Chapter 2
Visual Elite Design Demo

The Visual Elite tool provides a number of demonstration designs that can be accessed following installation. These demos are all located in sub-directories beneath the main demo directory: ***Visual_Elite_installation_directory****/VisualElite/demo*.

It is recommended that you copy the entire demo directory to an area in which you have read/write permission. Once copied, you can compile and simulate any of the demo designs, and even modify them if required.

The following tables specify the library in which each demo design is located, the top-level design unit for each demo, and the documentation file that accompanies each demo. The documentation (*.pdf*) is stored at ***Visual_Elite_installation_directory****/VisualElite/demo/doc*.

The three demos listed in Table 2-1 are different HDL language-specific implementations of the same design.

Table 2-1. Demos of Hardware Description Language-Based Designing

Language	Library	Top Unit	Documentation
VHDL version	cpu_demo_vhd	top_design	cpu_demo.pdf
Verilog version	cpu_demo_ver	top_design	cpu_demo.pdf
Mixed VHDL/Verilog version	cpu_demo_mixed	top_design	cpu_demo.pdf

Table 2-2. Demos of System-Level Based Designing

Language	Library	Top Unit	Documentation
C-based design	calc_demo_c	DeskCalculator CoSimSldBit_step1	calc_demo_c.pdf
C-based design	edge_demo_c	system_function	edge_demo_c.pdf
C-based design	des_demo_c	des_system	des_demo_c.pdf
SystemC-based design	des_demo_sc	des_system	des_demo_sc.pdf

Chapter 3
Setup and Invocation

For complete directions on how to install Visual Elite on your system, see the *Installation Guide*.

After installation, be sure to consult the ReadMe file for last-minute news. The *Installation Guide* details where to find the ReadMe file.

This section describes:

Displaying the License Agreement

To display the complete wording of the license agreement for Visual Elite:

1. Choose **About > About Visual Elite**.
2. In the dialog box displayed, click the **Agreement** button.

The Initialization File

The Visual Elite tool records settings related to your working environment within an *initialization file*. The information stored in the initialization file includes which libraries to keep available, and which to use as your *current library* — the default library for storage and retrieval. In addition, the initialization file records various operational settings ranging from the base time unit for simulation to the waveform colors for various data types.

Initialization File Configurability

You maintain different working environments by using different initialization files. To use the same environment as someone else, either reference the same initialization file, or (for greater flexibility) copy the same initialization file to the directory from which you invoke Visual Elite.

Initialization File Implementation

When Visual Elite is invoked, an initialization file is read to implement a given working environment. The initialization file read is the first existing file in the following list:

- An initialization file specified on the command line, using the –**ini** option; for example

  visual_elite -ini newlibs.ini

- A file named *visualhl.ini* in the directory referenced by the VISUALHDL environment variable
- A file named *visualhl.ini* in the directory from which you invoke Visual Elite (your working directory)

If none of the above initialization files is available, the Visual Elite tool creates a new initialization file in the directory from which you invoked the program.

Guidelines for Creating an Initialization File

In general, any initialization file you use should start as a copy of the original *visualhl.ini* file that was installed with the Visual Elite software so that it points to the standard libraries which are automatically downloaded during installation. If you move any of these standard libraries, the initialization file should be updated from within Visual Elite. (See "Referencing Libraries for Your Environment" on page 128.)

Note

The original *visualhl.ini* initialization file is automatically maintained by Visual Elite. Therefore, it is recommended that you refrain from editing this file using a text editor.

Specifying Libraries Using the Workspace Editor

You use the Inifile Editing window in the Visual Elite Workspace Editor, to specify a required set of standard libraries (std, ieee, visuallib, and others, where appropriate) to be referenced by the *.ini* file used in a particular workspace. For details, see "Workspace Editor" on page 73.

Using Multiple and Hierarchical Initialization Files

The Visual Elite tool supports the use of multiple and hierarchical initialization files. The initialization file, described in "The Initialization File" on page 47, is the main initialization file and is the one called by Visual Elite. The main initialization file can reference one or more additional initialization files used for accessing design libraries. The operational settings used by Visual Elite are always those recorded in the main initialization file.

Initialization Files Examples

The following examples depict how libraries are referenced using a single initialization file.

In this first example, the libraries section of the initialization file references five libraries:

```
[libraries]
watchlib /home/larry/vis_libs/watchlib
i960 /home/larry/vis_libs/i960
std $VISUALENV/$VARCH/Visual_lib/std
ieee $VISUALENV/$VARCH/Visual_lib/ieee
visuallib $VISUALENV/$VARCH/Visual_lib/vis_util
```

This example illustrates how the libraries section of an initialization file utilizes the $include statement to reference a single file, which in turn references the enumerated libraries:

```
 [libraries]
$include /work/projects/visual_libs.ini
```

Within the file */work/projects/visual_libs.ini*, the following libraries section appears:

```
[libraries]
watchlib /home/larry/vis_libs/watchlib
i960 /home/larry/vis_libs/i960
lib_asic1 /work/projects/lib_asic1
lib_asic2 /work/projects/lib_asic2
std $VISUALENV/$VARCH/Visual_lib/std
ieee $VISUALENV/$VARCH/Visual_lib/ieee
visuallib $VISUALENV/$VARCH/Visual_lib/vis_util
```

The final example depicts a multiple-level referencing of libraries. Once again, the Visual Elite tool references the main initialization file whose library section includes the statement:

```
[libraries]
$include /work/projects/visual_libs.ini
```

The libraries section of the referenced file is as follows:

```
[libraries]
watchlib /home/larry/vis_libs/watchlib
i960 /home/larry/vis_libs/i960
```

```
$include /work/group/asiclibs.ini
std $VISUALENV/$VARCH/Visual_lib/std
ieee $VISUALENV/$VARCH/Visual_lib/ieee
visuallib $VISUALENV/$VARCH/Visual_lib/vis_util
```

The initialization file referenced by the $include statement (*/work/group/asiclibs.ini*) has the following libraries section:

```
[libraries]
lib_asic1 /work/projects/lib_asic1
lib_asic2 /work/projects/lib_asic2
```

Depiction of the Referenced Libraries in Visual Elite

Regardless of how libraries are referenced in the *.ini* file (directly or hierarchically), the **File > Libraries** dialog box displays these libraries as if they were referenced directly by the main initialization file. For example, the following library list is displayed in the Libraries dialog box for the multiple-level hierarchical referencing example provided in "Initialization File Implementation" on page 48:

```
watchlib /home/larry/vis_libs/watchlib
i960 /home/larry/vis_libs/i960
lib_asic1 /work/projects/lib_asic1
lib_asic2 /work/projects/lib_asic2
std /home/hdldraw/sol_elite/SunOS5/Visual_lib/std
ieee /home/hdldraw/sol_elite/SunOS5/Visual_lib/ieee
visuallib /home/hdldraw/sol_elite/SunOS5/Visual_lib/vis_util
```

Note

You cannot reference hierarchical initialization files using the Visual Elite GUI or the related VEL primitives.

However, when saving your Visual Elite settings (**File > Save Environment**), the Visual Elite tool expands the $include statement(s) within the main initialization file. If the libraries referenced by an $include statement are unchanged (exist and are in the same order in the Visual Elite list of libraries as in the original included initialization file), then the Visual Elite tool uses the $include statement in the saved initialization file.

When the same logical name refers to two or more different libraries, the Visual Elite tool issues an error.

Setting Environment Variables

The Visual Elite tool uses a number of environment variables which enable you to override default settings. These variables are detailed further on in this section.

When working in Linux, values assigned to environment variables are set in your login file, or by using the setenv command at the system prompt displayed in the window from which you

invoke Visual Elite. Once Visual Elite is invoked, you can set a value for any environment variable using the **unix-putenv** primitive, which is part of the UNIX extension of VEL (Visual Elite Extension Language):

1. In the main menu bar, choose **Tools** > **Scheme**.
2. In the **Scheme Expression** window of the Invoke Scheme dialog box, enter the expression appropriate for the environment variable you need to set.

For example, to specify the directory in which external bitmaps are stored, you can enter the expression:

(unix-putenv "VISUAL_EXTERN_BITMAPS" "*directory_path*").

For more details on using the **unix-putenv** primitive, see the *Visual Elite Extension Language* manual.

For Visual Elite for Windows, all environment variables are registered, meaning that prior to invocation, they can be modified using the Registry Editor program. However, any variable that is added to the environment tab, overrides the corresponding value in the registry. It is recommended that you modify values assigned to environment variables using the Registry Editor rather than adding them to the NT environment.

To edit the Visual Elite registry, run the *regedit.exe* program. The Visual Elite environment variables are automatically entered beneath *HKEY_LOCAL_MACHINE\SOFTWARE\Mentor Graphics\VisualElite**version#*** during installation.

To edit a field, double-click it. The **Edit String** dialog box is displayed with the name and value of the variable. After modifying a value, click **OK**. From this point on, the Visual Elite tool uses the newly set value, unless it is overridden by a different value setting in the *autoexec.bat* file.

If you prefer not to use the registry to set up the Visual Elite environment variables, before running Visual Elite for the first time, you can set your required environment variables using your system Environment Variables window. Open the System Properties window from the Control Panel, click Advanced, then click Environment Variables.

Note

Once Visual Elite for Windows has been invoked, you can modify values for its environment variables using the **unix-putenv** primitive, just like in the Linux version.

Available Environment Variables

The environment variables used by Visual Elite are listed in Table 3-1, and are described in greater detail in the sections that follow.

Table 3-1. Environment Variables

Environment Variable	Platform	Valid Value
COMPUTER_NAME	Windows	pc name
LM_LICENSE_FILE[1]	All	file_pathname
LOGNAME[2]	All	user name
NO_MODELSIM_VERILOG_LICENSE	All	any value or no value at all
NO_NCSIM_VERILOG_LICENSE	All	any value or no value at all
PERLLIB	All	full pathname
SLD_COMP_OPTIONS	All	gcc command line options
SLD_DONT_UNDEF	All	any value or no value at all
SLD_LOADER_OPTIONS	All	gcc command line options
SYN_CTRL_EXEC_PATH	Windows	directory_path
USERID	Windows	personal user ID
VARCH	Linux	platform
VE_DEFAULT_CS_ASSIGNMENTS	All	0 or any value
VE_OLD_MACRO_STYLE	All	any value
VE_REMAIN_LANG	Linux	any value (other than “null”)
VE_RESIMULATION_DELAY	All	integer (number of seconds)
VE_USE_WORK_FOR_TEXT_UNIT	All	any value or no value at all
VE_VERILOG_MEMORY_OLD_STYLE	All	any value or no value at all
VE_WAVE_SIGNAL_HEIGHT_OLD_STYLE	All	1
VE_XEMACS_DELAYED_INVOKE	All	non-null value
VIS_CTRL_EXEC_PATH	Windows	full pathname
VIS_MAX_FONT_HEIGHT	Linux	integer
VISUAL_CHECK_SIGNAL_WIDTH	All	any value
VISUAL_CHECK_SIGNAL_WIDTH	All	any value or no value at all
VISUAL_COMP_OPTIONS	Linux	compiler name + options
VISUAL_ENABLE_SYSTEMC_EXCEPTIONS	All	any value
VISUAL_EXTERN_BITMAPS	All	directory_path
VISUAL_GRAPHIC_RO	All	any value or no value at all
VISUAL_HDL_CCOMPILER	Windows	microsoft; builder; or borland

Table 3-1. Environment Variables (cont.)

Environment Variable	Platform	Valid Value
VISUAL_HDL_COMPILER_NAME[3]	All	see "Optimized C Compiler"
VISUAL_HDL_JAVA_OPTIONS	Windows	Region and Language
VISUAL_HDL_LIBRARY_PATH	Windows	directory_path
VISUAL_HDL_LOADER_NAME[3]	All	see "Optimized C Compiler"
VISUAL_HDL_LOADER_OPTIONS	All	see "Optimized C Compiler"
VISUAL_IMAGE_MAX_SIZE_AS_IE	All	any value or no value at all
VISUAL_IMPORT_KEEP_ALL	All	Yes/No
VISUAL_IMPORT_KEEP_SYMBOL	All	any value or no value at all (null string)
VISUAL_LOCAL_DISKSPACE	All	directory_path
VISUAL_MAX_CYCLES	All	integer (Default = 200)
VISUAL_NEW_MACRO_STYLE	All	any value or no value at all (null string)
VISUAL_NO_DISPLAY_SUBNET_NAME	All	any value or no value at all (null string)
VISUAL_OLD_VECTOR_COMP_ASSOC_GEN	All	any value or no value at all
VISUAL_POSTSCR_IGN_PAGEDEVICE	All	Yes/No
VISUAL_RCS_EXEC_DIFF_PATH	All	full pathname
VISUAL_TCL_SERVER_PORT	All	integer (3000 or greater)
VISUAL_TEXT_LANG	All	ja
VISUAL_WAVE_WB_PRINT	All	any value
VISUAL_WRITE_MODE	All	append
VISUALENV	All	directory_path
VISUALHDL[4]	All	directory_path
VISUALSCM	All	full pathname
VSH_LIB	All	directory_path
VSH_VISUAL_COMMAND	All	invocation_command + options

1. Indicates that this environment variable is set during installation.
2. If you choose to set this variable, define it in the right-hand window of the HKEY_CURRENT_USER group located under *software\Summit\Visual Elite**version-number***.
3. Replaced by VISUAL_HDL_CCOMPILER variable but still supported
4. Following installation, you must update the path to the Borland lib directory.

COMPUTER_NAME

(Windows only)

The network name of your PC. This environment variable is required if you intend to compile and simulate locally on your PC using VCS or VCSi. (For details, see "Compiling Verilog-Based Designs" on page 634.)

You must define this variable only if your computer does not have a network name. (On Windows NT/2000, the computer always has a network name.)

LM_LICENSE_FILE

This environment variable should include the Visual Elite license file location. The Visual Elite tool looks for the value entered by the user (if this exists), followed by the following location:

- **Linux**:

  installation-dir/*Visual_Elite_**version**/**platform**/flexlm/license.dat*

- **Windows**:

  installation-dir*Visual_Elite_**version**\flexlm\license.dat*

Note

If you are working with another application that uses the LM_LICENSE_FILE variable, for Visual Elite you can alternatively use the variable summit.d_LICENSE_FILE. The location specified by the summit.d_LICENSE_FILE variable takes precedence over that specified by LM_LICENSE_FILE, in the event that both are simultaneously being used to specify *different* Visual Elite license file locations.

LOGNAME

The Visual Elite tool uses this environment variable, which is mandatory for purposes of access permission and version control, to determine the owner of libraries and design units.

Normally, you would not assign a value to this environment variable, because the Visual Elite tool uses the name belonging to the login account. If you do set a value for this variable, this value overrides the name stored in the login account.

NO_MODELSIM_VERILOG_LICENSE

This environment variable should be set when you simulate a pure VHDL design or a mixed VHDL/SystemC design with ModelSim, and you have a ModelSim VHDL license but no ModelSim Verilog license. You can set this variable with any value or no value at all.

You must adhere to a number of limitations in your mixed design:

- SystemC signals of the type sc_logic must be connected to VHDL signals of the type STD_LOGIC/STD_ULOGIC.
- SystemC signals of the type sc_lv must be connected to VHDL signals of the type STD_LOGIC_VECTOR/STD_ULOGIC_VECTOR.

If you have access to a Verilog license for ModelSim, you can circumvent these limitations by unsetting the NO_MODELSIM_VERILOG_LICENSE environment variable.

NO_NCSIM_VERILOG_LICENSE

This environment variable should be set (to any value) when you have an Incisive NC-Sim VHDL license but no Incisive NC-Sim Verilog license, and need to simulate one of the following with NC-Sim:

- a pure VHDL design
- a mixed VHDL/SystemC design

The following limitations apply:

- SystemC signals of the type sc_logic must be connected to VHDL signals of the type STD_LOGIC/STD_ULOGIC.
- SystemC signals of the type sc_lv must be connected to VHDL signals of the type STD_LOGIC_VECTOR/STD_ULOGIC_VECTOR.

If you have access to a Verilog license for Incisive NC-Sim, you can circumvent these limitations by unsetting the NO_NCSIM_VERILOG_LICENSE environment variable.

PERLLIB

This environment variable points to the location of the Perl library used by Visual Elite. The Visual Elite tool looks for any value you enter (if this exists), followed by the Visual Elite installation directory.

SLD_COMP_OPTIONS

This environment variable can be used to define the gcc compiler command line options for compiling C-based units. The default value for this variable is:

```
gcc -x c++ -c -I. -fPIC
```

For details on configuring these options, see your C++ compiler documentation.

SLD_DONT_UNDEF

This environment variable can be used before generating Verilog output code to be synthesized by Synopsys' Design Compiler.

Importing a Verilog file into Visual Elite sometimes results in the insertion of 'undef directives at the end of the created modules. When code is generated from these modules, these 'undef directives are passed on to the output code.

You can suppress the insertion of 'undef directives in the code by setting the SLD_DONT_UNDEF variable to any value or no value at all. This suppression takes effect only when the Purpose control under **Code Manager > Target** is Synthesis, and the specified vendor target is Synopsys (Design Compiler).

