MULTI: Managing Projects and Configuring the IDE

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Contents

Preface

Contents

This preface discusses the purpose of the manual, the MULTI documentation set, and typographical conventions used.

About This Book

The *MULTI: Managing Projects and Configuring the IDE* book contains four parts:

- *Part I: Creating and Managing Projects* contains information about creating, modifying, and managing projects; editing project files; configuring version control; and using version control tools to track changes to your files. See Part I. Creating and Managing Projects on page 1.
- *Part II: Configuring the MULTI IDE* contains information about configuring the Integrated Development Environment (IDE) to help you work more efficiently. You can customize the appearance and functionality of many GUI buttons, menus, keyboard shortcuts and mouse bindings. See Part II. Configuring the MULTI IDE on page 129.
- *Part III: GUI Reference* contains reference material, including descriptions of menus and toolbar buttons. See Part III. GUI Reference on page 241.
- *Part IV: Appendices* contains additional reference material, including a brief overview of the MULTI IDE directory structure, comprehensive documentation of Editor commands, a listing of default key and mouse bindings, and an explanation of how to use third-party tools with the Editor. See Part IV. Appendices on page 325.

Note

New or updated information may have become available while this book was in production. For additional material that was not available at press time, or for revisions that may have become necessary since this book was printed, please check your installation directory for release notes, **README** files, and other supplementary documentation.

The MULTI 6 Document Set

The primary documentation for using MULTI is provided in the following books:

- *MULTI: Getting Started* — Provides an introduction to the MULTI Integrated Development Environment and leads you through a simple tutorial.
- *MULTI: Licensing* — Describes how to obtain, install, and administer MULTI licenses.
- *MULTI: Managing Projects and Configuring the IDE* — Describes how to create and manage projects and how to configure the MULTI IDE.
- *MULTI: Building Applications* — Describes how to use the compiler driver and the tools that compile, assemble, and link your code. Also describes the Green Hills implementation of supported high-level languages.
- *MULTI: Configuring Connections* — Describes how to configure connections to your target.
- *MULTI: Debugging* — Describes how to set up your target debugging interface for use with MULTI and how to use the MULTI Debugger and associated tools.
- *MULTI: Debugging Command Reference* — Explains how to use Debugger commands and provides a comprehensive reference of Debugger commands.
- *MULTI: Scripting* — Describes how to create MULTI scripts. Also contains information about the MULTI-Python integration.

For a comprehensive list of the books provided with your MULTI installation, see the **Help → Manuals** menu accessible from most MULTI windows.

Most books are available in the following formats:

- A printed book (select books are not available in print).
- Online help, accessible from most MULTI windows via the **Help → Manuals** menu.
- An electronic PDF, available in the **manuals** subdirectory of your IDE or Compiler installation.

Conventions Used in the MULTI Document Set

All Green Hills documentation assumes that you have a working knowledge of your host operating system and its conventions, including its command line and graphical user interface (GUI) modes.

Green Hills documentation uses a variety of notational conventions to present information and describe procedures. These conventions are described below.

Convention	Indication	Example
bold type	Filename or pathname	**C:\MyProjects**
	Command	**setup** command
	Option	**-G** option
	Window title	The **Breakpoints** window
	Menu name or menu choice	The **File** menu
	Field name	**Working Directory:**
	Button name	The **Browse** button
italic type	Replaceable text	**-o *filename***
	A new term	A task may be called a *process* or a *thread*
	A book title	*MULTI: Debugging*
`monospace` type	Text you should enter as presented	Type `help` *`command_name`*
	A word or words used in a command or example	The **wait** [-global] command blocks command processing, where `-global` blocks command processing for all MULTI processes.
	Source code	`int a = 3;`
	Input/output	`> print Test` `Test`
	A function	`GHS_System()`
ellipsis (...) (in command line instructions)	The preceding argument or option can be repeated zero or more times.	**debugbutton** [*name*]...

Convention	Indication	Example
greater than sign (>)	Represents a prompt. Your actual prompt may be a different symbol or string. The > prompt helps to distinguish input from output in examples of screen displays.	`> print Test` `Test`
pipe (|) (in command line instructions)	One (and only one) of the parameters or options separated by the pipe or pipes should be specified.	**call** *proc* | *expr*
square brackets ([ ]) (in command line instructions)	Optional argument, command, option, and so on. You can either include or omit the enclosed elements. The square brackets should not appear in your actual command.	`.macro` *`name`* `[`*`list`*`]`

The following command description demonstrates the use of some of these typographical conventions.

gxyz [-*option*]*... filename*

The formatting of this command indicates that:

- The command **gxyz** should be entered as shown.
- The option *`-option`* should either be replaced with one or more appropriate options or be omitted.
- The word *`filename`* should be replaced with the actual filename of an appropriate file.

The square brackets and the ellipsis should not appear in the actual command you enter.

Part I

Creating and Managing Projects

Chapter 1

Creating a Project

Contents

The term *project* is used to encompass all of the files that are used to build your application. Projects are defined in Green Hills *project files* (**.gpj**), which are similar to makefiles. Projects are organized in a tree structure, where the root of the tree is a Top Project (usually called **default.gpj**).

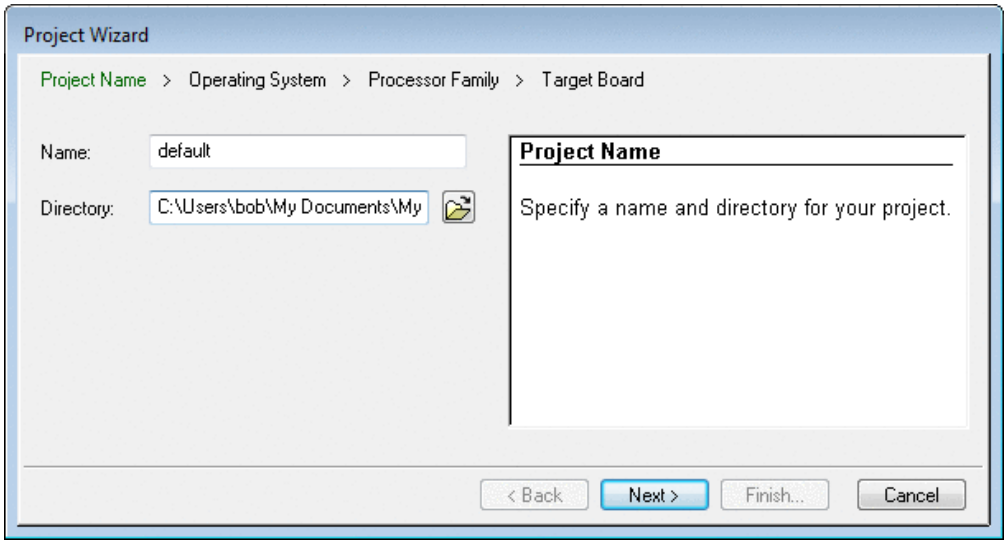
Before you begin development, you must create a Top Project with the **Project Wizard**. You can access all of your code and any executables you plan on building from this Top Project.

If you are creating a Top Project for INTEGRITY, see "Building INTEGRITY Applications" in the *INTEGRITY Development Guide*.

Creating a Project

To create a new Top Project, perform the following steps.

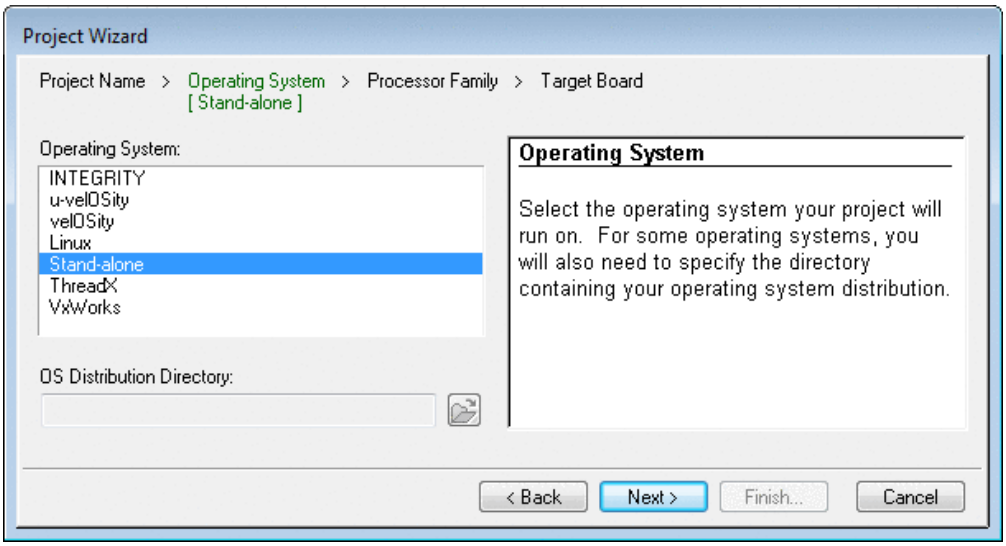
1. Start the MULTI Launcher on your host machine:
   - Windows — From the Windows **Start** menu, select the MULTI menu item. Alternatively, use Windows Explorer to navigate to the directory where you installed the MULTI IDE, and double-click **multi.exe**.
   - Linux/Solaris — Run the **multi** executable from your MULTI IDE installation directory.
2. Click the  button, and select **Create Project**. A screen that looks similar to the following graphic appears:



On this screen, you can specify:

- The name of the Top Project and the directory where the project will be created. The directory you select should be empty or non-existent.

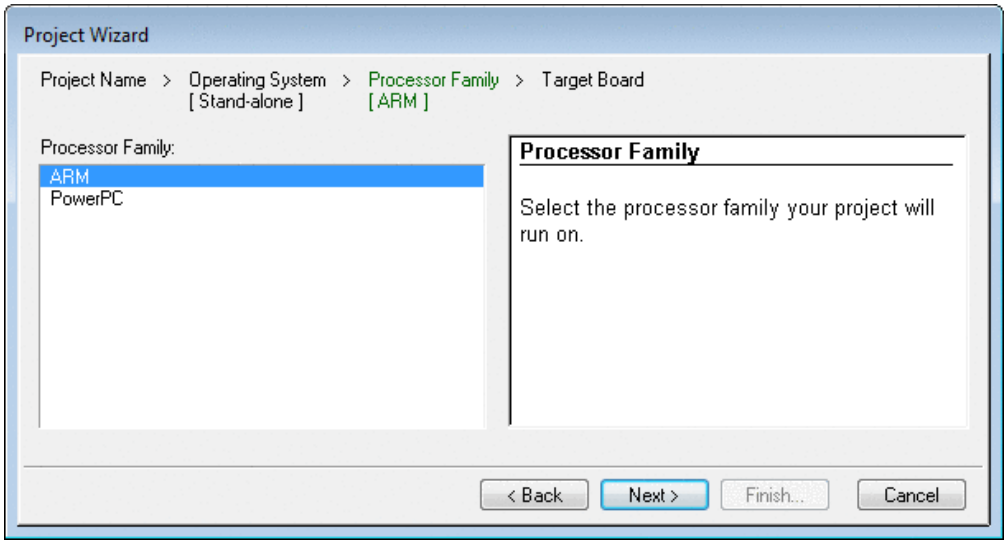
3. Click **Next**. If only one operating system is available, the wizard selects that operating system and continues to the next step. Otherwise, it displays a screen similar to the following:



On this screen, you can specify:

- The operating system running on your target. This book focuses on development for *stand-alone* targets, those which do not have a Real-Time Operating System (RTOS) running on them.

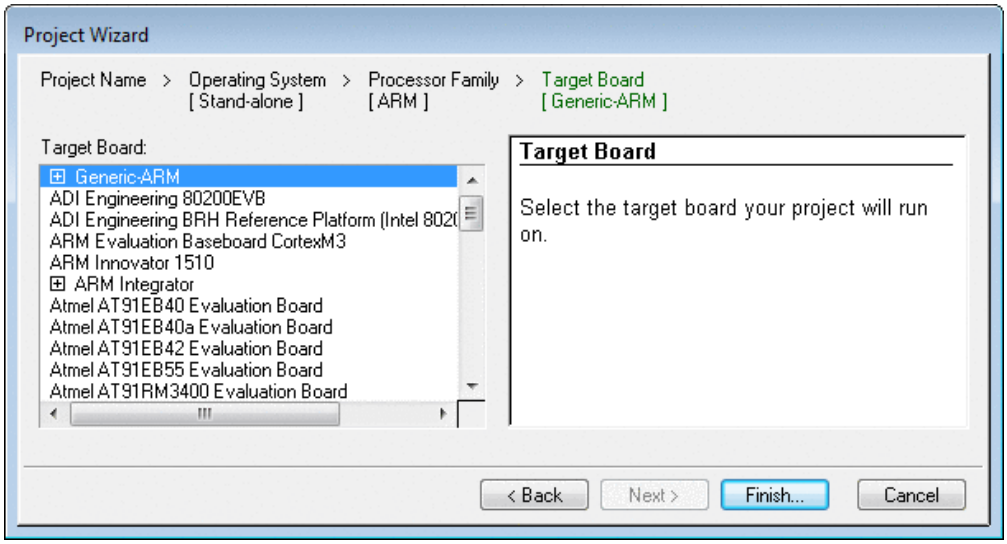
4. Click **Next**. If you have only installed one processor family for MULTI, the wizard selects that family and continues to the next step. Otherwise, it displays a screen similar to the following:



On this screen, you can specify:

- The processor family to which your target's processor belongs.

5. Click **Next**, and a screen similar to the following appears:



On this screen, you can specify:

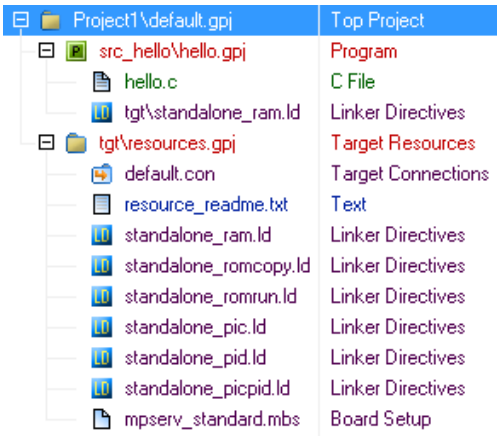
- Your target board. If your target board is not listed or if you are using custom hardware, click the plus sign to the left of the **Generic** item at the top of the list and select your processor. In this case, you will probably need to create or customize the board setup script and/or customize the default linker directives file.

6. Click **Finish** to complete the setup of the Top Project.
7. A dialog box will open to inform you about the newly created framework. To disable this message in the future, select the check box **Never show this message again**. Click **OK** to continue.
8. Select an executable or an example to add to your project. A good example to start with for a stand-alone project is **Hello World (C)**.
9. Click **Finish** to accept the default settings. For information about default settings and how to modify them, see "Adding New Items to Your Project" on page 19.

After you have completed the project setup, take some time to familiarize yourself with your project's structure (see "Project Structure" on page 7). Then follow the instructions provided in "Quick Start: Building and Running Hello World" on page 10.

Project Structure

After you create a Top Project, the MULTI Project Manager opens. The Project Manager, described in detail in "Project Manager Components" on page 17, provides a graphical representation of the hierarchy of your project files. Project files are text files that list program source files, subprojects, and other files that make up an executable or a project. In the Project Manager, source files and other project file entries can be followed by the project options used when building that file. The following graphic shows the files generated by the **Project Wizard** for the example project **Hello World**.



Top Projects

The Top Project is the root of your project hierarchy. Usually, Top Projects are named **default.gpj**. The Top Project encompasses all of your projects and defines your debugging environment. Among other things, it specifies:

- Your target architecture
- The operating system you are building for
- Customization files you are using, if any
- Build macro definitions
- Other projects (such as programs and libraries)
- Builder options inherited by other projects
- The target resources project (see “Target Resources Project” on page 8)

For information about the Top Project file format and advanced features, see the documentation about the Green Hills project file format in the *MULTI: Building Applications* book.

Target Resources Project

The target resources project (**tgt\resources.gpj**) is generated by the **Project Wizard** when you create a new Top Project. The files included in the target resources project contain information specific to the operating system and target board used for your

project. The following is a non-exhaustive list of files that may be included in your target resources project:

- Target Connection File (**default.con**) containing Target Connection Methods that you can use to connect to your target board.
- BSP Description File (**default.bsp**) containing memory configuration information used by the **Integrate** utility. This file is only included in INTEGRITY projects.
- Linker Directives Files (**.ld**) specifying pre-configured memory layouts for your programs.
- Target Setup Scripts (**.mbs** and **.dbs**) containing commands required to initialize your board for running programs in RAM.
- Board-Specific Notes (**.txt** and **.notes**) containing information about your target. If your project contains this file, read its contents before building the project.
- Custom Library Source Code (**lib*.gpj**) containing customizable copies of the Green Hills startup, system, and board initialization libraries. These files are only added if you select to customize the library code in one or more of your programs.

All of these files are located in the **tgt** subdirectory of your project.

By default, all executables you create within your Top Project share one target resources project. This allows you to make modifications in one place (for example, altering a linker directives file), and to see the corresponding changes in all of your executables. However, you can also copy files from the target resources project to an individual executable using **Copy *selected file* Local** (see "The Edit Menu" on page 259).

Caution

After making local copies of customized library files, you might need to modify your program's build options to make it use the local library instead of the shared one.

More Information

For information about other file types you may encounter in the Project Manager, see "File Types" on page 270. See also the documentation about file types in the

MULTI: Building Applications book. For more information about project files, see the documentation about the Green Hills project file format in the *MULTI: Building Applications* book.

Note

The Green Hills Project (**.gpj**) file format used by the Project Manager differs from the format of build files (**.bld**) used by previous tools releases.

Quick Start: Building and Running Hello World

In "Creating a Project" on page 4, you created an example "Hello World" project. Perform the steps provided in the following sections to build the project, connect to a simulated target or to a hardware target, and run the program in the Debugger.

Building Hello World

To build the "Hello World" example project:

1. Select **src_hello\hello.gpj** in the Project Manager.
2. Click the **Build** button (). You can follow the progress of the build in the **Status** pane of the Project Manager.

For more information, see "Building Your Project" on page 46.

Connecting To Your Target

To connect to the Green Hills simulator for your embedded target:

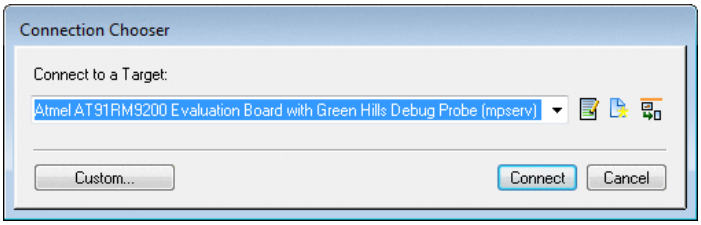
1. Click the **Connect** button () to open the **Connection Chooser**. The **Project Wizard** has created a connection called:

   Target Board* with Simulator for *target

   which is selected.
2. Click **Connect** to use this connection.

To connect to a hardware target:

1. Verify that all hardware connections are tight and secure, and that both the board and your hardware interface (if applicable) are powered.
2. Click the **Connect** button ( ) to open the **Connection Chooser**.
3. In the **Connect to a Target** list, select the combination of target and debug server you want to use. In the example shown next, a **Green Hills Debug Probe (mpserv)** connection has been selected.



4. Click **Connect**.
5. If the **Connection Chooser** needs more information, it opens the **Connection Editor**. In this case, set the required options in the **Connection Editor** and then click **OK**. For more information, see the documentation about the Connection Editor in the *MULTI: Configuring Connections* book.

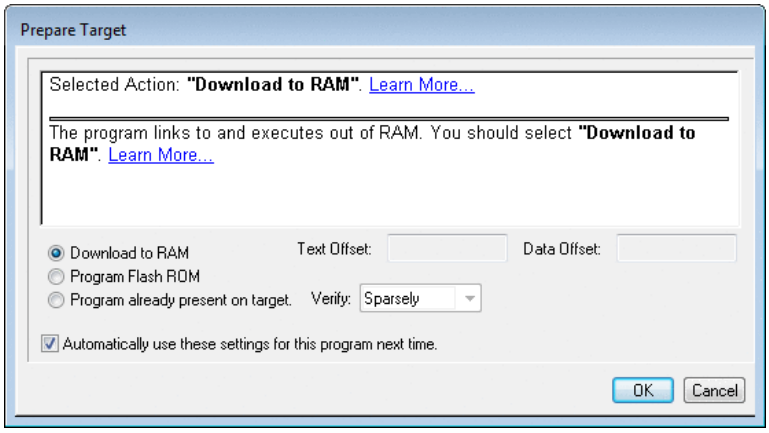
For more information, see Chapter 3, “Connecting to Your Target” in the *MULTI: Debugging* book.

Running Hello World

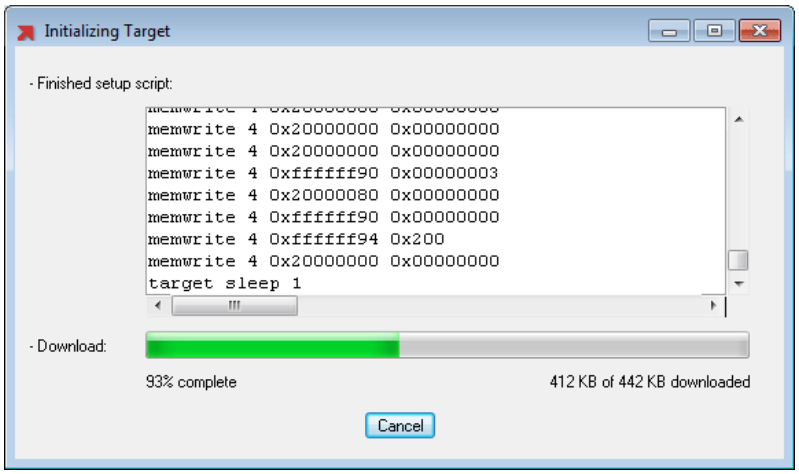
To run the “Hello World” example program in the Debugger:

1. In the Project Manager, click the **Debug** button ( ). (If the **Debug** button is not already enabled, select a **src_hello\hello.gpj** to enable it.)
2. In the MULTI Debugger, click . If you are connected to a simulator, this completes the steps needed to run your program. If you are connected to a hardware target, complete the remaining steps.

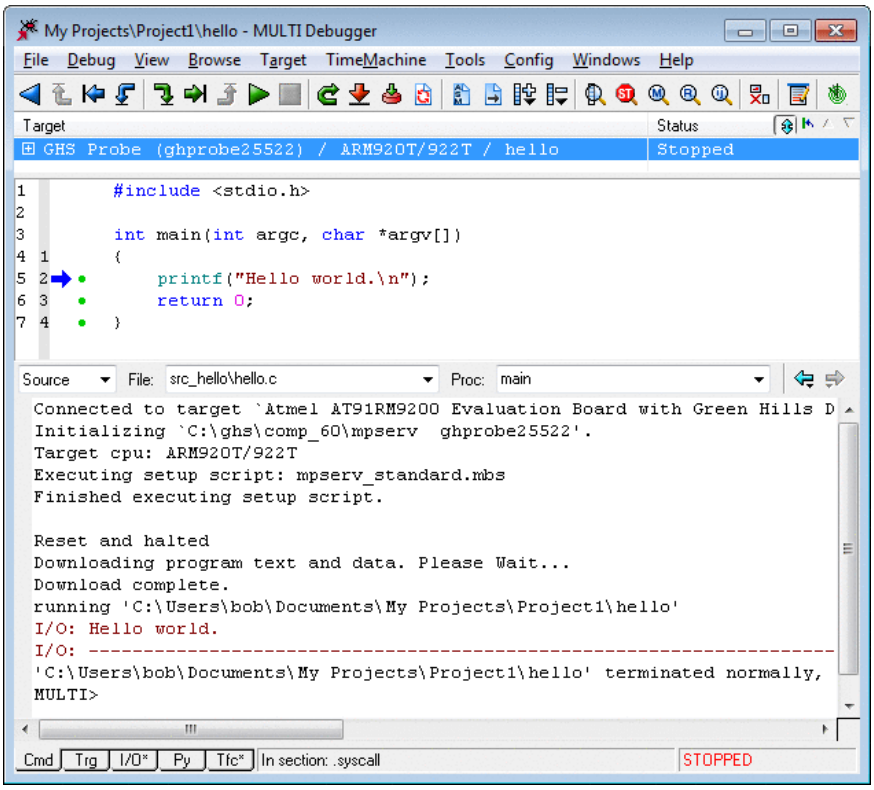
3. The **Prepare Target** dialog box opens. Leave settings at their default values. (The project is configured to download the program to RAM.) Click **OK**.



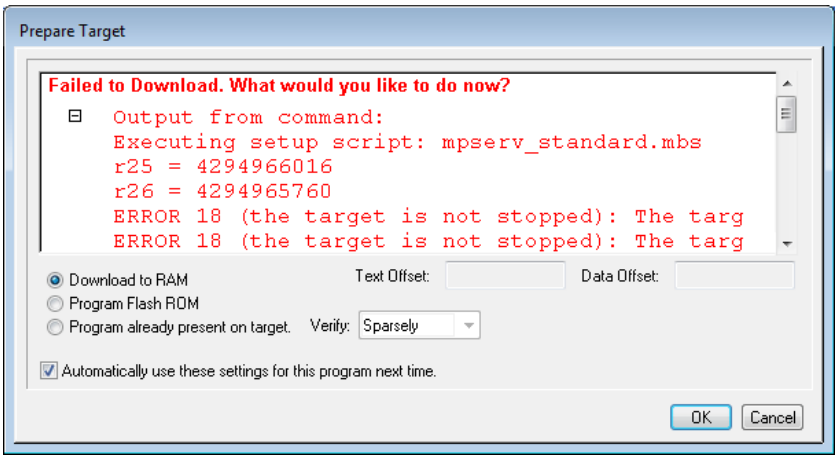
4. The **Initializing Target** dialog box opens. This dialog box shows progress as MULTI runs your setup script and downloads the program. The setup script generated by the **Project Wizard** and included in your Top Project is run by default. It is specified by the *Connection Method* (combination of target and debug server) that you chose when following the instructions listed in "Connecting To Your Target" on page 10. If you are using custom hardware, a setup script may not have been created.



If the download and execution of the program are successful, the Debugger should show output similar to the following:



If the download was unsuccessful, the **Prepare Target** dialog opens and displays any errors that occurred during execution of the setup script or while downloading the program:



If you are using custom hardware and you have not created or customized the setup script and/or customized the linker directives file in use, you should expect some errors. For information about how to configure your target properly, see "Configuring Your Target Hardware for Debugging" in Chapter 6, "Configuring Your Target Hardware" in the *MULTI: Debugging* book.

Chapter 2

Managing and Building Projects with the Project Manager

Contents

The MULTI Project Manager is a graphical tool that organizes your source and other input files, and controls the tools needed to compile your software project. The Project Manager also maintains file dependencies, and sets the options used in building.

Starting the MULTI Project Manager

You can open the Project Manager from the MULTI Launcher, the MULTI Debugger, the command line, or a Windows shortcut:

- From the MULTI Launcher, click the **Launch Project Manager** button () and select either an existing project or **Create Project**.
- From the MULTI Launcher, select **Components → Open Project Manager** to open a file chooser where you can select your program's Top Project.
- From the MULTI Debugger, select the **Tools → Project Manager** menu item.
- From the MULTI Debugger, enter the **builder** command on the Debugger command line.
- If you want to open the Project Manager from the command line, we recommend that you add the MULTI IDE install directory to your path for easy access. After updating your path, enter the following command:

  ```
  multi filename.gpj
  ```

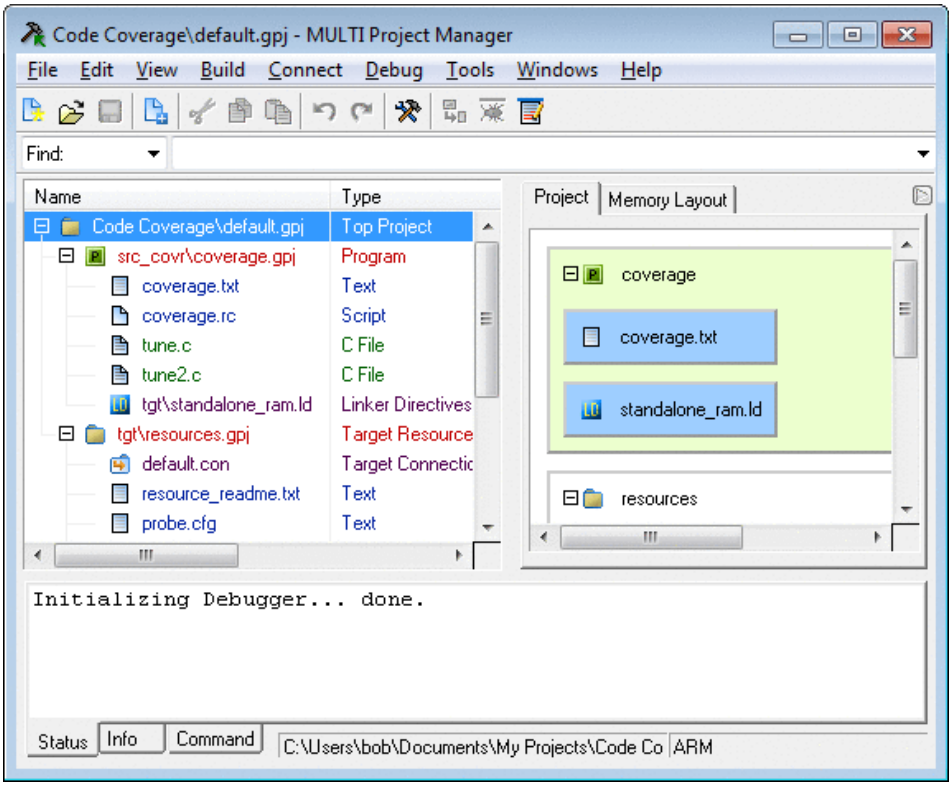
  where *filename*`.gpj` is your program's Top Project. If you do not specify *filename*`.gpj`, the Launcher opens instead of the Project Manager.
- On Windows, drag and drop a Top Project file to a MULTI icon to open it.

Note

The Project Manager can only open Top Project files (usually called **default.gpj**). For more information about these files, see “Top Projects” on page 8.

Project Manager Components

The following graphic displays the Project Manager window.



The primary components of the main Project Manager window are:

- *Title Bar* — Displays the location of the current Top Project. In the preceding screen, the project is **default.gpj**, which is the default project name for projects created by the **Project Wizard**.
- *Menu Bar* — For a complete list of all the menu items, see “Project Manager Menus” on page 258.
- *Toolbar* — The buttons on the Project Manager toolbar are documented along with their menu equivalents in “Project Manager Menus” on page 258.
- *File Shortcut Bar* — Allows you to quickly locate or build files and projects. For more information, see “The File Shortcut Bar” on page 268.
- *Project Tree* — Displays files and other configurable items in the current project. The Project Manager displays the name and type for each item in the tree. You can also configure it to display the size and modified Builder options

for applicable items. Projects (**.gpj**) and some configurable items have a small plus or minus sign to their left that allows you to expand or collapse their contents. For more information, see "The Project Tree Pane" on page 270.

- *Status Tab* — Displays information about the current status of the build process.
- *Info Tab* — Displays information about the selected items.
- *Command Tab* — Displays the command that will be run to build the selected file. This shows which driver options will be used to build the file.
- *Status Bar* — Displays the full path of the currently selected file. If a build is running, the status bar shows the progress of the build.
- *Target Indicator* — Displays the currently selected build target architecture and operating system.

Additionally, you can enable the *Advanced Views* pane to display the following tabs:

- *Project* — Displays the important components in your project, by using a layout that is similar to what you might draw on a white board. For more information, see "The Project Tab" on page 271.
- *Memory Layout* — Displays an overview of the section maps used in your project file. The information in this tab is only displayed after you have built the selected project. To learn about this functionality, see "The Memory Layout Tab" on page 271.
- *Integrate* — Displays a lightweight version of the Integrate Utility. This tab is only visible in INTEGRITY projects. For more information, see the *Integrate User's Guide*.

To enable the **Advanced Views** pane, select **View → Show All Views**, or click the arrow on the right edge of the window, just below the **File Shortcut Bar**.

Managing Your Project

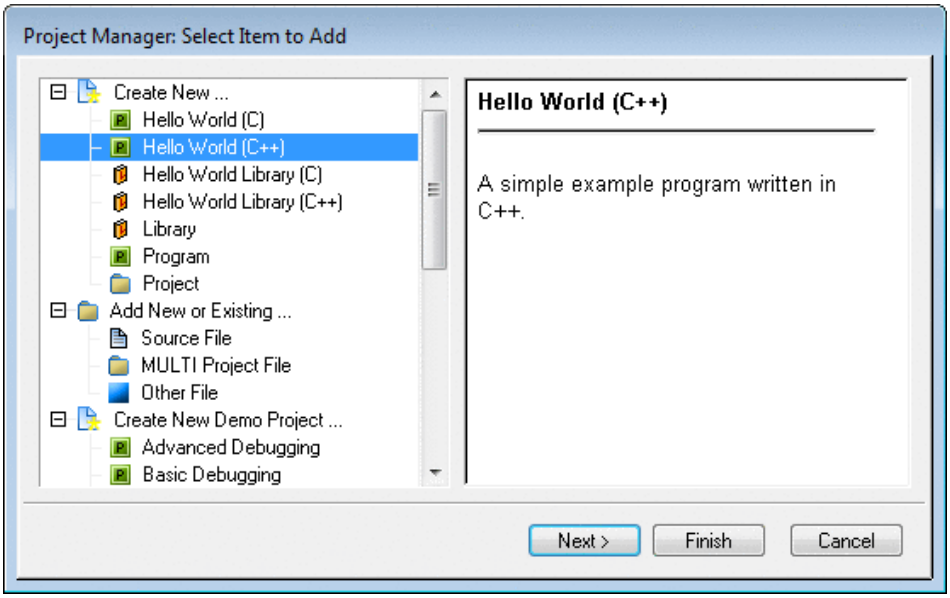
After you have created a project (see Chapter 1, "Creating a Project" on page 3), you can begin adding your own files to the skeleton project structure generated by the **Project Wizard**. The following sections provide information about how to manage your projects.

Adding New Items to Your Project

The Project Manager provides a **Select Item to Add** dialog box for adding new items to your project. Items that you might want to add to your project include libraries, projects for organizing your code, programs to create an executable, or source files. This dialog opens after you create a Top Project with the **Project Wizard**. If you want to add an item to an existing project:

1. Select the item that you want to add a child to.
2. Click  .

The contents of this dialog box vary based on the type of item you are adding a child to. For example, if you add a child to a stand-alone Top Project, it should look similar to the following image:



To add a new item:

1. Select the type of item you want to add.

   If you are adding items to an INTEGRITY project, see "Building INTEGRITY Applications" in the *INTEGRITY Development Guide*.
2. Click **Finish** to accept the default settings for the item, or click **Next** to modify the settings.

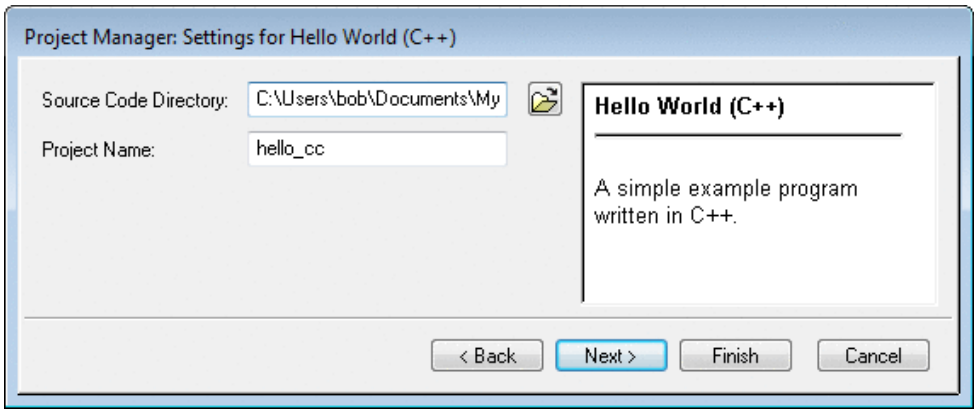
Each type of item has different settings available. The following sections describe several common settings. Documentation for other settings is shown in the text pane on the right side of the dialog box.

After you click **Finish**, the Project Manager generates any required files, and modifies the project hierarchy to include the new item. These changes are saved immediately.

Note

When adding a source file, you will be presented with a file chooser to enter the name of the source file. If the file you enter does not exist, it will be added to the project hierarchy, but the file will not be created. To create the file, double-click the file to open it in the MULTI Editor, edit, and save the file.

Settings for your Project

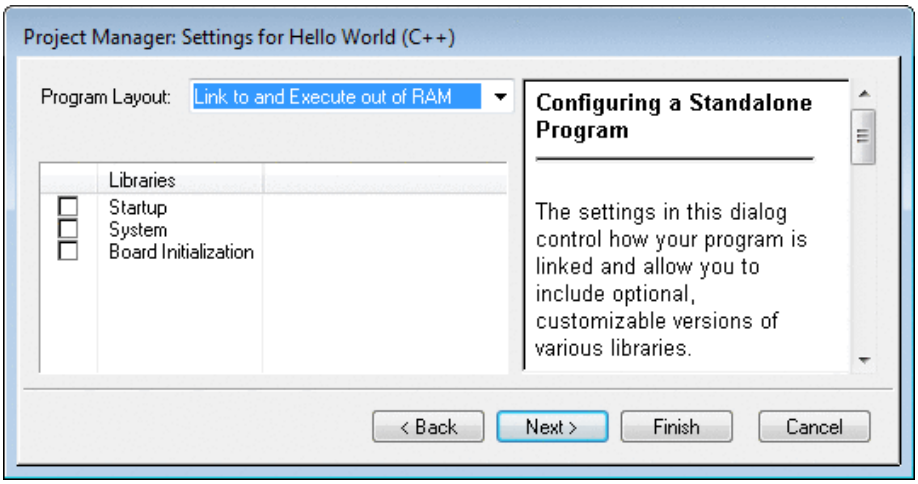


On this screen, you can specify:

- The directory where the source code for the new executable or example will be placed.
- The name of the project file. For program projects, this is also the default name of the output executable.

