suppressUI If **TRUE**, the build status dialog will not be displayed during the build process.

Return value **TRUE** if the node is built successfully, **FALSE**, otherwise.

Make method

Causes the node to be built, made, or translated by the IDE's Make engine according to the rules of the node if the node's *OutOfDate* property is **TRUE**.

Types expected bool Make(bool suppressUI)

suppressUI If **TRUE**, the build status dialog will not be displayed during the build process.

Return value **TRUE** if the node is made successfully, **FALSE**, otherwise

MakePreview method

Provides information about what files will be processed if you *Make* or *Build* this node.

Types expected void MakePreview()

Return value None

Description *MakePreview* performs the same dependency checks as a make and generates a report to the Message window listing the nodes that need to be rebuilt to keep the project up to date.

Remove method

Removes the node from the project, if the name of the node is specified.

Types expected bool Remove([string nodeName])

nodeName The name of the node to remove from the project. If *nodeName* is not specified, *Remove* removes this node from the project.

Return value **TRUE** if the node is removed, **FALSE**, otherwise

Translate method

Causes the node to be built, made, or translated by the IDE's Make engine according to the rules of the node.

Types expected bool Translate(bool suppressUI)

suppressUI If **TRUE**, the build status dialog will not be displayed during the build process.

Return value **TRUE** if the node is translated successfully, **FALSE**, otherwise

Built event

Raised after a build has been performed on the node. The event's default behavior is to do nothing.

Types expected void Built(bool status)

status Describes the result of the build. *status* is set to **TRUE** if the build completed successfully or with warnings, and **FALSE** if there were errors.

Return value None

Made event

Raised after a make has been performed on the node. The event's default behavior is to do nothing.

Types expected void Made(bool status)

status Describes the result of the build. *status* is set to **TRUE** if the build completed successfully or with warnings, and **FALSE** if there were errors.

Return value None

Translated event

Raised after a translate has been performed on the node. The event's default behavior is to do nothing.

Types expected void Translated(bool status)

status Describes the result of the build. *status* is set to **TRUE** if the build completed successfully or with warnings, and **FALSE** if there were errors.

Return value None

Description When the user performs a make or a build, the *ProjectNode* object receives a *Translated* event before it receives the *Built* or *Made* event.

Chapter

24

Record class

Creates an empty *Record* object into which keystrokes are saved.

Syntax Record([string RecordName])

RecordName The name of the *Record* object. If *RecordName* is not specified, a default name is automatically assigned ("Record1", "Record2", and so on).

Properties

bool IsPaused	Read-only
bool IsRecording	Read-only
int KeyCount	Read-only
string Name	Read-write

Methods

void Append(int KeyCode)

string GetCommand(int offset)

int GetKeyCode(int offset)

Record Next(void)

Events

None

Record class description

Because *Record* objects can be built programatically (outside the context of the keyboard manager), recordings can be saved to disk and restored, and keyboard sequences can be simulated through script.

KeyboardManager can also be used for key recording. *KeyboardManager.StartRecord* and *KeyboardManager.StopRecord* members populate a *Record* object with key sequences. An unlimited number of *Record* objects can be named and iterated.

IsPaused property

TRUE when *KeyboardManager.PauseRecording* is called in order to allow users to enter keystrokes that will not become part of the recording. **FALSE** otherwise.

Access Read-only

Type expected bool IsPaused

IsRecording property

TRUE when the *KeyboardManager* begins storing keystrokes to the *Record* object in response to a call to *KeyboardManager.StartRecord*. **FALSE** otherwise.

Access Read-only

Type expected bool IsRecording

KeyCount property

The number of keystrokes stored in this *Record* object.

Access Read-only

Type expected int KeyCount

Name property

The name of the *Record* object. This is a read-write property.

Type expected string Name

Append method

Appends a keycode to the record buffer.

Types expected void Append(int KeyCode)

keyCode The keycode to append.