SLD_LOADER_OPTIONS

This environment variable can be used to specify command line options for the gcc loader for compiling SystemC-based units. The default value for this variable is -shared. For details on configuring these options, see your gcc compiler documentation.

SYN_CTRL_EXEC_PATH

(Windows only)

This variable specifies (as a full Linux pathname) the location of the directory where files and scripts required to perform remote execution of synthesis from a PC are stored. (For details about this feature, see "Figure 24 on page 527.)

Be sure that the directories and files copied to your Linux station and pointed to by the SYN_CTRL_EXEC_PATH environment variable, are assigned the following permissions: for directories 755 and for files 555. Use the **chmod** command to set the appropriate permissions. For example:

```
> chmod 555 *.
```

USERID

(Windows only)

This environment variable is used for Visual Elite network-extension purposes.

- If your network is Linux based, assign this variable your personal user ID. For example:

```
set USERID=15317
```

(To check the value of your user ID, enter the **id** command at the system prompt.)

- If your network is Windows-based, enter any 5-digit integer. For example:

```
set USERID=13579
```

This number henceforth serves as your user ID.

VARCH

(Linux)

This environment variable is set during invocation and cannot be changed. Its most common use is to specify, as a parameter, the platform on which you are working; for example, in the Libraries dialog box.

VE_DEFAULT_CS_ASSIGNMENTS

This environment variable is used to control code generation of a state machine.

State machine code is generated when all of the following are true:

- This environment variable is set to any value except '0'
- The mode of the state machine is asynchronous
- Encoding is neither ‘One Hot’ nor ‘One Cold’

During code generation, for each current state signal before the code generated for the transitions the generated asynchronous process has an assignment of the form:

```
<current_state_signal_next> <=<current_state_signal_current>
```

VE_OLD_MACRO_STYLE

For most Visual Elite macros for Verilog, the generation of unnecessary intermediate signals is prevented. If a macro (with the intermediate signals) was frozen and saved in a previous Visual Elite version, you should unfreeze it then refreeze it again for this version. If this environment variable is set, the intermediate signals will be generated and old designs will not require any modifications.

VE_REMAIN_LANG

If the value of this environment variable is not “Null”, the LANG environment variable will not be removed. On Linux, the LANG environment variable was removed if its value was equal to “ja_JP.utf8” or “ja_JP.UTF-8”, due to performance issues of some third party programs that caused problems when either one of these values was specified.

VE_RESIMULATION_DELAY

This environment variable is used when performing resimulation using ModelSim PE and SE in Windows. The environment variable enables you to specify a period of time, in seconds, during which the Visual Elite tool tests ModelSim for completion of design reloading.

The default value is 60 and the maximum value is 6000. To disable the delay, set the value to 0.

VE_USE_WORK_FOR_TEXT_UNIT

This environment variable must be set, together with selecting the "Use work – instead of library name" option in the **Tools > Code Manager > Export** dialog box, so that the names of non-standard VHDL libraries are replaced with a reference to the WORK library in the VHDL code generated by Visual Elite. You can set this variable with any value or no value at all.

VE_VERILOG_MEMORY_OLD_STYLE

In the block diagram editor, you can create sub-signals from Verilog two dimensional arrays (memories). The sub-signal will be a one dimensional array of the memory's word-width size. The memory word is selected by an index with possible values defined by the memory size bounds. The order in which the two bound ranges are defined in the **Attributes** dialog box is controlled by this environment variable.

Defining this environment variable will produce the "old style" used in versions prior to 4.3.1 of Visual Elite, in which the "word size" bounds are the *first* dimension, while the "memory size" bounds are the *second* dimension:

```
7 : 0
0 : 1023
```

The default (without this environment variable defined) will define the bounds in the "new style" (starting from Visual Elite 4.3.1), similar to VHDL, where the "memory size" bounds are the *first* dimension, while the "word size" bounds are the *second* dimension:

```
0 : 1023
7 : 0
```

VE_WAVE_SIGNAL_HEIGHT_OLD_STYLE

Set this environment variable to 1 if you need to use the old wave signal's height.

VE_XEMACS_DELAYED_INVOKE

By default, when XEmacs is designated as your default text editor (**Tools > Options Manager > Editors > Text Editor**), it is launched when you invoke Visual Elite. To delay the invocation of XEmacs until the opening of the first textual unit or object, set this environment variable to some non-null value.

VIS_CTRL_EXEC_PATH

(Windows only)

This environment variable should be set to point to the location of the control executable that makes possible the remote compilation and simulation of designs. (For details, see "Compiling Mixed Designs in Visual Elite" on page 403.)

To set this variable correctly, first copy the ***VisualElite-install-dir****remote_exec****platform*** directory (where ***platform*** is the type of the station on which the control executable is to be stored) to a convenient location on a Linux machine. Then point to that location using VIS_CTRL_EXEC_PATH, for example, */home/john/remote_simulation*.

Beneath the directory specified by this variable, the control executable is stored in the location: *remote_exec*/***platform***/*VIS_CTRL_EXEC*.

VIS_MAX_FONT_HEIGHT

(Linux)

This environment variable enables you to set a limit to the height of fonts that appear in the graphic editors. If this variable is not set, there is no limit to the height of the fonts. Such unlimited font height has been known to cause the Visual Elite tool to hang when you zoom-in to a high degree of magnification. (The source of the problem is in xterm windows.) If you encounter this problem, set the environment variable as follows:

```
setenv VIS_MAX_FONT_HEIGHT 120
```

If the value 120 does not solve the problem, set a smaller value.

VISUAL_CHECK_SIGNAL_WIDTH

If you set this environment variable to any or no value, the Visual Elite tool performs checks on signals and communication channels to verify that scalars appear as thin lines in block diagrams, and that vectors or bundles are represented by thick lines.

VISUAL_COMP_OPTIONS

(Linux)

This environment variable enables you to override the default ANSI C compiler and/or options for performing optimized compilation on VHDL design units. (For details about default values and how to override these values, see "Optimized C Compiler" on page 602.)

VISUAL_DATA_BASE_CHECK

This environment variable can be used when you are receiving wrong line numbers in error messages during units compilation (for local signals).

Set the VISUAL_DATA_BASE_CHECK environment variable to 1 then run Visual Elite and compile the problem unit. Compilation with the VISUAL_DATA_BASE_CHECK environment variable set to 1 fixes the line number on the fly and displays the following notification message: “Need to sort Signals Declaration.”.

Note

Compiling a unit with the VISUAL_DATA_BASE_CHECK environment variable set to 1 is slower than normal compilation.

To fix the line number inconsistency permanently:

1. Double click on the message “Need to sort Signals Declaration.”

   The Local Signals dialog opens.

2. On the first signal, toggle the bounds arrow up then down.
3. Save the changes.

VISUAL_ENABLE_SYSTEMC_EXCEPTIONS

Setting this variable to any value prints any exceptions encountered during elaboration of a SystemC design to the Simulation Control window. Note, however, that you cannot trace these messages back to the cause of the problem. (But you can trace the source of the problem using the Simulation Control window command line.)

VISUAL_EXTERN_BITMAPS

This environment variable can be used to specify a directory in which external bitmaps are stored. The bitmaps can then be integrated in block diagram, state diagram, and flowchart units. (For more details, see “Inserting External Bitmaps in Graphical Units” on page 110.)

VISUAL_GRAPHIC_RO

With this variable set to any value, an alert is issued upon performing an action on a read-only graphical unit, and the action is undone.

VISUAL_HDL_CCOMPILER

(Windows only)

This environment variable enables you to specify your ANSI C compiler of choice for performing optimized compilation on VHDL design units. Available options are:

- **microsoft** for Microsoft Visual Studio
- **builder** for Borland Builder
- **borland** for Borland C++

VISUAL_HDL_COMPILER_NAME

This environment variable enables you to override the default ANSI C compiler for performing optimized compilation on VHDL-based design units. (For details about default values and how to override these values, see "Optimized C Compiler" on page 602.)

Note

The VISUAL_HDL_CCOMPILER variable replaces the VISUAL_HDL_COMPILER_NAME and VISUAL_HDL_LOADER_NAME variables (both of which are still supported).

VISUAL_HDL_JAVA_COMMAND

(Windows only)

When using version of javaw.exe should be 1.6 or newer, the VISUAL_HDL_JAVA_COMMAND environment variable enables you to override the default VE runtime java executable file.

Set the environment variable as follows:

```
set VISUAL_HDL_JAVA_OPTIONS=C:\Program Files\Java\jre7\bin\javaw.exe
```

VISUAL_HDL_JAVA_OPTIONS

This environment variable enables you to override the default Windows Region and Language setting. You must set the environment variable as follows:

```
set VISUAL_HDL_JAVA_OPTIONS=
-mx256m -Duser.language=en -Duser.country=US -Dfile.encoding=Cp1252
```

VISUAL_HDL_LIBRARY_PATH

(Windows only)

This environment variable is mandatory only if you are using a C++ compiler and specifies two locations: the shared libraries used by Visual Elite; and the lib directory of the C++ compiler that you have installed and intend to use. Its setting takes the format:

```
set VISUAL_HDL_LIBRARY_PATH=Visual_Elite-install-dir\bin;
compiler-install-dir\lib
```

For example, if you are planning to use the Borland C++ (5.0) compiler for optimized compilation of VHDL units, the definition of this environment variable might appear as:

```
SET VISUAL_HDL_LIBRARY_PATH=C:\VISUAL\BIN;C:\BC5\LIB
```

If you are performing optimized compilation of some or all of your VHDL design units, this variable must be defined for your system.

VISUAL_HDL_LOADER_NAME

This environment variable enables you to override the default ANSI C loader for performing optimized compilation on VHDL-based design units. (For details about default values and how to override these values, see “Optimized C Compiler” on page 602.)

Note

The VISUAL_HDL_CCOMPILER variable replaces the VISUAL_HDL_COMPILER_NAME and VISUAL_HDL_LOADER_NAME variables (both of which are still supported).

VISUAL_HDL_LOADER_OPTIONS

This environment variable can be used to specify command line options for the loader when compiling VHDL-based designs in the optimized compilation mode.

For details on configuring these options, see the documentation supplied with your loader.

VISUAL_IMAGE_MAX_SIZE_AS_IE

If you are performing an HTML capture of a Visual Elite graphical unit on Linux and there is a possibility that you will need to display this image later using your Internet Explorer browser, set this variable to any value. Setting this environment variable limits the image size so it can be displayed by both Netscape and Internet Explorer. You can set this variable with any value or no value at all.

VISUAL_IMPORT_KEEP_ALL

Set this environment variable to **yes** if, when importing a textual unit into Visual Elite, you need to retain **all** side objects created for the previous version of the unit having this name.

If neither VISUAL_IMPORT_KEEP_ALL nor VISUAL_IMPORT_KEEP_SYMBOL are set, or both are set to an empty string, then all textual units are deleted and re-created. Therefore, all side objects are deleted.

VISUAL_IMPORT_KEEP_SYMBOL

Set this environment variable to *any* value if, when importing a textual unit into Visual Elite, you need to retain any component symbols created for the previous version of the unit having this name.

If VISUAL_IMPORT_KEEP_SYMBOL is set but VISUAL_IMPORT_KEEP_ALL is not set or set to an empty string, then only component symbols are restored after import.

If neither VISUAL_IMPORT_KEEP_SYMBOL nor VISUAL_IMPORT_KEEP_ALL are set, or both are set to an empty string, then all textual units are deleted and re-created. Therefore, all side objects are deleted.

VISUAL_LOCAL_DISKSPACE

By default, the Visual Elite tool stores simulation data in a file located beneath the standard temporary directory as defined by your operating system. When long simulations containing a large number of events are run, space in the temporary directory might not suffice.

Use this variable to allocate a directory in which to store simulation data on your local machine. This directory should have about 700M of free disk space.

VISUAL_MAX_CYCLES

During simulation, certain VHDL code can cause the simulator to enter a “zero delay loop.” An example is the following concurrent signal assignment statement:

```
out1 <= NOT(out1)
```

To prevent the indefinite execution of such a statement, by default, the Visual Elite tool sets a maximum limit of 200 simulation cycles that are executed when a “zero delay loop” is entered, then simulation is halted and an alert message is generated.

This variable enables you to modify this maximum limit. For example, if you need to set an upper limit of 5,000 simulation cycles, you can set this value as follows:

- **Linux**

```
setenv VISUAL_MAX_CYCLES 5000
```

- **Windows**

```
set VISUAL_MAX_CYCLES=5000
```

VISUAL_NEW_MACRO_STYLE

By default, if the macro component in a library have both “sym” and “sym1” graphical symbols defined, the Visual Elite application uses the “sym” symbol. Set this environment variable to any value, or no value at all (null string), to use the “sym1” symbol as the default symbol for the macro components.

VISUAL_NO_DISPLAY_SUBNET_NAME

By default, for nets that have subnets, the Visual Elite application displays the subnet using the subnet name and bus width; the subnet name is the same as the net. For example, for net data[7:0] Visual Elite might display a subnet as data[7:4]. Set this environment variable to any value, or no value at all (null string), to disable the display of the subnet name. The subnet would then be displayed as [7:4].

VISUAL_OLD_VECTOR_COMP_ASSOC_GEN

By default, when using downto ways for the vector bounds, the generated code for the port map association of the vector components in Visual Elite now connects the instances in the descending order: first instance (C0) to the last 17bits of the vector and so on until the last instance is connected to the lower 17bits. For example:

```
C0: rx_data(67:51)
C1: rx_data(50:34)
C2: rx_data(33:17)
C3: rx_data(16:0)
```

Using this environment variable enables you to generate code that connects the instances in ascending order: C0 connected to the lower bits and so on until the last instance is connected to the upper bits of the vector. For example:

```
C0: rd_data(16:0)
C1: rx_data(33:17)
C2: rx_data(50:34)
C3: rx_data(67:51)
```

VISUAL_POSTSCR_IGN_PAGEDEVICE

This environment variable enables creating a PostScript file which does not include the pagedevice details.

VISUAL_RCS_EXEC_DIFF_PATH

This environment variable enables you to specify the *diff* command to be used by RCS during ci operations. When you use this environment variable, set the value to be the full pathname to the *diff* command used by your system.

VISUAL_TCL_SERVER_PORT

This environment variable is used if the Windows 32-bit operating system freezes while invoking Visual Elite.

To successfully invoke Visual Elite:

```
set VISUAL_TCL_SERVER_PORT=3000 (you can use numbers from 3000 and above)
```

Then restart Visual Elite.

VISUAL_TEXT_LANG

This environment variable is used to indicate to Visual Elite that it is being run under a Japanese operating system. The Visual Elite tool uses this information in maintaining its database. (For more details, see "“Entering Japanese Comments” on page 117".)

VISUAL_WAVE_WB_PRINT

Setting this variable with any value results in waves being printed in black and white on color printers, and improved resolution of signals when printing on black and white printers.

VISUAL_WRITE_MODE

This variable enables you to specify that data written to a file by a design during simulation should be appended to the previous contents of the file. Set the value as follows:

- **Linux**

  ```
  setenv VISUAL_WRITE_MODE append
  ```

- **Windows**

  ```
  set VISUAL_WRITE_MODE=append
  ```

Note

This variable, if used, can only be assigned one value: **append**.

If you do not use this variable, the data written to the file automatically overwrites the previous contents of the file.

VISUALENV

This environment variable specifies the root of the installation location for Visual Elite. The variable value is set automatically when Visual Elite is invoked. While you cannot change this value, you can use it to indicate locations of directories, relative to the installation directory; for example, in the Libraries dialog box. This value is needed by Visual Elite to use VEL (Visual Elite Extension Language).

For backward compatibility, the earlier variables VISUALENV_VHD and VISUALENV_VER point to the location of VISUALENV.

VISUALHDL

This environment variable specifies the directory in which the *visualhl.ini* file to be used is stored. For example, to indicate that the *visualhl.ini* file in the current directory is to be used, enter:

```
setenv VISUALHDL .
```

The initialization file explicitly pointed to by this variable takes precedence over the initialization file in your working directory. Any *visualhl.ini* file specified using the **-ini** command line option, overrides this variable.

This environmental variable is typically used when a group needs to share a common Visual Elite environment.

For backward compatibility, the earlier variables VISUALHDL_VHD and VISUALHDL_VER point to the location of VISUALHDL.

VISUALSCM

This environment variable can be used to point to a file that contains instructions, written using the Visual Elite Extension Language (VEL), that are to be executed by the Visual Elite tool immediately after invocation. If this variable is not set, a file named *visualhl.scm* is searched for first in the current directory, followed by the $VISUALHDL directory, and finally in the Scheme load path. (See the *Visual Elite Extension Language* manual.)

VSH_LIB

This environment variable is required when working with the Synplify synthesis tool from within Visual Elite. Set its value as follows:

- **Linux**

  ```
  setenv VSH_LIB Synplify-install-dir/lib/summit/visual
  ```

- **Windows**

```
set VSH_LIB=Synplify-install-dir\lib\summit\visual
```

VSH_VISUAL_COMMAND

This environment variable is used to invoke Visual Elite (either in the interactive or batch mode) if a Visual Elite process is currently not running. Before you can run Perl or Tcl scripts which interact with Visual Elite, you must set this environment variable. For example, this variable might be assigned the value:

```
visual_elite -ini visualhl.ini -nodisplay -noexit
```

Invoking Visual Elite

To invoke Visual Elite, follow one of the following procedures.