Enter the specific settings for the selected item and click **Next**.

Settings for Stand-Alone Programs



On this screen you can specify:

- A standard program layout. The different layouts correspond to different linker directives (**.ld**) files. Each layout provides an appropriate section map for your program, and memory map of your target board. The default layout links to and executes out of RAM.

  The layout that you choose is the one that will be used during linking. The Project Manager provides a number of linker directives files (in the target resources project) so that you can change the layout conveniently at later stages of development. For more information, see the documentation about linker directives files in the *MULTI: Building Applications* book.

  ### Note

  Selecting **Link to and Execute out of ROM** or **Link to ROM and Execute out of RAM** might require you to include the board initialization library in your program, or include other code that handles the target from reset and initializes the memory subsystems. If the board initialization library is available for your embedded target, you can find more information in the *MULTI: Building Applications* book.

- Whether to use the standard pre-built startup code, or to customize it. The default is to use the pre-built code. To customize startup code, click the **Startup**

box. If you choose to customize, the Project Manager adds an additional project file to your project that contains the source code to the Green Hills startup library.

Warning

If you customize the startup code, you may not be able to use MULTI features that depend on it. For more information, see the documentation about features that depend on the default Green Hills startup code in the *MULTI: Building Applications* book.

- Whether to use the standard pre-built low-level system code, or to customize it. The default is to use the pre-built code. To customize system code, click the **System** box. If you choose to customize, the Project Manager adds an additional project file to your project that contains the source code to the Green Hills system library.
- (Selected target boards only) Whether to include a board initialization library. The default is to omit the library. If this library is available, a check box for **Board Initialization** will appear in the list. This library provides basic memory and peripheral initialization code that allows the project to be built for ROM or flash. The library might also provide serial port code that allows standard I/O functions to use the serial port. If you choose to include this library, the Project Manager adds an additional project file that contains the source code to the Green Hills board initialization library. The source code to the Green Hills system library is also added because files in the board initialization library may reference that code.

  The board initialization library is intended for use with hardware connections. If you include this library, you may not be able to run your program on a simulator.
- Other settings might appear on this screen in addition to those above. See the in-dialog documentation for more information about these settings.

The Project Manager adds files for customized libraries and startup code to the target resources project in your Top Project. By default, all programs under one Top Project share the same customized source code. For more information, see “Target Resources Project” on page 8 and “Changing the Build Target” on page 26.

Click **Finish** to complete adding new items to your project framework. If you decide that you want to change one of these settings later, you can change most of them using the **Configure** menu item (see "Configuring Existing Items" on page 24).

Adding Existing Files To Your Project

To add existing source and project files to a project:

1. Select the location within the hierarchy where you want to add the file.
2. Click **Edit → Add File into *proj.gpj***, or right-click the project file and select **Add File into *proj.gpj***.

   Depending on what you have selected, either **Add File into *Project*** or **Add File after *Project*** is displayed.
3. In the file chooser, browse to the file and click **Add**.

Tip

On Windows, you can quickly add existing files to your project hierarchy by dragging the files from Windows Explorer into the Project Manager's Project Tree.

Automatically Including Files

The Project Manager supports an **Auto Include** file type that allows you to include a variable number of files matching specified name patterns. When the Project Manager loads an **Auto Include** file, it searches the current directory for files matching any of the file patterns specified by the **:autoInclude** option. The files become the children of the **Auto Include** file for the current build. Subdirectories are not searched; thus, file patterns that include a relative or absolute path to a set of files in another directory are ignored.

You can create a project file that allows you to automatically pull in files from a particular directory rather than listing specific items to include. To create such a project:

1. Select **Edit → Advanced → Create Auto-Include Subproject**.

2. In the **Name of new Auto Include** box, enter a location to create a new project file.
3. In the **File patterns to include** box, type a name pattern that matches the files you want to include. The name pattern must not contain any spaces. For example:
   - To match all **.c** files, type `*.c`.
   - To match all files with the name **plugin_*n*.gpj**, type `plugin_?.gpj`.
   - To match both of the above patterns, type `*.c,plugin_?.gpj`, without any spaces.

Configuring Existing Items

Many of the settings in the **Project Wizard** can be modified after you have created your project. To modify these settings:

1. Select the item you want to reconfigure.
2. From the toolbar select **Edit → Configure** or right-click your project file and select **Configure**.

   The **Project Wizard** opens with a dialog box that indicates your project's current settings. For more information about the **Project Wizard** settings dialog boxes, see “Adding New Items to Your Project” on page 19.

Editing Project Files

You can edit any of the files contained within a project in the MULTI Editor by selecting it and pressing **Ctrl**+**E**, or right-clicking it and selecting **Edit** from the context-sensitive menu. You can also open source files and text files in the Editor by double-clicking their name.

You can access graphical interfaces to assist you in editing certain file types, by right-clicking them and selecting **Graphically Edit**:

- Double-click a **Target Connections** file (**.con**) to open the **Connection Organizer**, which allows you to edit or add a way of connecting to your target. For more information, see Chapter 3, “Connecting to Your Target” in the *MULTI: Debugging* book.

- Windows — Files with registered file extensions can be opened with their open action.
- Linux/Solaris — Several standard third-party file types have been added including **.pdf**. You must have Adobe Acrobat Reader installed, and the **acroread** executable must be in your path to view **.pdf** files from the Project Manager.

Moving Items in the Project Hierarchy

The files at each level of your project's hierarchy are displayed in the order that you added them to the Project Manager. This is also the order in which the files are built. You can rearrange the order in which the files are displayed to change the compilation order or to help visualize your hierarchy.

To reorder files inside a single project file:

1. Select the file you want to move.
2. Press **Ctrl**+**UpArrow** to move the file up the hierarchy. Press **Ctrl**+**DownArrow** to move the file down the hierarchy.

To move files within a single project file or from one project to another, you can cut and paste files using either of the following methods:

- **Ctrl**+**X** and **Ctrl**+**V**, or
- the Cut () and Paste () buttons. The paste button is equivalent to the **Paste *file* as Link** menu items.

To paste files, select the file immediately above where you want the files to be added and click the Paste () button.

Note

You can select multiple files to cut as long as they are all contained within the same project.

You can also copy and paste items as links or local items. **Copy *file* as Link** allows you to copy the selected items to the clipboard. **Paste *file* as Link** takes the clipboard items and creates a reference to them in the selected context. This does not create

another copy of the items, so any changes made to the item will be reflected in all contexts that are linked.

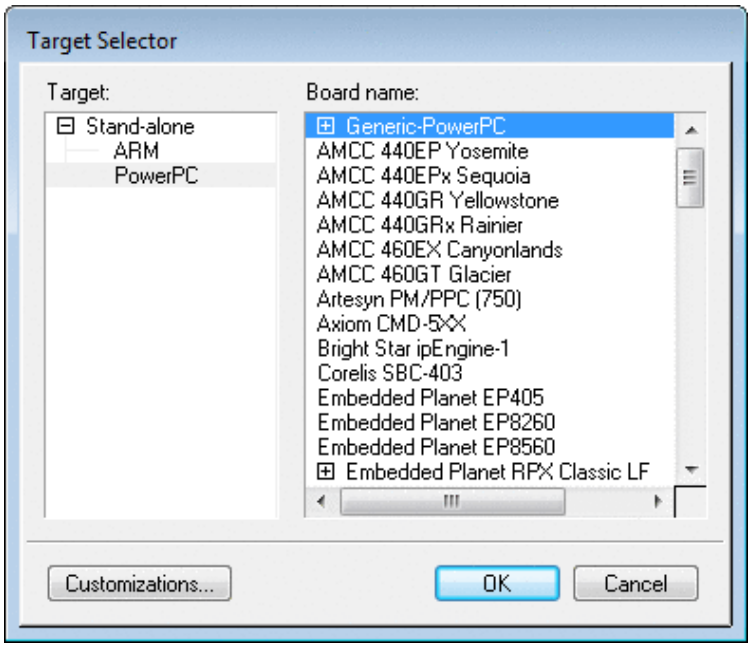
Copy *file* Local copies the selected items to the clipboard. **Paste *file* Local** takes the clipboard items and makes a recursive copy of each item within the selected context. You will have your own distinct copy of the item, so subsequent changes made in the old copy will not be reflected in your new copy.

Changing the Build Target

When you create a Top Project (see "Creating a Project" on page 4), you must specify a target to build for. The target resources project (**tgt\resources.gpj**) subsequently generated by the **Project Wizard** contains information specific to your project's operating system and target board.

To change your build target after you have already created a project:

1. Select **Edit → Set Build Target** to open the **Target Selector** window.



2. Choose a processor family from the **Target** list.

3. Choose a board from the **Board Name** list. Some boards are not supported for all operating systems. If your board is not listed, expand the **Generic-*target*** item, and select your processor from the list.

After you change the target for your Top Project, a new target resources project is generated with information specific to your new target. The original target resources project and all files in the **tgt** directory are moved to **tgt.old**.

Adding Customization Files

If you want to define custom file types or control custom tools, you need to create a customization file (**.bod**). To add a customization file to your project:

1. Select **Edit → Set Build Target**.
2. In the **Target Selector** window that appears, click **Customizations**.
3. In the **Build Customizations** dialog box, click **Add**.
4. In the file chooser, select a custom **.bod** file to add.

For more information, see the documentation about customization files in the *MULTI: Building Applications* book.

Common Scenarios

The following sections provide you with additional information about various tasks you can accomplish using the Project Manager.

Adding Header Files

You can add header files to your project hierarchy to quickly access them for editing. However, adding a header file to the hierarchy does not affect how the compiler locates the header file when it is compiling your source files.

To add a header file in your project hierarchy, add the file in the same manner as adding a source file (see “Adding Existing Files To Your Project” on page 23).

Linking with a Library that is Built with Your Project

You can add a library and its source files so that the library gets rebuilt as needed every time you build your project. If the library is the child of a program or subproject, the library inherits settings from the parent program or subproject. However, the library's source files are built into the library, not into the parent program.

To create such a library:

1. Select the location within the hierarchy where you want to add the library.
2. Click **Add Item into *selected*** ().
3. Select **Library** from the list of available items and click **Next**.

   If **Library** is not in the list of available item types, libraries are not supported in the location that you have selected.
4. Set the name and location of the library project file.

   It is recommended that you put your library's project file in the same directory as its source files, and that the name of the project file is the same as the library's name (but with a **.gpj** extension).
5. Click **Finish**.
6. Add source files (see“Adding New Items to Your Project” on page 19).

Warning

When including the same **Library** project in multiple programs, be sure that they do not inherit different options. For example, if one program is built with optimizations, and the other is not, your library will contain inconsistently built objects depending on which program was being built. One way to avoid this is to only set options in your Top Project and explicitly override any inherited options in the **Library** project.

Linking with a Pre-Built Library

To link a pre-built library into a program, add the library file to the program project file.

1. Select the project file of the appropriate program.
2. Select the appropriate **Add File** action.
3. In the file chooser, browse to the library file and click **Add**.

Note

Use this method when the source code for the pre-built library is unavailable. If you do have the source code for the library, use a **Library** project instead, because MULTI will rebuild the source files as necessary.

Warning

Never manually add Green-Hills-provided target libraries to your project. The compiler will link in the correct target libraries for your configuration when the appropriate Builder options are set.

For more information about how the Project Manager locates pre-built libraries, see the documentation about implicit dependency analysis in the *MULTI: Building Applications* book.

Configuring Projects That Are Compatible Across Multiple Hosts

If you plan to open your project on hosts that run different operating systems, always use forward slashes (/) when specifying paths or filenames. If you always use forward slashes, MULTI tools interpret paths correctly on all supported operating systems. If you configure MULTI to use any third-party tools or send commands to your operating system, follow the path conventions for those tools when specifying the commands or options that use them.

Note

The **Project Wizard** creates projects that use your host operating system's path delimiter. If you created your project in Windows using the **Project Wizard** and want it to be compatible across multiple hosts, you may need to open your project files and replace backslashes in paths with forward slashes.

Searching in the Project Manager

If your project has many files, it may be difficult to locate a particular file within the hierarchy or a particular text string within a file. The following sections provide information about searching in the Project Manager.

Searching the Project Hierarchy

To search for a file within the project hierarchy:

- Use the **File Shortcut Bar** by selecting either **Find:** or **Next:**, enter the name of an input (for example, **hello.c**) or output (for example, **hello.o**) file in your project and press **Enter**.

  For more information, see “The File Shortcut Bar” on page 268.

- You can also search the visually expanded portion of the project tree for options and files. Press **Ctrl**+**F** and type a search string to search forwards, or **Ctrl**+**B** and type a search string to search backwards. The Project Manager searches incrementally as you type. Press **Ctrl**+**F** or **Ctrl**+**B** to look at the next or previous instance of a string. To exit the search mode, press **Esc**.

Searching Files

The Project Manager supports searching for a text string in all of the searchable files in a project. To begin a full-text search of a subset of your project:

1. Select the portion of your project that you want to search. To search an individual source file, select only that file. To search all the files referenced by a project file (**.gpj**), select the project file.
2. Select **Search:** in the **File Shortcut Bar**.
3. Enter the search string in the text box, and press **Enter**.

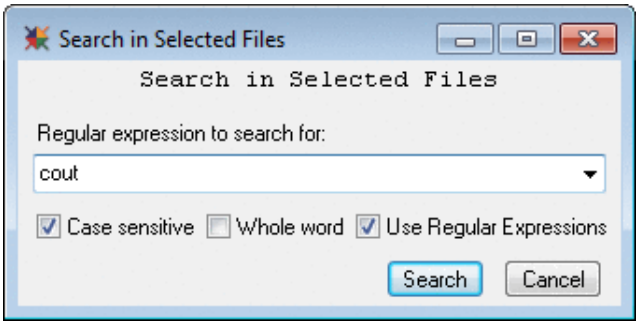
To begin a full-text search of all source files:

1. Select **Search All:** in the **File Shortcut Bar**.

2. Enter the search string in the text box, and press **Enter**.

You can also perform these searches via the **Search in Selected Files** dialog box, which provides additional searching options:

1. Select **View → Search in ...**.



2. Enter the search string in the text box (or use the drop-down list to select recent search strings).
3. Select any of the following searching options:

   - **Case sensitive** — The search only finds text that matches the case of the search string exactly. If this box is not selected, the search ignores case when searching for a match. This box is selected by default.
   - **Whole word** — The search only finds text that contains the search terms as words. This means that the matching string must be preceded by a non-word character and followed by a non-word character, where word characters are letters, digits, and the underscore. For example, if you select this check box, a search for `ice` does not match `slice` or `ice__`, but it does match `ice-9`. This box is cleared by default.
   - **Use Regular Expressions** — The search treats the text you enter in the text field as a regular expression. If this box is cleared, the search treats the text you enter as a fixed string. This box is selected by default.
4. After you have entered the search string and set your searching options, click **Search** to perform the search. A **Search in Files Results** window opens when the search is complete. For a description of this window, see “Viewing Search in Files Results” on page 88.

Note

The Search in Files feature uses the BSD **grep** utility. A copy of BSD **grep** is installed along with the MULTI IDE. However, BSD **grep** is not part of MULTI and is not distributed under the same license as MULTI. For more information about the license under which BSD **grep** is distributed, refer to the file **bsdgrep.txt**, which is located in the **copyright** subdirectory of the IDE installation. For information about the search expression format that BSD **grep** uses, refer to the OpenBSD re_format(7) man page.

Setting Builder Options

The Project Manager provides access to Builder options that allow you to control toolchain features such as:

- Extensions or restrictions to C or C++
- The location of your libraries and header files
- The level of debugging information to be generated
- How your project will be optimized
- Run-time error checking
- Program data allocation (and whether any Special Data Area, if available, is utilized)
- Generation of Position Independent Code (PIC) or Data (PID) if available for your target

Each of the Builder options corresponds directly to one or more of the command line compiler driver options. There are four different types of Builder options:

- **Switches** — Two or more settings from which you choose only one (for example, **Optimization Strategy** and **Debugging Level**).
- **Combination Switches** — Multiple settings from which you choose all, none, or any combination (for example, **Run-Time Error Checking** and **MISRA C**).
- **Strings** — Accepts a single string value (for example, **Output File Name** and **Start Address Symbol**).

- **Lists** — Accepts multiple string values (for example, **Include Directories** and **Library Directories**).
- Builder options are set through the **Build Options** window. For more information, see:
  - "The Build Options Window" on page 33 for an overview of the **Build Options** window.
  - The *MULTI: Building Applications* book for your target processor family for a complete list of options and for information about the features of your target that you can access or control with options.

The Build Options Window

To open the **Build Options** window, do one of the following:

- Right-click the file that you want to set the options in, and select **Set Build Options**.
- Select the file that you want to set the options in, and choose **Edit → Set Build Options**.

The **Build Options** window has three tabs (documented in the following sections), which provide different ways of viewing Builder options. The **Build Options** window opens on the last tab you viewed. A fourth tab, **Deactivated**, only appears if your project contains any build options that are marked as disabled for your architecture. Note that the **Deactivated** tab does not appear if the disabled option is marked with the `{optional}` conditional control statement (see the documentation about conditional control statements in the *MULTI: Building Applications* book).

To set or edit an option on any of the tabs, double-click it and select a setting, or enter a value in the dialog.

The present value or setting of the option is displayed in the **Value** column. Options can be set at different levels of the build hierarchy. An option set in a **.gpj** file is inherited by all the files contained in that **.gpj** file (see "Inheriting Options from Parent Build Files" on page 45). Each value appears in one of three colors:

- Values printed in gray and that appear in parentheses are default values that have not been explicitly set anywhere in the project. These values are listed as **Not Set** when you right-click or double-click the option. Note that not all options have default values, and that some defaults can change depending upon other option settings.

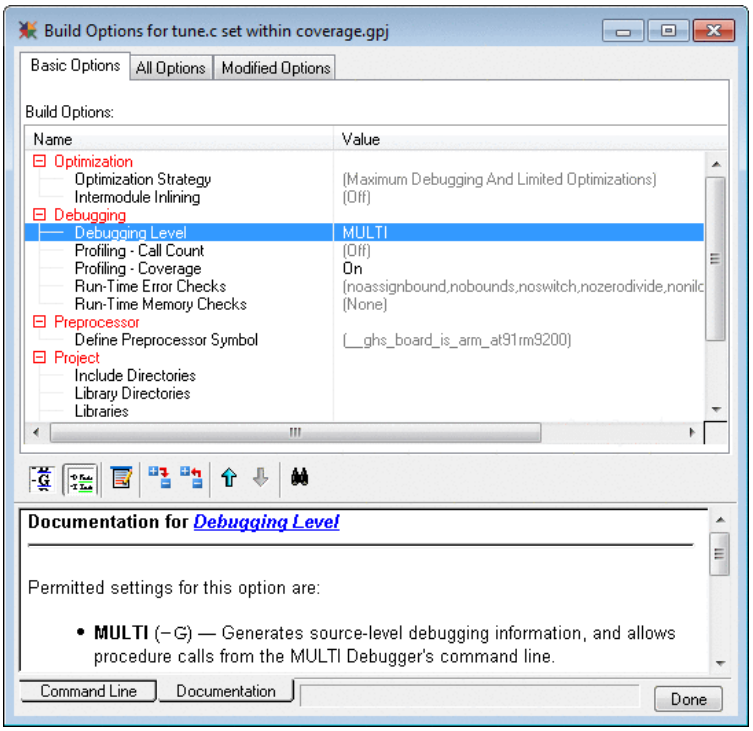
  If you open the **Build Options** window for a file that does not produce build output, such as your Top Project, the **Value** column does not display default values.
- Values printed in black are inherited from a parent file. These values are listed as **Inherited** when you right-click or double-click the option. You can override inherited values by setting the option to a new value in the present file.
- Values printed in blue are set in the present file.

For information about the toolbar buttons and lower tabs of the **Build Options** window, see "The Build Options Toolbar" on page 272 and "Build Options Tabs" on page 273.

Note

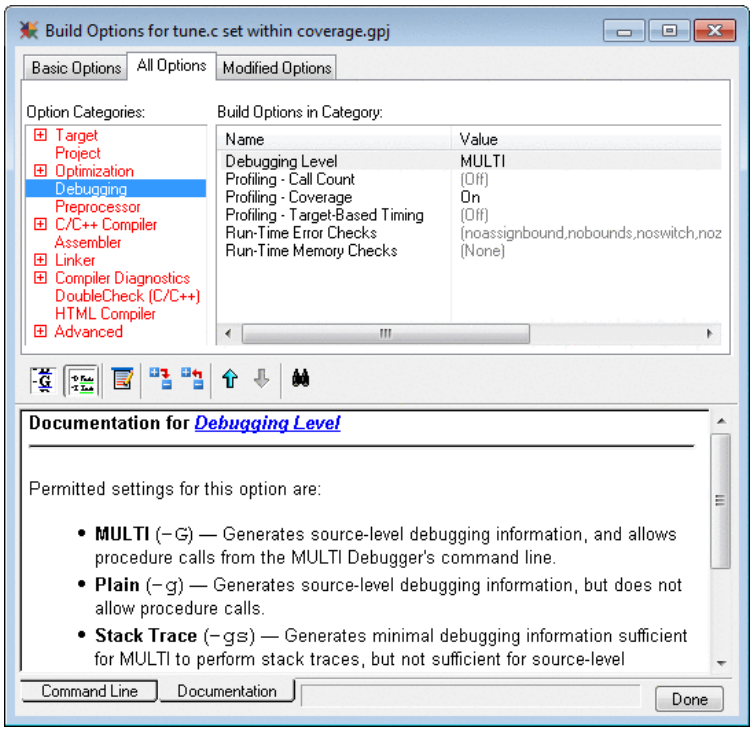
When an option is modified by a conditional control statement, you cannot use the **Build Options** window to modify that specific option, but you can usually use the **Build Options** window to add additional items to a list option or override the option in a subproject.

The Basic Options Tab



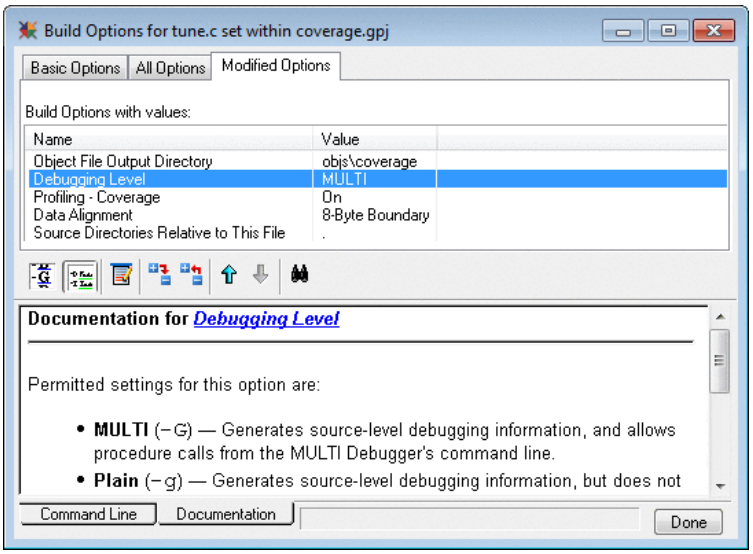
This tab lists only the common options that most users will need to control. Categories can be expanded or contracted by clicking the plus or minus sign to their left. Double-click an option to edit it.

The All Options Tab



This tab lists all of the Builder Options, which are categorized by type or associated tool. The pane on the left displays the category structure. Click a category to display the options it contains in the pane on the right.

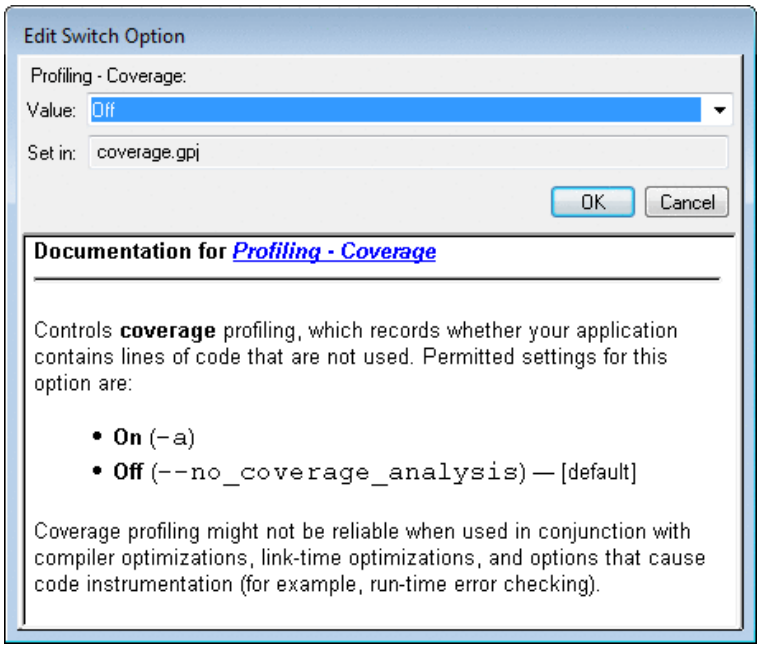
The Modified Options Tab



This tab displays those options that have been set in, or are inherited by, this file, together with their current settings. If you right-click the option that you want to modify and select **Goto Option Text**, the MULTI Editor opens on the line in the project file where that option is set. For options that are set in multiple locations in the project tree, the opened file is the closest parent project where the option is set.

Setting a Switch Option

When you double-click a switch option, a dialog box like this appears.



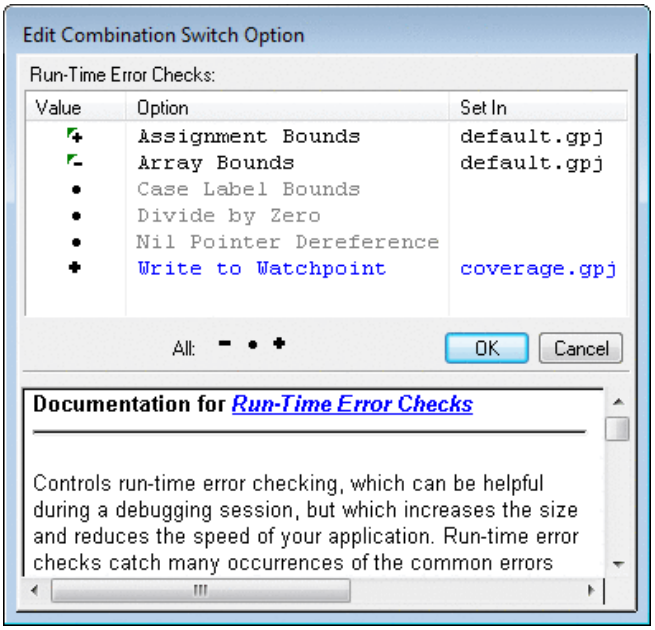
If the option has already been set at this or a higher level of the project hierarchy, its present setting is displayed in the **Value** field. The file where the option was set is displayed in the **Set In** field.

To set (or override a previous setting for) the option:

1. Select a value from the drop-down list. The **Set In** field changes to display the current file's name.
2. Click **OK** to save the new setting and return to the **Build Options** window.

Setting a Combination Switch Option

When you double-click a combination switch option, a dialog box like this appears, where all of the available sub-options are displayed:



If a sub-option has already been set at this or a higher level of the project hierarchy, its present setting is displayed in the **Value** column. The file where the sub-option was set is displayed in the **Set In** column. Sub-options set higher in the project hierarchy are printed in black and have a green arrow pointing up and to the left in the **Value** column. Those set in the present file are printed in blue, and those that have not been set are printed in gray.

To set (or override previous settings for) sub-options:

1. Click the option(s) that you would like to change. The symbols in the **Value** column toggle between:

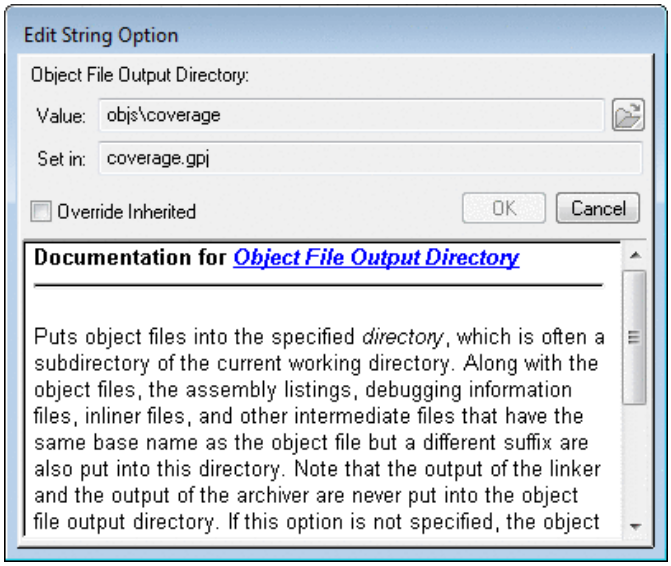
   - • — not set
   - ✚ — enabled
   - ▬ — disabled
   - (if applicable) — enabled higher in the project hierarchy
   - (if applicable) — disabled higher in the project hierarchy

You can enable or disable all of the sub-options with the **All** toggle (All: - • +) option.

2. Click **OK** to save the new setting(s) and return to the **Build Options** window.

Setting a String Option

When you double-click a string option, a dialog box appears:



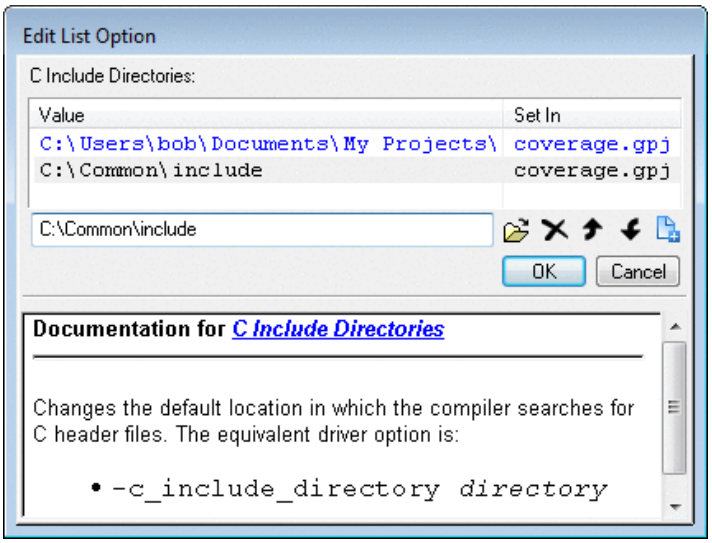
If the option has already been set at this or a higher level of the project hierarchy, its present setting is displayed in the **Value** field. The file where the value was set is displayed in the **Set In** field, and the **Override Inherited** check box is displayed.

To set the option:

1. Enter an appropriate string in the **Value** field (if the option has already been set, you must select the **Override Inherited** check box before you can access the **Value** field). If the option requires a directory or filename as a value, a folder icon ( ) is displayed, which you can use to navigate to the appropriate file or directory.
2. The **Set In** field changes to display the current file's name. Click **OK** to save the new setting and return to the **Build Options** window.

Setting a List Option

When you double-click a list option, a dialog box appears:



If the option has already had values assigned to it at this or a higher level of the project hierarchy, its present settings are displayed in the **Value** field. The file where each value was set is displayed in the **Set In** field.

To delete a value from the list:

- Click the value you want to delete, and click the delete button ( ).

To add a value to the list:

1. Click the **Add** button ( ) and enter an appropriate string in the text field. If the option requires a directory or filename as a value, a folder button ( ) is displayed, which you can use to navigate to the appropriate file or directory.
2. The new value is appended to the bottom of the list and the current file's name appears in its **Set In** field. Click **OK** to save the new setting and return to the **Build Options** window.

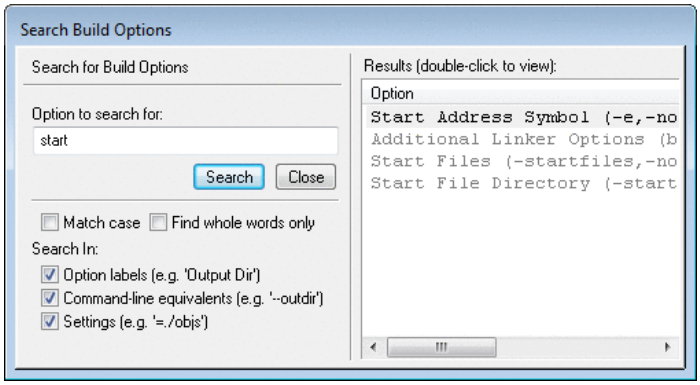
To reorder the list:

1. Click the value you want to move to select it.
2. Click the **Move Up** button ( ) to move the value up the list, or the **Move Down** button ( ) to move the value down the list.

3. Click **OK** to save the new order and return to the **Build Options** window.

Searching For Options

If you are unable to find the option you want to set, click the search button ( ) to open the **Search Build Options** dialog box:



Enter an option name or part of a name in the **Option to search for** text field, and click the **Search** button. By default, the Project Manager searches all three of:

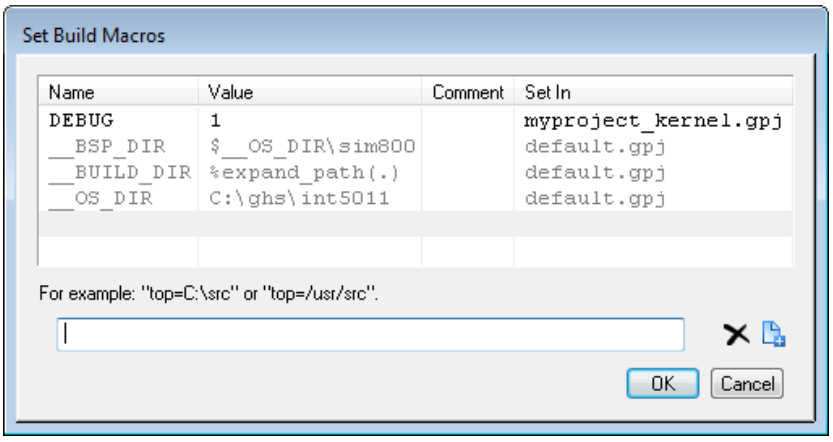
- **Build Option Names**
- **Compiler Driver Option Names**
- **Settings**

Search results appear in the right-hand **Results** pane. Double-click a result to go to its entry in the category tree and close the search dialog.

Setting Build Macros

You can define macros to stand in for commonly used strings in option settings.

Select **Edit → Set Build Macros** from the main Project Manager window to set a macro in the selected project file. The **Set Build Macros** dialog box opens.



To define a macro, enter *macro_name=value* in the text field.

The **Comment** column displays any comment specified on the same line as the macro definition in the project file. To include a comment with a macro definition, add `# Your Comment` to the end of the text field.

The **Set In** column indicates the project file in which the macro is set.

After you define the macro, it can be used as the value of a builder option, or part of the value of a builder option. Simply use `${`*macro_name*`}` anywhere in a builder option where you want the Project Manager to substitute the value of *macro_name*.

Note

The predefined macro `GHS_TOOLS_DIR` specifies the location of your Compiler installation.

Example 2.1. Defining and Using a Macro

This example explains how to define a macro for the root of the project on Windows hosts. The root directory of the project in this example is **C:\src**. To define a macro called `top` to represent the root directory:

1. Open the **Set Build Macros** dialog box.
2. Enter: `top=C:\src` and click **OK**.

The include files for the project are located in **C:\src\include**. To specify this include directory to the Project Manager using the `top` macro:

1. Click **Edit → Set Build Options** to open the **Build Options Window**.
2. Navigate to the **Project→Include Directories** option and open it.
3. Enter `$top\include` and click **OK**.

Note

You can also define a macro to be the name and value of a driver option. To use a macro defined in this way, you must edit the project (**.gpj**) file in a text editor and add *`$macro_name`* at the location where you would normally specify the option.

Importing Environment Variables

You can import variables from your environment to stand in for strings used in your option settings.

To import a variable:

1. Click **Edit → Advanced → Set Imported Environment Variables** to open the **Import Environment Variables** dialog box.
2. Enter the name of the environment variable you want to import. The current value from the environment is displayed in the **Value** column of the dialog box.
3. Click **OK** to import the variable.

Note

You can only import an environment variable if it is defined in your environment. If you previously imported an environment variable in a project and you open that project when the variable is not defined, the Project Manager issues a warning.

After you define the environment variable, use *`$variable_name`* anywhere in a builder option where you want the Project Manager to substitute the value of *`variable_name`*.

If the environment variable stores the name and value of a driver option, you can edit the project (**.gpj**) file in a text editor and add `$variable_name` at the location where you would normally specify the option.

The Project Manager tracks changes to the environment variables you import so that anything in your project that uses an environment variable is rebuilt whenever you modify that variable's value.

Example 2.2. How to Set Imported Environment Variables

To include header files in the **headers** subdirectory of a third-party SDK installed in a directory specified by the environment variable `SDK_DIR`:

1. Open the **Set Imported Environment Variables** dialog box.
2. Enter `SDK_DIR` and click **OK**.
3. Click **Edit → Set Build Options** to open the **Build Options** window.
4. Navigate to the **Project → Include Directories** option and open it.
5. Enter `$SDK_DIR\headers` and click **OK**.

Note

Imports are only valid if they are set in the Top Project. If you use the GUI for importing environment variables, the imports are always saved in the Top Project. This behavior is different from the **Set Build Options** dialog box where the options are set on whichever file is selected.