Return value None

Description *Append* allows empty *Record* objects to be built programatically or added to through a script.

GetCommand method

Returns information describing a key stored in the *Record* object.

Types expected string GetCommand(int offSet)

offSet The offset to examine.

Return value Because the meanings of the stored keystrokes can be altered by the execution of the recording, the information returned is transitory. For example, if the recording switches to another subsystem with a different key map, the stored keystrokes would be different than expected. The return values reflect the values as of the last run.

Description *GetCommand* is intended to be used after a *Record* object has been executed.

Note Keys are stored in the order which they are recorded. The first key in the recording is at offset 0.

GetKeyCode method

This method returns information describing a key stored in the *Record* object.

Note Keys are stored in the order which they are recorded. The first key in the recording is at offset 0.

Types expected int GetKeyCode(int offset)

offSet The offset to examine.

Return value The keystroke of the key at the specified offset, or zero if the offset is illegal.

Next method

As *Record* objects are created, they are automatically linked together. This method provides a mechanism for iterating the recordings.

Types expected Record Next(void)

Return value The next *Record* object or **NULL** indicating the end of the list.

Chapter

25

ScriptEngine class

A *ScriptEngine* object is responsible for carrying out the action in script files.

Syntax ScriptEngine()

Properties

bool AppendToLog	Read-write
int DiagnosticMessageMask	Read-write
bool DiagnosticMessages	Read-write
string LogFileName	Read-write
bool Logging	Read-write
string ScriptPath	Read-write
string StartupDirectory	Read-only

Methods

int Execute(string commandLine, bool temporary)

string Execute(string commandLine, bool temporary)

bool IsAClass(string className)

bool IsAFunction(string functionName)

bool IsAMethod(string className, string methodName)

bool IsAProperty(string className, string propertyName)

bool IsLoaded(string scriptFileName)

bool Load(string scriptFileName)

[] Modules(bool libraryOnly)

bool Reset(int resetWhat)

void SymbolLoad(string fileName, string symbols)

bool Unload(string scriptFileName)

Events

void Loaded(string scriptFileName)

void Unloaded(string scriptFileName)

ScriptEngine class description

A *ScriptEngine* object loads, unloads, executes, maintains modules and keeps error information on scripts. A *ScriptEngine* object can be created in any script; however, a system wide instance exists.

To create a local instance of a *ScriptEngine* object, use the following syntax:

```
declare ScriptEngine scriptEngine;
```

Once this statement is in your script file, you can use the *ScriptEngine* object as in the following example:

```
Function()
{
   scriptEngine.Load("ascript");
}
```

To reuse the system wide instance, include the following statement in your script file:

```
import scriptEngine;
```

Note Declaring the script engine locally provides slightly better performance than importing it.

AppendToLog property

Determines whether the next message logged to the log file name should replace an existing log file (if one exists) before performing the write.

Access Read-write

Type expected bool AppendToLog

Description *AppendToLog* is used when *Logging* is on. Once the write is completed, *AppendToLog* is set to **TRUE**, causing subsequent messages to be appended to the log.

DiagnosticMessageMask property

Controls which types of diagnostic messages to record.

Access Read-write

Type expected int DiagnosticMessageMask

Description *DiagnosticMessageMask* can be any combination of:

- OBJECT_DIAGNOSTICS
- METHOD_DIAGNOSTICS
- MEMBER_DIAGNOSTICS
- ARGUMENT_DIAGNOSTICS
- LANGUAGE_DIAGNOSTICS
- MODULE_DIAGNOSTICS
- FULL_DIAGNOSTICS
- NO_DIAGNOSTICS

DiagnosticMessages property

Controls whether diagnostic messages should be recorded in the Message window.

Access Read-write

Type expected bool DiagnosticMessages

LogFileName property

The name of the log file. Defaults to \SCRIPT.LOG.

Access Read-write

Type expected string LogFileName

Logging property

If **TRUE**, script messages will be stored in the log file.