On Linux

Before invoking Visual Elite, make sure that your license is active. For details, see the *Installation Guide*.

Once your license is active:

1. In order to be able to invoke Visual Elite without specifying its full pathname, add the appropriate bin directory to your machine search path. For example:

   ```
   setenv PATH Visual_Elite-installation-dir/:$PATH
   ```

   When the PATH includes the specified directory, you can invoke Visual Elite by entering the command **visual_elite**.

2. If you need to invoke Visual Elite from a particular directory because of the way your pointers are set up, use the **cd** command to go to that directory. (The directory from which you invoke Visual Elite becomes your working directory in which temporary files are written and from which the path to other directories is relative.)

3. Enter the command (together with the appropriate command line options):

   ```
   visual_elite [-bdsa] [-c_entry] [-cd directory-name]
                [-convert] [-deb debugger-name] [-env]
                [-exceed] [-fpga][-help]
                [-ini initialization-file] [-log log-file]
                [-nodisplay [-noexit]
                [-scm script-file] [-ws file-name]
   ```

On Windows

Before invoking Visual Elite, make sure that the protection mechanism used on your machine is installed. For details, see the *Installation Guide*.

Note

If you need to use a version of Java other than that provided in the Visual Elite installation, you must set the VISUAL_HDL_JAVA_COMMAND environment variable prior to invoking Visual Elite; for example:
set VISUAL_HDL_JAVA_COMMAND=c:\java\jre\bin\javaw.exe

Invoking Visual Elite is like invoking any other Windows program. You can use a number of command line options with the invocation command, **visual_elite.exe**:

```
visual_elite.exe [-cd directory-name] [-convert]
                   [-env] [-fpga] [-ini initialization-file]
                   [-log log-file] [-nodisplay]
                   [-noexit] [-scm script-file]
                   [-ws file-name]
```

To use the command line options, edit the Target line in the Shortcut pane of the Visual Elite icon Properties window. (For a description of the command line options available with the Windows version of Visual Elite, see "-bdsa" on page 69.)

For example, if your executable Visual Elite file is *c:\visual\visual_elite.exe*, the command:

```
c:\visual\visual_elite.exe -env -ini c:\lee\visualhl.ini -log
c:\lee\log.txt
```

retrieves the same Visual Elite window environment (the open windows, their size and position) that was in effect the last time you exited from Visual Elite, uses the initialization file named *c:\lee\visualhl.ini*, and saves file management and simulation messages in a file named *c:\lee\log.txt*.

See "Command Line Options" on page 68 for a description of the command line options. The Workspace Editor provides an easy-to-use interface for configuring the command line options to be invoked when running Visual Elite; for additional information see "Workspace Editor" on page 73.

Command Line Options

When invoking Visual Elite, you can specify one or more of the following command line options:

- -bdsa
- -c_entry

-bdsa

The **–bdsa** option is used to set the “Block Diagram Stand-Alone” entry license as the default license when invoking Visual Elite, instead of the HDL entry license. You must have a “Block Diagram Stand-Alone” entry license.

-c_entry

The **–c_entry** option is used to set the “C” entry license as the default license when invoking Visual Elite, instead of the HDL entry license. You must have a “C” entry license.

-cd or -chdir

The **-cd** or **-chdir** option can be used to define a new working directory for Visual Elite.

-convert

The **–convert** option is used to convert libraries created in the old database format (version 4.2 and earlier), to the current database format.

-deb

(Linux)

The **–deb** option is used to specify the name of a debugger to use when you utilize the Visual Elite Foreign "C" Interface capability. (Visual Elite on Linux version only.) The specified debugger must be visible in your environment PATH.

-env

The **–env** option is used to retrieve the same Visual Elite window environment (the open windows, their size, and position) that was in effect the last time you exited from Visual Elite.

-exceed

(Linux)

The **–exceed** option should be invoked when you are running Visual Elite for Linux on a PC by means of the Exceed Xemulator.

-fpga

The **–fpga** option invokes Visual Elite in a mode tailored for developing FPGA designs. While this mode generally provides the full functionality of Visual Elite, note that:

- It does not provide version control mechanism.
- It provides code generation and synthesis checks only for Synplicity, Exemplar, Leonardo, and Altera.
- It does not provide translation between VHDL and Verilog, or between Verilog and VHDL.

The FPGA version of Visual Elite uses a special license (VISUALFPGA) which is called up when the product is invoked.

-help

(Linux)

The **-help** option displays the available Visual Elite command line options.

-ini

The **–ini** option is used to specify an initialization file. The specified initialization file is used instead of any other available initialization files.

-ip-xact

The -ip-xact option is used to set the IP-XACT license as the default license when invoking Visual Elite. When using the IP-XACT license, only IP-XACT textual and graphical units are available.

-lib or -library

The -lib or -library option is used to load a file containing a list of additional libraries. The additional libraries are listed in the library file using the following format:

```
"library_name" = "library_path"
```

The -lib or -library options have the following formats:

-lib *library_file_name*

-library *library_file_name*

The libraries from the library file are loaded along with the libraries from the *.ini* file.

-license

The -license option is used to specify the license type to use when invoking Visual Elite. Use the following format:

-license <license type >

The license type can be one of the following:

- bdsa — “Block Diagram Stand-Alone” entry license
- fpga — VISUALFPGA license
- c_entry — “C” entry license
- ip-xact — IP-XACT license

-log

The **–log** option can be used to specify a file in which to save all the file management and simulation messages you receive from Visual Elite. You can specify any valid system file name for the log file.

- If you use the –log option but omit the log file name, your log file is named *visualhl.log*, and is stored in the directory from which you invoked Visual Elite.
- If you specify the name of an existing file, then new messages are added to the end of the file; old messages are not automatically deleted.
- Within the log file, messages displayed in the Simulation Control window are preceded by the letter S. Messages displayed in the main Message window — messages about validation, compilation, and miscellaneous data-handling issues — are preceded by the letter M.

-nodisplay

The **–nodisplay** option, which can be used in conjunction with the **-scm** option, disables the display of any graphics related to Visual Elite. If a situation arises during initialization which would ordinarily require input from you (for example, notification that a particular library does not exist), this is handled using the value supplied by the **batch-mode-default-answer** option of the **vel-env-set-flags** primitive. (For details, see the *Visual Elite Extension Language* manual.)

-noexit

The **-noexit** option, which can be used in conjunction with the **-scm** option, causes the Visual Elite tool not to exit the simulation environment following completion of a script-invoked simulation run.

-sc

This option is used with the Visual SLD Pro LNL and Visual SLD Pro LNL Plus license packages.

The **-sc** option causes the Visual Elite tool to run only with SystemC functionality available, including code entry and simulation with the OSCII simulators. Invoking Visual Elite without this option causes the Visual Elite tool to run with only HDL functionality available, including code entry and simulation with the Visual Elite internal simulator or external simulators.

-scm

The **–scm** option can be used to specify a script, written in the Visual Elite Extension Language, that is to be run as soon as Visual Elite is invoked. You can also run scripts after invoking Visual Elite. The use of VEL is described in the *Visual Elite Extension Language* manual.

-synchronicity

The -synchronicity option is used to set the synchronicity integration license as the default license when invoking Visual Elite.

-tcl

The -tcl option is used to run a Tcl initialization script when Visual Elite is invoked. The -tcl option has the following format:

-tcl *init_tcl_file*

You must specify the name of the Tcl initialization script to be run.

-vds

The -vds option is used to set the VDS (VGuide) integration license as the default license when invoking Visual Elite.

-ws or -workspace

The **–ws** or **-workspace** option can be used to invoke Visual Elite using the command line options defined in the Workspace Editor.

Workspace Editor

The Workspace Editor provides an easy-to-use interface for configuring the command line options to be invoked when running Visual Elite.

To invoke the Workspace Editor:

Windows:

- Choose **Start > Programs > Visual Elite *version#* > Workspace Editor**

  OR

- Select a Workspace icon, right-click, and choose the **Edit** menu item.

Linux:

- Run the script *ws*, which is found in the root installation directory of Visual Elite. (This is the directory pointed to by the VISUALENV environment variable.)

Once invoked, you can use the Workspace Editor for:

- Configuring Command Line Options
- Saving Command Line Configurations
- Editing Command Line Configuration Files
- Specifying Standard Libraries via the Workspace Editor

Configuring Command Line Options

The topmost text box in the Workspace Editor depicts the command line to be used when invoking Visual Elite. To dynamically updated the contents of this text box, select and clear the various command line options listed in Table 3-2.

Table 3-2. Command Line Options

Option	Resulting Command
Working Directory	-cd ***directory-name***
Inifile	-ini ***filename-name***
Log File	-log ***filename-name***
Scheme Script	-scm ***filename-name***
FPGA Mode	-fpga

Note

You can also manually edit the contents of this text box. The options are simultaneously selected or cleared as appropriate.

Caution

Do not enter the **-ws** command line option in the Command Line field. This could result in the recursive referencing of a workspace and cause the invocation script to enter an endless loop.

Saving Command Line Configurations

To save any command line configuration defined in a Workspace Editor session as a file, click the Save button at the bottom of the Workspace Editor, or use the **Save** or **Save As** menu item in the Workspace Editor's File menu. The saved file is given the name you assign plus the suffix *.vhdws*. On your Windows desktop, a Workspace icon associated with the saved file is created. Double-click the icon to invoke Visual Elite with the command line option values set in the file.

Editing Command Line Configuration Files

A saved command line configuration file is a Tcl script. You can edit the script, to further customize the invocation of a Visual Elite session, using any text editor. For example, you might need to set any number of environment variables from within this Tcl script, prior to the Command Line Options signature.

To set a value for an environment variable in Tcl, use one of the following commands:

Windows:

```
append ::env(variable_name) \;value
```

Linux:

```
append ::env(variable_name) :value
```

Specifying Standard Libraries via the Workspace Editor

By default, the library set initially displayed in the Inifile field of the Workspace Editor editing window is the one currently listed in the *.ini* file. To specify that a different set of standard libraries (std, ieee, visuallib, and others, where appropriate) be referenced by the *.ini* file being used in a particular workspace, click Edit next to the Inifile entry and use the Inifile editing window.

To access any *.ini* file stored in your system, choose **File > Open**. To specify an appropriate standard library set, select the library from the Library Set dropdown list. Click Update to replace the files previously displayed in Workspace Editor with those of the selected library.

To save the selected library set in the current *.ini* file, click Save at the bottom of the Inifile editing window, or choose **File > Save/Save As**.

External Tools Supported by Visual Elite

The following tables list the external tools currently supported by Visual Elite.

For details about the latest versions of these tools supported by Visual Elite, see the ReadMe file provided with this release.

Supported Synthesis Tools

Table 3-3 lists the supported Synthesis tools.

Table 3-3. Supported Synthesis Tools

Company	Tool	Remarks
Synopsys	Design Compiler	
Synopsys	Behavioral Compiler	
Synopsys	FPGA Express	
Synopsys	CoCentric	
Cadence	Synergy	
Exemplar	Galileo	
Exemplar	Leonardo	

Table 3-3. Supported Synthesis Tools (cont.)

Company	Tool	Remarks
QuickTurn	HDL ICE	
Synplicity	Synplify	
IBM	BooleDozer	VHDL only
Altera	MaxPlus2	VHDL only
Lucent	Synovation	VHDL only

Supported VHDL Simulation Environments

The supported VHDL simulation environments are listed in Table 3-4.

Table 3-4. Supported VHDL Simulation Environments

Company	Tool	Remarks
MTI	ModelSim	
Mentor Graphics Corporation	SpeedWave	
Cadence	Incisive NC-Sim	Support by Visual Elite started with version v2.1.

Supported Verilog Simulation Environments

The supported Verilog simulation environments are listed in Table 3-5.

Table 3-5. Supported Verilog Simulation Environments

Company	Tool
MTI	ModelSim
Synopsys	VCS/VCSI
Cadence	Incisive NC-Sim
Cadence	Verilog-XL
Mentor Graphics Corporation	Sim I/F Plus

Supported SystemC Simulation Environments

The supported SystemC simulation environments are listed in Table 3-6.

Table 3-6. Supported SystemC Simulation Environments

Company	Tool
OSCI	SystemC 2.0

Supported Version Control Systems

Table 3-7 lists the supported version control systems.

Table 3-7. Supported Version Control Systems

Company	Tool
Rational	ClearCase
Synchronicity	DesignSync
Public Domain	RCS
Public Domain	CVS
Lint	Subversion (SVN)

Supported Style Checkers

Table 3-8 lists the supported style checkers.

Table 3-8. Supported Style Checkers

Company	Tool
Leda	Proton
Mentor Graphics Corporation	Design Checker

Chapter 4
The Visual Elite Workplace

This section covers general conventions involved in working with the Visual Elite user interface:

- Main Menu Bar and Main Window
- Main Window Message Pane
- Options Manager
- Using the Mouse
- The Popup Menu
- Manipulating Windows
- Browser Controls
- Printing
- Saving and Reloading Your Working Environment
- Customizing Visual Elite
- Shortcut and Function Keys
- Online Help and Tool Tips

More specific topics are covered, as appropriate, in other sections of this manual.

Main Menu Bar and Main Window

When you initially invoke Visual Elite in Windows, after the copyright message is displayed, the opening or main menu bar displays on your screen. The main menu bar includes four menus: File, Tools, Window, and Help. It is from here that you begin to work. In the Linux version of Visual Elite, the same four menus are displayed in the main window that opens after the copyright message.7

Main Window Message Pane

The message pane has two functions:

- It displays traceable errors, warnings, and notes, along with other messages generated by Visual Elite.
- It can be used as a Linux-like console in which you enter commands.

Displayed Messages

Messages displayed in the message pane are color-coded as follows:

Table 4-1. Messages

Message type	Color
Error	Red
Warning	Blue
Note	Green
Non-traceable message	Black

In Windows, both the message text and the hyperlink are in the color designated above. In Linux, only the hyperlink is colored; the text remains black.

To trace the cause of any displayed message, double-click the empty bar to the left of the message or place the cursor anywhere within the message and press **Enter**.

Console Window

The message pane of the main window resembles a Linux console window and you be used to Visual Elite enter commands, such as clear, getenv, help, open, or putenv.

To display the list of available commands, press Tab.

To display help about all available commands, type the word “helpvis” at the prompt.

To copy text from the message pane, select the text and click **Ctrl+C**.

To paste text into the message pane, place the cursor at the insertion point and click **Ctrl+V.**

To select an entire line of text, click the empty bar to the left of the appropriate line (not on the line itself).

To modify font size or clear the pane, right-click when the pointer is within the pane then choose the appropriate command from the popup menu displayed.

To navigate through the history of commands that you have entered:

- In Windows, use the Ctrl+Up Arrow or Ctrl+Down Arrow
- In Linux, use the Meta+Up Arrow or Meta+Down Arrow

Options Manager

The Options Manager enables you to configure global system settings, as well as defaults for design-related issues when working in Visual Elite. Some of the settings can be overridden locally.

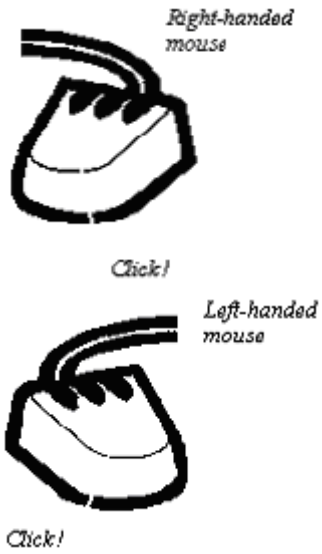
In the various panels of the Options Manager you can specify the following settings:

- Version Control
- Browser
- Editors
- Compiler Settings
- Simulation
- Synthesis
- HDL to Graphics
- Customization

To access the Options Manager, choose **Tools > Options Manager**.

Using the Mouse

Throughout this manual, instructions related to working with the mouse assume that you are using a *right-handed mouse*. If this is not the case on your machine, modify these instructions accordingly.



For example, you are often instructed to *click* with the mouse. Unless otherwise specified, *clicking* means pressing and immediately releasing the *left* mouse button. However, even when instructions explicitly direct you to click with the *right* mouse button, the assumption is, once again, that you are working with a right-handed mouse.

Naturally, whichever type of mouse you are working with, you are entirely free to configure the operations of its buttons to suit your preferences.

The Popup Menu

In addition to the menu bar that appears at the top of every Visual Elite window, a variable popup menu is available in the graphic editors (Block Diagram, State Diagram, and Flowchart), the Symbol Editor, and the Browser. To display this menu, press the right mouse button.

Figure 4-1. The Popup Menu

In the graphic and Symbol editors, the popup menu is displayed when the editor is in “Select” mode (the Select icon is active), and you click the right mouse button. When the mouse pointer is positioned on a selected graphic element, the menu includes commands that are pertinent to the selected element. If more than one element is selected, the menu includes only those commands that are pertinent to all these elements. When the mouse pointer is positioned on empty space, the menu includes commands that are pertinent to the unit as a whole.

In the Browser, a popup menu that displays the appropriate commands is always available.

Manipulating Windows

While several Visual Elite windows can be open simultaneously, at any given time only one window is active.

- On Linux stations, the active window is distinguished by its highlighted border.
- In Windows, the active window is distinguished by its blue banner.