Inheriting Options from Parent Build Files

A file inherits its options from its parent project (**.gpj**) file and all parents of that project. You can override these inherited options by setting options in the file itself. When the Builder compiles your project, the Top Project options are applied first, with each subsequent child project adding its options to the existing ones, overriding or appending where specified, until finally the individual file options are added for each file.

Setting Options for Projects and Subprojects

Because you can reuse project files for programs, subprojects, and libraries in multiple projects, it is important to specify whether the options for a project file are specific to the current project, or whether the options are specific to the project file itself regardless of the project to which it belongs.

- If the options apply everywhere that the child project is used, select that project (**child.gpj**), and set the options. These options are written to the child project file, and therefore are set for that project file regardless of what parent it currently belongs to.
- If the options apply only when the child project is the child of a particular parent project (**master.gpj**), select the child project (**child.gpj**) choose **Edit → Advanced → Set Options in Parent**, and set the options. These options are written to **master.gpj** and apply only to **child.gpj**. If you reuse the child's project file in a different project, the options are not carried over into the new project.

Setting Options for Source Files

You can set options for an individual file or for a list of files.

- To set an option for an individual file, select the file and set the options.
- To set an option for a group of files, select the project file that contains the files in the Project Manager's hierarchy of your project, and set the options. The options are set in the project file. All files below the project file, including its source files, will inherit these options.

Building Your Project

MULTI uses one of two different modes for building your projects: parallel or single-thread. To choose a build mode, select **Tools → Options**. In the **Options** window that opens, select the **Project Manager** tab, and locate the **Build Options** section. Select one of the following radio buttons:

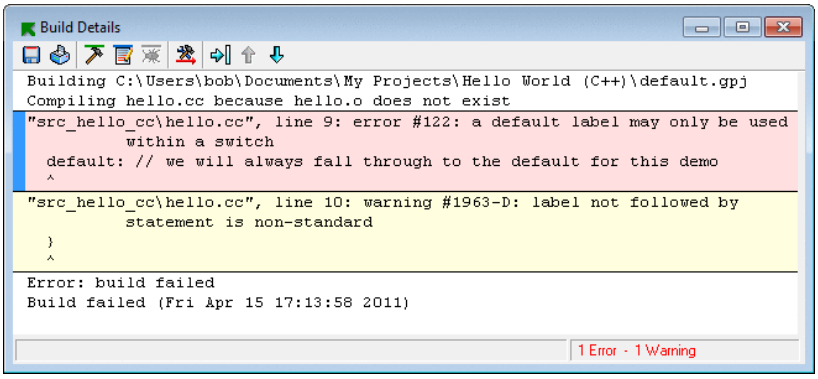
- **Parallel Build** — Splits the work of building your program among several processes on your local machine, which speeds up the build as a whole by interleaving independent compilations. This is the default build mode.

- **Single-Thread Build** — Builds your program using a single process on your local machine. If you have a slow machine that does not perform well in parallel build mode, use single-thread mode.

You can instruct the Project Manager to build your entire project; a specific subproject, executable, or library; or an individual source file:

- To build your entire project, select the Top Project (usually named **default.gpj**) in the **Project Tree** and click the **Build** button ( ).
- To build a specific subproject, executable, or library, select the appropriate project file and click the **Build** button or right-click and select **Build *selected file***.
- To build an individual source file, right-click the file and select **Compile *selected file***.
- To build multiple files, select the files you want to build, then right-click and select **Build Selected Files**.

In each case, the Project Manager invokes all of the tools necessary to build your project. You can follow the progress of the build in the **Status Tab** at the bottom of the Project Manager window. If the build is successful, its completion is reported here. If errors occur, a **Build Details** window opens:



You can modify or obtain extra information about the next build process by selecting **Build → Advanced Build** to open the **Advanced Build** dialog box (for full documentation, see “The Advanced Build Dialog Box” on page 274):

- To remove any previous output files before beginning the build, select the **Clean all output before building (-cleanfirst)** check box, and click the **Build** button.

- To see a dry-run of the build, without actually executing any commands or modifying any files, select the **Show build without execution (-info)** check box and click the **Build** button.
- To see the commands that the Builder executes as it builds, select the **Show tool commands (-commands)** check box and click the **Build** button.

Building Platform-Specific Programs from the Same Source Files

When a program works on multiple hardware platforms, the source files are often identical except for one or more assembly language routines that vary from processor to processor. In cases like this, you can create **Select One** projects that contain the processor-specific files so you can build the same program for multiple target processors.

Consider the following example:

During the build, the **Select One** project **traps.gpj** uses only one processor-specific file, **traps.ppc** or **traps.mip**, depending on the specified target processor.

If you have multiple files that are specific to a single processor, create multiple **Select One** projects. Suppose the program in this example also uses **bdriver.ppc** and **bdriver.mip**. In this case, you would create another **Select One** project, **bdriver.gpj**.

By default, the Project Manager chooses the file in the **Select One** project with an extension appropriate to your target architecture. If it cannot find a target-specific file, it uses the file with the **.c** extension.

Creating Your Project For Multiple Platforms

1. Create the project for your program.
2. Add all of the source files except the processor-specific assembly files to the project.

3. Add a **Select One** subproject (for example, **traps.gpj**) to the project. For more information, see “Adding New Items to Your Project” on page 19.
4. In the **Project Tree**, add the processor-specific assembly files to the **Select One** project.
5. If necessary, set the **'Select One' Project Extension List** option in your **Top Project**.

Chapter 3

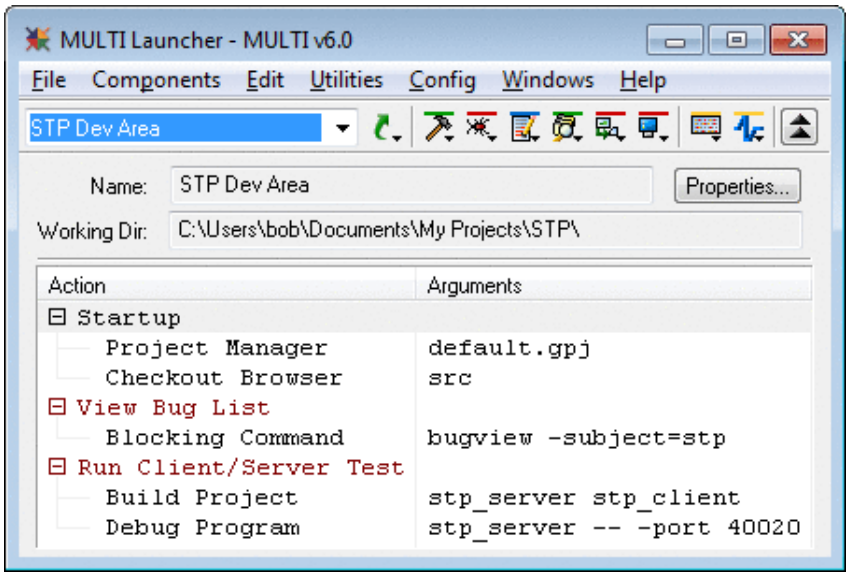
Managing Workspaces and Shortcuts with the Launcher

Contents

The MULTI Launcher allows you to create and use workspaces and shortcuts. A *workspace* is a virtual area where the tools, files, and actions required for a particular project can be organized, accessed, and executed. A workspace is typically created for each top-level project and includes a working directory and one or more related *action sequences*. The working directory for the workspace is the directory from which the action sequences will be started, and it is typically the directory containing the executable program associated with the project. An *action sequence* consists of one or more *actions* that are performed in the listed order. Action sequences may include:

- Building a program and then debugging it.
- Launching the Checkout Browser and opening several frequently used files for editing.
- Connecting the Debugger to a hardware target and opening a serial terminal connection.
- Running a script or batch file or executing a Debugger command.
- Invoking an external tool.

A *shortcut* is an action sequence that is not associated with a particular workspace. Shortcuts can be run from within any workspace. They execute in the working directory of the currently selected workspace.



The example above displays a workspace called **STP Dev Area** with a working directory of **C:\Users\bob\Documents\My Projects\STP** and action sequences named **Startup**, **View Bug List**, and **Run Client/Server Test**. The **Startup** action sequence contains the following actions:

- Open the MULTI Project Manager on the **default.gpj** project.
- Open the **Checkout Browser** on the **src** directory.

The **Run Client/Server Test** action sequence contains the following actions:

- Build the programs **stp_server** and **stp_client** contained in the **default.gpj** project.
- Open the MULTI Debugger on **stp_server** with arguments set to **-port 40020**.

Starting the MULTI Launcher

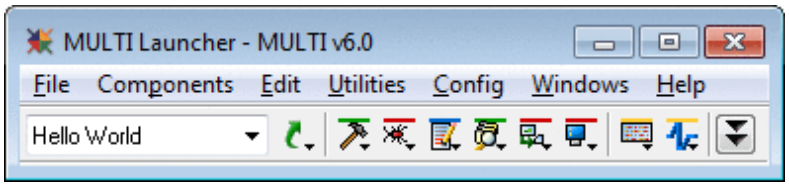
To start the Launcher:

- Windows — From the Windows **Start** menu, select the MULTI menu item. Alternatively, use Windows Explorer to navigate to the directory where you installed the MULTI IDE, and double-click **multi.exe**.
- Linux/Solaris — Run the **multi** executable from your MULTI IDE installation directory.

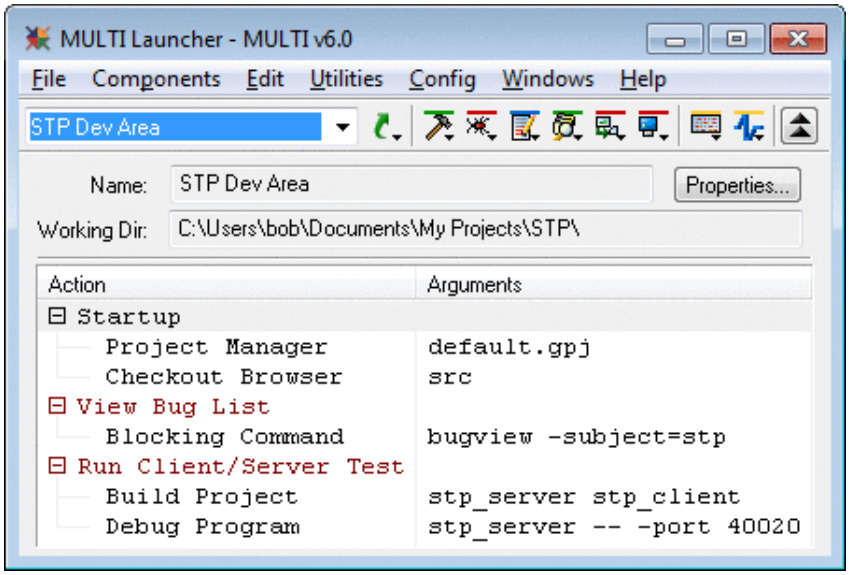
Launcher Display Modes

The Launcher has two display modes. You can switch between the two modes by clicking the ⏬ or ⏫ button.

Concise mode (shown next) uses little screen space. This mode is useful if you do not need to access or modify individual actions.



Detailed mode (shown next) shows more information and allows you to modify workspace action sequences.



The detail pane displays either brief help information about the Launcher or information for the current workspace. When displaying help information, the detail pane contains the following elements:

- Help information pane — Displays information about the Launcher.
- **Don't show this message again** — Select this check box to hide help information when the Launcher next starts up.

- **Start with MULTI Launcher** — Select this check box to start the Launcher when the **multi** command is run with no arguments. See the corresponding menu entry in "The Config Menu" on page 249.

When you create a new workspace or select a workspace in detailed mode, the detail pane contains the following elements:

- **Name** — Shows the workspace name.
- **Working Dir** — Shows the workspace working directory.
- **Properties** — Opens the **Set Workspace Properties** dialog box. The **Current** tab allows you to change the current workspace's basic information, and the **Global** tab allows you to change certain global settings. Both tabs also list variables and allow you to create, edit, and delete variables. The **Others** tab lists pre-defined MULTI Launcher variables. For more information about variables, see "Using Variables in the MULTI Launcher" on page 68.
- Action tree — Lists the action sequences and actions in the current workspace. For a list of menu items and keyboard commands that you can use to manipulate the action tree, see "The Edit Menu" on page 246.

The display mode is maintained across Launcher sessions.

For information about the menu items and toolbar buttons available in the Launcher, see Chapter 9, "Launcher GUI Reference" on page 243.

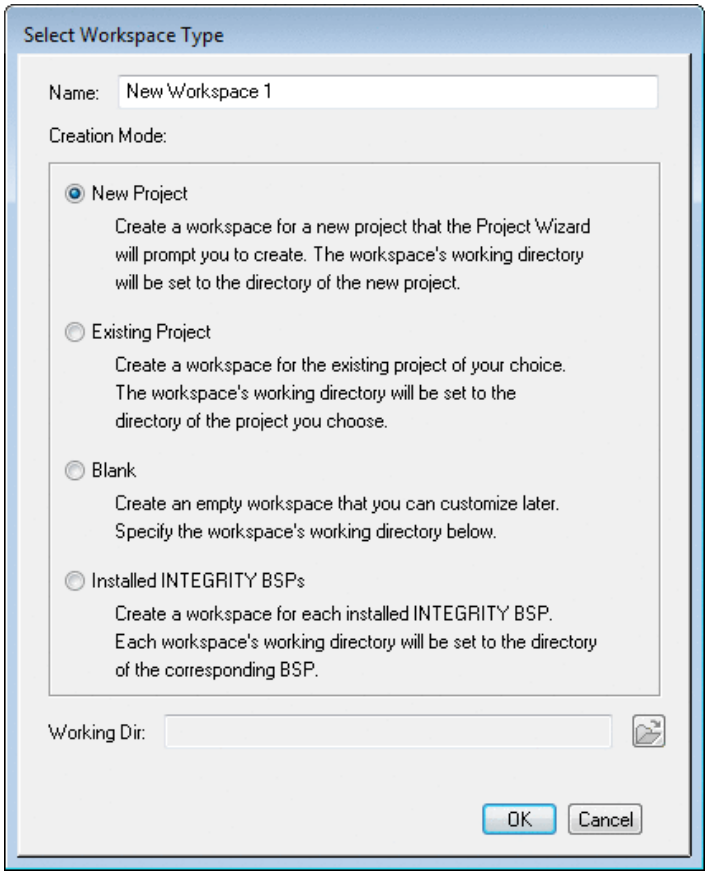
MULTI Workspaces

This section contains detailed information about creating, modifying, saving, loading, and opening MULTI workspaces.

Creating Workspaces

To create a workspace:

1. From the Launcher, select **File → Create Workspace**. The **Select Workspace Type** window appears.



2. Specify a name for your workspace and choose one of the following options:

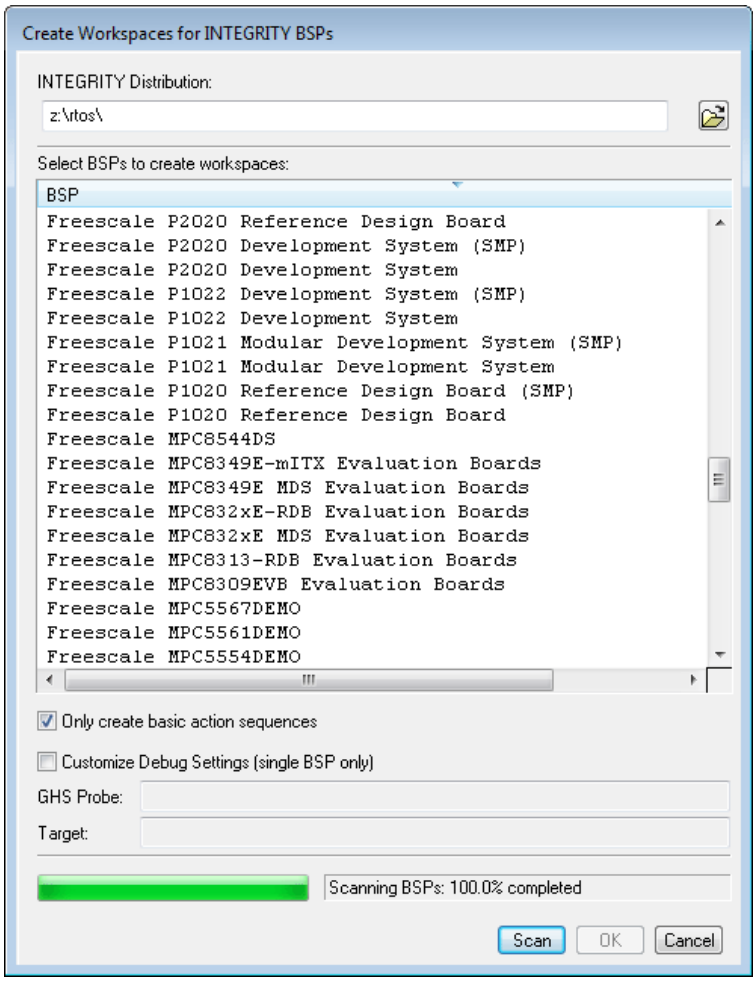
   - **New Project** — Select this option to create a workspace for a new project. The **Project Wizard** opens to allow you to create the project. For more information, see Chapter 1, “Creating a Project” on page 3.

- **Existing Project** — Select this option if you already have a top-level project and you want to create a workspace to provide you with easier access to that project. In the file chooser that appears, specify the location of your existing top-level project.
- **Blank** — Select this option to create an empty workspace (one that does not contain any action sequences). You can customize the workspace later. Enter the path to the desired working directory in the **Working Dir** field or click  to navigate to the desired working directory. For information about using variables to specify the working directory, see "Using Variables in the MULTI Launcher" on page 68.
- **Installed INTEGRITY BSPs** — Select this option to create one or more workspaces, each for an installed INTEGRITY BSP. Each workspace's working directory is set to the directory of the corresponding INTEGRITY BSP. For information about the dialog box that appears when you choose this option, see "Creating an INTEGRITY BSP Workspace" on page 58.

When you create a workspace for a new project or an existing project, an action sequence called **Startup** is created automatically. The **Startup** action sequence launches the Project Manager on your project. "Creating or Modifying an Action Sequence" on page 61 explains how to customize action sequences and how to add other action sequences to your workspace.

Creating an INTEGRITY BSP Workspace

When you choose to create a workspace of type **Installed INTEGRITY BSPs** (see "Creating Workspaces" on page 56), the **Create Workspaces for INTEGRITY BSPs** dialog box appears.



The fields and options available in this dialog box allow you to customize your BSP workspace. Each field, option, and button is described in detail below.

- **INTEGRITY Distribution** — Specifies the INTEGRITY distribution directory to scan for BSPs. If the default directory is incorrect or if you want to choose among multiple INTEGRITY installations, click the button located to the right of the field.

- **Select BSPs to create workspaces** — Lists the BSPs available in the **INTEGRITY Distribution** directory. Select one or more BSPs to create your workspace(s).
- **Only create basic action sequences** — Populates your workspace(s) with basic action sequences. If unselected, this option populates your workspace(s) with basic and advanced action sequences. This option is only applicable for simulator BSPs.
- **Customize Debug Settings (single BSP only)** — Creates connection actions for the specified **GHS Probe** and **Target**. These actions are used as part of the action sequence that downloads the kernel via the Probe and then launches a run-time debug connection on the specified target. This option is only applicable if you select a single hardware BSP, and you complete the **GHS Probe** and **Target** fields.
- **GHS Probe** — Specifies the name or IP address of your Green Hills Debug Probe. This field is used to create connection actions and is only available when **Customize Debug Settings (single BSP only)** is selected.
- **Target** — Specifies the name or IP address of your target. This field is used to create a connection action and is only available when **Customize Debug Settings (single BSP only)** is selected.
- Progress Bar — Indicates the percentage of the BSP scan completed. Press **Esc** to abort the scan.
- **Scan** — Scans the specified directory for BSPs. The directory is specified in the **INTEGRITY Distribution** text field located at the top of the dialog box.
- **OK** — Creates the workspace(s).
- **Cancel** — Closes the dialog box and cancels workspace creation.

Changing Workspace Properties and Global Settings

After you have created a workspace, you can edit the **Working Dir** path and other basic workspace information by clicking the **Properties** button in the Launcher. If this button is not visible, click  to reveal the detail pane.

In the **Set Workspace Properties** dialog box, the **Current** tab allows you to change the current workspace's basic information and the **Global** tab allows you to change certain global settings. The **Others** tab lists pre-defined MULTI Launcher variables.

For information about using variables in this dialog box, see "Using Variables in the MULTI Launcher" on page 68.

Saving Workspaces

To save your workspace to the default location, select **File → Save Changes** from the Launcher. The Launcher saves definitions of workspaces into the configuration file for the current workspace and into **index.gmb**, which is located at:

- Windows 7/Vista — ***user_dir*\AppData\Roaming\GHS\launcher**
- Windows XP — ***user_dir*\Application Data\GHS\launcher**
- Linux/Solaris — ***user_dir*/.ghs/launcher**

To find the full path to **index.gmb**, make a change to your current workspace and select **File → Save Changes** from the Launcher. The dialog box that opens displays the full path.

To save your workspace to a different file, see "Importing and Exporting Workspaces" on page 60.

Importing and Exporting Workspaces

If you want to export a workspace, select **File → Save Current Workspace into File** from the Launcher. In the file chooser that opens, select the file in which you want to save your workspace. You can share this file with other users.

To import a workspace, select **File → Load Workspace from File** and choose a **.gmb** file. MULTI prompts you to choose whether you want to access the workspace directly from the imported file or copy the workspace to your local configuration and access the copied workspace. In the workspace drop-down menu, workspaces that are not copied to your local configuration are indicated by  .

The workspace you import becomes the current workspace.

To add imported workspaces to a project, open the MULTI Project Manager on the project and select **Edit → Add File into default.gpj**.

Opening Workspaces

You can create as many workspaces as necessary, but only one workspace can be the *current* workspace, and you can only run actions from the current workspace. You can change the current workspace in either of the following ways:

- From the Launcher, open the workspace drop-down menu and select the desired workspace (see "The Launcher Toolbar" on page 252).
- From the Launcher, select **File → Recent Workspaces** and select the desired workspace.

Action Sequences and Actions

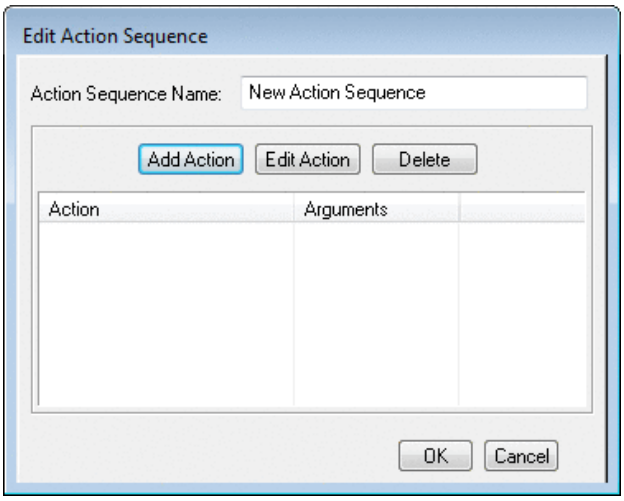
This section contains detailed information about:

- Creating, modifying, and running actions and action sequences.
- Managing running actions.

Creating or Modifying an Action Sequence

To create an action sequence:

1. Select **Edit → Add Action Sequence** from the Launcher. This opens the **Edit Action Sequence** dialog box on a new action sequence.



2. To add actions to your action sequence, follow the instructions in "Creating or Modifying an Action" on page 63.

To edit an action sequence, do one of the following:

- Select the action sequence and then select **Edit → Edit Selected Object**.
- Right-click the action sequence and select **Edit** from the shortcut menu.

Action sequences are modified in the **Edit Action Sequence** dialog box. You can use the buttons in this dialog box to add a new action to the action sequence, edit an existing action, or delete an action. You can also perform the following operations by right-clicking an action in this dialog box.

Edit Displays the **Edit Action** dialog. For more information, see "Creating or Modifying an Action" on page 63.
Disable or **Enable** Disables or enables the selected action. Disabled actions appear dimmed and do not run when the action sequence is run.
Cut, **Copy**, **Paste**, or **Delete** Performs the requested editing operation on the selected action. The **Paste** button inserts actions above the current selection; it does not overwrite the current selection.
Move Up or **Move Down** Moves the selected action or actions one position up (earlier) or down (later) in the list of actions.

To reorder an action sequence in the action tree, do one of the following:

- Select the action sequence, and then press **Ctrl+UpArrow** or **Ctrl+DownArrow** to move it up or down.
- Select the action sequence, and then choose **Edit → Move Selected Objects Up** or **Edit → Move Selected Objects Down**.
- Right-click the action sequence and select **Move Up** or **Move Down**.

To delete an action sequence, do one of the following:

- Select the action sequence and press **Delete**.
- Right-click the action sequence and select **Delete** from the shortcut menu.

Creating or Modifying an Action

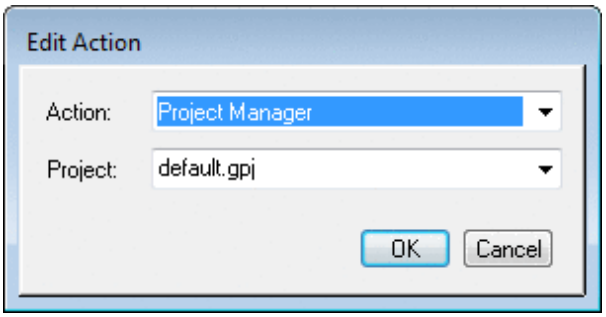
To create an action, perform one of the following operations:

- From the Launcher, right-click the action sequence and select **Add Action**.
- From the **Edit Action Sequence** dialog box, click **Add Action**.

To modify an action, perform one of the following operations:

- From the Launcher, right-click the action and choose **Edit**.
- From the Launcher, select the action and then choose **Edit → Edit Selected Object**.
- From the **Edit Action Sequence** dialog box, either right-click the action and choose **Edit**, or select the action and click **Edit Action**.

The **Edit Action** dialog box appears when you create or modify an action.



This dialog box contains two fields. The first field, **Action**, specifies the type of action. The second field (whose name is dependent on the **Action** selected) contains the arguments for the action. First select the type of action from the **Action** list, and then fill in the second field, which may contain variables. For information about using variables, see “Using Variables in the MULTI Launcher” on page 68.

Available action types and example arguments follow:

- **Project Manager** — Opens the MULTI Project Manager on the specified project. For example: **MyProjects/Project1/default.gpj**
- **Build Project** — Builds the specified project. For example: **MyProjects/Project1/default.gpj**

- **Debug Program** — Opens the MULTI Debugger on the specified executable. For example: **MyProjects/Project1/prog**
- **Debugger Command** — Performs the specified Debugger command. For example: **cb**

  For a list of commands, see the *MULTI: Debugging Command Reference* book.
- **Editor** — Opens the MULTI Editor on the specified file. For example: **MyProjects/Project1/readme.txt**
- **Diff View** — Opens the Diff Viewer on two files or two versions of a file. For example: **MyProjects/Project1/default.gpj -v 1.94 MyProjects/Project1/default.gpj -v 1.93**

  Argument usage for the **Diff View** action appears in a dialog box when you choose **Diff View** (Windows) or when your mouse hovers over the **Files** text field (Linux/Solaris).
- **Checkout Browser** — Opens the **Checkout Browser** on the specified directory. For example: **MyProjects/Project1**
- **Connection** — Connects to the specified target. For example: **simppc**
- **Serial Terminal** — Connects via a **Serial Terminal** to the specified target. For example: **com1** (Windows) and **ttyS0** (Linux)
- **EventAnalyzer** — Opens the **EventAnalyzer** on the specified event source file. For example: **evlog.mes**
- **ResourceAnalyzer** — Connects the **ResourceAnalyzer** to the specified target. For example: **127.0.0.1**
- **Flash GUI** — Opens the **Write to Flash Memory** window. You may specify a program for the window to open on. For example: **C:\My Projects\Project1\catalog**

  This action requires that MULTI be connected to a target.
- **Python Statement** — Executes the specified Python command(s). For example: **print "MULTI dir: $_multi_dir";**

  (`$_multi_dir` is a Launcher variable. For more information, see “Using Variables in the MULTI Launcher” on page 68.)
- **Python Script** — Runs the specified Python script file. For example, **checkout_src.py**

- **Nonblocking Command** — Runs the specified shell command. The command output is not displayed. A nonblocking command is particularly good for launching graphical programs. For example: **gmemfile program**
- **Blocking Command** — Runs the specified shell command. Subsequent actions must wait until the **Blocking Command** has completed before running. The command output is displayed in an editor window. A blocking command is particularly good for command line programs or batch-processing applications. For example: **gsize program**
- **Wait** — Causes the Launcher to wait the specified number of milliseconds before executing the next action. For example: **10000** (waits for 10 seconds)
- **Utility Actions** — Runs one of the Green Hills utility programs. When you choose this action in the **Edit Action** dialog, the Launcher displays a list of utility actions and allows you to choose one. For example: **gstrip program**

If the chosen action type requires a filename or directory to be specified, the drop-down list will also contain a **Select File** or **Select Directory** option to launch a file or directory chooser.

In the argument string of an action, you can use MULTI Launcher variables to make the action general. For more information, see "Using Variables in the MULTI Launcher" on page 68.

Running Actions and Action Sequences

To run action sequences or actions, do one of the following:

- Double-click the action sequence or action.
- Select one or more action sequences *or* actions in the Launcher's action tree, and select **Edit → Run Selected Objects**.
- Right-click the selected action sequence(s) *or* action(s) in the Launcher's action tree, and select **Run** from the shortcut menu.

To see example action sequences and actions, refer to the beginning of Chapter 3, "Managing Workspaces and Shortcuts with the Launcher" on page 51.

If the actions or action sequences being executed contain a **Build Project** action, a **Python Statement** action, a **Python Script** action, a **Blocking Command** action,

or any **Utility Action**, a progress window opens by default. For more information about the progress window, see “Managing Running Actions” on page 66.

Managing Running Actions

Each time one of the following workspace actions starts running, the corresponding process appears in the Launcher **Utilities → Running Actions** submenu:

- **Build Project**
- **Python Statement**
- **Python Script**
- **Blocking Command**
- Any **Utility Action**

If enabled [default], a MULTI Editor progress window displays when any of the preceding actions are run. The Launcher's toggle menu item **Config → Show Progress Window** enables and disables the appearance of the progress window for these actions.

The title of a progress window indicates the currently executing action or, if execution is complete, the last executed action. Inside the progress window, action output is displayed in the normal text color and progress information is displayed in a special color.

If the execution of an action is not yet finished when you try to close the progress window, a dialog box asks if you want to terminate the execution.

You can also terminate execution of any action listed in the **Utilities → Running Actions** menu by selecting the corresponding menu entry. This menu does not list components of the MULTI IDE that were launched by Launcher workspace actions.

Note

The **Utilities → Running Actions** menu only lists workspace actions. This menu is not related to programs being debugged by the MULTI Debugger.

MULTI Shortcuts

This section contains detailed information about creating, saving, and loading MULTI shortcuts.

Creating MULTI Shortcuts

MULTI shortcuts are like action sequences, except that they are not associated with any particular workspace.

To create a shortcut:

1. Click the **Shortcut** button ( ).
2. Select **Create or Change Shortcut**.

   If it's not showing already, the **MULTI Launcher Shortcuts** pane appears. The **Working Dir** field is empty to indicate that shortcuts do not have a working directory associated with them. (Shortcuts execute in the working directory of the currently selected workspace.)
3. You can create or modify shortcuts just as you would action sequences for a workspace. See “Creating or Modifying an Action Sequence” on page 61.

Saving Shortcuts

To save your shortcuts to the default location, select **File → Save Changes** from the Launcher. The Launcher saves definitions of shortcuts into the shortcut configuration file and into **index.gmb**, which is located at:

- Windows 7/Vista — ***user_dir*\AppData\Roaming\GHS\launcher**
- Windows XP — ***user_dir*\Application Data\GHS\launcher**
- Linux/Solaris — ***user_dir*/.ghs/launcher**

To find the full path to **index.gmb**, make a change to a shortcut and select **File → Save Changes** from the Launcher. The dialog box that opens displays the full path.

To save your shortcuts to a different file, see “Importing and Exporting Shortcuts” on page 68.

Importing and Exporting Shortcuts

If you want to export your shortcuts, select **File → Save Shortcuts into File** from the Launcher. In the file chooser that opens, select the file in which you want to save your shortcuts. You can share this file with other users.

To import shortcuts, select **File → Load Shortcuts from File** and choose a **.gmb** file. MULTI prompts you to choose whether you want to:

- Append these shortcuts to the list that appears when you select  ,
- Replace the shortcuts currently listed when you select  , or
- Cancel the load operation.

Using Variables in the MULTI Launcher

You can use variables to make actions and shortcuts generic and to make your projects more portable. This section begins with an overview of variable features and is followed by information about variable types; creating, modifying, and referencing variables; and variable substitution.

Overview of Variables

Launcher variables enable you to perform actions from the Launcher. For example, with the pre-defined `_ws_file_path` variable (described in “Variable Types” on page 69), you can create a shortcut that opens the Editor on the current workspace's configuration file.

The values of generic Launcher variables, such as the pre-defined MULTI Launcher variables, change depending on the context of the workspaces where they are used. This property allows you to use a single variable in multiple workspaces. For more information about pre-defined MULTI Launcher variables, see “Variable Types” on page 69.

Generic variables also make your project more portable. If you associate a workspace with a particular project file and share the project with another user, you can share the workspace too. Simply use the `_ws_file_dir` variable described in “Variable Types” on page 69 to specify the workspace's working directory. When the second

user opens the project and workspace, the value of the working directory dynamically updates to the correct location.

Variables are convenient to use. Typing a variable is usually much easier and faster than typing a long command string or pathname. In addition to being easy to type, variables allow you to maintain multiple workspaces simultaneously: modify a variable in one location, and you will see the change take effect every place where it is used.

You can use Launcher variables in the following places:

- Shortcuts and/or workspace actions — You can use variables when creating the workspace actions used in action sequences or shortcuts. For more information, see "Creating or Modifying an Action" on page 63.
- Workspace working directories — To use a variable to specify the working directory, click the **Properties** button in the Launcher. (If this button is not visible, click  to reveal the detail pane.) In the **Set Workspace Properties** dialog box, click the **Current** tab and enter the variable in the **Working Dir** field.
- Variable values — You can create variables for the current workspace or for all workspaces. For information about how to do this, see "Creating or Modifying Variables" on page 70.

Variable Types

The variables that the MULTI Launcher supports are categorized into the following types:

- *Workspace* (or *local*) *variables* — Available in the enclosing workspace. For information about creating workspace variables, see "Creating or Modifying Variables" on page 70.
- *Global variables* — Available to all workspaces. For information about creating global variables, see "Creating or Modifying Variables" on page 70.
- *Pre-defined MULTI Launcher variables* — Available to all workspaces and automatically defined by the MULTI Launcher. These variables and their values are listed on the **Others** tab of the **Set Workspace Properties** dialog box. For more information, see "Launcher Display Modes" on page 54.

The complete list of pre-defined variables follows.

- `_cwd` — Specifies the current working directory of the MULTI Launcher.
- `_ws_name` — Specifies the name of the current workspace.
- `_ws_working_dir` — Specifies the working directory of the current workspace.
- `_ws_file_name` — Specifies the base name of the file in which the current workspace is stored.
- `_ws_file_path` — Specifies the full path to the file in which the current workspace is stored.
- `_ws_file_dir` — Specifies the directory of the file in which the current workspace is stored.
- `_multi_dir` — Specifies the directory where the MULTI Launcher executable resides. This is in the MULTI IDE installation directory.
- `_user_cfg_dir` — Specifies the directory that stores the user's personal MULTI configuration.
- `_multi_major_version` — Specifies the major version number of MULTI. For example, `1` would be the `_multi_major_version` in MULTI 1.2.3.
- `_multi_minor_version` — Specifies the minor version number of MULTI. For example, `2` would be the `_multi_minor_version` in MULTI 1.2.3.
- `_multi_micro_version` — Specifies the micro version number of MULTI. For example, `3` would be the `_multi_micro_version` in MULTI 1.2.3.

- Host environment variables — Available to all workspaces and defined in the host environment.

Creating or Modifying Variables

To create or modify a workspace variable or global variable:

1. Click the **Properties** button in the Launcher. If this button is not visible, click  to reveal the detail pane.

2. In the **Set Workspace Properties** dialog box, click the **Current** tab to create or modify the current workspaces's variables and the **Global** tab to create or modify global variables.
3. To add a variable, click **New**. To edit a variable, select the variable and click **Edit**.
4. In the **MULTI Launcher Variable** dialog box, enter or modify the variable's name and its value.
5. Click **OK** in the **MULTI Launcher Variable** dialog box and in the **Set Workspace Properties** dialog box.

To delete a variable, select it in the **Set Workspace Properties** dialog box, and click **Delete**.

Workspace variables are a part of the workspace's definition and are kept in the workspace's definition file. Global variables are not a part of any workspace's definition and are kept in the **index.gmb** file located at:

- Windows 7/Vista — ***user_dir*\AppData\Roaming\GHS\launcher**
- Windows XP — ***user_dir*\Application Data\GHS\launcher**
- Linux/Solaris — ***user_dir*/.ghs/launcher**

Referencing Variables

To reference a variable, enter the dollar sign (`$`) followed by the variable's name. If the variable name contains characters other than alphabetic characters, numeric characters, and underscore, enclose the variable name in parentheses `()` or square brackets `[]`. Example variables follow:

- `$MyVar`
- `$(My Var)`
- `$[My Var]`

To precede a non-variable with a dollar sign (`$`), escape the dollar sign with a backslash character (`\`). For example: `\$NotVar`.