Access Read-write

Type expected bool Logging

ScriptPath property

Holds a string containing the names of the one or more directories to search for script files. Each directory path is separated from the others by a semicolon (;).

Access Read-write

Type expected string ScriptPath

StartupDirectory property

The name of the directory in which the file STARTUP.SPX was found during initialization.

Access Read-only

Type expected string StartupDirectory

Execute method

Executes the specified command.

Types expected
int Execute(string commandLine, bool temporary)
string Execute(string commandLine, bool temporary)

commandLine The command to execute. *commandLine* must be a valid cScript command.

temporary If *temporary* is **TRUE**, the command is run within a new context and must use **import** to access global variables declared in another module. Any global variables it creates will be used for the purposes of the command and then discarded.

If *temporary* is **FALSE** (the default), the command is executed with the scope of Immediate mode and has automatic access to globals from other modules. In this case, any variables created by the command continue to exist after the command has run and can be accessed from Immediate mode.

Return value The value appropriate to whatever *commandLine* evaluates to. If that value is an object, it is converted to a string

IsAClass method

Determines if cScript has seen the class declaration for the specified class.

Types expected bool IsAClass(string className)

className The name of the class. *IsAClass* searches for declaration of this class.

Return value **TRUE** if instances of the class can be constructed, **FALSE**, otherwise

IsAFunction method

Determines if cScript has seen the function declaration for the specified function.

Types expected bool IsAFunction(string functionName)

functionName The name of the function. *IsAClass* searches for declaration of this function.

Return value **TRUE** if the function can be called, **FALSE**, otherwise

IsAMethod method

Determines if the specified class has as a method with the specified name.

Types expected bool IsAMethod(string className, string methodName)

className The name of the class. *IsAClass* searches in this class for the method specified in *methodName*.

methodName The name of the method to search for.

Return value **TRUE** if the method is a member of the class, **FALSE**, otherwise

IsAProperty method

Determines if the specified class has as a property with the specified name.

Types expected bool IsAProperty(string className, string propertyName)

className The name of the class. *IsAClass* searches in this class for the property specified in *propertyName*.

propertyName The name of the property to search for.

Return value **TRUE** if the property is a member of the class, **FALSE**, otherwise

IsLoaded method

Determines whether the specified script file has been loaded, or if the file (either the source or the binary) can be found in the *ScriptPath*.

Types expected bool IsLoaded(string scriptFileName)

scriptFileName The name of the script file to load.

Return value **TRUE** if the file is loaded or can be loaded, **FALSE**, otherwise

Load method

Loads the specified script file. If not already loaded, the file (either the source or the binary) is searched for using the *ScriptPath*.

Types expected bool Load(string scriptFileName)

scriptFileName The name of the script file to load.

Return value **TRUE** if the script was located and loaded, **FALSE** if the script file was not found

Description If the script file to be loaded has already been loaded into memory, *Load* performs an in-place *Reset*. (The module's position in the module chain is not affected, but all its variables are restored to their original state.)

The **on** handlers are disconnected or reconnected. All variables local to the module are released and reset. Any code at the module level scope is executed again.

Modules method

Finds all the loaded modules.

Types expected [] Modules(bool ModuleName)

ModuleName One of the following:

- SCRIPT_MODULES For all modules
- LIBRARY_MODULES For only library modules

Return value An array of strings containing the names of the loaded modules

Reset method

Resets the script session by discarding all modules that match the specified value. If no value is supplied, the method does nothing.

Types expected bool Reset(int resetWhat)

resetWhat The module to reset. Can be either LIBRARY_MODULE or SCRIPT_MODULE

Return value **TRUE** if the session is reset, **FALSE**, otherwise

SymbolLoad method

Provides hints about where the definition of a given symbol might be. For example:

```
SymbolLoad("ScriptFile", "Foo, Bar, jump")
```

Types expected void SymbolLoad(string fileName, string symbols)

fileName A script file that should be loaded if the lookup for any of the listed symbols fails.

symbols A comma delimited string of the symbols which may be resolved by loading *fileName*.