The following sections discuss:

- Bringing a Window to the Front
- Adjusting Magnification

- Using the Panorama View
- Scrolling and Panning
- Redrawing the Active Window
- Making the Grid Visible
- Minimizing and Restoring Windows
- Reducing the Number of Windows Displayed
- Closing Windows

Bringing a Window to the Front

If any part of a Visual Elite window is visible, to bring that window to the front and make it active, click in the visible part of the window.

On Linux stations, place your pointer anywhere in any Visual Elite window and use the following function keys to control the Visual Elite windows:

- F4 — brings the main or Simulation Control window to the front.
- F8 — brings to the front any currently hidden dialog box that, because it is open, is preventing other work.

Adjusting Magnification

To display by default, the entire contents of the first page of a graphical unit at the largest possible size when the unit window is opened, choose **Tools > Options Manager> Editors > Global Settings > General and** select the **Open in Full Zoom Mode** option.

To magnify or reduce your graphics, or revert to the default magnification, use the Zoom command.

The following sections describe:

- Zooming In
- Zooming Out
- Default and Optimal Magnification
- Shortcut Key Zooming

Zooming In

You can zoom-in on a particular area or point in a design.

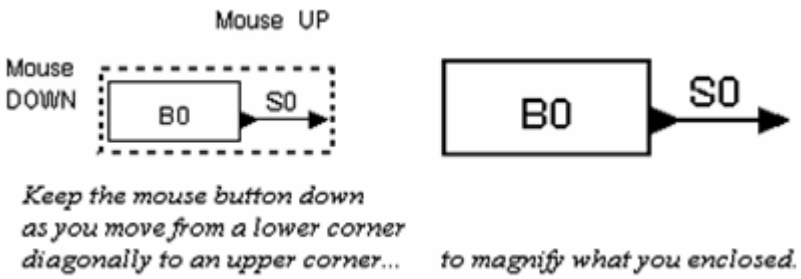
- To zoom-in on a particular area of a design (enlarging your graphics):

  Choose **View** > **Zoom** or the Zoom icon ( )

  or

  Click and drag from the bottom corner to the diagonally opposite top corner of the area you need to enlarge. The area you defined is magnified to the largest size that fits entirely into your window (see Figure 4-2).

Figure 4-2. Enlarging Graphics



- To zoom-in on a particular point in a design:

  Click the **Zoom In** icon ( )

  or

  Click the point of interest.

The default zoom-in factor is defined in the **Tools** > **Options Manager** > **Editors** > **Global Settings** > **General** pane. To set the default factor, enter a value for the "Zoom factor" option.

Note
Clicking the Zoom In (or Zoom Out) icon places the editing window in zoom mode.

When you use either of the second methods of zooming, the current value of the **Enable multi-zoom** option (also located in the **Global Settings** > **General** pane) determines the resulting behavior:

- If the option is selected, following a zoom operation you remain in the zoom mode and are able to perform another zoom operation.
- If the option is not selected, a single zoom in is executed. Following this single zoom, the select mode is re-entered.

Zooming In With the Mouse Wheel

If you are running Visual Elite on any of the supported platforms, to zoom-in in the graphical editor, press Ctrl and rotate the mouse wheel forwards. If you are running Visual Elite on Windows, this works for the textual editor as well.

Note

To revert the zoom direction, you need to set the environment variable VISUAL_WHEEL_ZOOM_DIRECTION to 1.

Zooming Out

You can zoom-out a particular area or from a particular point in a design.

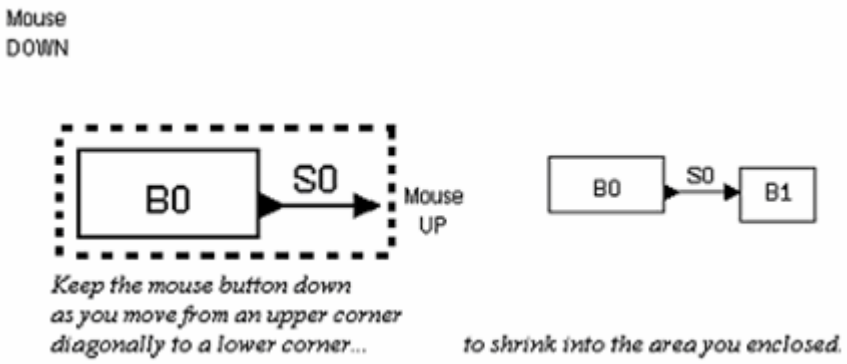
- To zoom-out (shrinking your graphics):

  Choose **View > Zoom** or click the Zoom icon ( )

  or

  Click and drag from the top corner to the diagonally opposite bottom corner of the area into which you need to shrink your currently visible graphics. Your graphics shrink to fit the area you defined, and the rest of your window is filled by any adjoining portions of the diagram (see Figure 4-3).

Figure 4-3. Shrinking Graphics



- To zoom-out from a particular point in the design:

  Click the Zoom Out icon ( )

  or

  Click the point.

The default zoom-out factor is defined in the **Tools > Options Manager > Editors > Global Settings > General** pane. To set the default factor, enter a value for the “Zoom factor” option.

Note
Clicking the Zoom Out (or Zoom In) icon places the editing window in zoom mode.

When you use either or the second methods of zooming, the current value of the **Enable multi-zoom** option (also located in the **Global Settings > General** pane) determines the resulting behavior:

- If the option is selected, following a zoom-out operation you remain in the zoom mode and are able to perform another zoom operation.
- If the option is not selected, a single zoom-out is executed. Following the single zoom, the select mode is re-entered.

Zooming Out With the Mouse Wheel

If you are running Visual Elite on any of the supported platforms, to zoom-out in the graphical editor, press Ctrl and rotate the mouse wheel backwards. If you are running Visual Elite on Windows, this works for the textual editor as well.

Note
To revert the zoom direction, you need to set the environment variable VISUAL_WHEEL_ZOOM_DIRECTION to 1.

Default and Optimal Magnification

To revert to the default magnification:

- Choose **View > Zoom** or click the Zoom icon ().

  or

- Click anywhere in your diagram.

To see your whole diagram at the largest size that fits entirely in your window, choose **View > Fit to Window**, or click the Fit to Window icon ()

Shortcut Key Zooming

The zoom-in and zoom-out operations in the graphic editors are attached to the default shortcut keys indicated in Table 4-2.

Table 4-2. Zoom Shortcut Keys

Operation	Default Zoom Factor	Default Assignment
Zoom In	x2	F10
Zoom Out	x0.5	Shift+F10

The specified default zoom-in factor for the shortcut keys can be modified using the VEL (Visual Elite Extension Language) *zoom-in-factor-request* utility. To change the zoom-in factor interactively:

1. Choose **Tools > Scheme**.
2. In the Scheme expression window of the Invoke Scheme dialog box, enter the expression “(zoom-in-factor-request)”.
3. Click **Eval**.
4. In the User Text dialog box, type the required zoom-in factor and click **OK**.

To modify the zoom-out factor, use the VEL *zoom-out-factor-request* utility.

For information on how to change the shortcut key assignments, see the *Visual Elite Extension Language* manual.

Note

When using the shortcut keys to zoom-in or -out, click once in the editor window to define the zoom point.

Using the Panorama View

In the graphical editors, you can display in a secondary window that provides a panoramic view of the entire current page of the unit. To access the Panorama window choose **View > Panorama.** Within the Panorama window, a red frame indicates that portion of the page currently displayed in the main editor window. To pan to different portions of the design page in the main window, click and drag the red frame. To increase or decrease the size of the Panorama window, right-click and choose the **Scale Up** or **Scale Down** menu item.

Scrolling and Panning

The following sections describe:

- Scrolling in the Editors
- Auto-Scrolling and Auto-Panning in Graphical Editors

Scrolling in the Editors

To scroll in the graphical or textual editors, use the horizontal and vertical scrollbars located at the bottom and right side of the window.

If your mouse is equipped with a mouse wheel, you can scroll as indicated in Table 4-3.

Table 4-3. Scrolling

Operation	Hold Key	Wheel Rotation	Remarks
Scroll up Scroll down	---	Forward Backwards	
Scroll left Scroll right	Shift	Forward Backwards	Graphical editors only

Auto-Scrolling and Auto-Panning in Graphical Editors

When you draw a new graphic element, or drag an existing graphic element beyond the confines of the window frame, the editing window automatically scrolls in the direction of the drawn or dragged element.

To enable automatic paning when the mouse pointer is brought to an edge of a window, choose **Tools > Options Manager > Editors > Global Settings > General** and select the **Perform auto-panning** option. For example, if you enable this option and bring the pointer to the right-hand edge, the window pans (scrolls) to the right.

Redrawing the Active Window

To redraw the graphics of the active editor window, use any of these methods:

- Hit the F2 key.
- Choose **View > Refresh** on Linux or **Window > Refresh** on Windows.
- (On Linux) Click the middle mouse button.

Making the Grid Visible

The Visual Elite graphic editors guarantee that your elements are positioned on a certain grid. To make the grid visible, choose **View > Show Grid** in your editor window menu. (Show Grid is a toggle that can be used to make the grid visible or invisible as needed.)

As a shortcut, you can press F6 to alternately display and hide the grid.

Minimizing and Restoring Windows

In addition to the usual methods for *minimizing* individual windows, you can use the F7 function key, when your pointer is in any open Visual Elite window, to minimize all editor windows and Waveform windows (except the main window).

In addition to the usual methods for *restoring* individual minimized windows, you can use Shift+F7, when your pointer is in any open Visual Elite window, to restore all minimized editor windows and Waveform windows.

On Windows, you can also use the **Window > Iconize All** and **Window > Deiconize All** menu item.

Reducing the Number of Windows Displayed

To reduce the number of windows the Visual Elite tool opens concurrently on your screen, choose **Tools > Options Manager > Editors > Global Settings > General** and enable the **Reduce number of windows** option.

When this option is enabled, the Visual Elite tool limits the number of windows so that any additional window that you open replaces an open window of the same type.

Windows are divided into the following types:

- block diagram, state diagram, flowchart, or symbol editor windows
- truth table windows
- textual editor windows
- generated code windows

Closing Windows

To close a specific window, choose **File > Close** or click the Close icon ( .)

To close all open windows, choose **Window > Close All** in the main or Simulation Control window.

Browser Controls

The VisualElite browser controls enable you to efficiently manage your design. The following sections describe how to use the various Browser controls for:

- Opening the Browser Window
- Setting Browser Display Defaults
- Displaying Levels of Detail
- Selecting a Unit or Object for Processing or Printing
- Performing Data Management Operations
- Finding Units and Instances

- Defining Access Rights to Units and Libraries
- Opening Units and Side Objects

For information about viewing library contents and design hierarchies in the Browser, see "The Design Environment" on page 125.

Opening the Browser Window

To display the Browser, choose **Tools > Browse** in the main menu bar. Depending on the setting currently active, either a single-paned or double-paned adjustable window displays on your screen. The window features an icon toolbar.

At any time, you can invoke any number of Browser windows, thereby displaying different portions or views of your environment simultaneously.

Setting Browser Display Defaults

You can choose among different default Browser views of design hierarchies and version-controlled projects. The default Browser views are set in the **Tools > Options Manager > Browser > General** pane. Changing settings in the Browser General pane of the Options Manager dialog box does *not* affect currently opened Browser windows. Only subsequently opened Browser windows are affected.

The view options include:

- Project View
- Design Browser View
- Browser View

Project View

Click **Integrated Project View** to display all version-controlled projects in the Browser window. Click **Generic Project View** to display projects in a separate Project Manager window.

Design Browser View

When you click **Design Centered Browser View**, the Browser displays all available libraries in your Visual Elite environment. To reveal the design units stored in a library, double-click the library icon. Selecting a hierarchical unit and clicking the Expand All icon displays only the design hierarchy beneath that unit.

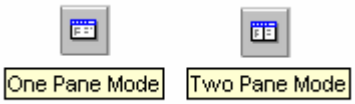
Click **Explorer Like Browser View** to revert the Browser to a Windows Explorer type browser in which you can view the contents of multiple libraries concurrently.

Browser View

Click either One Pane or Two Panes display mode.

To toggle between the One Pane and Two Pane views in an already opened Browser window, click the View Mode icon in the Browser toolbar (see Figure 4-4).

Figure 4-4. Browser View Icon



Displaying Levels of Detail

To control the amount of detail displayed for each design unit in the Browser, use the **Tools > Options > Browser > Display** pane. To determine the colors of the different items of information, use the **Tools > Options > Browser > Colors** pane.

To override these settings for a particular Browser window, click the Browser Options icon: () and use the Browser Options dialog box.

Selecting a Unit or Object for Processing or Printing

By selecting a unit or stimulus object in the Browser and then choosing the appropriate command in the Tools menu or clicking the appropriate icon, you can perform the following operations:

- Validate or compile a design unit or stimulus object.
- Simulate a design unit.
- Generate output code for a design unit or stimulus object.

Selecting the icon in the Browser and choosing **File > Print** causes the selected unit or object to be printed.

You can select multiple individual units for validation, compilation, or printing in a number of ways:

- Press Ctrl and click the icon of each unit to be selected.
- To select a range of units, press Shift and click the top and bottom unit in the required range.
- To select all the units in a Browser window, position the mouse pointer over empty space in the window, right-click and choose **Select All**.

- To select a particular unit and all objects for the unit, expand the Browser to display the objects to be selected, click the unit icon, right-click and choose **Select All**.

When you choose Tools > **Validate, Compile Unit, or Compile Tree** or right-click and choose Compile, all selected units are processed sequentially.

When you select multiple units or side objects in the Browser to print to individual files, the Print dialog box Template field displays the library name followed by the literal string ***object-name***. During the creation of the print files, each file is assigned a unique name in the destination directory, which reflects the name of the unit or object, and the extension appropriate for the type of print file that was generated.

Performing Data Management Operations

From within the Browser, you can perform the following data management operations:

Table 4-4. Data Management Operations

Operation	Applies to...
Copy	libraries, units, or any side object (except a page)
Rename	libraries, units, or any side object (except a page)
Delete	libraries, units, pages, or any other side object

To perform any of these operations using menu commands:

1. In the Browser window, select the library, unit, or object icon.
2. In the Browser File or Edit menu, or in the Browser popup menu (see "The Popup Menu" on page 82), choose the appropriate command.

To move units and side objects (with the exception of pages) between libraries, and side objects between units, use the Browser Cut and Paste commands or drag-and-drop the selected icons. To copy selected units or objects, press Ctrl and drag-and-drop the selected icons.

To select multiple units and/or objects on which to perform any of these operations, press Ctrl and click to select their icons one by one, or press Shift and click to define a range of icons.

Finding Units and Instances

The Browser provides two commands (**Find** and **Find Next**) that can be used to locate a particular library, library unit, instance, or side object.

A standard search includes only what you can currently see in your Browser window and what scrolling would show you. (It doesn't include, for example, the portion of a design tree hidden by the Collapse All command.)

The search *only* moves *downward* in the Browser view. If you have selected a unit, and that unit is not scrolled too high or low for you to see, the search starts from that unit. Otherwise, the search starts from the highest unit that is visible in the Browser view.

To perform a search:

1. Choose **Edit > Find,** select **Find** in the popup menu, or click the **Find** icon ().

   A Find command bar opens below the Browser icon bar.

2. In the Find command bar, enter the specifications of the item you need to search for in the list and text areas.

   You can search for a particular library, unit, instance, or side object. The instance name is the name of the design element or unit that instantiates the library unit and is displayed in rounded parentheses in the Browser full qualifier. Searching for an instance name displays the corresponding unit even if, by clearing the full qualifier, you have left the instance name invisible.

   You can use the following wildcards: "?" to mean "any one character" and "*" to mean "any one or more characters, or none."

The first unit that matches your specifications is highlighted in the Browser window. If no match is made, an appropriate message displays. Remember that the search works *down* the window only, not necessarily starting at the top.

To search again according to the same specifications, choose **Edit > Find Next,** use the drop-down menu on the Find icon and click the Find Next icon (), or click **Next** on the Find command bar.

To perform an advanced search of the entire Visual Elite database using more detailed criteria, click **More**. The Find dialog box enables you to search for libraries, units, instances, and side objects by modification date, version number, user checked-out to, type, and compilation status.

Defining Access Rights to Units and Libraries

The Visual Elite tool provides a convenient user-interface for changing the permission to access and change both units and libraries (see "The Design Environment" on page 125). This interface reflects the distinctions made by the operating system under which you run Visual Elite:

- Under Windows, the Visual Elite tool supports the DOS mode of permission, and therefore defines a unit or library as universally read/writable, read-only, or entirely inaccessible.

- Under Linux, the Visual Elite tool uses the Linux differentiation of owner, group, and all other users. For each of these types of users, a unit or library can be read/writable, read-only, or entirely inaccessible.

By default, when a new library is created, read/write permission is granted only to the owner of the library. All other users get read-only permission for the units stored in that library. If, however, you change the permission of a library, all units subsequently created in that library inherit the permission of the library.

Only the owner (the creator) of a library or unit can change its permission status. To change the permission of a library or unit:

1. Open the unit for editing, or select the unit or library in the Browser. To select multiple individual units whose permissions are to be changed, press Ctrl and click on the icon of each unit, or press Shift and click the top and bottom unit in a range.
2. In the editor window or Browser, choose **File > Permission**.
3. In the Permission dialog box, define the new permission for the unit or library in question.