Variable Substitution

When the MULTI Launcher evaluates a string containing variables, it scans the string from beginning to end and substitutes the string's variables with their values. The substitution process continues until no variables are left to substitute or until the Launcher has performed 20 scans. This maximum scan limit helps to prevent infinite loops caused by cyclic dependencies.

When the MULTI Launcher recognizes a variable name during the substitution process, it looks for the variable's value by searching the variable types in this order:

1. Workspace variables
2. Global variables
3. Pre-defined MULTI Launcher variables
4. Host environment variables

Because of the order in which the Launcher searches variable types, you can override a pre-defined or host environment variable by defining a workspace variable or global variable with the same name. To return back to the original value, delete the variable you created.

Chapter 4

Editing Files with the MULTI Editor

Contents

This chapter is an introduction to the MULTI Editor. Details about the following are provided:

- *Navigating in Files* — The Editor can automatically obtain function prototypes and cross reference information. For more information, see "Navigating in Files" on page 78.
- *Searching in the Editor* — The Editor and provides a number of search options. For more information, see "Searching in the Editor" on page 83.
- *Working with Code* — The Editor provides tools and keyboard shortcuts that are helpful when editing source code. For more information, see "Working with Code" on page 88.
- *Working with Multiple Files* — The Editor contains tools to merge or compare multiple files. For more information, see "Working with Multiple Files" on page 93.

Starting the MULTI Editor

You can start the Editor as a stand-alone editing program, or you can start it from another MULTI tool.

Starting the Editor from the Command Line

To start the MULTI Editor as a stand-alone program, run the Editor executable from the command line:

me [*options*]

where `options` is any non-conflicting combination of command line options:

+line file   Opens the Editor on `file` and navigates to line number `line`.
-diff *file1 file2*   Opens the **Diff Viewer** on the specified files.
file   Opens the Editor on `file`.

-h **-usage** Displays on-screen usage information.
-help Launches online help.
-new *file1 file2...* Opens each file in a new Editor window.
-reuse *file1 file2...* Opens each file in the same Editor window. This is the default.
-showhistory *file1* [*file2*]... Opens a History Browser on each file specified.

If you do not specify any option, a file chooser appears. Select or navigate to a file to open it in the Editor.

Note

The MULTI IDE may reuse an Editor process started from the command line. In this case, the process does not exit until the entire MULTI IDE is closed.

Starting the Editor from the Launcher

To start the Editor from the Launcher, do one of the following:

- Click the **Edit** button () and select a file or the **Open Editor** option.
- Select **Components** → **Open Editor**.

Starting the Editor from the Project Manager

To start the Editor while using the Project Manager, do one of the following:

- Select one or more files, then click the **Edit** button () to open them in the Editor.
- Select one or more files in the project tree, then select **Edit** → **Edit**, or right-click and select **Edit** from the shortcut menu.
- Double-click a text filename in the project tree.
- Double-click an error or warning in the **Build Details** window to open the source file in the Editor with the cursor placed on the line with the error. To see the next error (if any), click the **Next Error** button ().

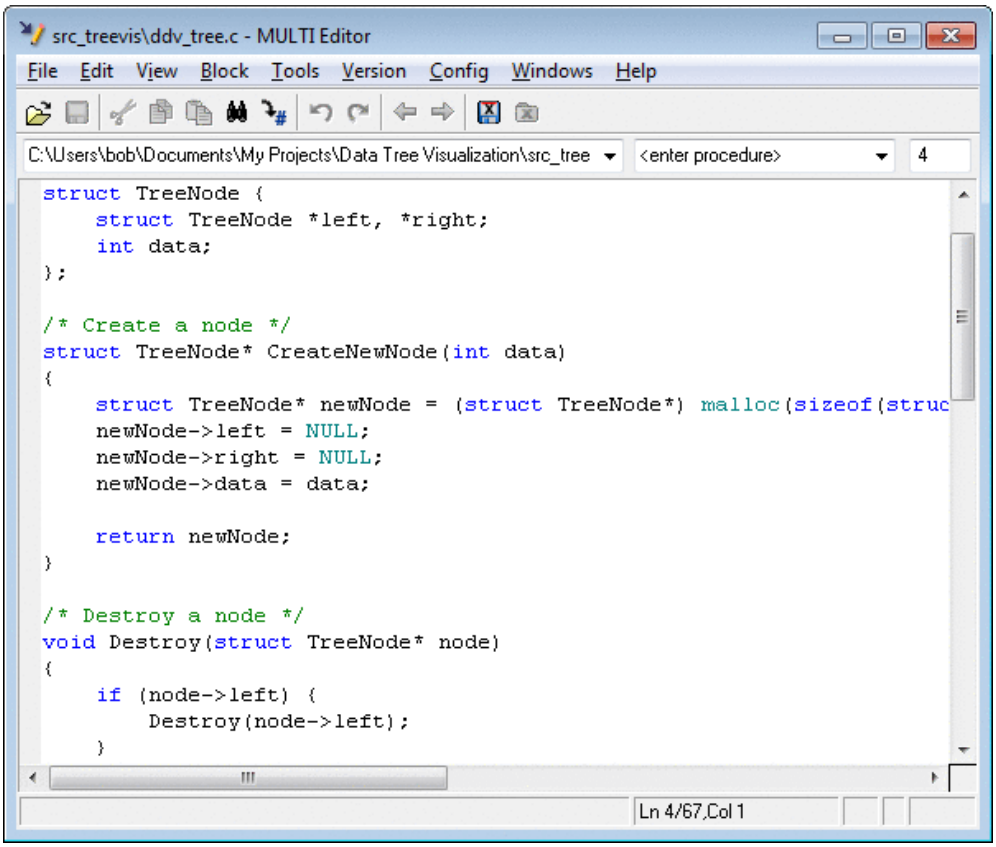
Starting the Editor from the Debugger

To start the Editor while using the Debugger, do one of the following:

- Click the **Edit** button ().
- Right-click in the source pane and select **Edit File**.
- Enter the **edit** command in the Debugger command pane. For more information about this command and related commands, see “General View Commands” in Chapter 22, “View Command Reference” in the *MULTI: Debugging Command Reference* book.

Editor Window Components

The following graphic displays the Editor window.



The main components of the Editor window are described below.

- *Title Bar* — Contains the path and filename of the file displayed in the current Editor window.
- *Menu Bar* — Contains menus to access Editor functions. All menus and menu items are described in detail in “Editor Menus” on page 278.
- *Editor Toolbar* — Contains buttons for some of the most common Editor actions. For more information, see “The Editor Toolbar” on page 294.
- *File and Procedure Fields* — Contains fields that provide quick access to files, procedures and line numbers. For more information, see “The File and Procedure Fields” on page 295.

- *Source Pane* — Displays the text of the active document. For information about operations you can perform from the source pane, see "The Shortcut Menu" on page 293.
- *Status Bar* — Displays information about document status and cursor position. For more information, see "The Status Bar" on page 296.

Navigating in Files

This section provides details about Editor functions that help you navigate within a single file, and across multiple files.

Using References and Prototypes

Whenever the MULTI Editor loads a C or C++ file, it attempts to obtain information about the file, including the following information:

- The operating system for which the code was written
- The source file's include files
- Cross reference information

Note

Cross reference information is available for source code in projects built using the Project Manager. Cross reference information is not available for preprocessor `#define`s in the Editor (but it is available in the Debugger).

When this information is obtained, the Editor automatically grabs the function prototypes from the include files; loads information for the operating system such as APIs, constants, and types; and uses this information for syntax coloring and auto-completion (see "The language.gsc Syntax Definition Files" on page 166). The prototype information also allows you to quickly jump to the function's definition or declaration from the shortcut menu.

If cross reference information is available, it is automatically loaded (see "Generate or Regenerate Cross References" on page 80). The Editor will attempt to obtain cross references from the following sources:

- MULTI Debugger — The Editor can obtain cross reference information from the Debugger when the Editor was launched from the Debugger and the current file in the Editor is contained in the program being debugged.
- Cross reference information files — These files are generated during a build.

Cross reference information for a source file may be incomplete. To obtain complete cross reference information for the source file's enclosing project, you can right-click and select **Generate Cross References** from the shortcut menu (see "Generate or Regenerate Cross References" on page 80).

Go To a Definition

To go to the definition of an item:

1. Right-click an object, function, variable, type or other text in the source pane and select **Go To Definition** from the shortcut menu.
2. The Editor will use the function prototype or cross reference information to find the definition of the clicked item and move the cursor to that position. This opens another file if the definition is not located in the current file.

Go To a Declaration

To go to a declaration of an item:

1. Right-click an object, function, variable, type or other text in the source pane and select **Go To Declaration** from the shortcut menu.
2. The Editor will use the function prototype or cross reference information to find the declaration of the clicked item and move the cursor to that position. This opens another file if the definition is not located in the current file.

Browse References

To browse reference information:

1. Right-click an object, function, variable, type, or other text in the source pane and select **Browse References** from the shortcut menu.
2. The Editor will attempt to obtain the item's cross references and display them in a **Browse** window.

   The **Browse** window for cross references in the Editor is very similar to the **Browse** window in the Debugger, except that it does not have Debugger-related functions (for details, see "Browsing Cross References" in Chapter 12, "Browsing Program Elements" in the *MULTI: Debugging* book).

The status box of the **Browse** window will display the source from which the cross references are obtained:

- **Based on debugger** — the source is the symbol table of the program in the corresponding Debugger.
- **Based on progress: N/A** — the source is the single cross reference information file for the current source file.
- **Based on progress: *70*%** — the source is multiple cross reference information files for the enclosing project. The percentage displayed represents the number of currently loaded cross reference information files out of the total number in the enclosing project.

Cross reference **Browse** windows are accessible in the Editor through the **Windows** menu. Cross reference **Browse** windows can be closed by selecting **View → Close Dependent Windows**.

Generate or Regenerate Cross References

To obtain complete cross reference information based on the project to which the source file belongs:

1. Right-click in the source pane and select **Generate Cross References** from the shortcut menu.

Note

This menu item is unavailable if the Editor obtained cross reference information from the corresponding MULTI Debugger.

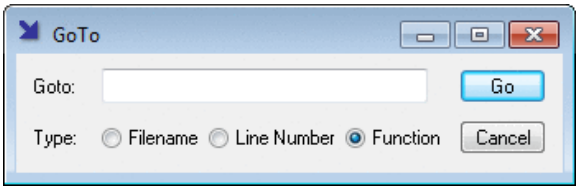
2. The Editor will search for the enclosing project and generate cross reference information for the whole project.

Generating cross reference information rebuilds the files in your program. Once cross reference information for the enclosing project is generated, the shortcut menu item changes to **Regenerate Cross References**. If any of the source files in the project have changed, the cross references for the enclosing project must be regenerated for the information to be accurate.

Using the GoTo Dialog Box

You can use the **GoTo** dialog box to go to a file, line number, or function. To open the **GoTo** dialog box, do one of the following:

- Select **Edit** → **Goto**.
- Click the **Goto** button ().
- Press **Ctrl**+**Shift**+**G**.



Go To a File

To open a file in the current Editor:

1. Type a filename in the **Goto** field.
2. Select the **Filename** radio button.
3. Click **Go**.

Go To a Line

To go to a specific line in the current file:

1. Type the line number in the **Goto** field.
2. Select the **Line Number** radio button.
3. Click **Go**.

Go To a Line Quickly

You can quickly go to a line without using the **GoTo** dialog box:

1. Type **Ctrl**+**G**. The **status box** in the lower left corner of the status bar will display the prompt `Goto Line:`.
2. Enter the line number to go to.
3. Press **Enter**.

Go To a Function

To go to a specific function in either the current file, or in another file:

1. Type a function name into the **Goto** field.
2. Select the **Function** radio button. If the **Function** button is not available, the **Editor** could not grab function prototypes for the file's language.
3. Click **Go**.
4. If the function is in the current file, the Editor moves the cursor to the beginning of the function. If the function is in a different file, the Editor opens that file and moves the cursor to the beginning of the function.

Note

This option is only available if the corresponding language is C or C++ (for which the Editor can automatically grab function prototypes from the edited file).

Searching in the Editor

The MULTI Editor provides three ways to search for text:

- *Incremental searching* — Performs a quick search of the active file. The search is incremental, so it searches for a string as you type it. This means that you do not always have to type the whole text string you are looking for. This type of searching uses keyboard shortcuts rather than a dialog box, so there are fewer options. For more information, see "Incremental Searching" on page 83.
- *Interactive searching* — Uses the Search dialog to perform a variety of searching tasks on the file in the active Editor window. Interactive searching allows search-and-replace and regular expression matching. For more information, see "Interactive Searching Using the Search Dialog Box" on page 84.
- *Searching files* — Performs full-text searching in all open files using the **grep** utility. For more information, see "Searching in Files" on page 86.

Incremental Searching

You can perform a quick incremental search (referred to in some command and option names as an *iSearch*) in the active Editor window without opening the Search dialog box. To do so, perform the following steps:

1. Press **Ctrl**+**F** (to search forward in the file) or **Ctrl**+**B** (to search backwards in the file). This will cause the status box in the lower-left corner of the status bar to display the prompt: `Srch`.
2. Type the string you are searching for. As you type characters, the search string is displayed in the status bar to the right of the `Srch` prompt and the first occurrence of the string pattern is highlighted in the Editor source pane. You can use the **Backspace** key to remove characters from the search string. As you modify the search string by typing additional characters or removing characters, the next occurrence of the new string is highlighted in the Editor source pane.

Note

The case sensitivity of the search is set via the **Match exact case in searches** option (see "The General Options Tab" on page 177).

However, note that even if the search is case-insensitive, it becomes case-sensitive if you enter any capital letters in the search string.

3. If a match has been found, press **Ctrl**+**F** again to view the next match or press **Ctrl**+**B** to view the previous match. If there is no other match, the status bar indicates that the search failed to find another match.
4. Press **Esc** at any time to clear the current search. (The `Srch` prompt will disappear.) The option **Escape restores view after iSearch** controls whether the cursor returns to its original location when you press **Esc**. For more information, see "The General Options Tab" on page 177.

Tip

If you are not in search mode (that is, if the `Srch` prompt is not showing in the status bar and the Search dialog box is not up), you can press **Ctrl**+**F** two times to repeat your most recent search, whether it was an incremental search or an interactive search (that is, a search performed from the Search dialog box).

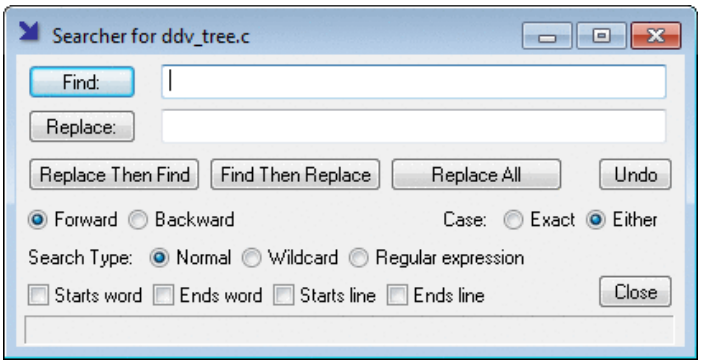
Search options that you have previously set in the Search dialog box affect incremental searches performed in the same Editor window and MULTI session. These options are: **Case**, **Search Type**, **Starts word**, **Ends word**, **Starts line**, and **Ends line**. Use the Search dialog box to clear or change these option settings. For more information about the Search dialog box and the options it contains, see "Interactive Searching Using the Search Dialog Box" on page 84.

Interactive Searching Using the Search Dialog Box

The Search dialog box allows you to specify search criteria for interactive searches.

To open the Search dialog box, do one of the following:

- Select **Edit** → **Find**.
- Click the **Find** button ( ).
- Press **Ctrl**+**Shift**+**F**.



The Search dialog box can be used to search for and to replace text in the file open in the active Editor window.

The fields and options in the Search dialog box are described in "The Search Dialog Box" on page 301.

Note

Some of the settings in this dialog box set the defaults for the next incremental search (see "Incremental Searching" on page 83).

Searching for Regular Expressions

The following table lists acceptable formats for entering regular expressions as search strings when the **Regular expression** radio button has been selected in the Search dialog box.

`.`	(A period) Matches any single character except a new line.
`[`*`string`*`]`	Matches any single character appearing in *`string`*. For example, `[abc]` matches an `a`, `b`, or `c`. You can specify character ranges by separating the start and end of the range with a dash (`-`). For example, `[b-e]` matches `b`, `c`, `d` and `e`. To include a close bracket (`]`) as part of the *`string`*, make it either the first character of *`string`*, or the last character of a range. For example, `[]abc]`.
`[^`*`string`*`]`	If the first character of the *`string`* is a caret (`^`), it matches any character that is not in *`string`*.
`^`	Place at the start of the search string to match the beginning of a line. Same as the **Starts line** option.
`$`	Place at the end of the search string to match the end of a line. Same as the **Ends line** option.

`<`	Place at the start of the search string to require that the rest of the search string matches the beginning of a word. Same as the **Starts word** option.
`>`	Place at the end of the search string to require that the rest of the search string matches the end of a word. Same as the **Ends word** option.
`(`*`regexp`*`)`	Matches the regular expression *`regexp`* enclosed in parentheses.
`regexp``*`	Matches zero or more occurrences in succession of the regular expression *`regexp`*.
`regexp1` `|` *`regexp2`*	Matches regular expression *`regexp1`* or regular expression *`regexp2`*.

The following table gives some examples of regular expressions that can be used in searches.

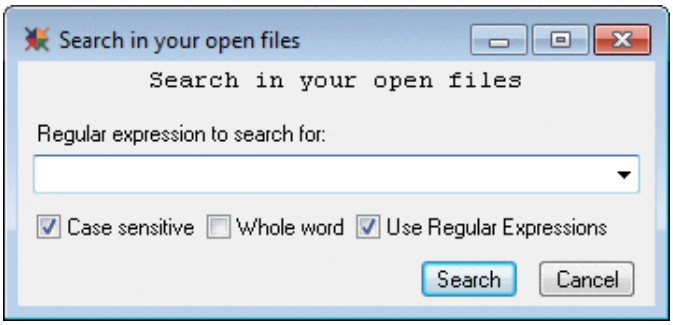
`a.d`	Matches `and`, `a d`, and `aud`.
`a.*d`	Matches `ad`, `are d`, and `abd`.
`<and`	Matches `and`, but not `stand`.
`are|is`	Matches either `are` or `is`.
`(are|is)* bad`	Matches `are bad`, `is bad`, `areisare bad`, and `bad`.

Searching in Files

The MULTI Editor supports full-text searching of all open files with the Search in Files feature. To search all open files, do one of the following:

- Select **Tools → Search in Files**.
- Enter the **grep** command in the **Execute Editor Commands** dialog, described in Appendix B, “Editor Commands” on page 329.

This opens the Search in Files dialog box.



Enter the search string in the text box (or use the drop-down list to select recent search strings) and select any of the following searching options, if desired:

- **Case sensitive** — The search will only find text that matches the case of the search string exactly. If this box is not selected, the search will ignore case when searching for a match. This box is selected by default.
- **Whole word** — The search only finds text that contains the search terms as words. This means that the matching string must be preceded by a non-word character and followed by a non-word character, where word characters are letters, digits, and the underscore. For example, if you select this check box, a search for `ice` does not match `slice` or `ice__`, but it does match `ice-9`. This box is cleared by default.
- **Use Regular Expressions** — The search treats the text you enter in the text box as a regular expression. If this box is not selected, the search treats the text you enter as a fixed string. This box is selected by default.

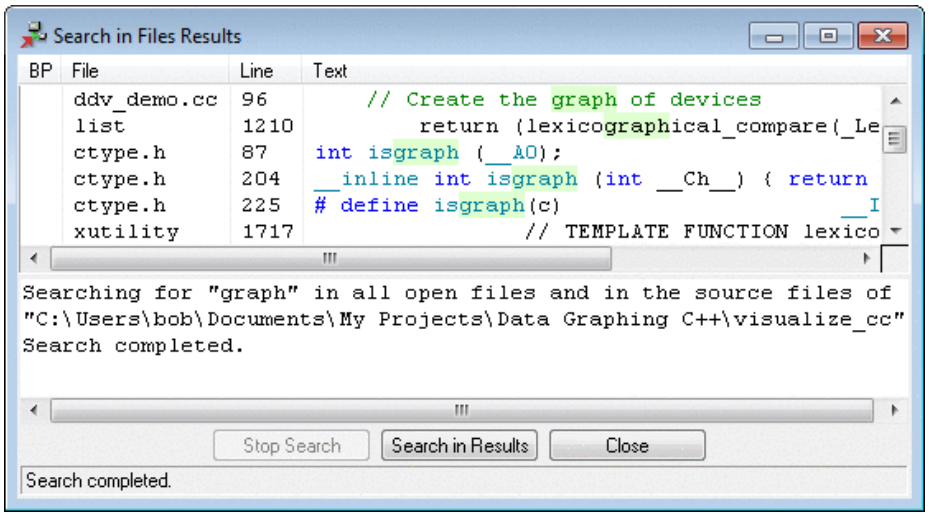
After you have entered the search string and set your searching options, click **Search** to perform the search. A **Search in Files Results** window will open and display all matches as they are found. See the next section for a description of this window.

Note

The Search in Files capability works by running the BSD **grep** utility. A copy of BSD **grep** is installed along with the MULTI IDE. However, BSD **grep** is not part of MULTI and is not distributed under the same license as MULTI. For more information about the license under which BSD **grep** is distributed, refer to the file **bsdgrep.txt**, which is located in the **copyright** subdirectory of the IDE installation directory. For information about the search expression format that BSD **grep** uses, refer to the OpenBSD re_format(7) man page.

Viewing Search in Files Results

The **Search in Files Results** window displays the results of a Search in Files operation.



You can double-click any line in the search results window to open an Editor on the specified file and line. If the Editor or the Search in Files dialog box has been launched from the MULTI Debugger, single-clicking a line displays the line in the Debugger source pane.

The components of the **Search in Files Results** window are described in “The Search in Files Results Window” on page 304.

Working with Code

The Editor provides tools and keyboard shortcuts that you will find helpful when editing source code.

Indenting Code

Indentation is whitespace at the beginning of each line, used to denote the hierarchical structure of your code and make it more readable. As you write code, you can manually insert an indent, or you can let the Editor indent your code based on common coding standards.

Manually Inserting or Removing an Indent

To manually insert or remove an indent:

1. Move the cursor to the appropriate line, or highlight multiple lines.
2. Select **Block → Indent** to insert an indent.
3. Select **Block → Unindent** to remove an indent.

For more information about working with indents, see "The Block Menu" on page 285.

Auto Indenting Code

The MULTI Editor auto indents your code according to common coding standards.

Note

Auto indenting is only available for certain languages. At present, MULTI supports auto indenting for C, C++, Java, and Ada.

1. If you want to auto indent a single line of code, move the cursor to that line. If you want to auto indent multiple lines of code, highlight those lines.
2. Select **Block → Auto Indent**, or press **Ctrl+2** or **Ctrl+;** (semicolon). Pressing the **Tab** key also automatically indents everything to the right of the cursor.

You can make a one-time change in how far the Editor auto indents the lines of a lexical block of code by indenting the first line of code the way you want the entire block to look, then highlighting the rest of the block and starting the auto indent. This prevents the Editor from breaking the conventions of a pre-existing block.

Configuring Indents

You can configure the default size of indents and how they affect your code.

- To change the configuration of indents for all files, select **Config → Options** and make changes on the **MULTI Editor** tab (see "The MULTI Editor Options Tab" on page 221).

- To change the size of indents for the current file and current session only, use the **Per File Settings** dialog box. See "The Per File Settings Dialog Box" on page 300 for more information.

Auto-Indent Characters

By default, the Editor automatically makes indenting adjustments when you type the following characters:

#	number sign
*	asterisk, if it is the first character of a C comment line
-	hyphen, if it is the first character of a C comment line and if **C chars aligned like '*' in comments** is set to - (the default)
;	semi-colon
:	colon
{	left curly brace
}	right curly brace

You can disable characters from auto indenting both your code and comments by disabling **Auto indent as you type**. If you want special characters to auto indent your code, but want to disable them if you use them within a comment, disable **Auto indent comments as you type**. See "The MULTI Editor Options Tab" on page 221.

Working with Comments

This section describes how you can use the Editor to easily insert and manipulate comments in your code.

Inserting or Removing a Comment

The Editor uses the proper syntax for comments based on your selected programming language. Block comment operations are available to C, C++, Java, and all languages that support line comments.

- To insert a new comment, place the cursor on a blank line where you want the comment to start and select **Block → Comment**.
- To comment out existing code, select the appropriate text, then select **Block → Comment**. The selection is implicitly extended to line boundaries; the entire line the selected text is in will be commented out.
- To uncomment a comment block, highlight the block and select **Block → UnComment**.

For more information about working with comments, see "The Block Menu" on page 285.

For information about configuring comments, see "The MULTI Editor Options Tab" on page 221.

Note

If the Editor is not using the correct syntax for comments, select **View → Language** to make sure it is configured for the correct language.

Highlighting the Boundaries of the Current Block of Code

To identify the beginning and end of the current block of code, select **View → Match**.

When you perform this operation, the Editor:

1. Searches backward from the cursor and finds the first enclosing instance of a left parenthesis "(", left curly brace "{" , or a left bracket "[".
2. Searches forward from the cursor to find the matching ending mark.
3. Selects the code in between.

For more information, see "The View Menu" on page 282.

Working with Columns

You can cut, copy and paste columns of text in the Editor. For more information, see "The Block Menu" on page 285.

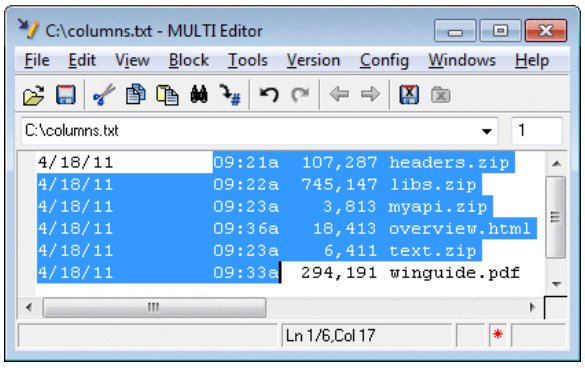
Copying a Column of Text

You can copy a column of data from a file, excluding data on either side of the column. For example, suppose you have a tab delimited file that lists date, time, file size, and filename. You can copy just the column that lists time without affecting any of the other data.

1. On the first line that contains data you want to copy, start the selection at the first character you want copy.
2. Extend the selection to include all of the data in the column. The last character selected should be the last character of the column.
3. Select **Block → Rect Copy**.
4. The region of text to be copied is the rectangle with the diagonal defined by the first character and the last character of the selection.

Example 4.1. Using Rect Copy

Highlight the following selection, then select **Block → Rect Copy**.



When you paste the contents of the clipboard, the following is inserted in your file:

```
09:21a
09:22a
09:23a
09:36a
09:23a
09:33a
```

Cutting a Column of Text

To cut a column of text out of a file, highlight the column and select **Block → Rect Cut**.

Pasting a Column of Text

After you have cut or copied a column of text from a file, you can:

- Select **Block → Rect Paste** to paste the column without inserting line breaks.
- Select **Edit → Paste** to paste the contents of the clipboard into the file with line breaks.

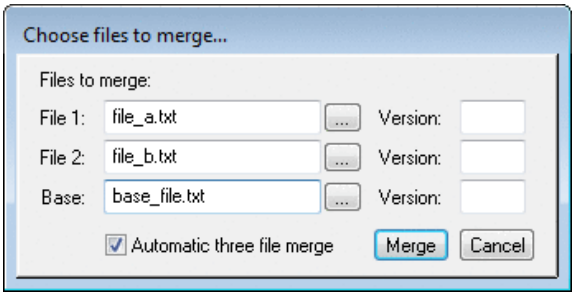
Working with Multiple Files

This section provides information about the MULTI Editor tools you can use to merge and compare multiple files.

Merging Files

You can use the Editor to merge two or three files into a single file. The initial files can be completely different files, or different versions of the same file.

To begin merging files, select **Tools → Merge Files** to open the **Choose files to merge** dialog box.



The **Choose files to merge** dialog box contains the following fields and buttons:

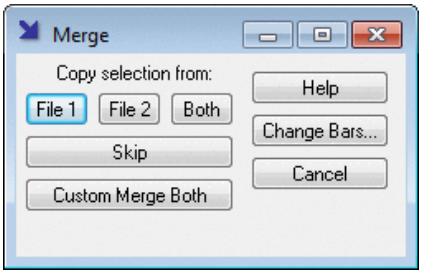
File 1	Type the name of the first file you want to merge, or click … (**Browse**) to select a file. If you are using a version control system and want to merge a different version of a file from disk, enter the filename in the **File 1** field and the version of that file to be merged in the adjacent **Version** field.
File 2	Type the name of the second file you want to merge, or click … to select a file. If you specify the same file in the **File 1** and **File 2** fields without specifying a version, then **File 1** refers to the copy currently open in the Editor, while **File 2** refers to the file on disk.
Base	Type the name of the file from which the other two files, **File 1** and **File 2**, are derived, or click … to select a file. If you are only merging two files, leave this field blank.
Automatic three file merge	Select this box if you want the Editor to attempt to resolve three-file merges without prompting you. Note that even with this option selected, the Editor prompts you if it encounters a conflict that it cannot resolve. Clear this box if you want to manually review every proposed merge.
Merge	Click **Merge** to begin the merge. The two-file **Merge** dialog box will open, or, if you specified a file in the **Base** field, the three-file **Merge** dialog box will open. See “Merging Two Files” on page 94 or “Merging Three Files” on page 96.

Merging Two Files

To merge two files:

1. Select merge criteria in the **Choose files to merge** dialog box (see “Merging Files” on page 93) and click **Merge**. An Editor window appears for each of the two files you specified, as well as an extra **Result** window that displays results of the merge. The **Status box** in the lower left corner of each window identifies which file is in each window.

In addition to the Editor windows, the two-file **Merge** dialog box will open:



The Editor will pause at each difference between the files and highlight the text that is different.

2. Use the following buttons in the two-file **Merge** dialog box to control the merge results:

File 1	Copies the selected text from **File 1** into the **Result** window.
File 2	Copies the selected text from **File 2** into the **Result** window.
Both	The first time you click this button, the dialog box **Configure change bars for this merge session** appears (see "Configure Change Bars for This Merge Session" on page 98). The next time you click this button, the last values entered are used.
Skip	Finds the next difference without adding the current difference to the file.
Custom Merge Both	Performs the same action as the **Both** button, except that you can modify the changes in a temporary window before merging them into the new file.
Help	Opens MULTI's online help for the **Merge** dialog box.
Change Bars	Changes the settings for the **Both** button. When you click this button, it opens the same dialog box that appears the first time you click the **Both** button (see "Configure Change Bars for This Merge Session" on page 98).
Cancel	Aborts the merge, closing all merge windows.

The results of each merge selection will be copied to the **Result** window. You can also manually cut and paste text into the **Result** window.

3. When the merge is complete, a **Save** dialog box opens so you can save the **Result** file.

After you save the results, the other Editor windows close. If you save the **Result** file with the same name as one of the original files, any Editor windows still open on that file will be updated with the merged results.

Merging Three Files

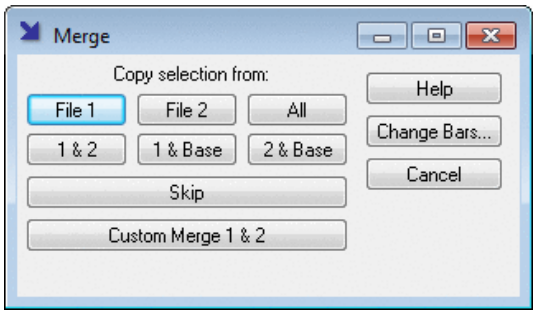
When you merge three files, one file is considered the **Base** file from which the other two are derived. With this assumption, the Editor is usually able to merge without asking you for information, using the following rules:

- If a difference exists between the two source files, and one is the same as the **Base** file, then the Editor uses the one that is different from the **Base** file.
- If both source files differ from the **Base** file, but are the same as each other, then the Editor uses the new text from either source file.
- If all three files are different, a conflicting change was made and the Editor has to ask which change to use. In this case, it is likely that you will have to merge the change manually.

To merge three files:

1. Select merge criteria in the **Choose files to merge** dialog box (see "Merging Files" on page 93) and click **Merge**. An Editor window appears for each of the three files you specified, as well as an extra **Result** window that displays results of the merge. The **Status box** in the lower left corner of each window identifies which file is in each window.

   In addition to the Editor windows, the three-file **Merge** dialog box will open.



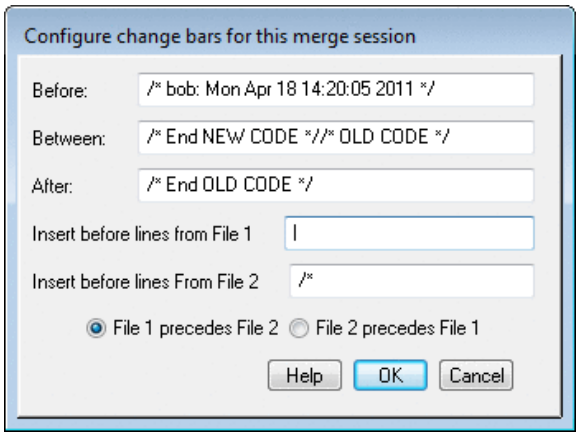
   The Editor will pause at each difference between the files and highlight the text that is different.

2. Use the following buttons in the three-file **Merge** dialog box to control the merge results:

Button	Meaning
File 1	Copies the selected text from **File 1** into the **Result** window.
File 2	Copies the selected text from **File 2** into the **Result** window.
All	Copies the selected text from all three files. The first time you click this, the dialog box **Configure change bars for this merge session** appears (see "Configure Change Bars for This Merge Session" on page 98). The next time you click this button, the last values entered will be used.
1 & 2	Merges the selections from **File 1** and **File 2**. The first time you click this, the dialog box **Configure change bars for this merge session** appears (see "Configure Change Bars for This Merge Session" on page 98). The next time you click this button, the last values entered will be used.
1 & Base	Functions the same as the **1 & 2** button, except it merges the selections from **File 1** and the **Base** file.
2 & Base	Functions the same as the **1 & 2** button, except it merges the selections from **File 2** and the **Base** file.
Skip	Finds the next difference without adding the current difference to the results file.
Custom Merge 1 & 2	Performs the same action as the **1 & 2** button, except that you can modify the changes in a temporary file before merging them into the new file.
Help	Opens MULTI's online help for the **Merge** dialog box.
Change Bars	Changes the settings for the **1 & 2**, **1 & Base**, **2 & Base**, and **All** buttons. This button opens the same dialog box that appears the first time you click any of those buttons (see "Configure Change Bars for This Merge Session" on page 98).
Cancel	Aborts the merge, closing all merge windows.

Configure Change Bars for This Merge Session

The dialog box **Configure change bars for this merge session** asks you how you want to merge multiple selections (with comments in front, between, or after them; with change bars around them; in what order; and so forth).

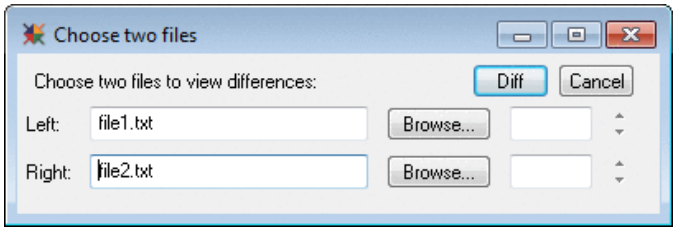


This dialog box is accessible from the **Merge** dialog box (see "Merging Two Files" on page 94 or "Merging Three Files" on page 96).

Comparing Files

You can compare files without merging them. To compare two files, do the following:

1. Select **Tools → Diff Files**. The **Choose two files** dialog box will open:



2. In the **Left** field, specify the ***filename*** and ***version*** of the first file you want to compare. Click the up or down arrows to increment or decrement the version number. If you do not specify a version, the Editor assumes you mean the current version.

3. In the **Right** field, specify the ***filename*** and ***version*** you want to compare to the first file. Click the up or down arrows to increment or decrement the version number. If you do not specify a version, the Editor assumes you mean the current version.
4. Click **Diff**.

The Editor opens a **Diff Viewer** that shows the differences between the two specified versions. For more information, see "The Diff Viewer" on page 121.

Chapter 5

Integrating MULTI with a Version Control System

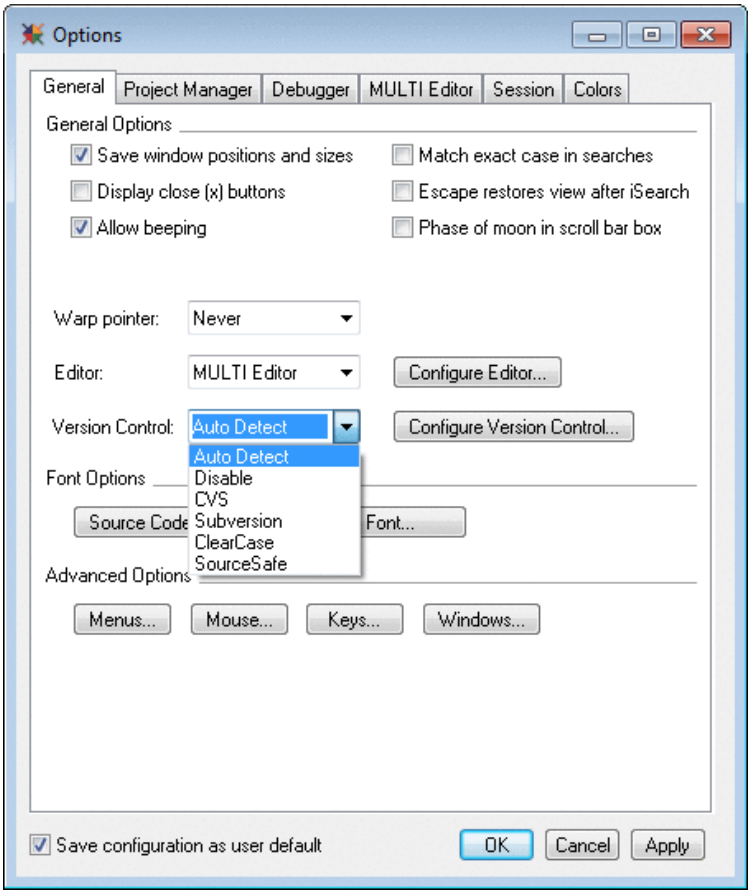
Contents

You can integrate the MULTI IDE with the ClearCase, CVS, SourceSafe, or Subversion version control system. This chapter describes general procedures for enabling and configuring a version control system with MULTI. It also provides specific instructions regarding each of the supported version control systems.