Return value None

Description At run time when the Script Engine tries to find a class, function, method, or global variable that it doesn't know about, it consults an internal table constructed by calls to this method.

Unload method

Tries to unload the specified script file. Future references from other scripts to variables, functions or classes defined in the unloaded script file are no longer valid.

Types expected bool Unload(string scriptFileName)

scriptFileName The name of the script file to unload.

Return value **FALSE** when the script file is not found to have been loaded, **TRUE**, otherwise

Loaded event

Raised whenever a new script module is successfully loaded.

Types expected void Loaded(string scriptFileName)

scriptFileName The name of the script file that was loaded.

Return value None

Unloaded event

Raised when when a module has been unloaded.

Types expected void Unloaded(string scriptFileName)

scriptFileName The name of the script file that was unloaded.

Return value None

Chapter

26

SearchOptions class

The *SearchOptions* class members search for text and error locations in your script file.

Syntax SearchOptions()

Properties

bool CaseSensitive	Read-write
bool FromCursor	Read-write
bool GoForward	Read-write
bool PromptOnReplace	Read-write
bool RegularExpression	Read-write
bool ReplaceAll	Read-write
string ReplaceText	Read-write
string SearchReplaceText	Read-write
string SearchText	Read-write
bool WholeFile	Read-write
bool WordBoundary	Read-write

Methods

void Copy(SearchOptions optionsToCopyFrom)

Events

None

SearchOptions class description

SearchOptions class members search and replace occurrences of text strings. *SearchOptions* class members allow:

- Case sensitive searching
- Searching from the current cursor position
- Searching forward or backward in the file
- Confirmation before text replacements
- Use of regular expressions in the search
- Replacement of all matching text
- Searching and replacing in the same operation

CaseSensitive property

If **TRUE**, a case-sensitive search is performed.

Access Read-write

Type expected bool CaseSensitive

FromCursor property

If **TRUE**, the search is made from the current cursor position.

Access Read-write

Type expected bool FromCursor

GoForward property

If **TRUE**, the search is "forward" towards the end of the file.

Access Read-write

Type expected bool GoForward

PromptOnReplace property

If **TRUE**, you are prompted (before a replacement is made) to confirm each instance where the *SearchReplaceText* will be replaced by the *ReplaceText*.

Access Read-write

Type expected bool PromptOnReplace

RegularExpression property

If **TRUE**, regular expressions are used in matching the *SearchText* or *SearchReplaceText* with the text to be searched.

Access Read-write

Type expected bool RegularExpression

ReplaceAll property

If **TRUE**, all text which matches the *SearchReplaceText* is replaced with the *ReplaceText* without any prompting for confirmation.

Access Read-write

Type expected bool ReplaceAll

ReplaceText property

Contains text which replaces instances of the *SearchReplaceText* string(s) found in the text being searched.

Access Read-write

Type expected string ReplaceText

SearchReplaceText property

Contains the text to search for in a search and replace operation (not a search-only operation).

Access Read-write

Type expected string SearchReplaceText

SearchText property

Contains the text to search for in a search operation (not a search and replace operation).

Access Read-write

Type expected string SearchText

WholeFile property

If **TRUE**, the whole file is searched for *SearchText* or *SearchReplaceText*, regardless of the cursor position.

Access Read-write

Type expected bool WholeFile

WordBoundary property

If **TRUE**, a match between *SearchText* or *SearchReplaceText* and the text being searched only occurs if the characters in *SearchText* make up an entire word (that is, they are surrounded by whitespace) and are not embedded in a larger word.

Access Read-write

Type expected bool WordBoundary

Copy method

Creates a copy of the current *SearchOptions*.

Types expected void Copy(SearchOptions optionsToCopyFrom)

optionsToCopyFrom The options to copy.

Return value None

Chapter

27

StackFrame class

StackFrame class members display information about the call stack.