Note

In the Permission dialog box displayed for Visual Elite under Windows, the owner of the unit or library is not displayed. However, as in Linux, a non-owner is unable to change the settings in this dialog box.

The Visual Elite tool distinguishes between two kinds of read-only status.

- Units stored in standard libraries supplied with Visual Elite are totally read-only protected. They can participate in simulation, but they cannot be modified or compiled. Such units can not be the top of a design hierarchy.
- Units stored in read/write libraries, but which currently have read-only status (for example, a unit that is fetched using the Visual Elite version control). In addition to being simulatable, such a unit can constitute the top of a design hierarchy and can also be compiled. However, such a unit cannot be modified.

Opening Units and Side Objects

There are two ways to open units and side objects in Visual Elite.

- Double-click the unit or object icon in the Browser.
- Choose **File > Open**.

When you choose the second method, the Open dialog box is displayed. The Units column of the dialog box lists units of all kinds and subdesign units. The Objects column lists *side objects* of the selected design unit. Side objects include breakpoint sets, waveforms, stimulus objects,

HDL output, and more. The Units list refers only to the currently selected library and the Objects list refers only to the currently selected unit.

To specify what to open, click in the Open dialog box lists or type a pathname in the text box. In a pathname, the library is separated from the unit (if any) by a colon, and each lower-level unit or object (if any) is preceded by a period. You can create a new unit or object by typing a pathname that doesn't yet exist.

To include or exclude a particular type of unit in the Open dialog box list of units, choose **Unit Filter** and select the appropriate Design Unit Type in the displayed Unit Filter dialog box.

To include or exclude a particular type of side object in the Open dialog box list of objects, choose **Object Filter** and select the appropriate Object Type in the displayed dialog box.

Printing

As you work in Visual Elite, you can print all or part of your graphical and textual units, and the results of simulation and code generation. This section describes the printing of graphical units, while instructions related to the printing of results are covered in the appropriate sections of this *User's Manual*.

The following sections describe:

- Printing a Single Diagram
- Printing a Design Hierarchy

Printing a Single Diagram

To print a single diagram:

1. Choose **File > Printer Setup** and adjust your printer setup in the displayed dialog box if required.
2. Make the diagram window active, or select its icon in the Browser.
3. Choose **File > Print** or click the Print icon () and use the Print dialog box.
4. To print a template together with the diagram select the With Template option.

   The template is either the default system template or the template in which you can define per unit type and page size. (For details on the latter, see "Creating Templates for Your Designs" on page 203.)

   Three read-only text boxes appear at the bottom of the Print dialog box:

   - the leftmost details the name of the unit to be printed

- the middle one displays a time stamp that records the time at which you issued the Print command
- the rightmost is reserved for the page number when multiple pages are printed

The other rectangular boxes can be used to type remarks that are to be incorporated in the printout if you are using the system default template for the current page. Remarks are not printed if you have assigned a user-defined template to this page.

To select multiple individual units for printing, press Ctrl and click the icon of each unit. To select a range of units, press Shift and click the top and bottom unit in the required range.

Printing a Design Hierarchy

The inclusive printing command, called Print Tree, issues a Print command for the currently selected design unit and for every unit and subdesign unit in the hierarchy beneath it. However, note the following points:

- The printout from Print Tree might contain many pages, but it is a single file, and its pages are numbered in a single continuous sequence.
- Print Tree does not print packages, package bodies, Verilog “includes”, or side objects other than pages.
- To print a design hierarchy, select a design unit, rather than a subdesign unit. If you select a subdesign unit, only that one subdesign unit is printed. (If a design unit is selected, all the subdesign units in its hierarchy are printed.)
- If you select a page for Print Tree, the printout also includes the other pages of the same unit.
- If a library unit or subdesign unit is instantiated more than once in your tree, it is printed only once. Any skipping of duplicate instantiations is reported in the Messages window.
- If some HDL text unit needs fresh compilation, the Print Tree operation does not proceed past that pair. (For other units, compilation status is not a consideration.)

To print a design hierarchy (printing a unit and all the other units it instantiates):

1. Click **File > Printer Setup** and adjust your printer setup in the displayed dialog box if required.
2. Make the unit active in an editor window, or select its icon in the Browser.
3. Choose **File > Print Tree**. The Print Tree dialog box opens.
4. Make your selections in the Print Tree dialog box, then click **OK**.

Each page of the printout shows the name of its own unit, even though the page numbering is a single sequence covering the whole Print Tree output file.

To select multiple hierarchical units on which to implement Print Tree, press Ctrl and click the icon of each such unit. To select a range of units, press Shift and click the top and bottom unit in the required range.

Saving and Reloading Your Working Environment

The "working environment" that you create as you work in Visual Elite, refers to all sorts of general settings and preferences that you specify by means of menus and dialog boxes. These settings can either be saved or discarded, depending on your requirements.

The working environment is saved in the initialization file currently in use — which, by default, is the initialization file that was loaded during invocation. (For a description of the initialization file, see "Setup and Invocation" on page 47.)

To save your working environment:

1. In the main menu bar, choose **File > Save Environment**.
2. In the Save Environment dialog box, specify the Visual Elite initialization (*.ini*) file in which you need to store your settings.

The Save Environment command also records which Visual Elite windows are open and how they are sized and positioned. If you invoke Visual Elite with the -env option, the system restores the window configuration that was on your screen when you last used the Save Environment command (see "Setup and Invocation" on page 47).

To switch to a different working environment (that is, load a different initialization file) anytime *after* invocation:

1. choose **File > Load Environment**.
2. In the Load Environment dialog box, enter the name of the initialization file you need to load. (The dialog box assumes that your initialization file has the *.ini* filename extension.)

Customizing Visual Elite

The Visual Elite tool provides a sophisticated, scheme-based extension language called VEL (Visual Elite Extension Language). By writing scripts in VEL, you can extend and customize Visual Elite functionality, and automate large amounts of otherwise repetitive work.

VEL scripts can be used in two modes of work:

- **Batch** — Batch-mode scripts are written to perform complete operations in an off-line mode. Such operations deal with overall functionality.

- **Interactive** — Interactive-mode scripts are written to automatically perform certain preliminary operations prior to working interactively with Visual Elite.

For complete details on how to write and run VEL scripts, see the *Visual Elite Extension Language* manual.

You can also prepare and run scripts for Visual Elite written in either Perl or Tcl. For more information, see "Using Perl and Tcl Scripts with Visual Elite" on page 549.

The Visual Elite tool enables you to add to menus the features that you use regularly, such as commands and VEL scripts, and remove from menus the features that you rarely use. (For more information about VEL scripts, see the *Visual Elite Extension Language* manual.)

You can customize menus and key assignments by creating those handiest for you. You can preserve the original Visual Elite settings and create separate template files for customized settings. To customize menus and key assignments, preserve the original Visual Elite settings, and create separate customized settings template files:

1. In the **Tools > Options Manager > Customization** pane **"**User-defined menu directory" option, enter the name of the directory in which to store your customized settings.
2. In the main menu bar, choose **Tools > Customize,** and use the Customize Menu dialog box.

Note

Menu configuration changes made using the **Customize** menu item are not applied immediately; to see the changes, you must re-invoke Visual Elite.

To revert to the Visual Elite default settings, click **Default** in the **Tools > Customize** dialog box. (See note above.)

Shortcut and Function Keys

Table 4-5 summarizes the default settings for shortcut key combinations used in Visual Elite. You can reconfigure these key combinations using the Visual Elite Extension Language (VEL). For details, see the *Visual Elite Extension Language* manual.

Table 4-5. Shortcut and Function Keys

Key Combination	Command	Key Combination	Command
Control+O	Open (unit/object)	Control+X	Cut
Control+S	Save (library /unit/object)	Control+C	Copy (in design)
Shift+Control+S	Save All	Control+V	Paste

Table 4-5. Shortcut and Function Keys (cont.)

Key Combination	Command	Key Combination	Command
Shift+Control+C	Copy (library /unit/object)	Control+Z	Undo
Shift+Control+M	Move (library /unit/object)	Delete	Delete
Shift+Control+R	Rename (library /unit/object)	Control+M	Comment Line (in the text editors), or Toggle Pin (Connector) Direction (in the Block Diagram Editor)
Control+R	Refresh Libraries	Control+U	Uncomment Line
Control+P	Print	Control+Y	Invoke Symbol Editor

Note

If the **Num Lock** button in the keyboard is pressed (**Num Lock** is active), the keyboard shortcuts will not work at all.

Table 4-6 summarizes the use of function keys in Visual Elite. Unlike the shortcut key combinations listed in Table 4-5, function keys cannot be reconfigured.

Table 4-6. Function Keys

Function Key	Command	Function Key	Command
F1	Online Help	F7	Minimize All windows
F2	Refresh Screen	Shift+F7	Restore All windows
F3	Display Element Attributes dialog box	F8 (Linux only)	Bring forward open dialog box/window
F4 (Linux only)	Bring forward Main or Simulation Control window	F10	Zoom In
F6	Toggle Grid	Shift+F10	Zoom Out

In addition, numerous shortcut key operations are available with the Visual Elite internal text editor. For details, see “Keyboard Commands (1)” on page 270.t.

Online Help and Tool Tips

The Visual Elite tool includes online Help to assist you as you work.

- To display the top of the Help tree, choose **Help > Help Topics**.

- To display Help specific to any dialog box, click **Help** in the dialog box.
- To display Help specific to a menu command, highlight the command using your mouse and press F1.
- To display Help specific to a window (such as an editing window), press F1 while your mouse pointer is positioned in that window.

Tool tips display the names of the Visual Elite icons. To see the name of any command icon, rest your mouse pointer on it for a moment. Similarly, a tool tip is displayed whenever the mouse pointer rests on a graphic element within an editing window: the element type and name are displayed.

Chapter 5
Common Editor Options

This section describes operations that are common to the Visual Elite editors: the Block Diagram, State Diagram, Flowchart, and Truth Table graphical editors, as well as, where relevant, the Visual Elite textual editors.

The following sections describe:

Creating a New Unit

To create a new unit, using the main or Browser menu, choose **File > New**, and specify the type of unit that you need to create; for example, **Block Diagram, State Diagram, or Flowchart**. The appropriate editor window opens, and you can begin creating the new unit.

The Visual Elite tool enables you to depict units in any of three languages: VHDL, Verilog, or SystemC. To override the global new unit language and create a unit in a different language, choose **File > New > *Language* > *Unit Type*** in the Editor.

For VHDL, the Visual Elite tool enables you to create units that conform to either the VHDL 87 or VHDL 2008 standard. To set the default standard of new units, choose **Tools > Options Manager > Compiler Settings > General** and set the “Compile as” value in the VHDL tab sheet of the General window**.** If you select VHDL 87, VHDL 87 units are created. VHDL 2008 units are created when you select VHDL 2008. The “Compile as” option also determine the way a VHDL unit is compiled (see “Specifying VHDL Type” on page 611).

Graphic Elements

This following sections describe issues related to working with graphic elements in the Block Diagram, State Diagram, and Flowchart editors:

Placing Graphic Elements in a Diagram

In the Block Diagram, State Diagram, and Flowchart editors, several of the icons are used to place graphic elements into the diagram. For example:

Table 5-1. Graphic Element Icons

	*Create a block* (in the Block Diagram Editor)
	*Create a state* (in the State Diagram Editor)

To place a required element:

1. Click the appropriate icon. The outer shading of the icon changes, indicating that it is selected.
2. Click in the window where you need the element placed.

Depending on what the element is, you might need to click twice (for example, for a block in the Block Editor) or even three times (for a transition in the State Diagram Editor). More detailed instructions are given where appropriate in the following chapters.

As a rule, the element is automatically assigned a default name.

For example, default names for blocks start with B (B0, B1, and so forth) and default names for signals start with S (S0, S1, and so forth).

If required, you can define your own preferred default names; for details, see "Defining Default Names for Graphic Elements" on page 106. In Visual Elite, you can assign a graphic element any name that is legal in VHDL or Verilog, depending on the language in which the unit is depicted. In SystemC block diagrams, you can assign legal C/C++ names.

3. To create more elements of the same type, click where you need them to be placed.

   You do not need to click the icon again since, once selected, each of the icons remains selected until you select a different icon or perform a right-click.

Right-click to cancel the drawing of a graphical element after you have started.

Selecting Elements in a Diagram

In the Block Diagram, State Diagram, and Flowchart editors, you can select elements either individually, or together with other elements.

Selecting Individual Elements

To select individual elements (and any associated text):

1. Click the Select icon ( ) or right-click anywhere in the diagram.
2. Click on an element to select it and its accompanying text (if any).

   The element, and any accompanying text, changes color to indicate it is selected.

When you select another element, the previously selected element is deselected.

Selecting More Than One Element One at a Time

To select more than one individual element, one at a time:

1. Click the Select icon ( ) or right-click anywhere in the diagram.
2. Press Shift and sequentially click on each of the elements to select.

Selecting a Line

To select a line up to the nearest intersection (node), click the Select icon () then click the segment of line that you need to select. To select an entire line up to all endpoints, double-click anywhere on the line.

Selecting Multiple Elements in an Area

To select all the elements contained in a rectangular area, as well as their associated text (such as their names), click the Select icon (). Locate a corner of the area where no element is present and click-and-drag a rectangle around all the elements you need to select. The elements change color, indicating they have been selected.

Selecting Elements Based on Predefined Criteria

To select elements based upon predefined criteria:

1. In the graphical editor, click **Edit > Query Select** or right-click in an empty area of the diagram and choose **Query Select** from the popup menu.
2. In the Query Select dialog box, click the Drawing option to select elements found throughout the entire current page, or click the Select List option to select a subset of already selected elements.
3. Define the elements to be selected using the Select by Name and Select by Type options as required.

   For example, if you need to select all the blocks whose names begin with the letter “M” in a block diagram, click the Blocks option and enter the string “M*” in the Select by Name text box.
4. Specify a signal or port name to select the items connected to the signal or port. Regular expressions are allowed.
   a. Check the Tree option to select all items connected to the signal or port recursively in the design.
   b. Check the Include Pages option all items connected to the signal or port on all pages contained in the current unit.

Using the various available options, you can specify as many criteria as you require. Once the elements you specify are selected, you can manipulate them; for example, you can change the color of the selected elements (see “Specifying Graphic Element Colors”). This type of selection is particularly useful in conjunction with defining attributes for multiple graphical elements.

Selecting All Elements in a Diagram

To select all the elements in your diagram, click the Select All icon () or right-click and choose Select All.

Deselecting Elements in a Diagram

The following sections describe how to deselect individual and all elements in a selection group.

Deselecting Individual Selected Elements

To deselect one particular element in a selection group, click the Select icon () then press Shift and click the element.

Deselecting All Selected Elements

To deselect all elements you have previously selected, perform one of the following actions without pressing Shift:

- Select a new element.
- Click in an empty area of the diagram.

Defining Attributes for Graphic Elements

All of the graphic elements used in the various editors have definable attributes; for example, the conditions governing a state transition or the contents of a block. The following sections describe how to define the attributes of individual or multiple elements:

Defining Attributes of Individual Elements

To define or modify these attributes, use the appropriate dialog box.

1. Click the Select icon ().
2. Click the element.
3. Click the Attributes icon ().

   Alternatively, you can press F3, click **Attributes > Element**, or right-click and choose **Attributes** in the popup menu.
4. In the Attributes dialog box, define the required attributes. (For details, see the individual editor chapters.)
5. After defining the required attributes, click **Apply** (the dialog box remains open) or **OK** (the dialog box closes) to save the attributes. Click **Cancel** to close the dialog box without saving the changed attributes.

Defining Attributes of Multiple Elements

To "page through" and define the attributes of multiple elements in a diagram:

1. Select all the elements whose attributes you need to change. (See "Selecting Elements in a Diagram" on page 103.)
2. Choose **Attributes > Element**.

   The Attributes dialog box for the initial element in the selection group opens.
3. Define the required attributes using the Attributes dialog box.
4. Click **Apply**.

   The defined attributes for the initial element in the selection group are saved and the Attributes dialog box for another selected element is automatically opened.
5. Continue to sequentially modify the attributes for the various elements.
6. When you have made the required modifications to the last selected element, click **OK.** The dialog box closes.

Defining Default Names for Graphic Elements

To define a default name for any or all of the graphic elements of a given type:

1. Choose **Tools > Options Manager > Editors > *Graphic Editor* > Default Names**, where ***Graphic Editor*** is: Block Diagram, State Diagram, or Flowchart.
2. In the Editors pane of the Options Manager dialog box, enter the prefix and optional suffix of the default name for each listed element.

   A running integer is appended to the prefix when you create the element.

Prefixes and suffixes can be defined for the following graphical elements:

- Block diagrams — blocks, components, signals or bundles, and taps
- State diagrams — states, transitions, and connectors
- Flowcharts — start boxes, action boxes, condition boxes, wait boxes, loop boxes, end loop boxes, case boxes, end case boxes, state boxes, and connectors

Specifying Graphic Element Colors

To set default fill and bordering line colors for graphic elements in Block Diagrams, State Diagrams, and Flowcharts, choose **Tools > Options Manager > Editors > *Graphic Editor* > Colors**; where ***Graphic Editor*** is: Block Diagram, State Diagram, or Flowchart.