Configuring Version Control in MULTI

MULTI's support for version control is enabled by default and will attempt to automatically detect which version control system is being used. To configure MULTI's version control support, perform the following steps:

1. Open the **Options** window:
    - In the Editor, Checkout Browser, Debugger or Launcher, select **Config → Options**; or
    - In the Project Manager, select **Tools → Options**.
2. Select the **General** tab of the **Options** window.
3. In the **Version Control** drop-down list, select a version control system.



The available options are:

- **Auto Detect** — Causes MULTI to automatically detect the version control system being used. This is the default setting, and should only be changed if MULTI does not integrate correctly with your version control system.
- **Disable** — Disables MULTI's version control integration.
- **CVS** — Configures MULTI to integrate with CVS. For detailed information, see “Integrating with CVS” on page 105.
- **Subversion** — Configures MULTI to integrate with Subversion. For detailed information, see “Integrating with Subversion” on page 108.
- **ClearCase** — Configures MULTI to integrate with the Rational ClearCase version control system. For detailed information, see “Integrating with ClearCase” on page 104.

- **SourceSafe** (Windows only) — Configures MULTI to integrate with the Microsoft SourceSafe version control system. For detailed information, see “Integrating with SourceSafe” on page 105.

4. Click the **Configure Version Control** button to open a dialog box that will prompt you to enter settings that are specific to the version control system you have selected. After you have entered the applicable settings, click **OK** in the dialog box.
5. Click **OK** in the **Options** window. For information about saving your changes, see “Saving Configuration Settings” on page 134.

Note

You may need to restart any Editors that you have open before the version control configuration changes take effect.

Integrating with Third-Party Version Control Systems

The following sections describe how to integrate with third-party version control systems supported by MULTI.

Integrating with ClearCase

If you use ClearCase, the program **cleartool** should exist in your path. If it does not, or if your ClearCase program uses a filename other than **cleartool** you should configure your ClearCase options to set the path to the ClearCase executable (see “Configuring Version Control in MULTI” on page 102). On Windows, the default location is **C:\Program Files\Rational\ClearCase\bin\cleartool**. On Linux/Solaris, the default location is **/usr/atria/bin/cleartool**.

The following features and issues are specific to ClearCase:

- **Show History** starts the ClearCase history browser.
- **Revert To History** and **Revert To Date** are not available.
- **Show View** is added to the Editor **Version** menu on Linux/Solaris hosts. (See “Working with Views (Linux/Solaris only)” on page 105).
- There is no **Checkout Browser** support for ClearCase.
- Only dynamic views are supported. (Snapshot views are not.)

Working with Views (Linux/Solaris only)

If you are going to set a view, it must be set before MULTI is started. There is no way to set or change the view once MULTI has been started. To see your current view, choose **Version → Show View** from the Editor. This will display the working directory view and the set view. The working directory view is also displayed next to the filename being edited at the top of the editor pane.

If it is necessary to work with two different views, set a view, start the Editor, and then set the next view and start another Editor.

Integrating with CVS

If you use CVS (Concurrent Version Systems), the program **cvs** should exist in your path. If it does not, or if your CVS program uses a filename other than **cvs**, configure your CVS options to set the path to the CVS executable (see "Configuring Version Control in MULTI" on page 102).

The following features and issues are specific to CVS:

- The **Checkout Browser** is supported with CVS. For more information, see "The Checkout Browser" on page 114.
- The History Browser is supported with CVS. For more information, see "The History Browser" on page 120.
- Version control integration may not function optimally in a Cygwin environment. For more information, see "Using Subversion or CVS in a Cygwin Environment (Windows)" on page 109.

Integrating with SourceSafe

Note

The SourceSafe integration is only available on Windows hosts.

If you use SourceSafe, the program **ss.exe** should exist in your path. If it does not, or if your SourceSafe program uses a filename other than **ss.exe** you should configure your SourceSafe options to set the path to the SourceSafe executable (see

"Configuring Version Control in MULTI" on page 102). The default location used is **C:\Program Files\Microsoft Visual Studio\VSS\win32\ss.exe**.

One advantage of this integration is that several different databases can be used simultaneously. The user can edit files from two different databases at the same time. The integration requires some setup steps to indicate what database is being used.

The following features and issues are specific to SourceSafe:

- The **Checkout Browser** is supported with SourceSafe. For more information, see "The Checkout Browser" on page 114.
- The History Browser is supported with SourceSafe. For more information, see "The History Browser" on page 120.

VSS Database Structure Assumptions

The following assumptions are made about the structure of the Visual Source Safe (VSS) database.

A working directory is defined. This should be defined using the **Visual SourceSafe Explorer**, which comes with the installation of VSS.

The directory structure in the working directory mirrors the directory structure of the database. For example: If there is a database with the following structure:

```
$/
 |_hello
  |_hello.c
```

and if the working directory of **$/ is C:\ssafedir**, then the working directory of the hello project is assumed to be **C:\ssafedir\hello**.

Most of the version control operations (such as **Check Out**, **Place Under VC**) assume read/write access permissions. However, you can view files read only.

Required Setup Steps

1. It is necessary to specify the database working folder location, otherwise known as the root of the checkout. It is also necessary to specify what database is going to be used. The are two ways to specify these parameters.
   a. The fist way to configure these parameters is through the GUI.
      i. Select the **Config → Options** available in most MULTI GUIs.
      ii. Select the **General** tab and then choose **SourceSafe** from the **Version Control** drop-down list.
      iii. Click the **Configure Version Control** button and enter the path to the root of the checkout and the directory path of the **srcsafe.ini** file for the database being used. Ask your administrator for the location of this file.
   b. The second way to configure these parameters is to create a **.ssdir** file at the root of each database checkout. This file should contain a single line with the directory path to the **srcsafe.ini** file for that particular database. For the example in the previous section it would be necessary to place a **.ssdir** file in the directory **C:\ssafedir**. The contents of the file would look similar to:

      ```
      C:\Program Files\Microsoft Visual Studio\VSS
      ```

      Ask your administrator for the location or determine the location by using the **Open SourceSafe Database** option in the **Visual SourceSafe Explorer**. This is a one time setup step required for each database checkout you want to use the version control integration with.

      It is necessary to use this method if the auto detection option is enabled. Auto detection works by locating and reading the **.ssdir** file.
2. Set the `SSUSER` environment variable. Set `SSUSER` to your SourceSafe username. This is necessary to avoid queries for your username.
3. Set the `SSPWD` environment variable. Set `SSPWD` to the SourceSafe password that corresponds to the `SSUSER` environment variable. This is necessary to avoid queries for your password.

Using the Integration

To create a new project in the database, simply create a new directory in the appropriate place in the working directory and start checking in files. With the first checked in file, a new project will be created by that name.

Integrating with Subversion

Integration with Subversion 1.4.x, 1.5.x, and 1.6.x is supported with MULTI. If you use Subversion, the program **svn** should exist in your path. If it does not, or if your Subversion program uses a filename other than **svn**, configure your Subversion options to set the path to the Subversion executable. For information about how to do this, see "Configuring Version Control in MULTI" on page 102.

The following features and issues are specific to Subversion:

- The **Checkout Browser** is supported with Subversion. For more information, see "The Checkout Browser" on page 114.
- The History Browser is supported with Subversion. In addition to the normal History Browser functions, the comment area located at the bottom of the window displays commit information related to the selected file. Namely, if another file or files were committed at the same time as the selected file, the History Browser displays these additional filenames. This information can be useful if you want to see what other files contain related changes.

  The History Browser precedes each additional filename with a letter indicating the action that was taken when the file was committed. Possible letters and their meanings follow.

  - **A** — The file was added to the repository.
  - **D** — The file was deleted from the repository.
  - **M** — The file in the repository was modified.

  For more information, see "The History Browser" on page 120.
- Version control integration may not function optimally in a Cygwin environment. For more information, see "Using Subversion or CVS in a Cygwin Environment (Windows)" on page 109.

Troubleshooting

Using Subversion or CVS in a Cygwin Environment (Windows)

If you use Cygwin as your primary shell, you may encounter problems when trying to perform Subversion or CVS version control operations from the MULTI tools. By default, Cygwin installs its own versions of **svn.exe** and **cvs.exe**, which are heavily modified to work within the Cygwin environment. Additionally, Cygwin modifies your PATH environment variable so that a search for **cvs.exe** or **svn.exe** first finds Cygwin's copies. By default, MULTI is configured to search your PATH and use the first **cvs** or **svn** executable it finds. To force use of the correct executable, we recommend that you configure MULTI to reference the full path of the non-Cygwin **cvs.exe** or **svn.exe**. To do so, follow the steps listed in “Configuring Version Control in MULTI” on page 102. You can enter the full path to the executable in the **CVS Configuration** or **Subversion Configuration** dialog box that opens when you perform step 4.

Chapter 6

Using MULTI's Version Control Tools and Capabilities

Contents

The MULTI Editor provides access to common version control operations, such as checking files in and out and viewing version history. Additionally, the MULTI IDE includes three graphical tools dedicated to displaying information about files under version control:

- The **Checkout Browser** — Provides a graphical view of the files in your checkout and easy access to version control operations. For more information, see "The Checkout Browser" on page 114.
- The **History Browser** — Displays the complete revision history of any file under version control. For more information, see "The History Browser" on page 120.
- The **Diff Viewer** — Compares two ASCII files (typically different revisions of the same file) and highlights differences between them. For more information, see "The Diff Viewer" on page 121.

Note

The term *repository* is used throughout this chapter to mean the central store of version control information for the version control system in use. Different version control systems may use different terms, for example, in SourceSafe the repository is called a *database*.

Using Version Control with the Editor

The MULTI Editor provides access to common version control operations, as explained in the following sections. For a comprehensive list of the version control operations you can perform from the Editor, see "The Version Menu" on page 288.

Automatic Checkout

If you enable the **Automatic Checkout** option, the MULTI Editor will automatically check out a file when you start editing it. In most version control systems, files that have not been checked out are read-only, which prevents you from making changes to them. CVS and Subversion are exceptions to this rule because they allow multiple users to edit the same file simultaneously and then they attempt to merge the changes.

To configure the Editor to automatically check out files when you modify them:

1. In the Editor, select the **Config → Options**. In the Project Manager, select **Tools → Options**.
2. Select the **General** tab.
3. Click the **Configure Version Control** button and check the **Automatic Checkout** option if available (see "Version Control Configuration Options" on page 184). This box may not be available for certain version control systems. For example, in CVS a file is always checked out so there is no option to enable or disable **Automatic Checkout**.

Note

To control **Automatic Checkout** on a per-file basis, select **Version → Auto Checkout** in the Editor.

Show Last Edit

To show the most recent edit made to a portion of a file:

1. In the Editor, select the portion of the file you want to examine.
2. Select **Version → Show Last Edit**.

   This finds the last version of the current file in which the selected text changed (or the entire file, if no text is selected) and displays the difference in the Diff Viewer. For information about the Diff Viewer, see "The Diff Viewer" on page 121. If the selection has never changed, a dialog stating this will be displayed.

   This command is only available if the file is under a version control system (such as CVS, ClearCase, SourceSafe, and Subversion) that supports this feature. This command is also available if the file has been locally modified, in which case the Diff Viewer will display the difference between the local file and the repository version of the file.

Note

Show Last Edit does not detect deletions. Because lines that were deleted in past versions cannot be selected, the **Show Last Edit** menu item does not show deletions as the most recent change.

Revert to a Previous Version of a File

There are three ways to specify the version of a file to which you want to revert:

- To select the version to revert to from a list of all versions of the file:
  1. Select **Version → Revert to History**.
  2. A History Browser will open. You can right-click a version in the browser window and select **Revert to Version** (see "The History Browser" on page 120).
- To revert to a version checked in on a specific date:
  1. Select **Version → Revert to Date**.
  2. A dialog box will open where you can enter the date of the appropriate version.
- To revert to a specific version number:
  1. Select **Version → Revert to Version**.
  2. A dialog box will open where you can enter the appropriate version number.

The Checkout Browser

The **Checkout Browser** is designed to be used with CVS, SourceSafe, or Subversion to give you a graphical view of your checkout and the status of files in the repository. While the **History Browser** (see "The History Browser" on page 120) is designed to give you detailed version information about a specific file, the **Checkout Browser** gives you general information about every file in your checkout, and provides access to more detailed information about any file within the checkout. The **Checkout Browser** also allows you to manipulate the files in your checkout. For example, you can select files in the **Checkout Browser** that have been modified, compare those files using the **Diff Viewer**, then commit those files to the repository.

The basic modes of operation for the **Checkout Browser** are:

- Creating a new checkout (CVS only)
- Modifying an existing checkout (CVS only)
- Scanning an existing checkout

The following sections provide more information.

Starting the Checkout Browser

You can start the **Checkout Browser** any of the following ways:

- From the Launcher, click the **Checkout Browser** button (), or select **Components → Open Checkout Browser**.
- On the command line, enter **mcobrowse.exe** (Windows) or **mcobrowse** (Linux/Solaris).
- From the **History Browser**, select **File → Checkout Browser**.

Creating or Modifying a Checkout (CVS only)

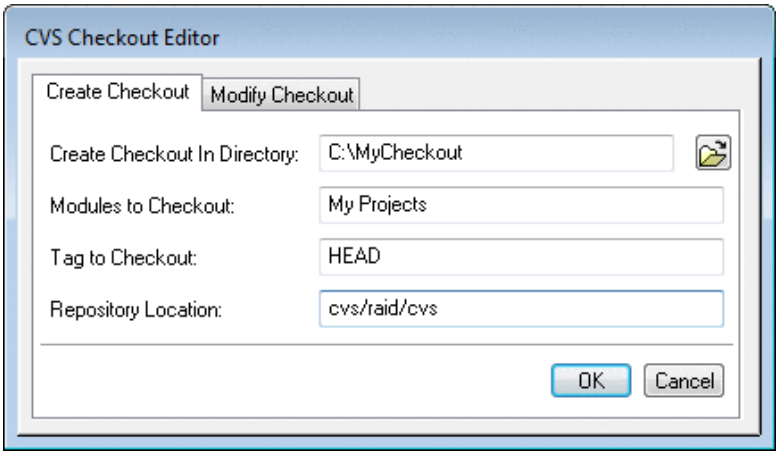
The **Checkout Browser** provides the capability to create or modify an entire CVS checkout with the **CVS Checkout Editor**.

To open the **CVS Checkout Editor**, select **File → CVS Checkout Editor** from the **Checkout Browser**.

The **CVS Checkout Editor** has two modes of operation, one for creating a new checkout and one for modifying an existing checkout.

To create a new checkout:

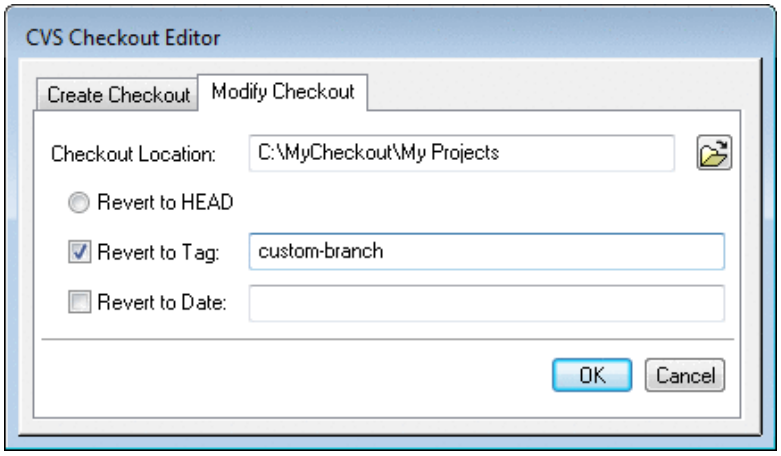
1. Select the **Create Checkout** tab.



2. Fill in the required fields:
   - **Create Checkout In Directory** — Enter the destination directory, which is where the checkout will be created. If this directory does not exist, but its parent does, the directory will be created automatically.
   - **Modules to Checkout** — Enter a space-separated list that specifies what should be checked out. You can enter filenames, directories, and/or modules as defined on the CVS server.
   - **Tag to Checkout** — Enter the tag to use when creating the checkout.
   - **Repository Location** — Enter the location of the repository. By default, the repository location is set to whatever is in the `$CVSROOT` environment variable.
3. Click **OK** to create the checkout.

To modify an existing checkout:

1. Select the **Modify Checkout** tab.



2. Enter the directory of the checkout to be modified in the **Checkout Location** text field. This may be a subdirectory of the root of the checkout.
3. Select either **Revert to HEAD** or one or both of **Revert to Tag** and **Revert to Date**:
   - **Revert to HEAD** — Select this option to reset all sticky tags. (Selecting this radio button clears the **Revert to Tag** and **Revert to Date** check boxes.)

- **Revert to Tag** — Select the check box, then enter the tag of the checkout to revert to in the text field. (Selecting this check box clears the **Revert to HEAD** radio button.)
- **Revert to Date** — Select the check box, then enter the date of the checkout to revert to in the text field. CVS supports many different date formats. Example date formats are `2006-09-24` and `24 Sep 2006`. (Selecting this check box clears the **Revert to HEAD** radio button.)

Note

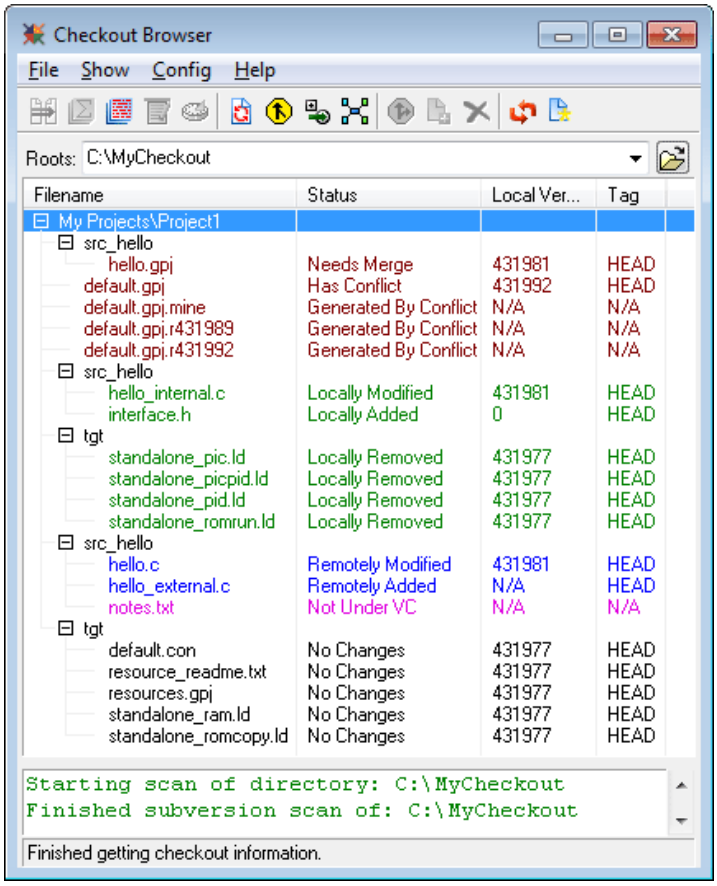
If you specify both a tag and a date, CVS sets the sticky tag. It also sets the version back to the specified date in that tagged branch, but does not set the sticky date.

4. Click **OK** to modify the checkout.

Scanning a Checkout

Scanning loads the information about an existing checkout or part of a checkout into the Checkout Browser. To scan a preexisting checkout:

1. Set the **Roots** field. The **Roots** field indicates what directories will be scanned and displayed in the browser. You can use any of the following methods to select what will be displayed:
   - Enter a directory in **Roots**. When using CVS or Subversion, it is possible to supply a comma-separated list of directories.
   - Use the **Roots** drop-down list to select from directories that have previously been displayed in the **Checkout Browser**.
   - Click  to browse for the correct folder.
2. Press **Enter** after entering or selecting a directory in the **Roots** field, or select **File → Full Rescan**.
3. The **Checkout Browser** will scan the selected directories and display the results of the scan.



Note

If one checkout contains another, and you scan the containing checkout, the Checkout Browser only displays results for the containing checkout. To display results for the contained checkout, you must scan it directly.

The Checkout Browser GUI

For information about the Checkout Browser's menus, toolbar buttons, columns, and status pane, see Chapter 12, “Version Control Tools GUI Reference” on page 307.

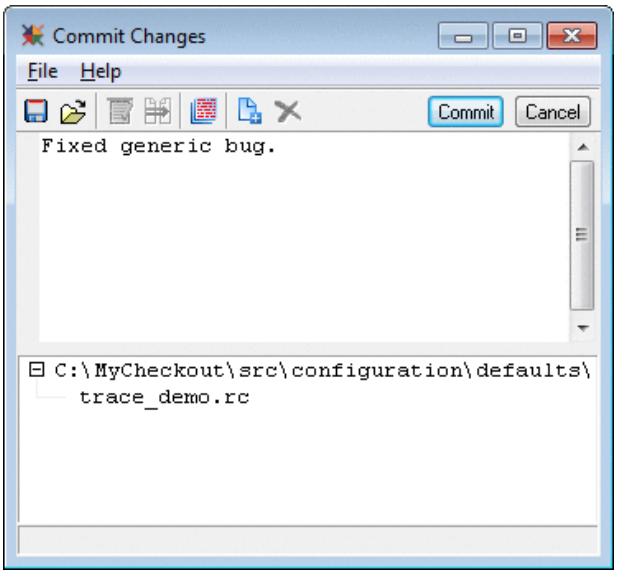
Features and Issues Specific to CVS

There are some limitations in the **Checkout Browser** when you use it with CVS. These limitations are:

- Updating the entire checkout (or a subdirectory) automatically uses the **-Pd** option to pull in new directories from the repository and prune empty directories from the checkout.
- Directories that have been added to the repository do not display after a **Rescan** although they will be displayed after an **Update**. This is because the **Checkout Browser** cannot determine whether the new directories are empty, and will be pruned with the next update.

The Commit Changes Dialog Box

The **Commit Changes** dialog box allows you to specify a log message when committing one or more files. The dialog box also gives you the ability to manipulate which files are committed and to see the changes in those files. A sample **Commit Changes** dialog box follows.



The **Commit Changes** dialog box opens when you try to commit one or more files via the **Checkout Browser** or the MULTI Editor. To commit files, do one of the following:

- In the **Checkout Browser**, right-click a locally modified file or a selection of locally modified files, and select **Commit**.
- In the MULTI Editor, select **Version → Check In** or **Version → Commit** (the option varies depending on your version control system).

When the **Commit Changes** dialog box initially opens, the bottom pane contains a list of files to commit. Depending on the specifics of your version control system and its configuration, the text field at the top of the dialog box may contain a template for a commit message. Simply enter a commit message and click the **Commit** button to commit the selected files. If the commit operation fails, the dialog box is not dismissed, giving you the opportunity to address whatever issue caused the failure without losing your commit message.

For information about the menu entries and buttons in the **Commit Changes** dialog box, see "The Commit Changes Dialog Box" on page 315.

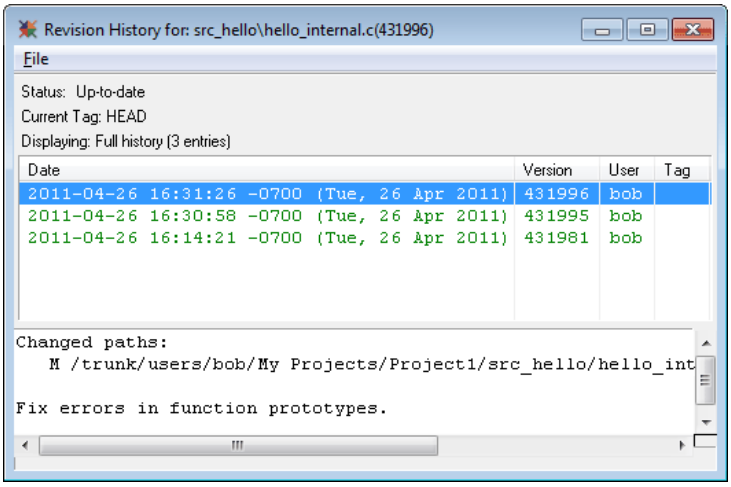
The History Browser

The **History Browser** allows you to examine all versions of a single file that exist in your version control system. As you scroll through the versions of the file, you can view the check in comments associated with those versions. You can also use the **History Browser** to compare versions or revert to a previous version.

To start the **History Browser**, do one of the following:

- In the Editor, select **Version → Show History**.
- In the **Checkout Browser**, click the **Show History** button ().
- You can open the **History Browser** as a stand-alone application by starting the MULTI Editor with the **-hb *filename*** option. For example, to start a **History Browser** that lists the version history of the source files **sample.cc**, enter:

  ```
  me -hb sample.cc
  ```



Tip

To view version changes that occurred after the **History Browser** was opened, select **File → Refresh History**.

For information about menu entries in the **History Browser**, see “History Browser Menus” on page 316. For information about other components of the window, see “The History Browser Window” on page 318.

The Diff Viewer

The **Diff Viewer** graphically displays differences between two ASCII files, whether they are different files or different versions of the same file.

Note

The **Diff Viewer** cannot open files larger than 2 GB in size, and it may not be able to open large files that are smaller than 2 GB.

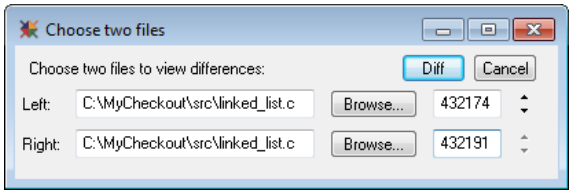
Starting the Diff Viewer

The following list describes the ways in which you can open the **Diff Viewer**:

- MULTI automatically opens the **Diff Viewer** whenever you choose to compare two file versions in the **History Browser** or **Checkout Browser** (see “The History Browser” on page 120 and “The Checkout Browser” on page 114).

- The **Diff Viewer** is a stand-alone tool that you can open from the command line with one of the following executables:
  - Windows — **diffview.exe**
  - Linux/Solaris — **diffview**

  For required and optional command line options, see "Starting the Diff Viewer from the Command Line" on page 122.
- In the Debugger command pane, enter the **diff** command.
- In the Editor, select **Tools → Diff Files** (see "The Tools Menu" on page 287). The **Choose two files** dialog box opens:



  Select filenames and versions to compare, then click **Diff**. The **Diff Viewer** opens on the specified files or file versions. For more information, see "Using the Diff Viewer" on page 125.

Starting the Diff Viewer from the Command Line

To start the **Diff Viewer** as a stand-alone program, run the **diffview** executable from the command line.

- The syntax for comparing two files on disk is:

  diffview [*options*] *file1 file2*
- The syntax for comparing two versions of a file under CVS is:

  diffview [*options*] [**-r** *rev1* | **-D** *date1*] [**-r** *rev2* | **-D** *date2*] *file*
- The syntax for comparing two versions of a file under Subversion is:

  diffview [*options*] [**-r** *rev1*[:*rev2*]] *file1* [*file2*]...

The **diffview** command accepts the following options.

Note

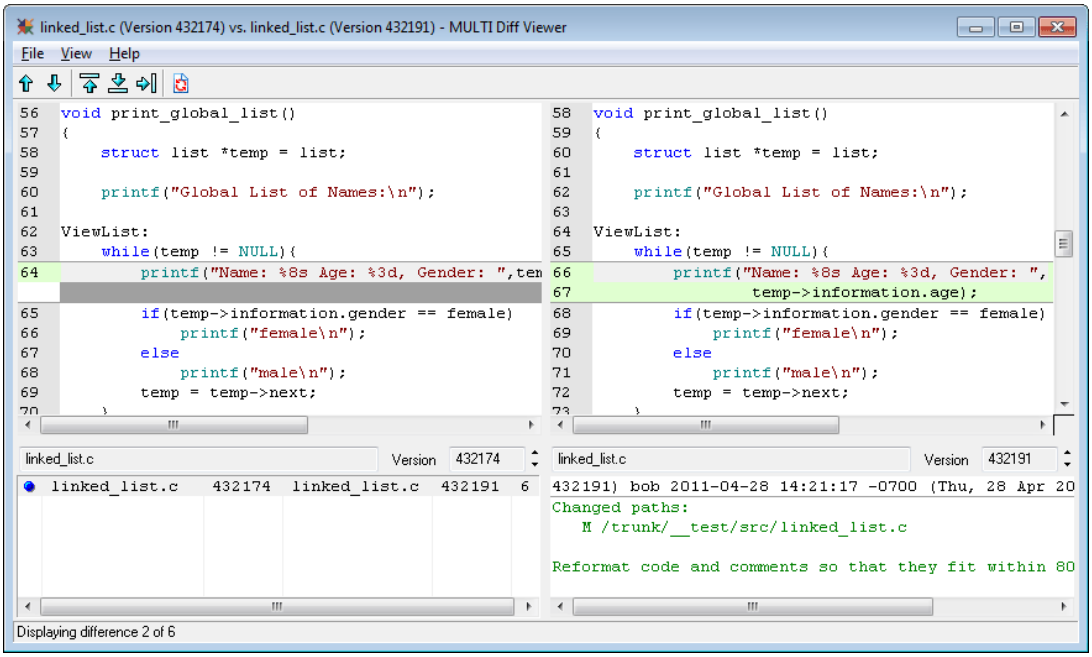
In this table, the term *whitespace* refers to space and tab characters. It does not refer to newline characters.

-add Adds the files or file versions to the pane in the lower-left corner of the existing **Diff Viewer**, but does not display them. If a **Diff Viewer** is not already open, this option opens one and displays the diff.
-b Ignores differences in the amounts of whitespace when displaying differences. For more information, see the description of **Ignore Whitespace Amount** in "Diff Viewer Menus" on page 319. See also **-lang=c** and **-w**.
-h, **--help** (Linux/Solaris only) Displays information about **diffview** command options.
-i Ignores differences in case.
-ignore_hex_numbers Ignores differences in hexadecimal numbers.
-ignore_numbers Ignores differences in decimal numbers.
-intraline Displays differences within lines. See also **-nointraline**.
-intraline_lineup Displays differences within lines column by column, not allowing insertions or deletions. See also **-nointraline_lineup**.
-intraline_tokens Displays differences within lines word by word (default). See also **-nointraline_tokens**.

-lang=c Ignores whitespace using heuristic C tokenization. For more information, see the description of **Ignore Whitespace for C** in “Diff Viewer Menus” on page 319. See also **-b** and **-w**.
-local Diffs a list of files against their local versions.
-new, **-noreuse** Opens a new Diff Viewer window. See also **-reuse**.
-nointraline Does not display differences within lines. See also **-intraline**.
-nointraline_lineup Displays differences within lines, allowing insertions or deletions (default). See also **-intraline_lineup**.
-nointraline_tokens Displays differences within lines character by character. See also **-intraline_tokens**.
-reuse Reuses an existing **Diff Viewer** (default). If no **Diff Viewer** is running, a new one opens. See also **-new**, **-noreuse**.
-w Ignores all whitespace. For more information, see the description of **Ignore All Whitespace** in “Diff Viewer Menus” on page 319. See also **-b** and **-lang=c**.

Using the Diff Viewer

The **Diff Viewer** contains the following features:



- The main panes of the **Diff Viewer** display the pair of files or file versions that are being compared. Differences are highlighted in the control area color, while the current selection is highlighted in the highlight color.
- The status bar displays the current diff number and total number of diffs.
- The pane in the lower-right corner displays the version control comments associated with the file displayed in the right-hand pane. This pane is not present if you are displaying local changes or if the file is not under version control.
- The pane in the lower-left corner contains a list of all the file or file-version pairs currently available for diffing in the **Diff Viewer**. The columns in this pane display the following information (from left to right):
    - The first column displays a blue dot next to the current file or file-version pair. The **Reload** ( ) button can be used to reload the current diff from the files on disk.
    - The second column shows the file that is displayed in the left pane when the row is selected, and the third column shows the version of that file. If the file is on disk, this field displays **disk**; if the file has been locally

modified, it displays **local (*version number*)** to indicate the version of the file that it is based on.

- The fourth column shows the file that is displayed in the right pane when the row is selected, and the fifth column shows the version of that file. If the file is on disk, this field displays **disk**; if the file has been locally modified, it displays **local (*version number*)**.
- The last column displays the total number of differences. A question mark (`?`) in this column indicates that the number of differences has not been calculated. To improve performance, the number of differences is calculated only when the diff for that row is displayed.

Right-click in the lower-left pane to access a shortcut menu that contains the following operations:

- **Show Diff** — Displays the highlighted diff view in the main panes of the **Diff Viewer**. The blue dot appears next to the file/file-version pair you selected.
- **Remove Diff** — Removes the highlighted diff view from the pane in the lower-left corner, and from the main panes of the **Diff Viewer**, if it is currently displayed.

Navigating the Diff Viewer

The **Diff Viewer** provides several ways to navigate through files:

- The  button and the minus (`-`) keyboard key jump back to the previous difference between the two displayed files/file versions.
- The  button and the plus (`+`) keyboard key jump down to the next difference.
- The  button jumps to the first difference.
- The  button jumps to the last difference.
- The  button and the asterisk (`*`) keyboard key reposition the pane to display the current difference (this is useful if you lose your place while scrolling).
- **Ctrl**+**F** and **Ctrl**+**B** incrementally search forward or backward through the displayed files/file versions (see “Incremental Searching” on page 83). If there is no current selection, the **Diff Viewer** begins its search at the top left corner of the visible pane.

- **Ctrl+G** goes to a line number (see "Go To a Line Quickly" on page 82).

Diff Viewer Menus

For information about menu items available in the **Diff Viewer**, see "Diff Viewer Menus" on page 319.

Part II

Configuring the MULTI IDE

Chapter 7

Configuring and Customizing MULTI

Contents

This chapter explains how you can configure and customize the MULTI environment to suit your specific needs and preferences. It includes information about:

- Setting configuration options that affect how various components of the MULTI IDE function (see "Setting Configuration Options" on page 132).
- Using scripts and/or macros to automate tasks and create custom functionality (see "Creating Custom Functionality Using Scripts and Macros" on page 141).
- Customizing the appearance and behavior of MULTI's graphical components (see "Customizing the GUI" on page 143).

Setting Configuration Options

MULTI contains a number of configuration options that control how various components of the MULTI IDE function. The following sections explain how you can change the settings of these options via the **Options** window, the **configure** command, and configuration files.

Using the Options Window

To set or edit configuration options via the **Options** window, do one of the following:

- From the Launcher, Debugger, or Editor, select **Config → Options**.
- From the Project Manager, select **Tools → Options**.

The **Options** window opens, allowing you to edit the values of most of the configuration options that affect MULTI. For information about each configuration option and its available settings, see Chapter 8, "Configuration Options" on page 175.

By default, any changes you make in the **Options** window are remembered across MULTI sessions. If you want changes to affect only the current MULTI session, clear the check box labeled **Save configuration as user default** (located in the bottom-left corner of the **Options** window).

Using the configure Command

You can set or edit configuration options from the MULTI Debugger command pane by issuing the **configure** command. Configuration settings entered or modified

with the **configure** command are automatically reflected in the **Options** window the next time it is opened.

The **configure** command may take any of the following forms. Note that you should not use this command while the **Options** window is open.

- **configure** *config_option=value*
- **configure** *config_option*: *value*
- **configure** *config_option value*

where *config_option* identifies which option you are setting and *value* is an appropriate setting for that option. For example:

```
> configure tabsize=9
> configure moon: On
> configure linenumbermode: Both
> configure prompt "Your wish is my command> "
```

If *value* is a Boolean, you may also enter:

- **configure** *config_option*

to toggle the Boolean value. MULTI indicates the new value. For example:

```
> configure closebuttonontitlebar
Toggling closebuttonontitlebar: new value is Off
```

To display a list of all the *config_options* that can be set, enter:

- **configure** ?

For a complete description of every configuration option and the available settings for each, see Chapter 8, “Configuration Options” on page 175.

By default, changes you make to configuration settings via the **configure** command only affect the current MULTI session. For information about saving configuration modifications, see the next section.

Saving Configuration Settings

Changes you make to configuration settings via the **Options** window or the **configure** command are saved to configuration files (***.cfg**). You can save changes to the user configuration file, the global configuration file, an application-specific configuration override file, or a file you specify and that you can manually load in future sessions. The following sections describe how to save configuration settings to each of these files.

Saving to the User Configuration File

To save configuration changes to the user configuration file so that they are automatically loaded every time you start a MULTI application, do one of the following:

- From most MULTI applications, select **Config → Save Configuration as User Default**. (From the Project Manager, select **Tools → Configuration → Save Configuration as User Default**.)
- Enter the **saveconfig** command (see "General Configuration Commands" in Chapter 6, "Configuration Command Reference" in the *MULTI: Debugging Command Reference* book).

Configuration settings modified from the **Options** window are saved to the user configuration file by default. For more information, see "Using the Options Window" on page 132.

For more information about the user configuration file, see "The User Configuration File" on page 138.