Syntax StackFrame(int howFarBack)

howFarBack The number of stack frames to go back through.

If *howFarBack* is 0, the stack frame for this call is retrieved.

If *howFarBack* is 1, the stack passed to this function's caller is retrieved, and so on.

When *howFarBack* is less than the depth of the stack, the object is not valid.

Properties

int ArgActual	Read-only
int ArgPadding	Read-only
string Caller	Read-write
bool IsValid	Read-only

Methods

StackElement GetParm(int parmNumber)

string InqType(int arg)

bool SetParm(int parmNumber, newValue)

Events

None

StackFrame class description

StackFrame class members display information about the call stack, the sequence of function calls that brought your script program to its current state. It deciphers all active functions and their argument values and displays them in a readable format.

The most recently called function displays at the top of the list, followed by its caller and the previous caller to that. The list continues to the first function in the calling sequence, which displays at the bottom of the list.

StackFrame class members:

- Return the number of arguments that were actually passed to a method.
- Indicate the number of objects cScript had to pad or truncate from the original call stack.
- Indicate the name of the method owning the stack frame.
- Indicate if the stack frame is valid.
- Return the object at a specified stack frame offset.

ArgActual property

Indicates the number of objects on the cScript stack belonging to this call frame.

Access Read-only

Type expected int ArgActual

Description *ArgActual* is the number of arguments that were actually passed to a method. cScript either pads or truncates arguments as necessary, so it must keep track of the number actually passed.

For example, if you have a call in your code to

```
MyMethod("hi");
```

its declaration shows the following:

```
MyMethod(first, second, third, fourth){
 print first, second, third, fourth;
}
```

If you were to insert `x = new StackFrame(0);` into the call to *MyMethod,* the value of *x.ArgActual* would be 1 since only one argument is passed.

ArgPadding property

Indicates the number of objects cScript had to pad or truncate from the original call stack to resolve any discrepancy between the number of arguments in the declaration and the number of arguments in the call.

Access Read-only

Type expected int ArgPadding

Caller property

Indicates the name of the method owning the stack frame.

Access Read-only

Type expected string Caller

Description *Caller* contains the empty string ("") if the call is a top level one. When the value is set, it is reflected in subsequent *StackFrame* calls until the current stack frame is popped off, at which point the value of *Caller* is reset to its original value.

IsValid property

FALSE if the object was constructed with an invalid stack frame depth or if the stack frame has gone out of scope. It is **TRUE** otherwise.

Access Read-only

Type expected bool IsValid

InqType method

Returns the type of argument.

Types expected string InqType(int arg)

arg The specified argument.

Return value A descriptor for the argument specified. If *arg* is greater than or equal to *ArgActual,* "Out of range" is returned.

GetParm method

Returns the object at the specified stack frame offset.

Types expected StackElement GetParm(int parmNumber)

parmNumber The number of the parameter to return.

Return value The object at the specified stack frame offset.

SetParm method

Sets the value of the object at the specified stack frame offset.

Types expected bool SetParm (int parmNumber, newValue)

parmNumber The value of the object to change.

newValue The object's new value.

Return value **TRUE** when the value was successfully changed. **FALSE** if the *StackFrame* is currently invalid or if *parmNumber* is not within the range of arguments specified for the *StackFrame*.

Chapter

28

String class

The *String* object manipulates text.

Syntax String(string theText)

theText The text to declare as a text object.

Properties

int Character	Read-write
int Integer	Read-write
bool IsAlphaNumeric	Read-only
int Length	Read-only
string Text	Read-write

Methods

String Compress()

bool Contains(string charactersToLookFor, int mask)

int Index(string substr[, int direction])

String Lower()

String SubString(int startPos[, int length])

String Trim([bool fromLeft])

String Upper()

Events

None

String class description

The *String* class manipulates text characters independently of each other. To store and manipulate text characters as a group, delcare the text as a **string** (note the lower case "s").