To modify the color of graphic elements locally, select the element(s) then right-click and choose **Colors**. In the Set Color dialog box, select the fill and line colors. Color is applied to all selected items, not just selected items on the current window.

To specify default colors to be displayed when graphic elements are selected with the cursor, when the Attributes dialog box is open, or during a pause in simulation, choose **Tools > Options Manager > Editors > Global Settings > Colors**.

Resizing Graphic Elements

To resize blocks, states, and all other resizeable graphic elements:

1. Select the graphic element.
2. Place your pointer on the edge or corner you need to move inward or outward.

   The pointer changes to a crosshair (+).
3. Click-and-drag toward or away from the center of the graphic element.

   The edge or corner moves with your pointer, resizing the graphic element.

Note

You can use the same method to convert the default circular shape of a state to an ellipse.

Moving Graphic Elements

After you place graphic elements in an editing window, you can move them as described in the following sections.

Moving an Individual Graphic Element

To move an individual graphic element:

1. Click the Select icon () or right-click anywhere in the diagram.
2. Click-and-drag the element to its new location.

Moving Multiple Graphic Elements

1. Select the elements you need to move.
2. Click-and-drag a selected element to a new location. All selected elements are moved.

Copying Graphic Elements

In Block Diagrams, State Diagrams, and Flowcharts, you can copy any graphic element. For the copies, the original names are used where reasonable (for example, the names of instantiated units and components in block diagrams). Where it is not reasonable to duplicate the original name (for example, the name of a state), new default names are automatically assigned. In some cases, while the original name is retained, the name might require editing (such as local connector names).

When copying elements, you can use the system clipboard or bypass the clipboard using a shortcut. (The clipboard, as in many other graphical and text editors, is an off-screen location from which many duplicates can be made. You *copy to* the clipboard and *paste from* the clipboard.)

To copy graphic elements not only within a unit, but also between units of the same type using the clipboard:

1. Select the element or elements that you need to copy.
2. Click the Copy icon () or choose **Edit > Copy**.

   Alternatively, you can right-click and choose **Copy** from the popup menu.
3. To copy into another diagram, make that diagram window active.

   You cannot copy into a diagram that belongs to another editor. For example, you cannot copy from a block diagram into a state diagram.
4. Click the Paste icon () or choose **Edit > Paste**. Alternatively, you can right-click and choose **Paste** from the popup menu.

   The copy retrieved from the clipboard moves with your pointer.
5. Move the copy into position and click to drop it. Or, to delete the copy, right-click or press Delete on the keyboard.
6. To place another copy of the same element(s), return to step 4.

   Your clipboard retains its content until you use the Copy command again or exit Visual Elite. It is separate from the text-editing clipboard.

To move duplicated elements after dropping them, move them like any other elements (see "Moving Graphic Elements" on page 107).

Duplicating Graphic Elements

Instead of just copying and pasting a graphic element a number of times, the Array command provides a quicker way to duplicate a graphic element several times:

1. Select the element.

2. Choose **Edit > Array** or right-click and choose **Array** from the popup menu.
3. In the Array dialog box, specify any of the following options:
   - **Horizontal** — the number of elements to be created in a row.
   - **Vertical** — the number of elements to be created in a column.
   - **Diagonal** — the number of elements to be created diagonally.

   You can enter numeric values for both Horizontal and Vertical, and create a two-dimensional array of elements. However, if you enter a value for Diagonal, neither Horizontal nor Vertical can be specified.
4. Move the pointer to position the elements, and click to drop them.

   The elements are spaced evenly from one another.

Rotating Graphic Elements

Depending on the graphical editor that you are using, the elements in Table 5-2 can be rotated.

Table 5-2. Elements That Can Be Rotated

Diagram	Elements
Block Diagram	signal names, components, connectors, connector names, block names, taps
State Diagram	connectors, connector names, other element names
Flowchart	connectors, connector names, box names

To rotate a graphic element:

1. Select the element to be rotated.
2. In the Edit toolbar, click the Rotate icon ( ).

   With each click, the element rotates 90 degrees counterclockwise.

In Block Diagrams after you rotate a component, unless disabled, autorouting can be used to adjust the paths of signals in order to keep them as clear and separate as possible. To disable autorouting, click **Tools > Options Manager > Editors > Global Settings > General** and deselect the “Perform auto-route” option.

Deleting an Element

To delete an element, such as a block or signal in the Block Diagram Editor, use one of the following methods:

- Select the element, and click the Delete icon ( ).

- Select the element, and choose **Delete** or **Cut** in either the Edit or popup menu.

  If you use the Cut command, the deleted element is retained in the clipboard.

- Select the element and press the Delete key.

Using Free Graphics in Graphical Editors

In the Block Diagram, Stage Diagram, and Flowchart editors, you can add free graphics to your design units. Free graphics do not have a logical significance on the design, but can be used for documentation purposes. To use any of the free graphics commands:

1. Right-click in an empty area of the design page.
2. Choose one of the following: **Line**, **Circle**, **Arc**, or **Rectangle**.
3. In the editing window, click and begin drawing the required shape or line. Click again to conclude the drawing.
4. If required, draw any additional lines or shapes of the same type you might need.
5. Right-click to exit the drawing mode for this shape or line.

You can manipulate free graphics objects as required. Select one or more of the shapes in the editing window. Right-click and choose **Fill**, **Unfill**, **Group**, or **Ungroup**.

Inserting External Bitmaps in Graphical Units

In the Block Diagram, State Diagram, and Flowchart editors (as well as in the Symbol and Template editors), you can insert external bitmap images. Such images do not have a logical significance in the design, but can be used for aesthetic and/or documentation purposes.

The bitmaps to insert can be stored in one of the following directories, which are listed according to their order of priority:

- The directory specified in the **Tools > Options Manager > Editors > Global Settings > General > Bitmap directory** option.
- The directory referenced by the environment variable VISUAL_EXTERN_BITMAPS.
- The default directory that you create at ***visual_installation_dir****/runtime/bitmaps*.
- A directory named */bitmaps* that you create in the directory where the current *.ini* file is stored.

To insert a bitmap in a design unit:

1. Right-click in an empty area of the design page.
2. Choose **External Bitmap**.

The Bitmaps dialog box lists all the bitmaps stored in the bitmap directories searched by Visual Elite.

3. Select the name of the bitmap file to be inserted and click **OK**.

Note

You can also insert a bitmap which is stored in a different directory. Click **Import** in the Bitmap dialog box. Browse to the location of the bitmap you need to insert. Click **OK** in the Bitmap dialog box. The bitmap is inserted in the unit window and copied to the designated bitmap directory.

Text in Graphic Units

The following sections describe issues related to the use of text when working in the Visual Elite editors:

- Copying All Kinds of Text
- Editing Text on Screen
- Specifying Font Style for Text
- Controlling Visibility of Graphic Element Text
- Finding and Replacing Text in Design Units
- Adding Free Text to a Diagram
- Defining Unit Headers
- Entering Japanese Comments
- Automatically Aligning Graphics and Text
- Editing Textual Units

Copying All Kinds of Text

Anywhere you type text (as free text, textual units, specifications in a dialog box, or values in a truth table) the same clipboard is shared. Using the shared clipboard, you can copy text from place to place in Visual Elite: from a truth table into a textual unit, from the action of a state transition to the action of a flowchart box, or between any two boxes where text is editable. You can copy as little as a signal name, or up to dozens of lines of code.

One way to copy text is as follows:

1. If it isn’t already, make the text available for editing; for example, if it is free text, or a state diagram action or condition, open its dialog box.

2. Drag the cursor to select the text to copy.
3. Press Ctrl+Insert to copy the text to the clipboard.
4. Click where you need to re-use the selected text.
5. Press Shift+Insert to paste the text from the clipboard.

See "Writing Text" on page 263 for a complete set of text-editing commands.

Editing Text on Screen

Much of the text displayed in graphical units can be edited directly in the graphical editor window, without having to bring up dialog boxes. For example, the names of all graphic elements, the width of signals, all free text, actions, transition guard conditions, and more. When you edit such textual items on screen, you change their values in the database.

To edit text on screen:

1. Select the text.
2. Click the text. The selected text now appears in an editable rectangle.
3. Modify the text as required.

   To cancel editing if required, press Esc.
4. Click anywhere in the editing window to finalize the editing.

   If the edited text is single-lined, you can press Return or Enter to finalize the editing.

Specifying Font Style for Text

To specify a default font to be used for text in graphical and textual units:

1. Choose **Tools > Options Manager > Editors > Global Settings > Fonts**.
2. In the Editors pane, specify the font to be used for graphical element names, free text, and in the text editors.
   a. In the appropriate field, click the drop-down button.
   b. In the Font dialog box, set the font attributes.

Note

In dialog boxes that provide a Font button, you can locally override the default font.

In Block Diagrams, State Diagrams, and Flowcharts, you can modify the font used for any selected text. Choose **Attributes > Font**. In the Change Font dialog box, specify the new font attributes.

Controlling Visibility of Graphic Element Text

Graphic elements in Block Diagrams, State Diagrams, and Flowcharts are generally accompanied by text. Using the appropriate Attributes dialog box, you can toggle the text on or off. The text can be moved independently of the element to which it belongs.

To change the visibility of accompanying text, choose **Tools > Options Manager > Editors > *Graphic Editor* > Visibility**; where *Graphic Editor* is: Block Diagram, State Diagram, or Flowchart. Specify which text in a given graphical editor is visible, and which is invisible. To make the text accompanying a particular type of element visible, select its checkbox. Table 5-3 lists the text elements whose visibility you can control.

Table 5-3. Text Elements with Visibility Control

Block Diagrams	State Diagrams	Flowcharts
Blocks: Name, Generic/Parameter values, Text, Ports	**States:** Name, Action	**Start boxes:** Name, Sensitivity List
Components: Name, Generic/Parameter values	**Transitions:** Name, Guard condition, Priority, Action	**Action boxes:** Name, Action
Signals/Bundles: Name, Contents	**Page Connectors:** Name	**State boxes:** Name, Action
Taps: Name, Assignments	**Other Connectors:** Name	**Condition boxes:** Name, Condition
Signal Pins: Name, Page Reference		**Wait boxes:** Name, Statement
		Global Connectors: Name, Priority, Condition
		Page Connectors: Name
		Case boxes: Name, Choices, Expression
		Loop boxes: Name, Statement

Using the **Tools > Options > Editors > *Graphic Editor* > Visibility** menu item to access a Visibility dialog box, enables you to set the default visibility for each subsequent unit of the given element type created.

To change the visibility for each unit locally, choose **Attributes > Visibility** in the graphic editor. When you change the visibility locally, the new setting is applied to:

- any currently selected element
- all subsequently created elements for this unit

Finding and Replacing Text in Design Units

You can find all occurrences of a string, either locally or across all pages of an entire unit or hierarchical design tree.

To find a string in a given unit:

1. Click the Find icon (), choose **Edit > Find**, or right-click when no element is selected and choose **Find** in the popup menu.
2. In the Find dialog box, specify how to display the search results: interactively or as a single report. If interactively, click **Next** or **Previous.**
   - Interactive:

   The Find dialog box closes and the search begins in the specified direction. If the string is found, its first occurrence is displayed. Each subsequent click on the Find Again icon () displays the next or previous occurrence of the string.

   To change the direction of the search, click the Find icon. The Find dialog box reopens enabling you to select the appropriate directions: Next or Previous.

   - Report:

   The Search Results dialog box opens and contains a list of all found occurrences of the string. Double-click any of the findings listed in this dialog box to highlight the actual occurrence of the string in the design.

To find and replace a string of text:

1. Choose **Edit > Replace** or right-click and choose **Replace** from the popup menu.

   The Replace dialog box opens.
2. In the Replace dialog box Replace field, enter the string to be searched for and replaced.
3. In the With field, enter the new string.
4. Specify the mode of the search and replace operation:
   - **Query** — Each consecutive occurrence of the found string is highlighted in the window or dialog box in which it is located. As each occurrence is displayed, confirm whether the string should be replaced.
   - **All —** All occurrences of the found string are replaced at once. Changes made in closed units are saved automatically.

Adding Free Text to a Diagram

Among the elements you can place in Block Diagrams, State Diagrams, and Flowcharts is free text; text that the Visual Elite tool does not process but simply displays as comments among your graphics. You can attach free text (including RCS keywords) to an entire unit. Free text comments can be linked specifically to the following graphical elements:

- *Block Diagram Editor* — blocks and components, signals and bundles, taps
- *State Diagram Editor* — states, transitions, junctions, connectors
- *Flowchart Editor* — start boxes, action boxes, state boxes, decision boxes, wait boxes, loop and end loop boxes, case and end case boxes, connectors. (You cannot attach a comment to an end box.)

Besides putting free text into a diagram, you can store text as a side object associated with a diagram. For details, see "The Visual Elite Workplace" on page 79.

Linking Free Text to an Entire Unit

To create and link free text to an entire unit:

1. Click the Free Text icon ().

   The Free Text dialog box opens.

2. In the Free Text dialog box, type the text to place.

   If you need to edit as you type, see "Writing Text" on page 263 for details of the available keyboard commands. Some of the icons described are also available in the Free Text dialog box.

3. Select the appropriate "Attach to" option to specify where to include the free text comments in the code generated for your unit.

   For VHDL units, you can attach comments to either entity or architecture declarations. For Verilog units, you can attach comments to module declarations. If you select Graphics only, your comments are displayed in the diagram but not in the generated code.

4. If you have specified Entity, Architecture, or Module in the previous step, select the appropriate Position option to determine the position of your comments relative to the appropriate declaration in the generated code.

5. If you need to modify the style, size, and color of fonts used, click **Font** and use the Font dialog box.

6. To draw a frame around the free text, select the Frame Visible option.

7. Click **OK**.

   The text attaches itself to your pointer.

8. Click in the diagram to place the text.

Once created and linked, you can move or copy the element of free text like any other diagram element. To revise the text, select only the free-text element and click the **Free Text** icon. Its dialog box reopens.

Linking Free Text to a Specific Graphic Unit

To link free text to a specific graphic element:

1. Select the element.
2. Click the Free Text icon ().
3. In the appropriate field of the displayed dialog box (for example, the Comments dialog box or the Comments tab sheet of the Attributes dialog box), type your text.

   Text that you enter in the “Before” field is placed in the generated code, just before the declaration line that represents the element. Text entered in the “At” or “Same Line” field is appended to the declaration line. “After” text is placed just after the line.

   For more specific information about the location of the free text in the HDL output of your design, see “Where Free Text Appears in the HDL Code” on page 523.
4. To make your text visible in the diagram, select the Visible option.
5. Click **OK**.

The positioned text automatically includes the name of the element.

Linking Free Text to a URL

Any free text integrated in Block Diagram, State Diagram, or Flowchart units can be linked to the URL of your choice. When this hyperlinked text is clicked, the default internet browser on your system is invoked, and the specified URL is loaded.

To define a hyperlink for free text:

1. Click on the text to select it.
2. Right-click and choose **Hyperlink**.
3. In the Hyperlink dialog box, enter the URL to be referenced by the hypertext.
4. Click **OK**.

Defining Unit Headers

In addition to free text, the Visual Elite tool enables you to specify unit headers that can incorporate RCS keywords for version control purposes. When a unit is checked-in (see

"Version Control" on page 141), the keywords are evaluated; the values display the next time the unit is checked-out or fetched.

For example, if you enter the RCS keyword $Header$, after evaluation the following displays in place of the keyword: *full pathname of the RCS file*, *revision number*, *date* and *time*, *author*, *state*, *who locked the unit*.

Defining a Page Header

In principle, each page of a Block Diagram, State Diagram, or Flowchart can be given its own individual header. To assign an individual header to a page:

1. Choose **Attributes > Header**.
2. In the Header dialog box, type the header text for the page.
3. Select the Visible option.
4. Click **OK**.

   The header text is attached to your mouse pointer.
5. Position the pointer to place the text and click.

Defining a Default Global Header

You can pre-define a default global header for every textual and graphical unit that you subsequently create. In textual units, the header text is displayed as comments preceding the unit code; in graphical units, it is displayed in the Header dialog box.

To define a default global header

1. Choose **Tools > Options Manager > Editors > Global Settings > Global Header**.
2. In the Editors pane, specify the types of graphical and textual units to which to apply the default header.
3. In the text window, enter the required contents of the default header.

To integrate the unit header in the output during code generation, choose **Tools > Code Manager > Style > Headers** and click the "Unit user-defined header" option. (For details, see the "Attaching Headers" on page 508.)

Entering Japanese Comments

An environment variable, VISUAL_TEXT_LANG, is provided to indicate to Visual Elite that it is being run under a Japanese operating system. The Visual Elite tool uses this information in maintaining its database.

Set the environment variable as follows:

Linux

```
setenv VISUAL_TEXT_LANG ja
```

Windows

```
set VISUAL_TEXT_LANG=ja
```

Where “ja” is in lowercase.

Once the environment variable is set, you can choose **Tools > Options Manager > Editors > Global Settings > Fonts and** select the jisx0208.1983 option in the Editors pane. The Editors pane Font sheet enables you to select from a number of available fonts for the language in use.