Saving to the Global Configuration File

To save your current settings to the global configuration file so that they are loaded for every user of the installation:

1. Enter the **saveconfigtofile** command in the Debugger command pane, or select **Config → Save Configuration As** from most MULTI applications (from the Project Manager, select **Tools → Configuration → Save Configuration As**). For more information about the **saveconfigtofile** command, see "General

Configuration Commands" in Chapter 6, "Configuration Command Reference" in the *MULTI: Debugging Command Reference* book.

2. The **Save Configuration to what file?** dialog box opens. Save the file as:

   - Windows — ***ide_install_dir*\config\ghs.cfg**
   - Linux/Solaris — ***ide_install_dir*/config/ghs.cfg**

For more information about the global configuration file, see "The Global Configuration File" on page 137.

Saving to an Application-Specific Configuration Override File

To save your current settings to an application-specific override file so that the global configuration file is overridden for a particular MULTI application:

1. Enter the **saveconfigtofile** command in the Debugger command pane, or select **Config → Save Configuration As** from most MULTI applications (from the Project Manager, select **Tools → Configuration → Save Configuration As**). For more information about the **saveconfigtofile** command, see "General Configuration Commands" in Chapter 6, "Configuration Command Reference" in the *MULTI: Debugging Command Reference* book.
2. The **Save Configuration to what file?** dialog box opens. Save the file as:
   - Windows — ***ide_install_dir*\config\override*application_name*.cfg**
   - Linux/Solaris — ***ide_install_dir*/config/override/*application_name*.cfg**

   where `application_name` is the name of the application whose configuration you want to override. For example, to override the global configuration of the MULTI Editor, name the file **me.cfg**. For a list of application names, see "The MULTI Integrated Development Environment" in Chapter 1, "Introduction" in the *MULTI: Getting Started* book.

To save your current settings to an application-specific override file so that the user configuration file is overridden for a particular MULTI application, follow the preceding steps, but save the file as:

- Windows 7/Vista — ***user_dir*\AppData\Roaming\GHS\v6\override*application_name*.cfg**

- Windows XP — ***user_dir*\Application Data\GHS\v6\override*application_name*.cfg**
- Linux/Solaris — ***user_dir*/.ghs/v6/override/*application_name*.cfg**

Saving to a User-Specified Configuration File

To save your current settings to a configuration file that is not automatically loaded at startup but that you can manually load to configure new or existing MULTI sessions, perform the following steps:

1. Enter the **saveconfigtofile** command in the Debugger command pane, or select **Config → Save Configuration As** from most MULTI applications (from the Project Manager, select **Tools → Configuration → Save Configuration As**). For more information about the **saveconfigtofile** command, see "General Configuration Commands" in Chapter 6, "Configuration Command Reference" in the *MULTI: Debugging Command Reference* book.
2. In the **Save Configuration to what file?** dialog box, specify a path and filename for the configuration file.

See also "Loading Configuration Files" on page 140.

Propagating Configuration Settings

In general, if you change the setting of a configuration option but do not save the configuration as the default, only the MULTI application from which the option was changed is aware of the new setting. If you do save the configuration as the default, however, all MULTI applications launched after the change are also notified of the new setting.

A limited number of configuration options do not follow this general rule. Changing the setting of one of these options causes all MULTI applications opened during the current session to be notified of the change—whether or not you saved the configuration as the default. These options are noted where applicable.

To be sure that a new option setting takes effect in all MULTI applications, save the configuration as the default and close and restart the MULTI IDE.

Creating and Editing Configuration Files

As an alternative to setting configuration options via the **Options** window or the **configure** command, you can manually create or edit configuration files (***.cfg**) using the MULTI Editor or another text editor. There are several types of configuration files:

- Global configuration file (see "The Global Configuration File" on page 137)
- User configuration file (see "The User Configuration File" on page 138)
- Application-specific configuration override files (see "Application-Specific Configuration Override Files" on page 138)
- Command line configuration file (see "The Command Line Configuration File" on page 139)

If conflicting settings exist among these configuration files, the order in which the files are loaded determines which settings take effect. For more information, see "Loading Configuration Files" on page 140.

For information about the format of configuration files, see "Configuration File Format" on page 139.

The Global Configuration File

Changes you make to the global configuration file are read each time a MULTI application starts and affect every user of the installation. This file is useful for setting up a common environment for a group of users working with the MULTI IDE. The global configuration file should be located at:

- Windows — ***ide_install_dir*\config\ghs.cfg**
- Linux/Solaris — ***ide_install_dir*/config/ghs.cfg**

If **ghs.cfg** is not found, ***application_name*.cfg** is used (if it exists), where *`application_name`* is a replaceable for a MULTI stand-alone application. For example, **multi.cfg** is the **.cfg** file for the MULTI Debugger, **me.cfg** is the **.cfg** file for the MULTI Editor, etc.

The global configuration file can be overridden on a per-application basis. For more information, see "Application-Specific Configuration Override Files" on page 138.

The User Configuration File

Changes you make to the user configuration file are read each time a MULTI application starts and only affect the user specified in `user_dir` (see below). This file is useful for setting up the environment required by a single user working with the MULTI IDE. The user configuration file should be located at:

- Windows 7/Vista — ***user_dir*\AppData\Roaming\GHS\v6\ghs.cfg**
- Windows XP — ***user_dir*\Application Data\GHS\v6\ghs.cfg**
- Linux/Solaris — ***user_dir*/.ghs/v6/ghs.cfg**

If **ghs.cfg** is not found, ***application_name*.cfg** is used (if it exists), where `application_name` is a replaceable for a MULTI stand-alone application. For example, **multi.cfg** is the **.cfg** file for the MULTI Debugger, **me.cfg** is the **.cfg** file for the MULTI Editor, etc.

The user configuration file can be overridden on a per-application basis. For more information, see "Application-Specific Configuration Override Files" on page 138.

Application-Specific Configuration Override Files

Both the global configuration file and the user configuration file can be overridden on a per-application basis.

To override the global configuration file for a particular MULTI application, create a configuration file located in:

- Windows — ***ide_install_dir*\config\override**
- Linux/Solaris — ***ide_install_dir*/config/override**

The override configuration file should be named ***application_name*.cfg**, where `application_name` is the name of the application whose configuration you want to override. For example, to override the global configuration of the MULTI Editor, name the file **me.cfg**.

To override the user configuration file for a particular application, create a configuration file named ***application_name*.cfg** in:

- Windows 7/Vista — ***user_dir*\AppData\Roaming\GHS\v6\override**

- Windows XP — ***user_dir*\Application Data\GHS\v6\override**
- Linux/Solaris — ***user_dir*/.ghs/v6/override**

The Command Line Configuration File

You can specify a configuration file (***.cfg**) from the command line with the **-configure *filename*** option (see "Using the Command Line" in Chapter 1, "Introduction" in the *MULTI: Debugging* book).

Configuration File Format

Each line in a configuration file should either:

- Begin with a pound sign (`#`) as the first non-whitespace character and contain a comment (these lines are ignored)
- Be in the format

  `config_option``:`*`value`*

  where *`config_option`* identifies which option you are setting and *`value`* is an appropriate setting for that option. Appropriate values for *`config_option`* and *`value`* are the same as those used with the **configure** command (see "Using the configure Command" on page 132), but you do not need to include the **configure** command in **.cfg** files.

  For a complete description of every configuration option and the available settings for each, see Chapter 8, "Configuration Options" on page 175.

Example 7.1. Configuration File Contents

```
# This is a comment that's ignored.
TabSize: 8
Background: #ffffff
Moon: On
LineNumberMode: Both
Prompt: "> "
# The following blank line is ignored as well:

AlwaysUseMeToFixBuildErrors: Off
```

Loading Configuration Files

On startup, MULTI applications automatically initialize configuration options from the following configuration files (***.cfg**), if they exist, in the following order:

1. Global configuration file (If a global configuration override file exists for a particular application, the application loads it instead of the global configuration file. See "The Global Configuration File" on page 137 and "Application-Specific Configuration Override Files" on page 138.)
2. User configuration file (If a user configuration override file exists for a particular application, the application loads it instead of the user configuration file. See "The User Configuration File" on page 138 and "Application-Specific Configuration Override Files" on page 138.)
3. The configuration file, if any, specified on the command line with the **-configure** option (See "The Command Line Configuration File" on page 139.)

If conflicting settings exist among these configuration files, the settings in the last file loaded override settings specified in previously loaded files.

Note

If you start the MULTI Editor from the MULTI Debugger, the Editor inherits the settings that were initialized when the Debugger was started. As a result, any configuration override files that exist to overwrite settings for the Editor will not take effect.

Script files can also affect configuration options. For more information, see "Using Script Files" on page 142.

To load a predefined configuration file during a MULTI session, do one of the following:

- Choose **Config → Load Configuration** (from the Project Manager, **Tools → Configuration → Load Configuration**), and select the configuration file you want to load.
- In the Debugger command pane, use the **configurefile** command (see "General Configuration Commands" in Chapter 6, "Configuration Command Reference" in the *MULTI: Debugging Command Reference* book).

Clearing Configuration Settings

To permanently delete your user configuration file, which contains configuration options you have saved, do one of the following:

- Select **Config → Clear User Default Configuration** from most MULTI applications (from the Project Manager, select **Tools → Configuration → Clear User Default Configuration**).
- Enter the **clearconfig** command in the Debugger command pane (see "General Configuration Commands" in Chapter 6, "Configuration Command Reference" in the *MULTI: Debugging Command Reference* book).
- Delete the following file:
  - Windows 7/Vista — ***user_dir*\AppData\Roaming\GHS\v6\ghs.cfg**
  - Windows XP — ***user_dir*\Application Data\GHS\v6\ghs.cfg**
  - Linux/Solaris — ***user_dir*/.ghs/v6/ghs.cfg**

Future sessions will use MULTI's default settings unless you create a new user configuration file or a user configuration override file (operates on a per-application basis) or specify another configuration file for the session. For more information about the user configuration file, see "The User Configuration File" on page 138.

Creating Custom Functionality Using Scripts and Macros

You can use scripts and/or macros to customize MULTI to simplify and automate tasks. A script is a list of commands and expressions in a file that MULTI reads and executes as if they were entered individually in the Debugger command pane.

Scripts are powerful tools for automating both common tasks and regression testing. A script file could, for example, compare a program variable to a constant value and then perform some action based on that result. Scripts are also useful for configuring your target board. You could also write a command script that executes parts of your program and then checks to see whether the process is running correctly. Such a script would be useful for verifying that the process still runs as expected after you make changes. For complete details on how to write, use, and debug scripts, see Chapter 1, "Using MULTI Scripts" in the *MULTI: Scripting* book.

Using Script Files

Upon startup, or upon loading a program, the MULTI Debugger can execute script files. Script files run after configuration files are loaded (see "Loading Configuration Files" on page 140). The Debugger runs the following scripts, if they exist, in the following order:

1. Global script file
2. User script file
3. The script file, if any, specified on the command line with the **-rc** option
4. Program script file

The global script file, user script file, and command line script file are executed when the first MULTI Debugger window appears. All Debugger windows launched in a debugging session share the same Debugger environment. The program script file is executed every time the corresponding program is loaded into a Debugger window.

The following table provides details about these script files.

Global script file • Windows — ***ide_install_dir*\config\multi.rc** • Linux/Solaris — ***ide_install_dir*/config/multi.rc** This file is useful for commands that need to run once when any person in a user group starts the Debugger for the first time in a debugging session.
User script file • Windows 7/Vista — ***user_dir*\AppData\Roaming\GHS\v6\multi.rc** • Windows XP — ***user_dir*\Application Data\GHS\v6\multi.rc** • Linux/Solaris — ***user_dir*/.ghs/v6/multi.rc** This file is useful for commands that need to run once when a single user debugs any program.
Command line script file You can specify a script file from the command line with the **-rc** option (see Appendix C, "Command Line Reference" in the *MULTI: Debugging* book). For example: `multi my_prog -rc my_script`

Program script file

- Windows — ***executable_dir\executable_name*.rc**
- Linux/Solaris — ***executable_dir*/*executable_name*.rc**

The program script file is executed every time the corresponding program is loaded into a Debugger window (that is, with every new Debugger window opened on the program, or with every program reload in the current Debugger, but not with every process restart).

If you load a new program into an existing Debugger window, MULTI will automatically execute the commands in the script file of the new program (if any), but it does not clean up the effects of the script file of the old program (if any).

For more information about writing scripts to include in your startup files, see Chapter 1, "Using MULTI Scripts" in the *MULTI: Scripting* book.

Customizing the GUI

MULTI allows you to customize buttons, menus, keystroke combinations, and mouse clicks in the Debugger, Project Manager, Editor, and some other MULTI applications. You can remove these GUI elements, add new GUI elements, or change the commands that are executed when the GUI element is used.

You can define customized GUI elements using the following methods:

- Enter configuration commands in the Debugger command pane. For proper syntax, refer to the commands that appear in the following sections.
- Use the **Options** window to access and change configuration options. To open the **Options** window, select **Config → Options**.
- Write a script file that contains customization commands. The following table lists the commands used to configure each GUI element. Be aware that the script files that MULTI loads automatically (global, user, and program script files) are loaded only when the Debugger is launched, so do not put customizations that apply to the Project Manager and Editor into these startup script files; use a configuration file instead. For more information about writing a script, see Chapter 1, "Using MULTI Scripts" in the *MULTI: Scripting* book.

Changes must be be saved in a configuration file if you want the configuration available for later use (see "Saving Configuration Settings" on page 134). Once you have defined a configuration file or script file that customizes the GUI, you can

have MULTI load that file. For more information about these and other files that MULTI uses at startup, see "Creating and Editing Configuration Files" on page 137 and "Using Script Files" on page 142.

To customize a particular GUI element, use the following as a guide:

Debugger buttons • Debugger command pane — To customize buttons within the current MULTI session, use the **debugbutton** command. For information about the **debugbutton** command, see "Configuring and Customizing Toolbar Buttons" on page 145. • GUI — To customize buttons across MULTI sessions, select **Config → Customize Toolbar** from the Debugger menu bar. For information about how to use the window that appears, see "Adding, Removing, and Rearranging Toolbar Buttons" in Appendix A, "Debugger GUI Reference" in the *MULTI: Debugging* book.
Editor buttons • Debugger command pane — Use the **editbutton** command (see "Configuring and Customizing Toolbar Buttons" on page 145). • GUI — Select **Config → Options**+**MULTI Editor**+**Configure Editor Buttons** (see "The MULTI Editor Options Tab" on page 221)
GUI menus • Debugger command pane — Use the **menu** command (see "Configuring and Customizing Menus" on page 148). • GUI — Select **Config → Customize Menus**.
Keyboard shortcuts • Debugger command pane — Use the **keybind** command (see "Customizing Keys and Mouse Behavior" on page 153). • GUI — Select **Config → Options**+**General**+**Keys** (see "The General Options Tab" on page 177).
Mouse actions • Debugger command pane — Use the **mouse** command (see "Customizing Keys and Mouse Behavior" on page 153). • GUI — Select **Config → Options**+**General**+**Mouse** (see "The General Options Tab" on page 177).

Configuring and Customizing Toolbar Buttons

You can customize Debugger or Editor toolbar buttons by using the following Debugger commands:

debugbutton [*num*] [*name*] [c=*command*] [i=*iconname*] [h=*helpstring*] [t=*tooltip*]

editbutton [*num*] [*name*] [c=*command*] [i=*iconname*] [h=*helpstring*] [t=*tooltip*]

Adds, deletes, or configures a button on the Debugger's (**debugbutton**) or Editor's (**editbutton**) toolbar, where:

- *num* is the number that MULTI assigns to the button.
- *name* is the name of the button.
- *command* is the command executed when the button is pressed. You may use semicolons to execute multiple commands. For example:

  ```
  > debugbutton printxy c="print x;print y"
  ```

  This command creates a button named **printxy** that, when clicked, prints out the values of the variables `x` and `y` in the current context.
- *iconname* is the name of the button's icon, which may be:
  - A built-in icon. To obtain the names of built-in icons and to see what the icons look like, select **Config → Options+MULTI Editor+Configure Editor Buttons**. Alternatively, select **Config → Customize Toolbar** from the Debugger, and click **Add Custom Button** () in the window that appears.
  - The filename of an icon you have created yourself. If only a partial path is given, it is assumed to be relative to the MULTI IDE installation directory. For information about creating icons, see “Creating and Working with Icons” on page 147.
- *helpstring* is the text that appears in the status bar when the cursor moves over the button.
- *tooltip* is the text that appears when the cursor hovers over the button. If you do not specify a tooltip, the name of the button is used.

The arguments *name*, *command*, *iconname*, *helpstring*, and *tooltip* must be entered as either single words or quoted strings of the form:

```
"This is a quoted string."
"These are quotes \" \" within a quoted string."
```

You cannot save **debugbutton** changes across MULTI sessions. As a result, this command is generally only useful for the creation or modification of buttons executed by scripts. For information about how to change the Debugger toolbar permanently, see "Adding, Removing, and Rearranging Toolbar Buttons" in Appendix A, "Debugger GUI Reference" in the *MULTI: Debugging* book.

To save **editbutton** changes across MULTI sessions, select **Config → Save Configuration as User Default**.

Note: The **debugbutton** command does not affect customizations you make through the **Customize Toolbar** window. For information about this window, see "Adding, Removing, and Rearranging Toolbar Buttons" in Appendix A, "Debugger GUI Reference" in the *MULTI: Debugging* book.

The following special forms of **debugbutton** and **editbutton** can be used in the Debugger command pane:

- **debugbutton** or **editbutton**— Lists defined Debugger or Editor buttons. The **debugbutton** command does not list the **Close Debugger** button or the separator before it; these cannot be modified or deleted.
- **debugbutton 0** or **editbutton 0** — Deletes all Debugger or Editor buttons, with the exception that the **debugbutton 0** command does not delete the **Close Debugger** button or the separator before it.
- **debugbutton *num*** or **editbutton *num*** — Deletes the Debugger or Editor button numbered *num*. You can view button numbers by entering **debugbutton** or **editbutton** in the command pane.
- **debugbutton *name* [...]** or **editbutton *name* [...]** — If no optional arguments are specified, deletes the button named *name*. If optional arguments are specified and if a button named *name* exists, the button is replaced. Otherwise a new button named *name* is added to the end of the Debugger or Editor toolbar. You can view button names by entering **debugbutton** or **editbutton** in the command pane.

- **debugbutton *num name* [...]** or **editbutton *num name* [...]** — Replaces the button numbered *num* with a new button named *name*. You can view button numbers by entering **debugbutton** or **editbutton** in the command pane.

Creating and Working with Icons

In addition to numerous built-in icons, MULTI can use graphic files you provide for icons. If you create your own graphic file, it must be in the Windows Bitmap format (**.bmp**). If you plan to use the bitmap in a Linux/Solaris environment, it must additionally be in an uncompressed 16- or 256-color format. An easy way to create such a bitmap is to use the Paint accessory in Microsoft Windows. Select **16 Color Bitmap** or **256 Color Bitmap** for the **Save as type** in the **Save As** dialog box.

- The built-in icons in MULTI are 16 pixels wide by 16 pixels tall, so your buttons will look best if you also use this size for your custom bitmaps.
- By default, the color light gray in your custom icons will become transparent.

On Linux/Solaris, you can specify color translations for your custom icon by appending a string of the form "*oldcolor1=newcolor1*&*oldcolor2=newcolor2*" with a question mark to the end of your bitmap filename. For example:

```
> debugbutton Hello c="echo hello" \
continued> i="/home/user/hello.bmp?black=fg&dkgray=shadow&white=highlight" \
continued> h="Say hello"
```

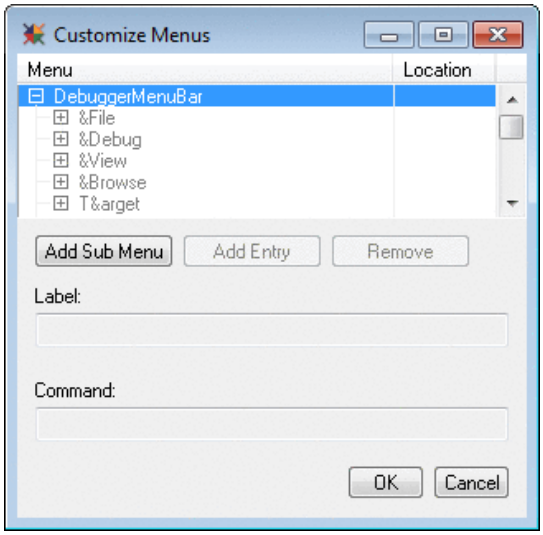
The above example would replace black pixels in **hello.bmp** with the current foreground color, dark gray pixels with the current shadow color, and white pixels with the current highlight color. You can use the following values for *oldcolor* and *newcolor*.

Oldcolor (RGB values)	Possible values for newcolor
white (255,255,255)	white [default] highlight
ltgray (192,192,192)	transparent [default] ltgray
dkgray (128,128,128)	dkgray [default] shadow

Oldcolor (RGB values)	Possible values for newcolor
`black` (`0,0,0`)	`black` [default] `fg`

Configuring and Customizing Menus

MULTI comes with a set of predefined menus for the Debugger, Editor, and Project Manager, but you can create new menus or add to existing menus from within any of these tools by using the **Customize Menus** window.



The **Customize Menus** window allows you to add new menus to the end of the menu bar; add new submenus and menu items to the end of existing menus; and remove menus, submenus, and menu items that you have added.

To access this window from the Debugger or Editor:

- Select **Config → Customize Menus**.
- Use the Debugger or Editor **customizemenus** command.

To access this window from the Project Manager:

- Select **Tools → Customize Menus**.

After you have opened the **Customize Menus** window, you can add a new menu to the end of a tool's menu bar:

1. Select the menu bar you want to add the menu to: the **DebuggerMenuBar**, **EditorMenuBar**, or **ProjectManagerMenuBar**.
2. Click **Add Sub Menu**.
3. Enter a menu name in the **Label** text field.

Adding a submenu is very similar to adding a menu: instead of selecting ***tool*MenuBar**, select the menu you want to add the submenu to. Then follow steps 2 through 3 above. MULTI adds the submenu to the end of the menu you selected.

To add a new menu item to the end of an existing menu or submenu:

1. Select the menu or submenu you want to add to.
2. Click **Add Entry**.
3. Enter a name for your menu item in the **Label** text field.
4. In the **Command** field, enter a valid command that you want to be executed whenever you select the menu item. If you are adding the menu item to:
   - The **DebuggerMenuBar** — Enter a MULTI Debugger command. See the *MULTI: Debugging Command Reference*.
   - The **EditorMenuBar** — Enter a MULTI Editor command. See Appendix B, “Editor Commands” on page 329.
   - The **ProjectManagerMenuBar** — Enter a MULTI Project Manager command. See the following table for a list of Project Manager commands.

ConnectByName connectName: "*connection_method_name*" Connects to the Connection Method `connection_method_name`.
DebugByName debugPath: "*filename*" Opens the executable file `filename` in the MULTI Debugger.
EditOtherByName editPath: "*filename*" Opens `filename` in your configured editor.

ExecuteCommandOnSelected commandSpec: "*command*" Executes the system command `command` on the file(s) selected in the Project Manager and directs output to the Project Manager **Status** pane. If more than one file is selected, `command` is run once for each file. By default, the full path of the selected file is appended to the end of `command`. To include the full path elsewhere (for example, in the middle of `command`), specify `%filename` in the command string. When `command` executes, `%filename` is replaced with the full path of the selected file.
ExecuteShellCommandOnSelected commandSpec: "*command*" Behaves the same as **ExecuteCommandOnSelected** (above) except that `command` is executed in a separate shell window and output is sent to the shell window instead of to the Project Manager **Status** pane.
LoadModuleByName modulePath: "*filename*" Downloads the object module `filename` to your run-mode target.
OpenProjectByName projectPath: "*filename*" Opens the project file `filename` in the Project Manager.

The label **local config** appears to the right of menus, submenus, or menu items you added locally. The label **site config** appears to the right of menus, submenus, or menu items that result from changes saved to a site-wide configuration directory.

Menus, submenus, and menu items that you add through the **Customize Menus** window are saved by default. To delete them, open the **Customize Menus** window, select the desired item, and click **Remove**.

The **Customize Menus** window does not allow you to rename default menus or menu items, nor does it allow you to change the command associated with a default menu item.

In addition to using the **Customize Menus** window, you can also configure menus by using the following methods:

- Enter the **menu** command along with appropriate arguments.
- Edit the **menu.odb** configuration file located in one of the following directories:
  - Windows 7/Vista — ***user_dir*\AppData\Roaming\GHS\v6**
  - Windows XP — ***user_dir*\Application Data\GHS\v6**
  - Linux/Solaris — ***user_dir*/.ghs/v6**

Note

Menu names are case-sensitive.

You can view and manipulate menus with the **menu** command.

menu Prints a list of all the currently defined menus.
menu *name* Prints the body of the menu named `name`. To view menu names, enter **menu**.
menu *name* { { *label cmd* } ... } Defines a menu that can be inserted into a menu bar or displayed by a MULTI button, mouse button, or key binding. The arguments in this command have the following meanings: `name` is the menu name that appears on the menu bar or at the top of the menu when it is opened. `label` is an entry in the menu. `cmd` is a command that executes when the associated `label` is selected. Menus can contain other menus by using the **->** command. For example, the menu `Main` defined below contains `RunCmds` as a submenu: `menu Main {{RunCmds -> RunCmds}{Up {E 1}}{Down {E -1}}{ToPC E}}` **Note**: To replace an existing menu, define a new menu with the same name.

To create a menu:

1. Enter the command **menu** followed by the name for the menu.
2. Create menu items by entering a label and an associated command enclosed in curly braces `{}`.
   - If one of the characters in a menu label is preceded with an ampersand (`&`), that character becomes a *hotkey* and will be underlined when the menu is displayed. The user can type that character to execute the associated command just as if they had clicked the label.
   - The `cmd` portion can contain its own subset of curly braces for commands that require them (such as **if**), but they must be paired correctly.
   - If `cmd` is a single command and that command is associated with a key binding, that key binding will be displayed to the right of `label` when the menu is displayed.
3. Enclose the entire body of the menu in curly braces `{}`.

The following example creates a menu named `RunCmds`:

```
menu RunCmds {{Step s}{Next S}{Run r}{Go c}{Return cU}}
```

Opening and Accessing Menus

You can access new menus in the following ways:

-> *name* Opens a menu named *`name`*. For example, to open the **Main** menu from the Debugger command pane, enter: `-> Main`
debugbutton *name* ***->****menu* Binds a menu named *`menu`* to the Debugger button named *`name`*. For example, the following command will create a button named **View** on the Debugger toolbar, which opens the **View** menu when it is clicked: `debugbutton View ->ViewMenu` This command is most useful when used in conjunction with the **menu** command to define your own menus. For information about the **menu** command, see "Configuring and Customizing Menus" on page 148. You cannot save **debugbutton** changes across MULTI sessions. As a result, this command is generally only useful for the creation or modification of buttons executed by scripts.
mouse *button_num**Click*click_num*[(AtOnce)][|*modifiers*]*@location*=***->****menu* Binds a menu to a mouse click. The keyword `Click` may be replaced by `Press` or `Either`. The following example command displays the **RunCmds** menu when the third mouse button is clicked: `mouse mouse3*Press1@All=->RunCmds` For more information about binding mouse clicks to commands, see "Customizing Mouse Behavior with the mouse Command" on page 155.

Customizing Keys and Mouse Behavior

You can customize Debugger and Editor key bindings and the behavior of mouse clicks by doing one of the following:

- Select **Config → Options** to open the **Options** window. Click the **General** tab, then click the **Keys** button to open the **Keyboard Commands** dialog box, or click the **Mouse** button to open the **Mouse Commands** dialog box. Make appropriate changes.
- In the Debugger command pane, enter the **keybind** or **mouse** command with appropriate options. For information about these commands, see the following sections.

Customizing Keys with the keybind Command

keybind

keybind *location*

keybind *key* [|*modifiers*] [@*location*] [=*command*]

This command binds a key to a command or displays key bindings, depending on the options given.

Entering this command with no arguments (the first command shown) displays key bindings that apply in all contexts (`location` specified as `All`). For information about `location`, see "Key and Mouse Locations" on page 157.

Entering the second command displays the current key bindings for a particular `location`. See "Key and Mouse Locations" on page 157.

The third command assigns an action to take when a key is pressed in the specified context. The arguments for this command have the following meanings:

- `key` is an identifier that specifies the keyboard key for which binding is active. This identifier may be either a single ASCII (or ISO8859) character or a quoted string containing the name of one of the keys on the keyboard, such as "`BACKSPACE`" or "`F3`." Characters needing more than one key press (besides the **Shift**, **Ctrl**, **Alt**, and **Meta** keys) cannot be used.

  - To obtain a list of all of the acceptable key names, type `keybind "????"`.
  - The `BACKSPACE` key is different from `h|Control` even though their ASCII representations are the same.
  - To specify the double quotation mark key, use a sequence of three double quotation marks in a row (`"""`).
- *`modifiers`* are other keys (**Shift**, **Ctrl**, **Alt**, and **Meta**) that may be used in combination with *`key`*. If a modifier is specified, the command runs only if that modifier is pressed at the same time as *`key`*. If more than one modifier is specified, they should be separated from each other and from *`key`* by vertical bars (`|`).
- *`location`* is the area of the window the cursor must be in for the key binding to be matched. If *`location`* is omitted, the default is `Command`. For more information, see "Key and Mouse Locations" on page 157.
- *`command`* is the command that will be executed upon the key press. For more information, see "Key and Mouse Command Special Sequences" on page 158.

If the *`key`*`[|`*`modifier`*`]@`*`location`* portion of the **keybind** command matches a previously defined binding, then the new definition replaces the old binding. If no command is specified in the new definition, then the old binding is deleted.

When a key is pressed in a window, MULTI searches for key bindings that match. There may be more than one, in which case MULTI chooses the one whose location is the most specific. If there are still several, then MULTI chooses one arbitrarily.

Example 7.2. keybind Command

With this command, MULTI evaluates and prints the selection when the first function key (**F1**) is pressed in the source pane or command pane:

```
> keybind "F1"@Command=print %s
```

With this command, the Debugger opens a Data Explorer that displays the current selection when the key combination **Ctrl**+**F1** is pressed:

```
> keybind "F1"|Control@All=view %s
```

With these commands, the MULTI Editor scrolls up and down by pages when **Ctrl**+**UpArrow** and **Ctrl**+**DownArrow** are pressed:

```
> keybind "Up"|Control@Edit=PageUp
> keybind "Down"|Control@Edit=PageDown
```

With this command, MULTI single-steps the process when **Ctrl**+**S** is pressed in the source pane or command pane:

```
> keybind "s"|Control@Command=S
```

Customizing Mouse Behavior with the mouse Command

mouse

mouse *location*

mouse *button_num* *Click*click_num* [(AtOnce)] [|*modifiers*] *@location=command*

This command defines the function of a mouse button or displays mouse bindings, depending on the options given.

Entering this command with no arguments (the first command shown) displays all current mouse bindings.

Entering the second command displays the current mouse bindings for a particular location. For information about *`location`*, see "Key and Mouse Locations" on page 157.

The third command assigns an action to a mouse button click. Note that the command arguments should not be separated by spaces. The arguments for this command have the following meanings:

- *`button_num`* represents the mouse button to be assigned. This can be the keyword `Any`, which matches any mouse button, or the word `mouse`, followed by a combination of digits between `1` and `5` which match the specified mouse button. For example, `mouse2` matches the second (usually the middle) mouse button, while `mouse13` matches both the first (usually the left) and the third (usually the right) buttons. Not all mice have five buttons. Commands assigned to non-existent buttons will never be matched.

- The keyword `Click` may be replaced by `Press`, which executes the command on the button press rather than the release, or by `Either`, which executes the command on both the press and release. A binding that contains `*Either1` is executed twice, once for the press of the mouse button, and once for the release.
- *`click_num`* specifies the number of times the mouse button must be released before the command is executed. This may be a number between `1` and `5`. A binding that contains `*Click3` would be executed upon the release of the specified button on a triple click. If the `*Click`*`click_num`* option is omitted, the binding matches the first release of the specified mouse button.
- The keyword `(AtOnce)` causes the command assigned to execute immediately rather than pausing to see if it is part of a click sequence. A binding that contains `*Press2` is executed only after the second press of a mouse button in a double-click, while `*Press2(AtOnce)` would be executed for the second mouse button press in a double-click, triple-click, quadruple-click, etc. This is acceptable behavior for many options, such as the standard selection clicks: one click sets the insertion point, two clicks selects the current word, three the line, and so forth. If `(AtOnce)` is not used, there is a slight delay when invoking single-click commands. This delay is specified by the **clickPause** configuration option.
- *`modifiers`* are other keys that must be held down at the same time the button is clicked. Valid *`modifiers`* are **Shift** and **Ctrl** (plus **Meta** for Linux/Solaris). Modifiers are preceded by a vertical bar (`|`), which separates them from each other and from the previous arguments. If more than one modifier is specified, all of the modifiers listed must be pressed simultaneously with the mouse click for the binding to be matched.
- *`location`* indicates the place within MULTI's windows the mouse must be for the binding to be matched. If *`location`* is omitted, the default is `Source`. For more information, see “Key and Mouse Locations” on page 157.
- *`command`* is the MULTI command that will be executed when the binding is matched. For more information, see “Key and Mouse Command Special Sequences” on page 158.

If the *`button_num`*`[*Click`*`click_num`*`][|`*`modifiers`*`][@`*`location`*`]` portion of a mouse binding matches a previously defined mouse binding, then the new binding replaces the old one. If no command is specified, then the old mouse binding is deleted.

When the mouse is clicked in a window, MULTI searches its list of mouse actions for a matching binding. If there is more than one that might match the event, then MULTI uses the one whose location is the most specific. If there are multiple bindings that match the most specific location, then MULTI chooses the one which is bound to the fewest number of different mouse buttons. If there are still several bindings, then MULTI chooses one of the bindings arbitrarily.

Example 7.3. Mouse Command

With this binding, the Debugger evaluates and prints the selection when you click the left mouse button once in the source pane.

```
Mouse1*Click1@OutputWindow=completeselection;echo "%s";examine %s
```

With this binding, the Debugger opens a Data Explorer displaying the current selection when you double-click the left mouse button in any window.

```
mouse mouse1*Click2@All=view %s
```

Key and Mouse Locations

The *`location`* argument for the **keybind** and **mouse** commands can be one of the following:

`All`	**keybind** — Any MULTI window except the Editor. **mouse** — Any MULTI window.
`InputWindow`	Any MULTI input interface such as the command pane.
`OutputWindow`	Any output-only window, such as the source pane or a monitor window.
`Command`	**keybind** — The command pane or source pane. **mouse** — The command pane.
`Source`	**mouse** only — The source pane.
`Monitor`	Anywhere in a monitor window except the title bar.
`Freeze`	Anywhere in the region indicating whether or not the window is frozen.
`Close`	The close button in the title bar.
`Edit`	Anywhere within an Editor.

Some of these locations implicitly include other locations. These locations are:

`All`	`InputWindow`, `OutputWindow`, and `View`
`InputWindow`	`Command`
`OutputWindow`	`Source` and `Monitor`

Key and Mouse Command Special Sequences

The *`command`* is any MULTI command to be executed when the key or mouse binding is matched. Several special sequences of characters in *`command`* will be replaced with information about MULTI's state when the action is performed. These sequences are not valid for key or mouse bindings in the Editor. The following are the special sequences for *`command`*:

`%s`	Replaced by the current selection.
`%p`	Replaced by the current selection if it exists, otherwise MULTI prompts for input.
`%P`	Always prompts for input.
`%w`	Replaced by a special number identifying the window to MULTI. In command synopses and MULTI documentation, this number is referred to as a *window identification number* or *wid*.
`%x`	Replaced by the `x` location in the window when pressing the button or mouse.
`%y`	Replaced by the `y` location in the window when pressing the button or mouse.
`%k`	(**keybind**) — Replaced by the ASCII expansion of the key. For the key labeled **a**, this is replaced with `"a"`. (**mouse**) — Replaced by the null string.
`%m`	(**keybind**) — Replaced by `Press` to indicate a key press triggered the action. (**mouse**) — Replaced by `Press` or `Release`, depending on whether the command was executed as a result of a mouse button press or a mouse button release.
`%%`	Replaced by `%`.

Inserting a Character Blocked By a Custom Key Binding

If you customize the Editor to run a command based on a single keystroke, you will not be able to directly insert the literal character of that keystroke into a file. For example, if you customize the key binding so that every time you press `d` the cursor

moves down one line, then you will not be able to type the literal letter `d` in a file. To enter the literal character `d` in your file, you would have to:

1. Press **Ctrl**+\ (the **Ctrl** key with the backslash "\" key).
2. Press the key for the character that you want to enter into the file.

Configuring Taskbar Organization

On Windows, MULTI windows are grouped under a single taskbar entry to free up the taskbar. You can configure MULTI to group windows under a system tray icon instead, or you can disable the taskbar organization feature altogether. Clicking either the taskbar entry or system tray icon provides access to all MULTI windows via a shortcut menu (described in the next section).

This feature is especially useful if you open large numbers of MULTI windows while you work.

Note

Taskbar organization is not supported on Linux/Solaris.

The two modes of taskbar organization are:

- Taskbar mode — [default] Adds an entry labeled **MULTI** to the Windows taskbar, and groups all MULTI windows under this entry.
- Tray icon mode — Adds a MULTI icon () to the system tray—the taskbar status area located at the far right side of the taskbar—and groups all MULTI windows under this icon. To activate the system tray icon, you can click it, or:
  1. Press the Windows key + **B**.
  2. Use the arrow keys to navigate the tray icons.
  3. Press **Enter** when the MULTI icon is selected.

To configure taskbar organization, perform the following steps:

1. Select **Config** → **Options** from a major MULTI tool such as the Launcher, Editor, or Debugger.
2. In the **Options** window that appears, click the **General** tab.