Class members can be used to:

- Get the first character of the text.
- Get the numeric equivalent of the beginning of the text. (Useful for converting text to numeric values.)
- Test if the first character is alphanumeric.
- Return the length of the text.
- Return the text object as a string versus a String.
- Convert multiple whitespace characters to one whitespace character.
- Find any number of characters within the text.
- Return the offset of a particular character.
- Lower case the text.
- Return a portion of the text as a String.
- Remove whitespace from either the right or left of the text.
- Upper case the text.

Character property

Indicates the integer value of character 0 of the string.

Access Read-write

Type expected int Character

Description When the value of *Character* is set, it changes the whole string to the new value.

For example, if you start with a string *Str* containing the text "FOO", the value of *Str.Text* is "FOO" and the value of *Str.Character* is 'F'. If you then set the value of *Str* with `Str.Character = 'X'`, the value of *Str.Text* is now "X" and not "XOO".

Integer property

Indicates the numerical equivalent of the character string that this object represents, or zero if the string does not contain numerals.

Access Read-write

Type expected int Integer

IsAlphaNumeric property

TRUE if the text of the *String* is made up entirely of alphanumeric characters (determined by checking the system's current locale). **FALSE**, otherwise.

Access Read-only

Type expected bool IsAlphaNumeric

Length property

Calculates length of the string (equivalent to *strlen*). Does not include the **NULL**.

Access Read-only

Type expected int Length

Text property

The character string that this object represents.

Access Read-write

Type expected string Text

Compress method

Compresses a string.

Types expected String Compress()

Return value A new string consisting of *String* with whitespace removed.

Contains method

Searches *String* for the specified characters.

Types expected bool Contains(string charactersToLookFor, [int mask])

charactersToLookFor The characters to search for in *String*.

mask Any of the following constants:

Constant	Description
BACKWARD_RIP	Rip from left to right.
INVERT_LEGAL_CHARS	Interpret the string as the inverse of the string you wish to use. In other words, specify "t" to mean any ASCII value between 1 and 255 except 't'.
INCLUDE_LOWERCASE_ALPHA_CHARS	Append the characters `abcdefghijklmnopqrstuvwxyz` to the string.
INCLUDE_UPPERCASE_ALPHA_CHARS	Append the characters `ABCDEFGHIJKLMNOPQRSTUVWXYZ` to the string.
INCLUDE_ALPHA_CHARS	Append both uppercase and lowercase alpha characters to the string.
INCLUDE_NUMERIC_CHARS	Append the characters `1234567890` to the string.
INCLUDE_SPECIAL_CHARS	Append the characters ` ` - = [ ] \ ; ' , . / ~ ! @ # $ % ^ & * ( ) _ + { } | : " < > ? to the string.

Return value **TRUE** if the string contains one of the characters specified, **FALSE**, otherwise

Index method

Scans the string for an embedded occurrence of the specified substring.

Index does not accept regular expressions.

Types expected int Index(string substr[, int direction])

substr The string to search for.

direction The direction to search in. One of:

- SEARCH_FORWARD (default)
- SEARCH_BACKWARD

Return value 0 if *substr* is not found or, if found, the one based offset + 1 of the substring

Lower method

Translates *String* to lowercase.

Types expected String Lower()

Return value A new string consisting of *String* in lowercase text.

SubString method

This method returns a new string consisting of the specified substring.

Types expected String SubString(int startPos[, int length])

startPos The starting point of the substring in the string.

length The number of characters in the substring. Defaults to MAX_EDITOR_LINE_LEN (1024). If *length* is not specified, *SubString* continues to the end of the string.

Return value A new string consisting of the specified substring.

Trim method

Trims whitespace from *String*.

Types expected String Trim([bool fromLeft])

fromLeft If **TRUE**, trims leading whitespace. If **FALSE**, trims trailing whitespace.

Return value A new string consisting of *String* without trailing or leading whitespaces (depending on *fromLeft* selection).