(For more details about using the Visual Elite environment variables, see “Setup and Invocation” on page 47.)

Note

As an alternative to using the VISUAL_TEXT_LANG environment variable provided by Visual Elite, you can use the general environment variable LANG. This variable should be assigned the value “ja”.

Automatically Aligning Graphics and Text

In a graphical editor, to align graphic elements and text boxes automatically:

1. Select the elements to align.
2. Choose **Edit > Align**.
3. Use the controls in the Alignment dialog box.

Editing Textual Units

The Visual Elite tool offers you a number of possibilities for editing textual units:

- XEmacs, the default editor
- Mentor Graphics’ DesignPad editor
- Visual Elite internal text editor
- Any other external editor of your choice that can be invoked from within Visual Elite

For details, see “Writing Text” on page 263.

Undoing and Redoing Steps of Work

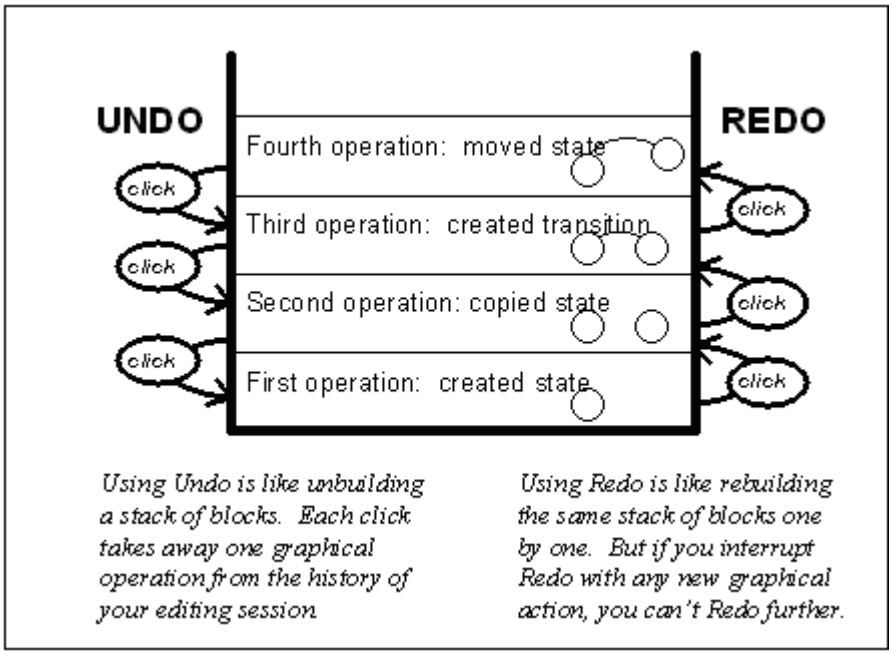
Each of the Visual Elite graphical editors has an Undo and Redo icon.

Using the Undo command cancels recent changes made to graphic elements in a design unit. For example, you can undo the deletion of a signal in a Block Diagram, or you can undo a change in the action of a state in a state machine. You *cannot* undo actions that do not relate to specific graphic elements. For example, using the Undo icon you cannot undo a change to the list of generics defined for a VHDL unit.

Saving your unit does not affect your ability to undo work, but closing your window does. When you open a window, you cannot undo changes that were made before you last closed it.

To undo the latest action or actions affecting your graphic elements, click the Undo icon ( ) as many times as necessary.

To redo an action or actions that you undid, *immediately* after the Undo command, click the Redo icon ( ) as many times as necessary. The Redo command does not work on any changes you make to graphic elements after performing an Undo command. Steps that do not change your graphic elements (for example, working on your list of VHDL generics or changing your zoom factor) do not count.



In graphical units of more than one page (see "Pages" on page 120), the Undo and Redo icons for each page work independently.

To adjust the size of the buffer allotted to Undo operations, choose **Tools > Options Manager > Editors > Global Settings > General** and enter the required number in the "Undo limit" option.

Moving Up the Design Hierarchy

The Visual Elite editors provide Pop and Top icons for opening design units located hierarchically above the one that you are editing.

The Pop icon () opens the unit that instantiates the one that you are editing.

The Top icon () opens the highest-positioned unit in the hierarchy that you are editing.

The banner of the editing window for a diagram displays the path of the design unit that Pop and Top can climb. For example, if you open a flowchart as a block in a Block Diagram, you see the Block Diagram name to the left of the block name. However, if you open a unit directly from the Browser Library view or from the Open dialog box, there is no hierarchical path for you to climb. (Exceptions: You can always climb up from a subdesign unit to its design unit, and you can always take advantage of certain hierarchical data intrinsic to HDL text units.)

Displaying Global Data

Each of the Visual Elite graphic editors enables you to display a summary of global, unit-related information that is taken from the various **Attributes > Declarations** and **Attributes > Properties** (state diagrams) dialog boxes.

For state diagrams, lists of all states and transitions in the unit are also provided.

To display a summary of global, unit-related information, choose **View > Global Data** in the editor window or, where available, click the Global Data icon ().

Pages

In the Block Diagram, State Diagram, and Flowchart editors, the work surface in the editor window is called a “page”. You can manipulate page units as described in the following sections:

- Defining Page Size
- Navigating Multi-Page Units
- Creating a New Page
- Accessing a Specific Page
- Moving a Page
- Deleting a Page

Defining Page Size

For graphical designs, you can specify a predefined page size, or define your own page size.

To specify a default page size and orientation for use in all your designs, choose **Tools > Options Manager > Editors > Global Settings > Page Setup**.

The page size and orientation you specify in the Page Setup sheet of the Editors pane are used in all Block Diagram, State Diagram, and Flowchart units subsequently created. The borders of the page are marked in the editor windows and graphical elements placed in the page are not allowed to exceed the limits of the page borders.

To locally change the page size of an existing graphical unit, choose **Attributes > Page Setup** in the editor window and use the Page Setup dialog box to redefine the page size of the specific unit.

Note

You can always increase the page size of an existing unit, but you can only reduce a unit page size if there are no graphic elements which extend beyond the borders of the new size.

Navigating Multi-Page Units

Block diagram, state diagram, and flowchart units can extend over several pages. However, the pages are a graphical convenience and have no logical significance. All the elements on the various pages of a unit interact logically as if they were on the same page.

The three editors that support multiple-page units feature five page-related menu items in their **View > Navigate** sub-menu (**Next**, **Previous**, **First**, **Last**, **Find**, and **Move**), and one menu item in the **File > New** sub-menu (**Page**). (These commands also have their own icons.)

Creating a New Page

To create a new page:

1. In the editor window, choose **File > New > Page**.
2. In the New Page dialog box, enter the number of the page to be created.

   Accept the default value to append the new page to the already-existing page(s) for the unit.

   To insert a page between two existing pages, enter the number of the higher-numbered page. For example, to insert a page between pages 2 and 3, enter the value 3. The page that was previously numbered 3 becomes page 4 and all other higher-numbered pages are incremented by 1. You cannot insert a page before page 1 of a unit; nor can you assign a page a number higher than the resulting total number of pages in the unit.

When a unit has more than one page, the number of the page displays next to the unit name in the window banner for this page.

Page numbers are created and maintained automatically, as necessary. The number changes automatically if lower-numbered pages are deleted. The **Previous** and **Next** page commands move you from page to page according to numeric order.

In the editor window, the **Save** and **Close** commands apply only to the individual page displayed.

You cannot drag elements from one page to another. To copy or move elements from one page to another, use the clipboard as if you were copying or moving from unit to unit (see "Copying Graphic Elements" on page 108 and "Moving Graphic Elements" on page 107).

Accessing a Specific Page

To open a specific page of a multi-page unit, use one of the following methods:

- Choose **File > Open** in the editor window, and select the appropriate page in the Unit list box.
- Double-click the page icon in the Browser. To open the first page, you can alternatively double-click the unit icon.
- If you are editing the page that immediately precedes the one that you need to open, choose **View > Navigate > Next Page**, or use the Next Page icon ( ).
- If you are editing the page that immediately follows the one that you need to open, choose **View > Navigate > Previous Page**, or use the Previous Page icon ( )
- To open a specifically-numbered page within a unit that you are editing, choose **View > Navigate > Find Page** or click **Find Page** icon ( ) and use the Find Page dialog box.

Moving a Page

To move a page to a different position in the context of its unit:

1. Choose **View > Navigate > Move Page**, or click the Move Page icon ( ).
2. In the Move Page dialog box, enter the new location page number.

Moving a page causes other pages to be shifted forward or backward, as appropriate. The first page of a unit cannot be moved.

Deleting a Page

To delete a page, use the Browser as you would to delete any side object. (See "The Visual Elite Workplace" on page 79.)

Validating a Unit

Before saving changes that you have made to a diagram you should validate it. Validation checks for errors that would otherwise be reported only during compilation. You can validate any unit that you can compile.

Synthesizability is not a problem for Block Diagrams, but state machines, flowcharts, truth tables, or HDL units should be validated with your intended synthesis tool to uncover any possible incompatibilities. To include synthesizability in your validation checks:

1. Choose **Tools > Code Manager > Target**. In the Target pane, select the "Verify synthesizability" option (if it is not already selected). Specify Synthesis as your purpose and select your synthesis vendor.
2. Choose **Tools > Options Manager > Compiler Settings > General**. In the Compiler Settings pane, select the "Verify synthesizability after compilation" option.

To validate a unit:

1. Activate the unit window, or select the unit in an active Browser window.
2. Choose **Tools > Validate** in the editor or Browser, or click the Validate icon ().

   Progress of validation is reported in the Messages pane of the main window.
3. In the main window Message pane, check whether any messages indicate an error.

To see what caused a specific error (for example, a disconnected signal or an illegal line of HDL), double-click the error message line. The Visual Elite tool displays the unit and highlights the appropriate graphic element or line of text.

To print the messages, choose **File > Print** in the main menu bar.

To retrieve the messages when you return later to edit the unit further:

- In the editor window, choose **View > Messages Window.**
- In the Browser, select the unit icon and choose **View > Messages Window**.

The messages remain available for redisplay until you validate or compile the unit again.

If you invoked Visual Elite with the –log option, your messages are also saved in a log file.

Saving Units and Objects

Three commands are available for saving design units and objects:

- **Save** — Saves the last changes made to the currently active unit or object. In a unit that consists of several pages, the Save command applies only to the page you are editing.

- **Save As** — Enables you to:
  - Assign a name to a previously unnamed new unit or object.

    or
  - Make a copy of the currently active unit or object and assign this copy a new name.

  Using this command stores the diagram in the current library only. To move or copy a unit or object to a different library, use the methods described in "The Visual Elite Workplace".
- **Save All** — Saves all previously unsaved changes in all open Visual Elite editor and simulation wave windows.

If a unit or object has been modified but not saved, the Save icon appears as follows in the editor icon bar:

If a unit or object has not been changed since it was last saved, the Save icon appears as follows:

To save the contents of an editor window:

1. Make the window active.
2. Choose **File > Save** or **Save As** in the editor window, **File > Save All** in the main menu bar, or click the Save icon.

You can instruct the Visual Elite tool to automatically save the changed files in your working environment at a predefined frequency. To automatically save changed files at a predefined frequency:

1. Choose **Tools > Options Manager > Editors > Global Settings > General**.
2. In the Editors pane, select the "Auto-save every" option.
3. Specify the save frequency (in minutes).

Chapter 6
The Design Environment

This section describes the environment you work in when creating designs in Visual Elite, including:

- Naming Conventions
- VHDL93-compatible units
- Libraries (in the Design Environment)
- Units
- Viewing a Design Hierarchy
- Projects

Naming Conventions

As you work in Visual Elite, the naming conventions for libraries, units, side objects, graphic elements, and so forth, follow the conventions of the language of design; therefore, these names can be any name which is valid in VHDL, Verilog (*except for a Verilog escaped identifier)*, or C/C++.

VHDL93-compatible units

Whether created in Visual Elite or imported from outside, VHDL93-compatible units can have extended-identifier names. Such names must begin and end with a backslash character (\), and can include any of the supported graphic characters such as #,$,%,^,&, and more (except for the \ character itself); for example, \n*2Y$\. For more details, see section 13.3.2 of the VHDL Language Reference Manual (LRM).

Libraries (in the Design Environment)

All work created in Visual Elite is stored in libraries. (For an explanation on how to define access permission to libraries and the units stored in them, see “Defining Access Rights to Units and Libraries” on page 93.)

The following sections describe:

- Libraries Supplied by Visual Elite
- Creating Your Own Libraries

Libraries Supplied by Visual Elite

During installation, a number of write-protected, standard libraries are copied to your system.

HDL Libraries

VisualElite provides the following HDL Libraries:

- **ieee** — Contains a number of packages defined in the IEEE 1076-1987 Language Reference Manual (LRM).
- **std** — Contains the VHDL packages STANDARD and TEXTIO.
- **vis_util** and **vis_util_mti** — Contain packages which define general design utilities. (For details, see "Packages" on page 571.)
- **STD_VER** — This mandatory library is used by Visual Elite to internally access semantic information.
- **gates** — This library contains a graphic element for each of the gates depicted in the Verilog Language Reference Manual (LRM).
- **macrosyn_ver**, **macrosyn_vhd**, and **macrosyn_systemC** — Contain a number of configurable, technology-independent logic gates and sequential logic components that can be incorporated in block diagrams. (For more details, see "Macro Components" on page 250.)

The libraries are stored at the following locations:

- **Linux**

  installation-dir`/Visual_Elite/`***platform*/*library_set*/*library_name***

  Where ***library_set*** is:

  - Visual_lib if you are compiling or simulating your design with the Visual Elite interpreted VHDL compiler

- the name of the appropriate library set supplied for the supported external compiler/simulator. (See "External Compilers" on page 603)

- **Windows**

  installation-dir\VisualElite***version******library_set******library_name***

  Where ***library_set*** is

  - int_libs, syn_int_libs, or syn93_int_libs if you are using the Visual Elite interpreted compiler
  - bc5_libs; syn_bc5_libs; syn93_bc5_libs; ms_libs; syn_ms_libs; or syn93_ms_libs depending on which optimized compiler you are using. (See "External Compilers" on page 603)

SystemC Libraries

VisualElite provides the following SystemC Libraries:

- **STD_C, SYSTEM_C, FAST_C** — These mandatory libraries are used by Visual Elite to internally access semantic information.
- **SYSTEM_C_DTTYPE** — Contains definitions of special SystemC data types stored in packages. Automatically included for compilation of a SystemC design.
- **communication_channels** — Contains EliteC communication channel protocols stored in packages.

The libraries are stored at the following locations:

- **Linux**

installation-dir/Visual_Elite_***version***/***platform***/VisualSLD_lib/***library_name***

- **Windows**

installation-dir\VisualElite***version***\VisualSLD_lib***library_name***

Creating Your Own Libraries

Before you can begin working in Visual Elite, you have to create at least one library in which to store your designs.

You might decide to organize your working environment in such a way that one design is stored in its own dedicated library, while one or more other libraries are created to store units that are included in many designs. The choice of how to organize the libraries that you work with is yours or, if you are part of a team, is the responsibility of whoever is overseeing the combined effort.

To create a library for storing your own work:

1. Choose **File > Libraries**.

   The Libraries dialog box opens.

2. In the Library list, double-click in an empty row of the Library column, type the *logical* name to assign to the library.

   The logical library name is displayed whenever the Visual Elite tool makes reference to this library. You can assign a library any valid name except for the name WORK. (For the significance of assigning the name WORK to a library, see "The Current Library" on page 132.)

3. In the Library Path column, enter the pathname of a *not yet existing* system directory where the library is to be stored.

   Either type the pathname of the directory or use the browse mechanism to locate and enter the pathname. The directory pathname can be either the full pathname or a pathname relative to the working directory (the directory from which you invoked Visual Elite).

4. Click **OK**.

   The directory you specified is created automatically.

When you create a new library, it becomes your *current library*. (See "The Current Library" on page 132.)

Referencing Libraries for Your Environment

In order to be visible to your working environment, a library must be listed in the Libraries dialog box. As you develop a design, you can instantiate any unit stored in any of the libraries appearing in this list.

To display the Libraries dialog box, choose **File > Libraries**.

Besides any libraries that you have created, the list in the Libraries dialog box should display the logical name and path for each of the write-protected libraries supplied with the Visual Elite tool and appropriate for the compilation and simulation environment you are intending to use. (See "Libraries Supplied by Visual Elite" on page 126.)

To point to additional libraries that can be accessed by your machine, you must add these libraries to the list:

1. Choose **File > Libraries**.
2. To display the new library before a currently listed library in the Browser, select the existing library in the Library list.

3. Click the Add New/Existing Library icon ().

   A new, empty row is displayed before the currently selected library or at the bottom of the Library list. The Visibility option is automatically enabled.

4. In the Library list, type the *logical* name to assign to the library.

   The logical library name is the one that is displayed whenever the Visual Elite tool makes reference to this library. You can assign a library any valid name except for the name WORK. (For the significance of assigning the name WORK to a library, see "The Current Library" on page 132.)

Note

If you reference a library that someone else has created, be sure to use the same logical name that was used by the original designer. Not doing so can result in an incomplete reference within the design.