3. Click the **Windows** button located at the bottom of the tab.
4. Select **Taskbar Organizer** and click **OK**.
5. In the **Taskbar Organizer** dialog box that appears, adjust your configuration settings as desired. The **Mode** drop-down list controls whether taskbar mode is enabled, tray icon mode is enabled, or whether both modes are disabled. For detailed information about all of the configuration settings available in the dialog box, see "The Taskbar Organizer Dialog Box" on page 185.
6. Click **OK**.

Note

If the Taskbar Organizer is enabled (in either taskbar mode or tray icon mode), the Windows key + **M** key combination does not minimize MULTI windows. The Windows key + **D** key combination and the **Show Desktop** button both hide all windows, but MULTI windows may reappear when another application is brought to the front.

Taskbar Organizer Menu Options

The menu that appears when you click the **MULTI** taskbar entry or system tray icon allows you to display any window that is currently open in the MULTI IDE. The most recently used windows are displayed at the top of the menu, and all other windows are grouped into submenus according to their type. For example, at the top of the menu, you might see the recently accessed Debugger program **hello** followed by the Editor file **hello.c**. Under the separator bar, you would see your Debugger windows grouped under the **Debuggers** submenu and MULTI Editor windows grouped under the **Editors** submenu.

The menu also contains the following menu items:

- **Settings** — Opens the **Taskbar Organizer** dialog box. For detailed information about the configuration settings located in this dialog box, see "The Taskbar Organizer Dialog Box" on page 185.
- **Show All** — Displays MULTI IDE windows that were previously minimized.
- **Minimize All** — Minimizes all MULTI IDE windows.
- **Exit All** — Exits all running MULTI IDE processes. A dialog box asking you to confirm this action appears.

Note

In taskbar mode, clicking the **MULTI** taskbar entry when only a single window is open brings that window to the front. To access the menu while in taskbar mode, more than one window must be open.

Configuring Window Docking

MULTI includes configurable *window docking* options, which allow you to customize how multiple windows interact and are displayed on the screen. Window docking is supported in Windows and Linux/Solaris environments. For information that is specific to Linux/Solaris environments, see “Linux/Solaris Docking Limitations” on page 162.

The following two types of behavior are supported:

- Window alignment — Windows of the same application automatically snap together when they are brought near each other, and windows brought near the edge of your screen automatically snap to the edge of the screen. You can configure the distance at which a window snaps to another window or screen border. See **Docking Distance** in “Window Docking Global Options” on page 188.
- Window grouping — Windows of a similar type form groups when they are brought near each other. You can move, close, or minimize the entire group of windows by using the group title bar. Do not use the **Maximize** button on the group bar.

Tip

To see or configure the window types that group together, perform the following steps:

1. Select **Config → Options**.
2. Click the **General** tab.
3. Click the **Windows** button located at the bottom of the dialog box.
4. Windows only — Select **Window Docking** and click **OK**.
5. Click the **Application Options** tab.

For information about window docking options, see “The Window Docking Options Window” on page 187.

Linux/Solaris Docking Limitations

Due to the design of the X protocol, the window manager running has nearly absolute control over window position and size, and the application is reduced to a much less active role. Window docking attempts to give you the benefits of a window manager at the application level.

Some window managers, such as KDE, do not allow a window to be created smaller than a certain size. While you can still use window groups in these situations, the group bar takes up more space than usual.

Unless otherwise stated, the following X Window Managers support both window alignment and window grouping.

- afterSTEP
- Blackbox
- Desktop Window Manager (**dtwm**)
- FVWM, FVWM2, FVWM95
- Ice Window Manager (**icewm**)
- KDE Window Manager (**kwin**) — Window grouping is disabled by default because the KDE window manager does not allow windows to be created with a height smaller than 25 pixels. You can still use window grouping; however, the group bar takes up more space than usual.
- Metacity
- OpenLook Window Manager (**olwm**)
- Sawfish
- Tabbed Window Manager (**twm**)
- WindowMaker (**wmaker**)
- wm2 — Window grouping is not supported because wm2 windows do not use a horizontal title bar, which is required for window grouping.

The following X Window Managers do not work properly with window docking and are not supported. If you use one of these window managers, set Window Docking Options to **Disable All Window Management** (see "Window Docking Global Options" on page 188).

- PWM
- Ion

If your window manager is not named in either of the preceding lists, it has not been verified to work properly.

Configuring Window Focus

When MULTI launches a new window or dialog box, it is brought to the foreground and given input focus even when MULTI is not the current application. The appearance of some MULTI dialog boxes, such as the one indicating that an executable has been rebuilt, may interrupt a previous foreground application by taking focus away from it.

On Windows, perform the following steps to help prevent this:

1. Download and install Tweak UI from the Microsoft Web site [http://www.microsoft.com]. Note that Tweak UI is not available for Windows Vista.
2. Launch the **Tweak UI** window:
   - Windows XP — Select **Tweak UI** from the Start menu.
   - Earlier Windows versions — Select **Tweak UI** from the **Control Panel**.
3. In the **Tweak UI** window, expand **General** and select **Focus**.
4. Select **Prevent applications from stealing focus**.
5. Click **OK**.

On Linux/Solaris, window managers are solely responsible for maintaining window focus. Some window managers, such as KDE, have configurable window focus settings. However, adjusting such settings may prevent MULTI from bringing its windows to the foreground even when MULTI is the current application.

Configuring the Editor for a Programming Language

The MULTI Editor automatically configures itself based on the programming language of the source file that is currently being edited. For example, if you open a file **foo.c**, the Editor automatically identifies text enclosed in double quotes (`""`) as a string, completes certain words (such as language-specific keywords) as they are typed into the file, and automatically colors the code to make it more readable.

Two files are used to identify the programming language in a source file, color the programming language, and enable auto-completion:

- **index.gsc** — The index configuration file that the Editor uses to match the source file with the appropriate syntax definition file.
- ***language*.gsc** — The syntax definition file for a specific programming language. This file defines how the Editor should color the language and whether the Editor should auto-complete certain words as they are typed.

Adding Support for New Languages

You can create new syntax definition files for any language, for example you can add support for a proprietary scripting language. To implement support, you must create a syntax definition file for the language (for example, ***my_language.gsc***), and then create an entry in the **index.gsc** file for the new language.

Tip

MULTI's default index configuration file and syntax definition files include detailed comments. The easiest way to add a new language is to look at the default files, which are located in one of the following directories:

- Windows — ***ide_install_dir*\defaults\syntax_coloring**
- Linux/Solaris — ***ide_install_dir*/defaults/syntax_coloring**

The index.gsc Configuration File

When the Editor opens a file, it searches the **index.gsc** configuration file for the file's extension and uses it to locate the corresponding language syntax definition

file. The **index.gsc** configuration file is located in the **defaults/syntax_coloring** directory of your MULTI IDE installation.

Each entry defines the basic information about a language. The definition order determines how they will be displayed in the Editor's **View → Language** menu or submenu. For each language, the **index.gsc** file defines the following:

`Identifier`

A unique identifier for the name of the language. This identifier must correspond to the `name` in the language's syntax definition file (see "The language.gsc Syntax Definition Files" on page 166).

If the language's identifier contains any non-alphanumeric characters, enclose the entire identifier in quotes, for example: `"C++"`.

`extension`

Lists the file extensions of files that contain the language. If the Editor cannot match a language based on the source file's extension, or if the extension matches more than one entry in **index.gsc**, the Editor will use the definition of `first_line_pattern` to select the correct language. See the description of `first_line_pattern` below.

If identification of a language via `extension` and `first_line_pattern` fails and you have added `-*-`*`language`*`-*-` inside a comment on the first non-blank line of the file, the Editor uses the language specified. For example, if you enter:

```
// -*- c++ -*-
```

on the first line of the file, the Editor views the file as C++.

`description`

The name of the language as it will appear in the Editor's **View → Language** menu.

The `&` symbol indicates that the following key is a hot key for the menu item. For example, if you specify `description = "Per&l"`, the letter `l` becomes the hot key.

`definition_file`

The language's syntax definition file. If an absolute path is not specified, the Editor will look for the syntax definition file in the **syntax_coloring** directory of your local or site-wide MULTI configuration directory. For more information, see "The language.gsc Syntax Definition Files" on page 166.

`hide`

You can determine whether the language appears in the Editor's **View → Language** menu.

To hide a language, enter `hide = true`. The default is `false`.

Although a hidden language will not appear in the menu, the Editor will still use it to color files written in the corresponding language.

`submenu`
To group languages into a submenu within the **View → Language** menu, enter:
`submenu = submenu_name`

`first_line_pattern` The regular expressions that may be used to identify the language by the source file's first non-blank line. See the description of `extension` above. Be sure to use a double escape character sequence (`\\`) when defining the regular expressions. Regular expression support is provided by the PCRE library package, which is open source software, written by Philip Hazel, and copyrighted by the University of Cambridge, England. It can be downloaded from the University of Cambridge FTP server [ftp://ftp.csx.cam.ac.uk/pub/software/programming/pcre/].

Example 7.4. The index.gsc Entry

The entry in the index configuration file for the Perl language might look like:

```
Perl {
    extension = {"pl"}
    description = "Per&l"
    definition_file = "perl.gsc"
    first_line_pattern = {"^[\\s]*#![\\w /\\\\]*[/\\\\]perl"}
}
```

To visually separate languages when they are listed in the **View → Language** menu, define a unique identifier with a description of `"\x01"`. An example follows.

```
"GHS-Sep1" {
    description = "\x01"
}
```

Each separator should be given a unique name.

The language.gsc Syntax Definition Files

The MULTI Editor uses ***language*.gsc** syntax definition files to determine items such as the display color of language elements, case sensitivity, and auto-completion. Each language has its own syntax definition file located in the **syntax_coloring** directory. The definitions for some languages are split into multiple files, in which

case the ***language*.gsc** file can use `%include "filename.gsc"` statements to include definitions from other syntax definition files.

Each of the following elements can be defined in the syntax definition file. For each element that can be defined, you can specify a color by using the syntax `color = "#hex_value"`, where *hex_value* is a six-digit hexadecimal value in RGB format. For example, `#FF0000` specifies the color red. If you do not specify a color for a particular element, the applicable color in the **Config → Options → Colors** tab is used.

`general`

The following entries define general settings for the language:

- `name =` The identifier for the language. This identifier must match the `Identifier` listed in the **index.gsc** file (see "The index.gsc Configuration File" on page 164).
- `description =` The name of the language as it will appear in the Editor's **View → Language** menu.
- `extension =` File extensions associated with this language.
- `case_sensitive =` Defines whether the language is case-sensitive. For a case-insensitive language, enter `case_sensitive = false`. The default is `true`.
- `pascal_style_priority =` (Boolean) In languages such as C/C++, comments, strings and characters receive higher priority than preprocessor statements; while other languages, such as Pascal, give higher priority to preprocessor statements. To assign priority to preprocessor statements, enter `pascal_style_priority = true`. The default is `false`.
- `separator =` Separators used to delimit syntax tokens.
- `escape =` Escape sequence leader.

For example:

```
name = "Pascal"
description = "Pascal"
extension = {"p", "pas", "h"}
case_sensitive = false
separator = "\\\"+-*/<=>:,;'\t()[]^%!~|& {}.@?"
escape = "\\"
```

`preprocessor`

Specifies preprocessor keywords. Limitations are:

- There can only be one non-alphabetic preprocessor lead character. Example lead characters include `%` and `#`.
- Semantics are C-like.

`keyword`

Defines a list of keywords, the display color for keywords, and/or whether keywords are auto-completed.

`line_comment`

Specifies line comment characters. Multiple line comment leaders can be defined, so an index number is used for each. For example:

```
1 = "//"
```

The following entry defines an attribute of `line_comment`:

- `span_line_by_escape =` Specifies whether `line_comment` spans multiple lines when the escape character defined in `general` (if any) appears at the end of the line(s). To prohibit `line_comment` from spanning multiple lines even when the escape character is used, enter `span_line_by_escape = false`. The default is `true`.

You can use special characters to identify the column position in a line. The `\x01` string matches the beginning of a line. This is similar to the regular expression `^`. The `\x02` string matches the end of a line. This is similar to the regular expression `$`.

`comment`

Specifies comment characters. Multiple comment characters can be defined, so an index number is used for each. For example:

```
1 { begin = "(*"; end = "*)" }
2 { begin = "{"; end = "}" }
```

`string`

Specifies string characters. Multiple string characters can be defined, so an index number is used for each. For example:

```
1 { begin = "'"; end = "'" }
```

`character`

Specifies constant characters. Multiple characters can be defined, so an index number is used for each. For example:

```
1 { begin = "\'"; end = "\'" }
```

`block`

Specifies a block. A block must contain a `begin` and an `end` string. The begin and end strings may not contain separators, as defined in the description of `general` (above).

You can use special characters to identify the column position in a line. The `\x01` string matches the beginning of a line. This is similar to the regular expression `^`. The `\x02` string matches the end of a line. This is similar to the regular expression `$`.

`integer`

The following entries define support for integers:

- `hex =` Specifies whether hex integers are supported. To support hex integers, enter `hex = true`. The default is `false`.
- `case_sensitive =` Specifies case sensitivity in integer suffixes. To make integer suffixes case-insensitive, enter: `case_sensitive = false`. The default is `true`.
- `decimal_suffix =` Specifies a list of suffixes for decimal integers.
- `hex_suffix =` Specifies a list of suffixes for hex integers.

`float`

The following entries can be made to define the display of numbers in floating point form.

- `scientific =` Specifies whether scientific format is supported. To use scientific format, enter `scientific = true`. The default is `false`.
- `hex_scientific =` Specifies whether hexadecimal scientific format is supported as in C99. To use the hexadecimal scientific format, enter `hex_scientific = true`. The default is `false`.
- `case_sensitive =` Specifies case sensitivity for the float suffix. The default is `true`. To override the default, enter `case_sensitive = false`
- `suffix =` Specifies a list of suffixes for the float.

`customized`

The following entries define the list of customized items (strings of text that are displayed in a customized color) for a language:

- `pattern += {"`*`string`*`"}` Defines a string to be displayed in the customized color. *`string`* may contain wildcards. `pattern += {"`*`string`*`"}` may be specified multiple times.
- `autocomplete =` Specifies whether any customized items not containing wildcards are auto-completed. The default is `true`. To override the default, enter `autocomplete = false`.

`autocomplete`
Defines the auto-complete behavior. For information, see “Configuring Editor Auto-Complete” on page 170.

Configuring Editor Auto-Complete

A language syntax definition file determines whether keywords, preprocessor statements, and customized items will be automatically completed by the MULTI Editor as they are typed. Most of the language syntax definition files included with MULTI have auto-complete enabled for both keywords and preprocessor statements. Auto-complete can also be enabled for function prototypes.

Note

Auto-completion does not work for customized items that contain wildcard characters.

You can turn auto-complete on or off for an entire language, or for a specific category of items in the syntax definition file by specifying `autocomplete = false` or `autocomplete = true`.

The following sections provide details about auto-complete. You can modify auto-complete by editing the `autocomplete` section of the syntax definition file.

Note

Even when auto-completion is disabled, you can use the keyboard shortcuts listed in “Auto-Completion” on page 381 to perform auto-completion functions based on the characters located at the cursor.

First Match vs. Best Match Auto-Complete

Auto-completion uses either *first match* logic or *best match* logic to complete words based on the letters that have been typed:

- `autocomplete = "first"` — Completes the first word that begins with the letter that has been typed.
- `autocomplete = "best"` — Does not complete a word until it can uniquely identify the letters that have been typed. This is the default setting.

For example, assume auto-completion has been enabled for the keywords: `main`, `mailman` and `mist`. When the letter `m` is typed, first match logic auto-completes the item into `main`, but best match logic does not perform any auto-completion. When the letters `ma` have been typed, first match logic still auto-completes the item into `main`, while best match logic auto-completes the item to `mai` because it still cannot determine whether the item should be `main` or `mailman`.

Minimum String Length

You can control the minimum number of characters in a string before auto-complete attempts to match the sting.

The default value is `1`. To change this setting, enter:

`min_string_length = num`

where *`num`* is the number of characters in the string.

Auto-Completion of Function Prototypes

Auto-complete entries also control the use of function prototypes. Function prototypes are often defined in included files. Whenever the Editor loads a C or C++ file, it automatically grabs the include files for function prototypes if it can find the include files.

- `grab_prototype =` Specifies whether function prototypes are dynamically grabbed as you type in the Editor. The default setting is `false`. To dynamically grab function prototypes as you type, enter `grab_protoype = true`. Automatically grabbing function prototypes is only supported for C and C++.
- `show_prototype =` Specifies whether function prototypes are displayed as you type. To automatically display function prototypes, enter `show_prototype = true`. When when you type a function name in the Editor followed by a "(" (open parentheses), a tooltip containing prototype information will appear to guide you through the function's arguments. The default setting is `false`.

These two options are explicitly enabled in the syntax definition files for C and C++.

Configuring File Extensions

When you are using the MULTI IDE, some operations require you to select a file from a graphical file chooser. These file choosers provide a set of filters that allow only the relevant files to be displayed. While common extensions are present in these filters, additional custom extensions and file types may be required. These extensions can be added by customizing the file extension mappings used by MULTI.

Extension Mapping Files

The extension mappings are stored in configuration files named **extensions.udb** in a directory named **file_types**. They are applied in the same order as configuration files, starting with the **defaults** directory and followed by the site-wide and user configuration directories (see "Creating and Editing Configuration Files" on page 137).

To add custom file extensions, create a directory named **file_types** in either the site or user configuration directories and create an **extensions.udb** file defining the custom file extension. The extension mapping configuration files contain entries describing individual file types as well as collections of file types for use in individual file choosers.

For an example **extensions.udb** file, see:

***ide_install_dir*/defaults/file_types/extensions.udb**

This file contains the default extension mappings.

See also the **fileextensions** command in "General Configuration Commands" in Chapter 6, "Configuration Command Reference" in the *MULTI: Debugging Command Reference* book.

Configuring File Associations (Windows only)

When you install MULTI on Windows, the installer prompts you to choose what program you would like to use to open files of various extensions. You may choose to associate certain file types with the MULTI Project Manager and certain file types with the MULTI Editor. Perform the following steps to change these file associations at a later time.

If you are using Windows 7/Vista:

1. Access the **Control Panel**'s **Default Programs**.
2. Click **Associate a file type or protocol with a specific program**, and make the desired changes.

If you are using Windows XP:

1. Access the **Control Panel**'s **Folder Options**.
2. Click the **File Types** tab, and make the desired changes.

Linking to a Different Compiler and Probe Installation

When you install MULTI, the MULTI IDE is linked to a Compiler and Green Hills Debug Probe installation.

If you want to link the IDE to a different Compiler and Green Hills Debug Probe installation at a later time:

1. Exit the entire IDE.
2. Run *`ide_install_dir`*`\gcomplink` *`ide_install_dir compiler_install_dir`*.*

   For example, you might enter:

   ```
   > C:\ghs\multi_600\gcomplink.exe C:\ghs\multi_600 C:\ghs\comp_201200
   ```

*You may specify a relative path to the Compiler and Green Hills Debug Probe installation. This is useful if you installed into a version control repository. The path is resolved relative to the IDE installation directory.

Note

You can only link compatible installations.

Installing a Patch

The **gpatch** command line utility program allows you to install and create simple patches. It is most commonly used to install a patch provided by Green Hills support staff.

To install a patch into the current working directory, ensure the MULTI IDE or Compiler installation directory is in your path and run:

gpatch [-install_patch] *patch_filename*

The following table describes command line options supported by **gpatch**.

-help Displays documentation for all **gpatch** command line options.
-install_patch *patch_filename* Installs the patch *patch_filename*. By default, the patch is installed into the current working directory, but you may also pass **-target_dir** (below) to specify another location.
-key *installation_key* Decrypts the patch using *installation_key*.
-list Lists the files contained in the archive. This does not install the patch.
-nouninstall Does not create an uninstallation archive.
-target_dir *directory* Specifies the directory where the patch will be installed. If you do not pass this option, the patch is installed into your current working directory.

For a complete list of the command line options available for use with **gpatch**, run **gpatch -help**. Example uses of the **gpatch** utility program follow.

To list all files in **patch_1234.iff** without installing the patch:

```
> gpatch -list -install_patch patch_1234.iff
```

To install patch **2028.iff** into **C:\ghs\multi_*xxx***:

```
> gpatch -install_patch 2028.iff -target_dir C:\ghs\multi_xxx
```

Chapter 8

Configuration Options

Contents

Chapter 7, "Configuring and Customizing MULTI" on page 131 discusses how you can customize your interface using MULTI's configuration options. This chapter describes these configuration options and their default settings.

You can set many, but not all, of the configuration options via the **Options** window. To open the **Options** window:

- From the Launcher, Debugger, or Editor, select **Config → Options**.
- From the Project Manager, select **Tools → Options**.

You can also set or edit all of the options available in the **Options** window (and more besides) by entering the following command in the Debugger command pane. Note that you should not use this command while the **Options** window is open.

```
configure config_option [:|=] value
```

For options that cannot be set in the **Options** window, *`config_option`* and possible *`values`* are listed at the beginning of the table row dedicated to the option. For options that can be set in the **Options** window, *`config_option`* and *`values`* are listed—often in parentheses—in the option description. For example, in this chapter, the GUI option **Match exact case in searches** is followed by two option/value pairs in parentheses:

- **Selected** (**exactCase on**)
- **Cleared** (**exactCase off**)

This indicates that you could either enter:

```
configure exactCase on
```

or

```
configure exactCase off
```

in the Debugger command pane. When you modify configuration settings via the **configure** command, the modifications are not saved by default. For more information, see "Using the configure Command" on page 132. In general, if you change the setting of a configuration option without saving the modification, only the MULTI tool from which the option was changed is aware of the new setting. For more information, see "Propagating Configuration Settings" on page 136.

Options that can be set via the **configure** command can also be set in configuration files. Syntactically, the only difference between entering an option in a configuration file and entering it in the command pane is that you do not include **configure** in the configuration file. For information about setting configuration options in a configuration file, see "Creating and Editing Configuration Files" on page 137.

Note

Configuration options are case-insensitive; thus `exactCase off` and `exactcase off` are equivalent and are both valid. In this chapter, we use mixed-case notation where it makes the options more readable.

Tip

Entering `help` *`config_option`* in the Debugger command pane opens online help for the specified configuration option.

General Configuration Options

This section describes configuration options that affect the overall appearance of MULTI. Most of these options appear on the **General** tab of the **Options** window.

The General Options Tab

To access the following options, select **Config → Options → General** tab.

For information about setting configuration options from the command pane, see the introduction of Chapter 8, "Configuration Options" on page 175.

Save window positions and sizes

Permitted settings for this option are:

- **Selected** (**rememberWindowPositions on**) — [default] Remembers the position and size of windows created by MULTI so that the next time a window of the same type is created, it appears in the same location and with the same size. For example, if you resize the Project Manager window, move it to a specific location on your screen, and then close the window, the next Project Manager you open appears in the same place and with the same size. The first window of a given type is positioned in the saved location. Any new windows of the same type are slightly offset from the location of the open window and are given the saved size. Size and position are remembered even after you exit and restart MULTI.
- **Cleared** (**rememberWindowPositions off**) — Does not remember the position and size of windows created by MULTI.

Note: This setting does not apply to certain types of dialog boxes, such as modal dialog boxes, or certain windows, such as the **Active Licenses** window, the **Memory Test Wizard**, the **Perform Memory Test** window, and the **Source Path** window.

Display close (x) buttons

Permitted settings for this option are:

- **Selected** (**closeButtonOnTitlebar on**) — A **Close** button will appear on window toolbars. This option only affects new windows created after you change this setting, except for Debugger windows, which adjust to the new setting immediately.
- **Cleared** (**closeButtonOnTitlebar off**) — [default] The **Close** button will not appear on toolbars.

Allow beeping

Permitted settings for this option are:

- **Selected** (**beep on**) — [default] MULTI beeps on various error conditions, such as a search that does not match anything.
- **Cleared** (**beep off**) — MULTI never beeps.

For information about the **Beep** Editor command, see "Miscellaneous Commands" on page 368.

Show tooltips

Linux/Solaris only

Permitted settings for this option are:

- **Selected** (**tooltips on**) — [default] Tooltips (small explanatory boxes that pop up when you hover the cursor over a GUI item) will appear if available.
- **Cleared** (**tooltips off**) — Tooltips will never appear.

Match exact case in searches

Determines the case sensitivity of interactive text searches in the Editor and of incremental text searches in MULTI tools. Permitted settings for this option are:

- **Selected** (**exactCase on**) — Searches are case-sensitive.
- **Cleared** (**exactCase off**) — [default] Searches are case-insensitive.

This option can also be set on a per-Editor-window basis with the Search dialog box. For more information, see "Interactive Searching Using the Search Dialog Box" on page 84.

Note: This setting does not apply to the **grep** Editor or Debugger commands or to any of the Search in Files dialog boxes, all of which run **grep** and are case-sensitive by default.

Escape restores view after iSearch

Permitted settings for this option are:

- **Selected** (**iSearchReturn on**) — Returns the cursor to its original position when you press **Esc** while in incremental search mode. See "Incremental Searching" on page 83.
- **Cleared** (**iSearchReturn off**) — [default] Does not return the cursor to its original position when you press **Esc** while in incremental search mode.

Phase of moon in scroll bar box

We at Green Hills decry the unfortunate tendency in our society whereby mankind perceives itself as disconnected from its environment. We as individuals pay no attention to flowers blooming or leaves falling. We live immersed in our air conditioned offices and, if we are programmers, we never see the light of day. In a perhaps futile effort to stop this trend, we provide all MULTI users with the current phase of the moon to encourage them to leave their desks and look up at the beautiful night sky.

Permitted settings for this option are:

- **Selected** (**moon on**) — Displays the approximate phase of the moon in the nook of the vertical and horizontal scroll bars.
- **Cleared** (**moon off**) — [default] The phase of the moon is not displayed.

Changes to this setting only affect new windows.

Launch clipboard manager

Linux/Solaris only

Permitted settings for this option are:

- **Selected** (**clipManLaunch on**) — [default] The clipboard manager, which stores selections that have been sent to the clipboard by all applications, will run after MULTI has exited, making the contents of the clipboard accessible to other applications.
- **Cleared** (**clipManLaunch off**) — The contents of the clipboard are lost when MULTI exits.

Warp pointer

Permitted settings for this option are:

- **Never** (**warpPointer never**) — [default for Windows] Never move the mouse pointer automatically. The mouse cursor can only be changed by physically moving the mouse.
- **Into Dialog Box** (**warpPointer intoDialogue**) — [default for Linux/Solaris] Warp the mouse pointer to the default button of new dialog boxes that appear.
- **In & Out of Dialog Box** (**warpPointer in&OutDialogue**) — Warp the mouse pointer into the default button of new dialog boxes, and warp it back to its previous location when the dialog box is closed.

Print command

Linux/Solaris only

(**printCommand** ***command***) Specifies the command used to send information to a printer. The default is **lpr**.

Editor

Specifies which editor MULTI uses when you request an editor to start. Permitted settings for this option are:

- **MULTI Editor** (**extEditor_Choice "multi editor"**) — [default] Uses the MULTI Editor.
- **Emacs** (**extEditor_Choice emacs**) — Uses the Emacs Editor.
- **Vi** (**extEditor_Choice vi**) — Uses the vi Editor.
- **Other** (**extEditor_Choice other**) — Uses an editor that is not available in the list.

Configure Editor

Opens a dialog box that allows you to specify configuration settings specific to the editor selected in the **Editor** field. For more information, see "Third-Party Editor Configuration Options" on page 183.

If **MULTI Editor** is selected in the **Editor** field, clicking this button opens the **MULTI Editor** tab. For more information, see "The MULTI Editor Options Tab" on page 221.

Version Control

Specifies which version control system MULTI uses. Permitted settings for this option are:

- **Auto Detect** (**versionControlType autoDetect**) — [default] Version control is auto-detected based on the file currently in use.
- **Disable** (**versionControlType disable**) — Version control is disabled.
- **CVS** (Concurrent Versions System) (**versionControlType cvs**) — An open-source network-transport version control system. See "Integrating with CVS" on page 105.
- **Subversion** (**versionControlType subversion**) — An open-source network-transport version control system. See "Integrating with Subversion" on page 108.
- **ClearCase** (**versionControlType clearCase**) — A version control system from Rational Software. See "Integrating with ClearCase" on page 104.
- **SourceSafe** (**versionControlType sourceSafe**) — (Windows only) A version control system from Microsoft. See "Integrating with SourceSafe" on page 105.

Configure Version Control

Opens a dialog box that you use to specify configuration settings that are specific to the version control selected in the **Version Control** field. For more information, see "Version Control Configuration Options" on page 184.

Source Code Font

(**font** ***font_name***) Opens a font selection dialog box in which you can set the source code font. This font is used for most textual display, including in the Debugger source pane, the command pane, and the MULTI Editor. Click **Source Code Font** and select a font installed on your system. The font you choose should normally be a fixed-width font so that characters align properly. Italic and oblique fonts should not be chosen. While some italic and oblique fonts work correctly, others exhibit drawing problems.

The default font on Windows is **Courier New Regular**. The command to restore the default Windows font from the command pane is:

configure font "courier new:13"

The default font on Linux/Solaris is **misc fixed medium semi-condensed**. The command to restore the default Linux/Solaris font from the command pane is:

configure font -misc-fixed-medium-r-semicondensed-*-*-120-*-*-*-*-*-*

All MULTI tools opened during the current MULTI session are notified of changes to this option. For more information, see “Propagating Configuration Settings” on page 136.

GUI Font

(**guiFont** ***font_name***) Opens a font selection dialog box in which you can set the GUI font. This font is used for buttons, menus, and other GUI controls. Click **GUI Font** and select a font installed on your system. Italic and oblique fonts should not be chosen. While some italic and oblique fonts work correctly, others exhibit drawing problems.

The default font on Windows is **MS Sans Serif Regular**. The command to restore the default Windows font from the command pane is:

configure guiFont "ms sans serif"

The default font on Linux/Solaris is **adobe helvetica medium**. The command to restore the default Linux/Solaris font from the command pane is:

configure guiFont *-helvetica-medium-r-normal-*-12-*-*-*-*-*-*-*

All MULTI tools opened during the current MULTI session are notified of changes to this option. For more information, see “Propagating Configuration Settings” on page 136.

Menus

Opens the **Customize Menus** window, which allows you to configure menus in a number of MULTI tools. For information about how to use this window, see “Configuring and Customizing Menus” on page 148.

Mouse

Opens the **Mouse Commands** dialog box, which you can use to edit the mouse bindings used by MULTI. The mouse bindings are displayed in the same format as the **mouse** command. See “Customizing Keys and Mouse Behavior” on page 153.

Keys
Opens the **Keyboard Commands** dialog box, which you can use to edit the key bindings used by MULTI. The key bindings are displayed in the same format as the **keybind** command. See "Customizing Keys and Mouse Behavior" on page 153.
Windows
Opens a dialog box, where: • **Taskbar Organizer** — (Windows only) Configures taskbar organization. For more information, see "The Taskbar Organizer Dialog Box" on page 185. • **Window Docking** — Configures window alignment and grouping. For more information, see "The Window Docking Options Window" on page 187.

Third-Party Editor Configuration Options

To access the following options, select **Config → Options → General** tab. Then select an alternative editor (any editor other than the MULTI Editor) from the **Editor** drop-down list and click the **Configure Editor** button. (If you select **MULTI Editor** from the **Editor** drop-down list, the **MULTI Editor** tab opens. See "The MULTI Editor Options Tab" on page 221.)

The options that appear are specific to the editor type selected. Not all options appear for every editor type.

For information about setting configuration options from the command pane, see the introduction of Chapter 8, "Configuration Options" on page 175.

Path to Editor
(**extEditor_EmacsPath** ***editor_path*** for Emacs, **extEditor_ViPath** ***editor_path*** for vi, **extEditor_OtherPath** ***editor_path*** for other editors) Specifies where the editor executable is located on the system. Depending upon your `PATH` environment variable, you may need to specify the full path to the editor in the **Path to Editor** field.
Use command window
Windows only (**extEditor_EmacsUseCmd** for Emacs, **extEditor_ViUseCmd** for vi, **extEditor_OtherUseCmd** for other editors) Determines whether the editor will be launched from within a command window. Users with console mode editors should enable this option. This is equivalent to prefixing **cmd.exe /k** to the command to launch the editor. You must restart MULTI for changes to this option to take effect.

Use XTerm Linux/Solaris only (**extEditor_EmacsUseXTerm** for Emacs, **extEditor_ViUseXTerm** for vi, **extEditor_OtherUseXTerm** for other editors) Determines whether the external editor will be launched from within an xterm. This is equivalent to prefixing **xterm -e** to the command to launch the editor. Users with console mode editors should enable this option. You must restart MULTI for changes to this option to take effect.
Command line arguments (**"extEditor_EmacsArgumentFormat +%LINE %FILE0 %FILES"** for Emacs, **"extEditor_ViArgumentFormat +%LINE %FILE0 %FILES"** for vi, **"extEditor_OtherArgumentFormat *command line specification*"** for other editors) Determines the arguments given to the editor when it is launched. Three special character sequences are replaced when the editor is run. Substitution rules follow: • **%LINE** — Replaced with the line number to go to when opening the file (removed if MULTI does not specify a line number). • **%FILE0** — Replaced with the first file to be edited. • **%FILES** — Replaced with all but the first file if there is more than one file to edit (removed if MULTI only specifies one file to edit). Each file is separated by a space.

Version Control Configuration Options

To access the following options, select **Config → Options → General** tab. Then click the **Configure Version Control** button.

The options that appear are specific to the version control type selected. Not all options appear for every version control type.

For information about setting configuration options from the command pane, see the introduction of Chapter 8, “Configuration Options” on page 175.

Automatic Checkout

Permitted settings for this option are:

- **Selected** (**versCtrl_ClearCaseAutoCheckout on** for ClearCase, **versCtrl_SourceSafeAutoCheckout on** for SourceSafe) — Files are automatically checked out when you start to edit them.
- **Cleared** (**versCtrl_ClearCaseAutoCheckout off** for ClearCase, **versCtrl_SourceSafeAutoCheckout off** for SourceSafe) — [default] Files are not automatically checked out.

This option is not available if you have selected the CVS or Subversion version control systems because a file is always checked out when you use CVS or Subversion.

Location of VC binary

For CVS, ClearCase, SourceSafe, and Subversion version control systems only.

Specifies the name of the command to run, according to your version control system. The defaults are:

- **cvs** (**versCtrl_CvsPath cvs**) — For CVS
- **svn** (**versCtrl_SubversionPath svn**) — For Subversion
- **cleartool** (**versCtrl_ClearCasePath cleartool**) — For ClearCase
- **ss** (**versCtrl_SourceSafePath ss**) — For SourceSafe

SourceSafe database location

SourceSafe only

(**versCtrl_SourceSafeDatabase** ***location***) Specifies the location of the SourceSafe database. In other words, this is the location of the **srcsafe.ini** file corresponding to the desired database.

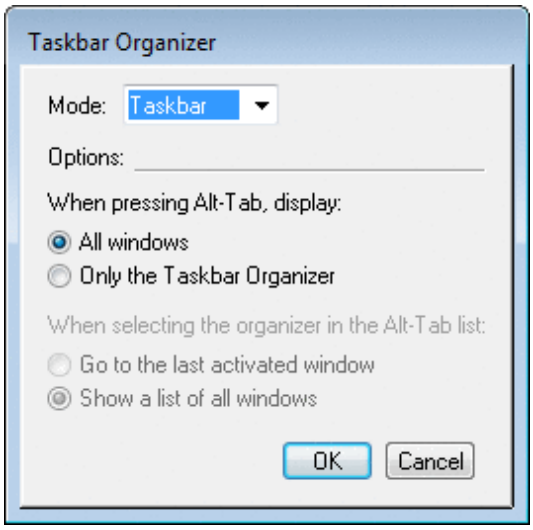
Root of checkout

SourceSafe only

(**versCtrl_SourceSafeRoot** ***location***) Specifies the working directory of the SourceSafe database root (**$/**). The MULTI integration with SourceSafe assumes that the directory structure of a database is maintained when files are checked out from that database. For example, the **$/example.c** file in the database is checked out to **root_of_checkout/example.c**.

The Taskbar Organizer Dialog Box

The **Taskbar Organizer** dialog box allows you to free up the Windows taskbar by grouping MULTI windows into a single taskbar entry or system tray icon. You can also disable taskbar organization via this dialog box.



Note

The Taskbar Organizer is only available on Windows. No equivalent feature exists for Linux/Solaris.

To access the **Taskbar Organizer** dialog box, select **Config → Options → General** tab and click the **Windows** button. Select **Taskbar Organizer** and click **OK**. The following table describes the modes and options available in the dialog box. Note that not all options appear for every mode and that not all combinations of taskbar options are valid. The dialog box prevents you from selecting invalid combinations by dimming radio buttons that you cannot change given the current combination of settings.

Mode

Permitted settings for this option are:

- **Disabled (taskbarType disabled)** — Disables the Taskbar Organizer. In this mode, MULTI windows populate both the taskbar and the window list that appears when you press the **Alt**+**Tab** key combination.
- **Taskbar (taskbarType taskbar)** — Enables taskbar mode. In taskbar mode, all MULTI windows are grouped into a single taskbar entry labeled **MULTI**. For more information, see “Configuring Taskbar Organization” on page 159.
- **Tray (taskbarType tray)** — Enables tray icon mode. In tray icon mode, all MULTI windows are grouped under a single system tray icon. For more information, see “Configuring Taskbar Organization” on page 159.