Upper method

Translates *String* to uppercase.

Types expected String Upper()

Return value A new string consisting of *String* in upper case text.

Chapter

29

TimeStamp class

TimeStamp indicates the current time. It initializes to the system time at the time of construction.

Syntax TimeStamp()

Properties

int Day	Read-write
int Hour	Read-write
int Hundredth	Read-write
int Millisecond	Read-write
int Minute	Read-write
int Month	Read-write
int Second	Read-write
int Year	Read-write

Methods

int Compare(TimeStamp tstamp)

string DayName()

string MonthName()

Events

None

Day property

Indicates the current day in the range of 0 (Sunday) to 6 (Saturday).

Access Read-write

Type expected int Day

Hour property

Indicates the current hour in the range of 0 (Midnight) to 23 (11:00 PM).

Access Read-write

Type expected int Hour

Hundredth property

Indicates the current hundredth of an hour in the range of 0 to 99.

Access Read-write

Type expected int Hundredth

Millisecond property

Indicates the number of milliseconds after the current second in the range of 0 to 999.

Access Read-write

Type expected int Millisecond

Minute property

Indicates the number of minutes after the current hour in the range of 0 to 59.

Access Read-write

Type expected int Minute

Month property

Indicates the current month of the year in the range of 0 (January) to 11 (December).

Access Read-write

Type expected int Month

Second property

Indicates the number of seconds after the current minute in the range of 0 to 59.

Access Read-write

Type expected int Second

Year property

Indicates the current year.

Access Read-write

Type expected int Year

Compare method

Compares the time properties of the calling *TimeStamp* object with those of the *tstamp* argument.

Types expected int Compare(TimeStamp tstamp)

tstamp The properties to compare *TimeStamp* to.

Return value –1 if the calling *TimeStamp* is newer than *tstamp*, 0 if the calling *TimeStamp* is the same age as *tstamp*, and 1 if the calling *TimeStamp* is older than *tstamp*.

DayName method

Returns the name of the current day of the week.

Types expected string DayName()

Return value Monday, Tuesday, and so on

MonthName method

Returns the name of the current month.

Types expected string MonthName()

Return value January, February, and so on

Chapter

30

TransferOutput class

Internally created by the IDE after processing a transfer tool, *TransferOutput* is passed to the IDE event *TransferOutputExists*.

Syntax TransferOutput()

Properties

int MessageId	Read-only
string Provider	Read-only

Methods

string ReadLine()

Events

None

TransferOutput class description

An object of type *TransferOutput* is internally created by the IDE whenever a transfer operation is performed.

When the IDE starts a transfer, it outputs a message to the Message window saying "Transferring to *ToolName...*"

When a transfer happens, the IDE captures all its output and stores it in an internal buffer. The contents of this buffer may be accessed by using *TransferOutput.ReadLine*. This method returns the next line of text until the stream is exhausted, at which point it returns **NULL**.

The IDE contains built-in processing for tools it commonly transfers to. These tools include TASM and Grep. The script sample files FILTSTUB.SPP and FILTERS.SPP show uses of this class in action.

MessageId property

The owning message stored to the message system.

Access Read-only

Type expected int MessageId

Description *MessageID* is intended to be used as the *parentMessage* parameter of *IDE.MessageCreate*. The messages produced by the transfer can be grouped with the transfer message rather than at the same level.

Provider property

Indicates the name of the tool that was spawned by the transfer; for example, COMMAND.COM.

Access Read-only

Type expected string Provider

ReadLine method

Reads the next line of text that was produced by the transfer.

Types expected string ReadLine()

Return value The next line of text that was produced by the transfer. If the line is empty, returns the empty string (" "). If there is no more input to read, it returns **NULL**.

Description When a transfer happens, the IDE captures all its output and stores it in an internal buffer. The contents of this buffer may be accessed by repeatedly calling *ReadLine*, which returns the next line of text until the stream has been exhausted, at which point it returns **NULL**.

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