5. In the Library Path list, enter the pathname of the system directory where the existing library resides.

   Either type the pathname of the directory in the text box or use the browse mechanism to locate and enter the pathname. The directory pathname can be either the full pathname or a pathname relative to the working directory. (You can point to an existing system directory in which no library data was previously stored, which is an alternate way of creating a new library.)

   When specifying the path to libraries in the Libraries dialog box, you can use the environment variable VISUALENV. In the Library Path text box, enter a dollar sign, followed by the environment variable; for example:

   $VISUALENV/*SunOS/Visual_lib/std*

   ${VISUALENV}*int_libs**std*

Note

The name of the environment variable must be preceded by a $.

6. Click **OK**.

When you have completed defining the libraries referenced by your environment, their order of appearance in the Libraries dialog box constitutes the Visual Elite *search path*. (See "The Current Library" on page 132).

To delete a library from the Libraries dialog box, select the appropriate row in the list box and click the Remove icon ().

To modify a library reference that is already listed, select the appropriate row and change the required information.

Defining External Libraries

The Visual Elite tool supports instantiating block diagram units taken from externally stored, pre-compiled libraries supplied by third party vendors. Because the designs are pre-compiled by the supplying vendor, when instantiated they do not have to be compiled. This can significantly save computer resources.

While the sources of these libraries remain external to Visual Elite, their contents can be selectively displayed in the Browser. Choose **View > Show/Hide External Units**.

This functionality is available for VHDL, Verilog, and IP-XACT units that are simulated within Visual Elite using the ModelSim or Incisive NC-Sim simulators. Naturally, the external library units that can be instantiated must be supplied by the appropriate vendor for each of these simulators.

To link an external library that resides in your file system to Visual Elite:

1. Choose **Tools > Options Manager > Simulation > General**.
2. In the language specific tab sheet of the Simulation pane, verify the “Select simulator” option is set to the name of the simulator for which the external library units have been pre-compiled by the supplying vendor.
3. In the main window or Browser, choose **File > Libraries**.
4. In the Libraries dialog box, define the new library to link to Visual Elite. You must specify both the:
   - External Library path — path to the compiled files for the external library.
   - Library path — path to the Visual Elite library to be linked with the external library.
5. In the Browser, select the external library that you linked to Visual Elite in the previous step.
6. Choose **View > Show/Hide External Units**, or right-click and choose **Show/Hide External Units**.
7. In the External Units dialog box, select those units that you need displayed in the Browser.

Note

If the External Units dialog box does not open, there could be a non-compatibility issue with your external library. Verify the version of the simulator used to compile the library is the same version with which you are currently working. If the external library was compiled using Incisive NC-Sim, check the *ncls.log* file messages; the file is located in the directory where you invoked Visual Elite.

The “Source” displayed in the External Units dialog box is the path and name of the source file used to compile the external library. If the Visual Elite tool generates a message that the source library does not exist (which can occur if the source file was deleted by the simulator after compilation), you must either reconstruct the source file in its originally defined location or reference a copy of the source file somewhere else on your system by editing the designated path. To reconstruct the source file, you can use the following commands:

```
cd source_directory
cat *.vhd > full_path_to_source_file
```

Updating External Units Integrated in Existing Designs

To update your designs when a new component library is released by your vendor, choose **Tools > Options Manager > Compiler Settings > General** and select the “Update external units during compile tree” option. When this option is selected, during a Compile Tree operation, the Visual Elite tool checks whether the sources of any units stored in external libraries have been modified and, if so, recompiles the modified units.

Limitations

The following limitations exist with regard to the definition and use of external libraries.

- **Converting Library Types** — A library initially defined as an external library cannot be converted to a regular Visual Elite library and a library initially defined as a regular library cannot be converted to an external library. The only way to assign to a regular library the name of a previously defined external library, or an external library the name of a previously defined regular library, is to:
  a. Delete all of the units from the existing library.
  b. Delete the now-empty library itself.
  c. Define a new library of the desired type and assign it the same name that was previously assigned to the library that you deleted.
- **Visual Elite “Current Library”** — An external library cannot be set as the “Current Library” in the Browser.
- **Renaming Units** — You cannot rename the units stored in external libraries.
- **Copying Units** — You cannot copy units to or from an external library defined in Visual Elite and:
  - your external file system
  - another external library
  - a regular Visual Elite library

Viewing Libraries in the Browser

By default, all libraries defined in your Visual Elite environment are enabled for display in the Browser. To disable the visibility of a library so that it is not displayed in the Browser:

1. Choose **Files > Libraries**.
2. In the Libraries dialog box, click the Visibility option to disable the display of the library in the Browser.
3. To redisplay a currently hidden library, click the Visibility option again (a checkmark is displayed).

To open the Browser, choose **Tools > Browse**.

In the Browser, each library is represented by its own icon. The current library (see "The Current Library" on page 132) is represented by a special flag icon as shown in Figure 6-1.

Figure 6-1. Library Icons

The Current Library

In Visual Elite, the *current library* is the active library. Any new units you create are stored in the current library. When performing a search, the Visual Elite tool initiates all searches to retrieve any needed information from the current library unless you explicitly specify a library to search from. If the needed information is not in the current library, the Visual Elite tool searches the remaining libraries in the order in which they are listed in the Libraries dialog box. When you create a new library, it automatically becomes the current library.

To change the current library, select the library icon in the Browser or open the **Libraries** dialog box and select the required library, then click the Current icon ().

As you develop a design, you can refer to the current library (for instance, to instantiate a unit stored there) in one of two ways:

- Explicitly by its own name. You can also use this method to refer to a library even when it is not the current library.
- By the name WORK, which means "the current library, whatever it may be."

For example, if your current library is called ADAPTER, and you need to instantiate the unit called CONVERTER that is stored there, and in the future you need that unit to come from the ADAPTER library no matter what library is current at that time, you should refer to the unit explicitly as ADAPTER:CONVERTER. However, if in the future you need that unit to come from whatever library is the current library (from ADAPTER if it is the current library or from some other library if it is current) then you should refer to the unit as WORK:CONVERTER.

Viewing Library Contents

To see the full contents of a library, use one of the following methods:

- Select the library icon to view its contents in right-hand pane of the Browser.
- Click the expandability icon (+) or double-click the library icon to view its contents in the left-hand pane of the Browser, immediately below the library name.
- Select the library icon and click the Expand One Level icon ( ) to view its contents in the left-hand pane of the Browser, immediately below the library name.

To revert to a libraries only view, click the Libraries icon ( ) in the Browser toolbar.

The following sections describe how the library contents are displayed in the browser:

- Unit Icons in the Browser
- Name Display in the Browser
- Side Objects

Unit Icons in the Browser

In the Browser, different icons represent the different types of units contained in a library as detailed in Table 6-1.

Table 6-1. Browser Unit Icons

Unit	Icon
block diagram	
state diagram	
flowchart/ASM/AFSM	
truth table	
VHDL/SystemC package or Verilog include	
VHDL/SystemC package body	
VHDL/Verilog Regent module	
empty unit	
VHDL entity	
VHDL architecture	
VHDL configuration	
Verilog module or macromodule	

Table 6-1. Browser Unit Icons

Unit	Icon
Verilog primitive	
Verilog external	
Verilog gate	
SystemC module	
SystemC module implementation	

The icon for any subdesign unit (a flowchart within a flowchart, or a state diagram within a state diagram) is displayed as a rightward branch beneath the unit that contains the subdesign unit. The same rightward branching is used for secondary HDL units. To enhance the display of hierarchical units, choose **Tools > Options Manager > Browser > Display** and click:

- **Display solid lines** — By default, the branching lines that link the different units displayed in the Browser are dashed lines. Select this option to specify a solid black line be used.
- **Hide instance shortcuts** — When the Design Centered Browser View is displayed in the Browser, a “shortcut” icon is displayed in the branch link between an instance of a unit and the higher-level unit that instantiates it. Select this option to hide this shortcut icon.

Note

Selecting either option does not implement the option in any already opened Browser window, but only in any Browser window you subsequently open.

To open a unit from the Browser, double-click its icon. The unit is displayed in the appropriate Visual Elite editor.

Name Display in the Browser

In the Browser, design units are sorted by type. Within each type, units are ordered alphabetically, with uppercase letters listed before lowercase letters.

To order units by type, name, language, or time, choose **View > Sort By**, or right-click then choose **Sort By**, and the appropriate option.

When you sort by name or type, subdesign units always appear directly after their units, regardless of their names.

You cannot store two units having the same name in the same library except for *subdesign units* belonging to different units since they are entirely local to the unit that instantiates them.

You cannot instantiate two different units having the same name in a design, even if the units are stored in different libraries. You can, nevertheless, keep units with the same name in different libraries. By structuring the Visual Elite search path as your design requires, you can specify which libraries to search through (using the Libraries dialog box, see "The Current Library" on page 132) and in which order, in seeking any unit for which you have not explicitly specified a library.

Side Objects

Each of the units stored in a library can have one or several associated *side objects*. Many of the side objects contain parameters to be used during simulation, simulation results, or output data to be sent to an external system. When you select a design unit in the left-hand pane of the Browser, its side objects are displayed in the right-hand pane.

Table 6-2 lists the various side objects that can be associated with units. Each type of side object is represented by a specific icon.

Table 6-2. Side Objects

Side Objects	Icon
page	
textual stimulus/ SystemC clock definition	
graphical stimulus	
expected output	
simulation results	
generated testbench	
generated VHDL	
generated Verilog	
generated EDIF netlist	
breakpoints	
signal/variable names	
free text object	
memory component names	
profiler report	
synthesis script	
component symbol	
module compiler object	
VCD+ file	

To open a side object from the Browser, double-click its icon. If the unit or object is editable, you can edit it once it opens. Output generated by the Visual Elite tool cannot be edited in the Visual Elite environment; however, such output can be exported outside of the Visual Elite environment, where it can be edited (for details, see "Exporting a Textual Unit" on page 273).

For design units of more than one page, the pages appear as side objects. Double-click the icon for the page to open the corresponding page of the unit. (Double-clicking the unit icon is the same as double-clicking the first page.)

The various side objects displayed in the Browser are described in the relevant contexts throughout this User's Manual.

Units

In Visual Elite, a *unit* is the smallest amount of data that you can single out for compilation, simulation and computer-assisted debugging, or generation of synthesizable or simulatable output. In the Browser, each unit is represented by an icon that indicates the editor in which it was created (see Table 6-1).

The following sections describe:

- Graphical Units
- Textual Units
- Viewing a Design Hierarchy
- Projects

Graphical Units

There are six type of graphical units created in Visual Elite:

- block diagrams
- state diagrams
- flowcharts
- algorithmic state machines (ASMs)
- algorithmic flowchart state machines (AFSMs)
- truth tables

Each type of unit receives specific inputs, processes them in a specific way, and produces specific outputs. Furthermore, each type can be an instance in a higher-level block diagram, and therefore part of a larger design hierarchy.

Textual Units

In addition to graphical units, the Visual Elite tool enables you to create and edit textual units as described in the following sections:

- Textual Unit Language Constructs
- Textual Units in VHDL-Based Designs
- Textual Units in Verilog-Based Designs
- Textual Units in SystemC-Based Designs
- Editing Textual Units

Textual Unit Language Constructs

In addition to graphical units, the Visual Elite tool enables you to create textual units with the help of any of the constructs available in the hardware description language you are using for design.

Table 6-3. Graphical Units

VHDL	Verilog	SystemC
entity architecture(s) [configuration(s)] package [package body]	module primitive external include	header file (package) code (package body)

Textual Units in VHDL-Based Designs

In a VHDL-based design, you create a textual design unit using a primary unit called an *entity* and a secondary unit called an *architecture.* The entity unit, as the receiver of input and producer of output, describes the inputs and outputs without detailing where the inputs go or where the outputs come from. The architecture unit describes the internal manipulations of the inputs and outputs. Each entity must have at least one architecture. Since there can be any number of ways to manipulate the same data between input and output, an entity can have any number of architectures, each handling the same inputs, processing them differently, and sending values to the same outputs.

An additional secondary unit which you can create is a *configuration*. The configuration unit defines the implementation of a specific architecture with an entity.

You can instantiate any VHDL entity and architecture pair stored in a Visual Elite library in a design, just as you instantiate graphical design units.

Another type of VHDL primary unit you can create is a VHDL *package*. While packages are stored in libraries, strictly speaking a package is not considered a Visual Elite design unit because it does not have a place of its own in a design hierarchy. A package does not process inputs or produce outputs; nor can it be simulated. In VHDL, a package is a collection of declarations that you might otherwise need to repeat inside several different units. For better efficiency, these declarations are made in a single package that you can specify be used by one or more design units. For a design unit, using a package is as good as containing its contents. (See more about packages in"Packages" on page 571.)

A package can be accompanied by a secondary unit called a *package body*. While the contents of a package are meant to be *used* by other design units (that is, to be treated as if they are part of each of them), the package body is for information that, although necessary to the package, is not to be used by other design units. A package body typically defines subprogram bodies and deferred constants. (For details, see your VHDL documentation.) While a package can have a package body (only one; no more), it does not have to.

Textual Units in Verilog-Based Designs

In a Verilog-based design, among the textual units available are Verilog *modules* and *primitives*, both of which can be instantiated in a larger design. You can instantiate a module directly, or indirectly through an *external* unit. An external unit is an abbreviated version of a module for which, for reasons of convenience, the complete version resides elsewhere. An external unit contains the module ports, parameters, and a pointer to the complete location of the module.

Parallel to packages which are available when designing in VHDL (see "Textual Units in VHDL-Based Designs" on page 137), the Visual Elite tool provides an additional type of unit called an *include*. An include is a collection of declarations (variables, subprograms, and 'define statements) that spare you the repeating of such declarations inside various individual units. One or more Verilog design units can *use* a specific include in order to access its contents.

Textual Units in SystemC-Based Designs

In a SystemC-based design**,** code to be shared among different design units should be included in a SystemC package. From a software point of view, a SystemC package corresponds to a SystemC library. A SystemC package contains two parts: a package declaration (header) and a package body (code).

A package declaration includes SystemC declarations such as communication channel protocols and data types. It should be used by any unit that requires its functionality.

A package body includes the SystemC code that implements the declarations made in the header. A package declaration can have no more than one package body or none.

Editing Textual Units

For editing textual units, the Visual Elite tool provides the following editors:

- XEmacs, the default editor
- Mentor Graphics DesignPad editor
- Visual Elite internal text editor
- any external editor that can be invoked from within Visual Elite

For details, see "Writing Text" on page 263.

Viewing a Design Hierarchy

The Browser displays the hierarchical structure of a design, starting from a selected unit. Any unit that instantiates other units, and therefore has a design structure beneath it, is indicated by an expandability icon (+).

To display a design hierarchy, select the unit icon in the left-hand pane of the Browser and choose **View > Expand > Expand All** or click the Expand All icon ( ). The Browser displays a tree-like diagram which includes all units that the selected unit instantiates, and any lower-level units that those instantiate. The tree-like diagram displayed in the Browser depicts all units instantiated by a given block diagram, regardless of whether or not the units are stored in the same library.

In a block diagram, the name of the instantiating block might differ from the name of the unit which it instantiates. In such cases, the Browser displays the name of the instantiating block. However, if the *full qualifier* is displayed, both the block name and unit name are displayed (see "Displaying Levels of Detail" on page 91).

For subdesign units, the Browser displays the name of an instantiating state or action box, rather than the name of the subdesign unit. However, if you request that the full qualifier be displayed, then both the state or action box name and the subdesign name are displayed.

If a block instantiates a unit that has not been created, it is represented by an empty unit icon ( ). Subdesign units that do not have any contents, are also indicated by this icon.

To hide any units instantiated by a design unit, select the icon for the unit and choose **View > Collapse > Collapse All** or click the Collapse All icon ( ).

To hide only the lowest visible level of instantiated units, use the Collapse One Level command. (This command works only on complete sets of siblings that are hierarchically beneath the unit you selected.)

1. Select a unit that is hierarchically above the units that you need to collapse. The command applies to all complete sets of siblings below the selected unit that do not instantiate other visible units.
2. Choose **View > Collapse > Collapse One Level** or click the Collapse One Level icon ().

To see one more level of instantiation under the currently selected unit, choose **View > Expand > Expand One Level** or click the Expand One Level icon ().

You can also use the left and right arrow keys to move up and down the design hierarchy, respectively.

To return to a libraries only view, click the Libraries icon () in the Browser toolbar.

Use the **View > Hide Tree** and **Show Tree** menu items (also available from the right-click popup menu), to control the visibility of the hierarchy or a particular branch of the hierarchy of a design without any influence of what, for instance, takes place higher up in the hierarchy. For example, if you have a branch that you always need hidden regardless of what happens to its parents and siblings, you can select the icon for the top unit of this branch, and choose the Hide Tree menu item. Hiding a branch has no effect on its active participation in a design; it is still compiled, code is generated for it, and more.

Projects

Projects are specially designated hierarchies of units, each of which commences with a particular topmost unit. Projects are useful for keeping track of various versions of your work.

To invoke the Visual Elite Project Manager, choose **File > Projects** or click the Projects icon () in the Browser. The Projects dialog box opens.

To display fewer projects, choose **File > Projects** in the main or Browser menu bar and use the Projects dialog box. (For details on how to create, manage, and view projects, see “Project Management” on page 163.)