When pressing Alt-Tab, display

Allows you to configure the appearance of items in the **Alt**+**Tab** list. Permitted settings for this option are:

- **All windows** (**taskbarShowAllWindows on**) — Displays all MULTI windows in the **Alt**+**Tab** list.
- **Only the Taskbar Organizer** (**taskbarShowAllWindows off**) — Displays a single MULTI icon in the **Alt**+**Tab** list, regardless of the number of open MULTI windows. The setting of the option **When selecting the organizer in the Alt-Tab list** determines the behavior of the MULTI icon when selected.
- **Nothing** — Does not display any MULTI windows or icons in the **Alt**+**Tab** list.

When selecting the organizer in the Alt-Tab list

Determines what occurs after you select the MULTI icon in the **Alt**+**Tab** list. Permitted settings for this option are:

- **Go to the last activated window** (**taskbarGotoLastWindow on**) — Returns focus to the last active MULTI window.
- **Show a list of all windows** (**taskbarGotoLastWindow off**) — Displays a shortcut menu providing access to all open MULTI windows. For more information, see "Taskbar Organizer Menu Options" on page 160.

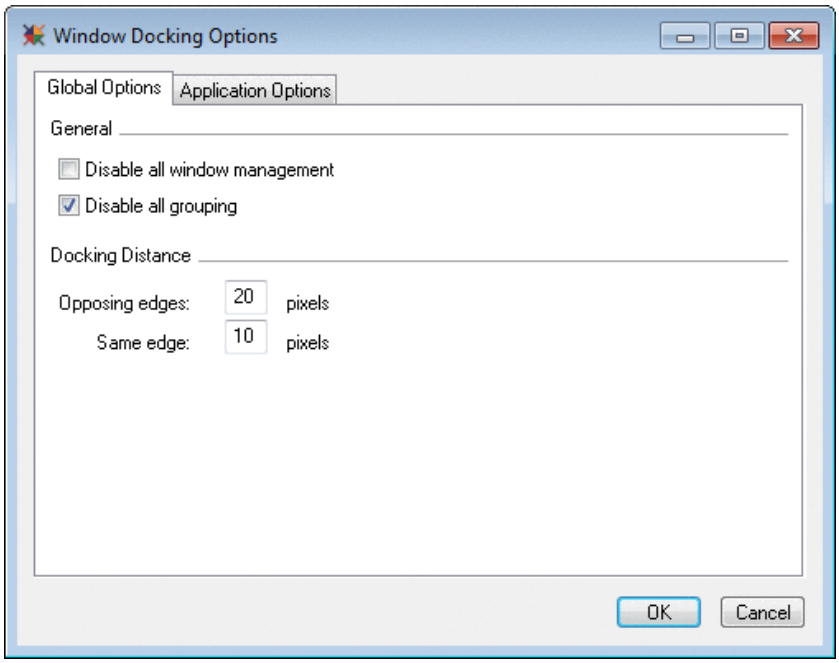
The Window Docking Options Window

To access the **Window Docking Options** window, select **Config → Options → General** tab and click the **Windows** button. On Windows hosts, select **Window Docking** and click **OK**. The resulting window contains two tabs:

- **Global Options** — The options on this tab apply to all MULTI applications (see "Window Docking Global Options" on page 188). Options selected on this tab override any application-level options set on the **Application Options** tab.
- **Application Options** — The options on this tab only apply to the application configuration file specified in the **Application** text box of the tab (see "Window Docking Application Options" on page 189). These application-level options can be overridden by options set on the **Global Options** tab.

The options on each of these tabs are described in the following sections. For more information about window docking, see "Configuring Window Docking" on page 161.

Window Docking Global Options



The items on the **Global Options** tab apply to all applications.

Disable all window management Completely disables both window alignment (snapping) and window grouping. This option is cleared by default.
Disable all grouping Completely disables window grouping, overriding any **Application Options**. This option is selected by default.
Docking Distance Specifies the distance at which windows snap to each other, either side by side or vertically. There are two settings: • **Opposing edges** — Specifies the distance (in pixels) at which windows snap together when the left edge of one window snaps to the right edge of another, or the top of one window snaps to the bottom of another. The default is 20. • **Same edge** — Specifies the distance (in pixels) at which windows snap together when you align the edges of vertically adjacent windows. For example, you can align a series of windows in a column along the left edge. The default is 10.

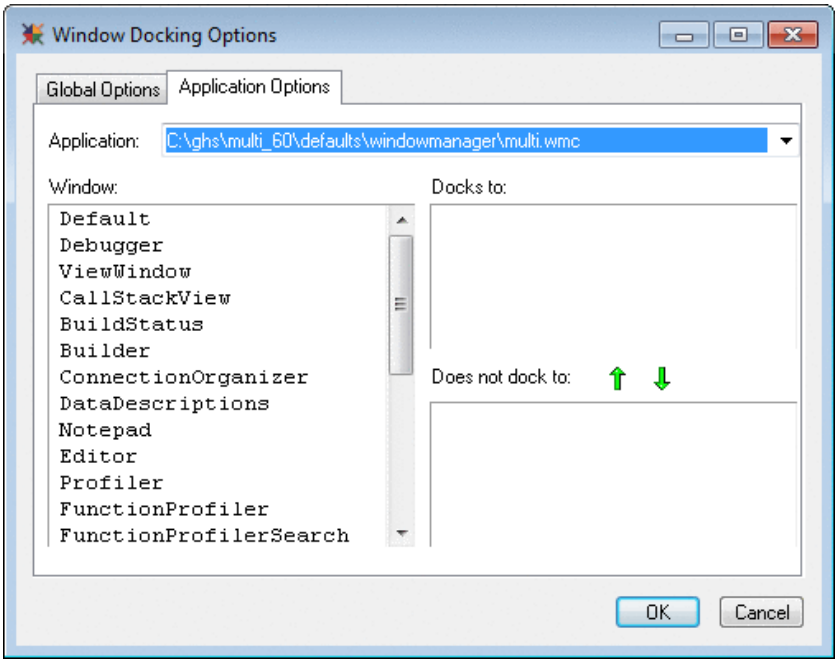
Compatibility

Linux/Solaris only

Disables window docking behavior that may not be supported in specific circumstances. Available options are:

- **Disable grouping in KDE** — Disables window grouping when the KDE window manager is detected. This setting overrides any application-level options and is selected by default. For more information, see "Linux/Solaris Docking Limitations" on page 162.
- **Disable activation follows focus** — Does not raise all windows in a group when one of the windows gets the focus. This option is selected by default.
- **Disable geometry caching** — Disables caching of window manager geometry. Selecting this option causes a small window to open and close each time an application is started, enabling MULTI to detect window manager geometry properties. This option is cleared by default and should not be selected unless MULTI cannot detect a change in window managers.

Window Docking Application Options



The items on the **Application Options** tab allow you to configure window grouping on a per-application basis.

Application Displays the location of the window docking configuration file that is currently being viewed. This file may be located in the site-wide configuration directory or in the user configuration directory. Any changes are saved to the user configuration directory.
Window Lists available window types (which vary depending on the **Application** setting). Each window supports configurable window grouping.
Docks to Specifies the window types that form groups with **Window**. You can use the arrow buttons to move window types between the **Docks to** and **Does not dock to** lists. If window type A is added to the **Docks to** list for window type B, then window type B should also be added to the **Docks to** list for window type A. If this is not done, window groups are only formed when you move window type B near window type A, but not vice versa.
Does not dock to Specifies the window types that do not form groups with **Window**. You can use the arrow buttons to move window types between the **Docks to** and **Does not dock to** lists.

Other General Configuration Options

The options in this section are not accessible from the **Options** window. To set these options, you can either enter them in a configuration file or in the Debugger command pane (preceded by the **configure** command). For information about setting these options in configuration files, see "Creating and Editing Configuration Files" on page 137. For information about setting configuration options from the command pane, see the introduction of Chapter 8, "Configuration Options" on page 175.

blinkingCursor [on | off] Linux/Solaris only Permitted settings for this option are: • `on` — [default] The vertical bar cursor in various windows (such as the Debugger command pane and the Editor) will blink. • `off` — The cursor will be a solid non-blinking bar.
clearKeys Removes all of the key bindings so they can be created from scratch with **keybind**.

clearMenus

Removes all menus so they can be created from scratch using **menu**.

clearMice

Removes all mouse button bindings so they can be created from scratch with the **mouse** command. See "Customizing Mouse Behavior with the mouse Command" on page 155.

clickPause *time*

Linux/Solaris only

Specifies the length of time, in *time* tenths of a second, that MULTI waits between successive button presses to recognize double or triple clicks. For example, if *time* is `4`, two clicks on the same button, in the same mouse location, within four tenths of a second, are treated as a double-click. If the two clicks are separated by more than *time* tenths of a second, they are treated as two single-clicks.

If no mouse binding requiring multiple clicks exists for a particular mouse location, MULTI executes the mouse binding immediately without waiting for multiple clicks.

The default *time* is `4`.

configureFile *filename*

Used within a configuration file to read in another configuration file specified by *filename*. After *filename* is processed, processing of the original configuration file continues as normal.

disAsmStyle [remote | XORmacs | unix]

Controls the style of disassembled Motorola 68000 series code. Permitted settings for this option are:

- `remote` — [default] Use `XORmacs` style if the code is destined for execution on an embedded processor or Linux/Solaris style for native development.
- `XORmacs` — Always use `XORmacs` style (such as `MOVE.L (12,A6),D0`).
- `unix` — Always use Linux/Solaris style (such as `movel a6@(12),d0`).

focusOnRaise [on | off]

Linux/Solaris only

Controls whether existing windows are automatically given focus when they are raised. This option does not affect windows when they are displayed for the first time.

- `on` — [default] Existing windows are automatically given focus when they are raised. This setting is recommended if your window manager uses a click-to-focus policy.
- `off` — Existing windows are not given focus when they are raised. This setting is recommended if your window manager uses a focus-follows-mouse policy.

grabTimeout *time*

Linux/Solaris only

Specifies an interval used to force processes to release any X-server keyboard or mouse grabs:

- If *time* is less than zero — MULTI does not check to see if there are any outstanding grabs on the X-server each time it stops.
- If *time* is greater than zero — MULTI checks to see if the process has any outstanding grabs when the process is stopped by a signal or breakpoint. If both the keyboard and the mouse are grabbed, MULTI waits *time* seconds before aborting the other process's grabs, and then exits.

The default *time* is `-1`.

This option is only useful for Solaris native and Linux native development.

iconify [on | off]

Linux/Solaris only

Permitted settings for this option are:

- `on` — The next MULTI window will be minimized as an icon when it opens.

  If you repeatedly configure this option to `on`, it will remember the number of times you have done this, and cause the next *num* windows to be created minimized (one per time you configure the option to `on`). After the correct number of windows come up minimized, this option resets itself to `off`.
- `off` — [default] Does not minimize MULTI windows.

This option is only applied to the next window created and does not affect existing windows.

ignoreMotion *num*

Specifies the number of pixels the mouse can move during a press and release of a mouse button.

If you move the mouse less than *num* pixels between a button press and release, the click is treated as a single click. If you move the mouse more than *num* pixels between press and release, the mouse click is no longer treated as a single click but as two independent press and release events.

The default *num* is `4`.

keyBind

Used to assign an action to a key. For more information, see “Customizing Keys and Mouse Behavior” on page 153 and “Customizing Keys with the keybind Command” on page 153.

menu

Used to define a menu. For more information, see “Configuring and Customizing Menus” on page 148.

menuDelay *time*

The delay, in milliseconds, between moving the cursor over a submenu entry and the submenu opening. If set to `0`, submenus will open immediately.

The default *`time`* is `25`.

mouse

Used to assign an action to mouse button clicks. For more information, see "Customizing Keys and Mouse Behavior" on page 153 and "Customizing Mouse Behavior with the mouse Command" on page 155.

multiiconPreName *string*

Linux/Solaris only

When you iconify a window, *`string`* prefixes the icon name. For example, if you set *`string`* to `MULTI`, iconified Editor windows are named **MULTI:*Filename*.c** instead of ***Filename*.c**.

If your window manager does not support iconifying, this option has no effect. The default is an empty string.

Changes to this setting only affect new windows.

multiWinPreName *string*

Linux/Solaris only

Prepends *`string`* to the title bar's window name. The default is an empty string.

Changes to this setting only affect new windows.

noDecoration [on | off]

Linux/Solaris only

Permitted settings for this option are:

- `on` — If the windows manager supports this setting, all windows appear without title bars.
- `off` — [default] Windows appear with title bars.

numberSeparator *string*

Specifies a character (*`string`*) used to break up large numbers for ease of reading. For example, specifying an underscore would cause MULTI to display `0x123456789` as `0x1_23456789`.

`string` may only be a single character. The default is an empty string, which results in MULTI not using any separator character to break up numbers.

showGrepCommand [on | off]

Permitted settings for this option are:

- `on` — The full **grep** command prints out whenever the **grep** command is executed.
- `off` — [default] The full **grep** command does not print out.

synchronous [on | off]

Linux/Solaris only

Permitted settings for this option are:

- `on` — Enable synchronous X-windows mode. Synchronous mode ensures that X-window calls from MULTI complete before they return. This can be useful when running MULTI on faulty X-servers.
- `off` — [default] Disables synchronous X-windows mode.

useWmPositioning [on | off]

Permitted settings for this option are:

- `on` — MULTI allows the window manager to determine where all windows should go.
- `off` — [default] MULTI automatically places windows in convenient locations.

Project Manager Configuration Options

This section describes configuration options that affect the Project Manager. To access the following options, select **Config → Options → Project Manager** tab (from the Project Manager, select **Tools → Options**).

For information about setting configuration options from the command pane, see the introduction of Chapter 8, "Configuration Options" on page 175.

Open build details window*

Permitted settings for this option are:

- **Always** (**showProgress always**) — The **Build Details** window opens every time you build an application, even if no warnings or errors are produced.
- **On Warnings and Errors** (**showProgress on warnings and errors**) — [default] The **Build Details** window opens if your build produces warnings or errors.
- **On Errors** (**showProgress on errors**) — The **Build Details** window opens if your build produces errors, but does not open for warnings.
- **Never** (**showProgress never**) — The **Build Details** window never opens, even if warnings or errors are produced.

Automatically open editor on errors

Permitted settings for this option are:

- **Selected** (**autoEditErrors on**) — [default] If the **Build Details** window is open or is configured to open on errors, the code that caused the first error of the build is automatically displayed in an Editor window.
- **Cleared** (**autoEditErrors off**) — Errors are displayed in the **Build Details** window. Double-click an error to open it in an Editor window.

All MULTI tools opened during the current MULTI session are notified of changes to this option. For more information, see "Propagating Configuration Settings" on page 136.

On warnings

Permitted settings for this option are:

- **Selected** (**autoEditWarnings on**) — If the **Build Details** window is open or is configured to open on warnings, the code that caused the first warning of the build is automatically displayed in an Editor window.
- **Cleared** (**autoEditWarnings off**) — [default] Warnings are displayed in the **Build Details** window. Double-click a warning to open it in an Editor window.

All MULTI tools opened during the current MULTI session are notified of changes to this option. For more information, see "Propagating Configuration Settings" on page 136.

Use MULTI Editor on errors (even if alternate editor is specified elsewhere)

Permitted settings for this option are:

- **Selected** (**alwaysUseMeToFixBuildErrors on**) — [default] Errors and warnings will be displayed in the MULTI Editor even if you have configured the MULTI environment to use an alternative, third-party editor.
- **Cleared** (**alwaysUseMeToFixBuildErrors off**) — Errors and warnings will be displayed in the editor you use in your MULTI environment.

All MULTI tools opened during the current MULTI session are notified of changes to this option. For more information, see "Propagating Configuration Settings" on page 136.

Project directory root

(**defaultNpwDir *string***) Specifies the base directory where new projects are created. If left blank, new projects are created at:

- Windows 7/Vista — **C:\Users*username*\My Documents\My Projects**
- Windows XP — **C:\Documents and Settings*username*\My Documents\My Projects**
- Linux/Solaris — **~/MyProjects/**

The **Project Wizard** creates a **Project*n*** directory in this location to act as the root directory of the project.

All MULTI tools opened during the current MULTI session are notified of changes to this option. For more information, see "Propagating Configuration Settings" on page 136.

Parallel Build*

(**buildType parallel**) [default] Builds programs using the number of processes specified. See the descriptions of **Number of parallel processes**, **Auto-detect**, and **Custom** below.

Single-Thread Build*

(**buildType singleThread**) Runs the build in a single process.

Number of parallel processes*

(**numParallelBuildProcesses *num***) Specifies the number of processes that may be run in parallel. This option is only available with the **Parallel Build** option. The default `num` is `2`. See the descriptions of **Auto-detect** and **Custom** below.

Auto-detect*

(**autoDetectNumParallel auto**) [default] Auto-detects the maximum number of processes that may be run in parallel.

Custom*

(**autoDetectNumParallel custom**) Uses the number value set by **numParallelBuildProcesses *num*** (above).

Use lock files (-lockout)*

Permitted settings for this option are:

- **Selected** (**useLockFiles on**) — Prevents multiple simultaneous builds of the same program or library by creating temporary **.lck** lock files.
- **Cleared** (**useLockFiles off**) — [default] Does not create temporary **.lck** lock files.

Note: -lockout is the corresponding **gbuild** option. For information about the **gbuild** utility program, see the *MULTI: Building Applications* book for your target processor family.

Execute tools at low priority (-nice)*

Permitted settings for this option are:

- **Selected** (**useLowPriority on**) — Executes the build with lower than normal priority—scheduling priority 10 (Linux/Solaris) or the idle priority class (Windows).
- **Cleared** (**useLowPriority off**) — [default] Executes the build at normal priority.

Note: -nice is the corresponding **gbuild** option. For information about the **gbuild** utility program, see the *MULTI: Building Applications* book for your target processor family.

Show tool commands (-commands)*

Permitted settings for this option are:

- **Selected** (**toolCommands on**) — Displays commands as they are executed.
- **Cleared** (**toolCommands off**) — [default] Does not display commands as they are executed.

Note: -commands is the corresponding **gbuild** option. For information about the **gbuild** utility program, see the *MULTI: Building Applications* book for your target processor family.

Beep when build completes

Permitted settings for this option are:

- **Selected** (**beepOnBuildCompletion on**) — Beeps at the end of a successful build. This setting only takes effect if **Allow beeping** on the **General** tab is selected (see "The General Options Tab" on page 177).
- **Cleared** (**beepOnBuildCompletion off**) — [default] Does not beep.

Automatically share target connections

Permitted settings for this option are:

- **Selected** (**autoConnectionMode on**) — [default] The primary target connection is used.
- **Cleared** (**autoConnectionMode off**) — Multiple target connections can run concurrently. Advanced users who need to have multiple target connections running must clear this option before starting multiple connections.

Display connection type in Connection Chooser

Permitted settings for this option are:

- **Selected** (**displayConnectionTypeinChooser on**) — The type of a connection method is displayed in brackets after the name in the drop-down list in the **Connection Chooser** dialog. Custom connection methods have no type displayed.
- **Cleared** (**displayConnectionTypeinChooser off**) — [default] Only the name of the connection method is displayed.

*: For changes to this option to take effect, you must either set the option from the Project Manager, or save the change as your default configuration and then restart the IDE.

Debugger Configuration Options

This section describes configuration options that affect the Debugger. Most of these options appear on the **Debugger** tab of the **Options** window.

The Debugger Options Tab

To access the following options, select **Config → Options → Debugger** tab.

For information about setting configuration options from the command pane, see the introduction of Chapter 8, "Configuration Options" on page 175.

Ask before halting to set breakpoint

Permitted settings for this option are:

- **Selected** (**verifyHalt on**) — [default] The Debugger will ask for confirmation before halting the process to set a breakpoint.
- **Cleared** (**verifyHalt off**) — The Debugger will automatically halt, set the breakpoint, and continue the process without requiring user intervention.

Use procedure relative line numbers (vs. file relative)

Permitted settings for this option are:

- **Selected** (**procRelativeLines on**) — [default] Debugger commands, such as the **e** command, interpret line numbers as procedure relative, instead of file relative.
- **Cleared** (**procRelativeLines off**) — Line numbers are treated as file relative.

For more information, see "Specifying Line Numbers" in Chapter 1, "Using Debugger Commands" in the *MULTI: Debugging Command Reference* book.

Display all numbers/characters as hex

Permitted settings for this option are:

- **Selected** (**hexMode on**) — All numeric values evaluated by the Debugger are displayed in hexadecimal format.
- **Cleared** (**hexMode off**) — [default] Display format is based on the "natural" display format for that type. For integral types, the natural display format is decimal.

View unsigned char as integer

Permitted settings for this option are:

- **Selected** (**viewUnsignedCharAsint on**) — [default] The "natural" display format of unsigned chars will be the same as for ints. This is useful when you want to view byte values as numeric values instead of characters.
- **Cleared** (**viewUnsignedCharAsint off**) — The natural display format for unsigned chars is a literal character, such as '**A**'.

Coloring for multiple debuggers

Specifies how the background color of new Debugger windows is chosen. It is useful to turn this on when using multiple Debugger windows to make them visually distinct. Permitted settings for this option are:

- **Do Not Color** (**backgroundMode off**) — All Debugger windows use the normal background color.
- **Use Color Offsets** (**backgroundMode offset**) — [default] New Debugger windows will use predetermined offsets from the normal background color. This option is usually best since it will pick colors near the current background color, and keep the text as legible as possible.
- **Use Preset Colors** (**backgroundMode preset**) — New Debugger windows will use a color from a set of pre-chosen, highly distinctive colors.

Line numbers in source pane

Specifies how line numbers are displayed on the left side of the Debugger source pane. Permitted settings for this option are:

- **No Number** (**lineNumberMode none**) — No line numbers are displayed.
- **File Number** (**lineNumberMode file**) — The file relative line numbers are displayed.
- **Proc Number** (**lineNumberMode proc**) — The procedure relative line numbers are displayed.
- **Both Numbers** (**lineNumberMode both**) — [default] Both file-relative and procedure-relative line numbers are displayed.

Show variable values in tooltips

Permitted settings for this option are:

- **Never (fastest and safest)** (**hoverValues never**) — Never show variable values in tooltips.
- **On Mouse Hover** (**hoverValues always**) — When the mouse is positioned over a variable, show its value in a tooltip.
- **On Mouse Hover with Shift Key** (**hoverValues onShift**) — [default] When the mouse is positioned over a variable and the **Shift** key is pressed, show the variable's value in a tooltip.

Variables are evaluated in the context of the blue current line pointer. If you want to view the value of a local variable, ensure that the current line pointer is positioned in the current function. For information about the current line pointer, see "The Source Pane" in Chapter 2, "The Main Debugger Window" in the *MULTI: Debugging* book.

Debugger child windows

Windows only

Controls how Debugger child windows (such as the Data Explorer and the **Breakpoint** window) interact with the Debugger window in terms of stacking order and focus. Permitted settings for this option are:

- **Stay above Debugger** (**viewsAreChildrenMode children**) — Child windows are always displayed in front of the Debugger, and the keyboard focus stays with the Debugger when a child window appears. This makes it easy to keep track of child windows and keeps the focus with the Debugger for further command input, but can be annoying if the child windows start to obscure the Debugger window. Child windows can be minimized, but this mode precludes partially obscuring a child window with the Debugger to save space.
- **Can be below Debugger** (**viewsAreChildrenMode topLevel**) — [default] Child windows can be either above or below the Debugger, and keyboard focus remains with the Debugger for further command input when a child window first appears. Because the keyboard focus remains with the Debugger, child windows will appear to flash above the Debugger and then immediately go behind it, so this option is most useful on a large screen where child windows do not overlap the Debugger when they first appear.
- **Are initially focused** (**viewsAreChildrenMode keepFocus**) — Child windows can be either above or below the Debugger, and also receive the keyboard focus when they first appear. This keeps child windows from immediately going behind the Debugger, but takes the focus away from the Debugger. Further command input into the Debugger is not possible until you click the Debugger again to give it the keyboard focus.

Command pane prompt

(**prompt *string***) Specifies the string used as a prompt in the Debugger command pane to indicate that user input is desired. The default *`string`* is `MULTI>`.

Configure Debugger Buttons

Opens a dialog box that you can use to edit the Debugger toolbar buttons. This dialog box is only accessible from the MULTI Debugger. For more information, see "Adding, Removing, and Rearranging Toolbar Buttons" in Appendix A, "Debugger GUI Reference" in the *MULTI: Debugging* book.

More Debugger Options

This button opens the **More Debugger Options** dialog box, which contains additional configuration options for the Debugger (see "The More Debugger Options Dialog" on page 202).

Minimum initial size (WxH)

(**minViewSize** ***width*x*height***) Specifies the minimum initial size that will be used to auto-size Data Explorer windows in characters (width) by lines (height) or in pixels, as specified.

This option provides a lower limit that sets how small a Data Explorer can be, but not necessarily how small it is. The default *`widthxheight`* is `40x3`. The default units are characters/lines. To specify pixels from the command pane or in a configuration file, put a `p` after *`widthxheight`* (for example, `200x21p`).

Maximum initial size (WxH)

(**maxViewSize** ***width*x*height***) Specifies the maximum initial size that will be used to auto-size Data Explorer windows in characters (width) by lines (height) or in pixels, as specified.

This option provides an upper limit that sets how large a Data Explorer can be, but not necessarily how large it is. Even if the **minViewSize** option (preceding) is greater in either dimension than **maxViewSize**, the **maxViewSize** value is still used.

The default *`widthxheight`* is `40x40`. The default units are characters/lines. To specify pixels from the command pane or in a configuration file, put a `p` after *`widthxheight`* (for example, `200x200p`).

Initial position (XxY)

(**firstPosition** ***x-coordinate*x*y-coordinate***) Specifies the initial position of the Data Explorer from the top-left of the screen. You may specify the position in characters (x-coordinate) by lines (y-coordinate) or in pixels.

This option only applies to the first Data Explorer. Subsequent Data Explorers are offset from the first one that was created, preventing excessive overlap. If this option is left unspecified (blank), the Data Explorer remembers its previous position. The default *`x-coordinatexy-coordinate`* is `0x0`. The default units are characters/lines. To specify pixels from the command pane or in a configuration file, put a `p` after *`x-coordinatexy-coordinate`* (for example, `0x0p`).

The More Debugger Options Dialog

To access this dialog box, select **Config → Options → Debugger** tab and click the **More Debugger Options** button.

For information about setting configuration options from the command pane, see the introduction of Chapter 8, "Configuration Options" on page 175.

Automatically dereference pointers

Permitted settings for this option are:

- **Selected** (**derefPointer on**) — [default] MULTI automatically follows pointers when it encounters them and prints both the pointer value and the object it points to.
- **Cleared** (**derefPointer off**) — MULTI only displays the value of the pointer.

Check syntax of breakpoints when they are set

Permitted settings for this option are:

- **Selected** (**bpSyntaxChecking on**) — [default] Commands associated with a breakpoint must pass syntax checking for the breakpoint to be set. Breakpoint commands that fail syntax checking cannot be set.
- **Cleared** (**bpSyntaxChecking off**) — A syntax error in a breakpoint command will not be detected by MULTI until the breakpoint is hit and MULTI tries to execute the associated commands.

Continue running script files on error

Permitted settings for this option are:

- **Selected** (**continuePlaybackFileOnError on**) — The Debugger will not stop if it encounters an error while running a script file. Instead, it will print any error output and continue reading and performing commands out of that file.
- **Cleared** (**continuePlaybackFileOnError off**) — [default] The Debugger aborts running a script file if it encounters an error.

"s" (step) and "n" (next) are blocking by default

Permitted settings for this option are:

- **Selected** (**blockStep on**) — Step/next operations block subsequent commands until the step/next operations have finished.
- **Cleared** (**blockStep off**) — [default] Step/next operations allow subsequent commands to execute before the step/next operations have finished. This can cause scripts that use step/next commands to behave inconsistently.

You can make a step or next command blocking or non-blocking regardless of the setting of this option by appending an `n` (for non-blocking) or `b` (for blocking) to the command. See "Single-Stepping Commands" in Chapter 13, "Program Execution Command Reference" in the *MULTI: Debugging Command Reference* book.

See also the **blockRun** option in "Other Debugger Configuration Options" on page 209.

Show locations of variables for "print" command

Permitted settings for this option are:

- **Selected** (**showAddress on**) — The location (address in memory or register name) of a variable is printed when using the **print** command.
- **Cleared** (**showAddress off**) — [default] The location of a variable will not be printed; only the value is displayed.

Display typedef type instead of basic type

Permitted settings for this option are:

- **Selected** (**leaveTypeDef on**) — Data Explorers for structures will display the name of the type definition.
- **Cleared** (**leaveTypeDef off**) — [default] Data Explorers for structures will display the actual self-contained type.

Show position in non-GUI (-nodisplay) mode

Permitted settings for this option are:

- **Selected** (**showPosinNoDisplayMode on**) — [default] When running in non-GUI mode, MULTI will print the line of source associated with the current line pointer, each time the current line pointer moves. This is the line that will be affected by the next Debugger command executed.
- **Cleared** (**showPosinNoDisplayMode off**) — The line of source code associated with the current line will not display.

Pressing Esc halts the target when connected

Permitted settings for this option are:

- **Selected** (**escHalts on**) — [default] MULTI attempts to halt the current process when you press **Esc** and the Debugger window is active.
- **Cleared** (**escHalts off**) — MULTI does not attempt to halt the current process when you press **Esc**.

Prompt for OSA package when package is not found

Permitted settings for this option are:

- **Selected** (**requestOsaPackage on**) — If MULTI determines that the program is a freeze-mode debugging project (see Chapter 26, "Freeze-Mode Debugging and OS-Awareness" in the *MULTI: Debugging* book) but cannot determine the Operating System Awareness (OSA) package, MULTI will prompt you for the package name. You can choose the package name so that MULTI can provide the corresponding debugging features, or select **Cancel** to continue without OSA.
- **Cleared** (**requestOsaPackage off**) — [default] MULTI will not prompt you for the OSA package name and will continue without OSA.

Delete dead tasks from group

Permitted settings for this option are:

- **Selected** (**deleteDeadTaskFromGroup on**) — The Task Manager will delete dead task fingerprints from the task group. For information about task groups and the meaning of dead tasks, see Chapter 25, "Run-Mode Debugging" in the *MULTI: Debugging* book.
- **Cleared** (**deleteDeadTaskFromGroup off**) — [default] The Task Manager will not delete dead task fingerprints from the task group.

Automatically verify ROM image is up-to-date

Permitted settings for this option are:

- **Selected** (**autoVerifyRomSections on**) — When an executable residing in the target's ROM begins executing, the Debugger will automatically check whether the host and target versions of the executable match. If the executable has a checksum, even slight variations between the two versions will be detected. If the executable does not have a checksum, only more significant differences will be detected. For more information, see Chapter 23, "Working with ROM" in the *MULTI: Debugging* book.

  For information about generating a checksum for an executable, see the documentation about verifying program integrity in the *MULTI: Building Applications* book.
- **Cleared** (**autoVerifyRomSections off**) — [default] The Debugger will not check the target's version of the executable.

Translate DWARF debugging information (requires dwarf2dbo license)

Permitted settings for this option are:

- **Selected** (**autoDwarf2Dbo on**) — Enables automatic translation of DWARF debugging information when an executable built entirely by a third-party compiler that generates DWARF information is loaded. This option is only meaningful if you have licensed the DWARF Debug Translator; otherwise it has no effect.
- **Cleared** (**autoDwarf2Dbo off**) — [default] Disables automatic translation of DWARF debugging information if **Translate stabs debugging information** (next) is selected. If both **Translate DWARF**... and **Translate stabs**... are cleared, and the executable is built entirely by a third-party compiler, the debugging information is automatically translated into the format required by the MULTI Debugger (assuming that you have licensed the appropriate Debug Translator).

For more information, including instructions about what to do if you compiled some of the object files of your executable with a third-party compiler and others with a Green Hills Software compiler, see the documentation about generating debugging information for applications compiled with third-party compilers in the *MULTI: Building Applications* book.

Translate stabs debugging information (requires stabs2dbo license)

Permitted settings for this option are:

- **Selected** (**autoStabs2Dbo on**) — Enables automatic translation of Stabs debugging information when an executable built entirely by a third-party compiler that generates Stabs information is loaded. This option is only meaningful if you have licensed the Stabs Debug Translator; otherwise it has no effect.

  Note that if both this option and the preceding are selected, only a DWARF translation is attempted (the DWARF Debug Translator must be licensed).
- **Cleared** (**autoStabs2Dbo off**) — [default] Disables automatic translation of Stabs debugging information if **Translate DWARF debugging information** (preceding) is selected. If both **Translate stabs**... and **Translate DWARF**... are cleared, and the executable is built entirely by a third-party compiler, the debugging information is automatically translated into the format required by the MULTI Debugger (assuming that you have licensed the appropriate Debug Translator).

For more information, including instructions about what to do if you compiled some of the object files of your executable with a third-party compiler and others with a Green Hills Software compiler, see the documentation about generating debugging information for applications compiled with third-party compilers in the *MULTI: Building Applications* book.

Reuse Data Explorer

Permitted settings for this option are:

- **Selected** (**unifyViewWindows on**) — [default] Causes MULTI to display newly opened variables in an existing Data Explorer when available.
- **Cleared** (**unifyViewWindows off**) — Causes each newly viewed variable to be displayed in a separate Data Explorer.

For more information, see Chapter 11, “Viewing and Modifying Variables with the Data Explorer” in the *MULTI: Debugging* book.

All MULTI tools opened during the current MULTI session are notified of changes to this option. For more information, see “Propagating Configuration Settings” on page 136.

Stepping over longjmps

When the Debugger performs a *next operation* over a subroutine that calls **longjmp** or throws a C++ exception (implemented by a call to **longjmp** internally), the subroutine does not return in the normal way because of the transfer of control within the function call. This is significant because the Debugger uses a temporary breakpoint just after the normal return address to implement the next operation. This is also true of step if there is no source available for the subroutine. When **longjmp** is called, this temporary breakpoint is bypassed because of the transfer of control, and execution can "run away" since the breakpoint will never be hit.

This configuration option controls how MULTI attempts to properly catch unexpected transfers of control while stepping through code. Permitted settings for this option are:

- **Ignore/Run Away** (**longjmpStepMode ignoreRunAway**) — [default] Allows the code to call **longjmp** without attempting to detect abnormal transfers of control.
- **Minimize Temp Stops** (**longjmpStepMode minimizeTempStops**) — Fixes the problem in a way that does not cause temporary stops in **longjmp** as the process runs normally. This option inserts and removes a temporary breakpoint at **longjmp** for each next over a function call.
- **Maximize Step Speed** (**longjmpStepMode maximizeStepSpeed**) — Fixes the problem in a way that minimizes the time it takes to do a next. This option leaves a permanent breakpoint at **longjmp** and results in execution always halting due to a breakpoint being hit whenever the process calls **longjmp**—even during normal execution.

Debug server timeout in seconds

(**serverTimeout** ***seconds***) Specifies the number of seconds to wait for communication from a debug server before assuming it is dead and disconnecting from it.

A timeout that is too low may cause a premature disconnect from the debug server, and is not recommended. A fairly high timeout can be useful for very slow debug servers or for debug servers that are being debugged. However, a high timeout can be frustrating if the debug server dies because the Debugger cannot accept input while it's waiting for communication from the debug server.

The default is `15` seconds.

Interval to refresh Task Manager (in seconds)

(**serverPollinterval** ***seconds***) Specifies the polling interval in seconds. MULTI checks for interesting events happening in the underlying RTOS and refreshes the **Task Manager** periodically.

The default is `1` second for INTEGRITY and `5` for other real-time operating systems.

Criteria to decide if a task is in a group

Controls how to match a task fingerprint against a task. For more information about how the fingerprint is used in the construction process of a task group, see Chapter 25, "Run-Mode Debugging" in the *MULTI: Debugging* book.

Permitted settings for this option are:

- **Task Name** (**taskMatchCriteria name**) — [default] Matches against the name of the task.
- **Task Identifier** (**taskMatchCriteria id**) — Matches against the identifier of the task.
- **Task Name or Identifier** (**taskMatchCriteria nameOrid**) — Matches against the name or identifier of the task.

Prompt when exiting Debugger

Controls whether a confirmation dialog box appears when a user attempts to close the Debugger. Permitted settings for this option are:

- **Confirm If Process Started** (**promptQuitDebugger normal**) — [default] The confirmation dialog box is displayed only if the Debugger is attached to a process that has been started. If the Debugger is attached to a process that has not been started, the Debugger closes without displaying the confirmation dialog box. In a run-mode debugging environment, the Debugger closes without displaying the confirmation dialog even though the process has been started.
- **Always Confirm** (**promptQuitDebugger always**) — The Debugger will not close until the user confirms the action in the confirmation dialog box.
- **Never Confirm** (**promptQuitDebugger never**) — The Debugger never displays the confirmation dialog box before closing.

Maximum size for container display

(**maxContainerDisplaySize *num***) Sets the maximum number of elements initially displayed when a container is viewed in a Data Explorer.

The default *num* is 20.

Increment to maximum container size

(**containerSizeincrement *num***) Sets the number of elements to add when expanding a container that is being viewed in a Data Explorer.

The default *num* is 10.

Other Debugger Configuration Options

The options in this section are not accessible from the **Options** window. To set these options, you can either enter them in a configuration file or in the Debugger command pane (preceded by the **configure** command). For information about setting these options in configuration files, see "Creating and Editing Configuration Files" on page 137. For information about setting configuration options from the command pane, see the introduction of Chapter 8, "Configuration Options" on page 175.

allowExecutioninBpCommand [on | off]

- `on` — Stepping and execution of command line procedure calls are allowed from within a breakpoint command. This is somewhat risky because infinite breakpoint command recursion can occur if the execution from within the breakpoint command causes the same or another breakpoint to be hit. The **resume** command is always allowed in a breakpoint command.
- `off` — [default].

allowProcCallinExamine [on | off]

- `on` — [default] Permits command line procedure calls during evaluation of an expression as part of an **examine** command. Clicking an expression in the Debugger's source pane automatically executes an **examine** command, so when this option is enabled (the default), clicking an expression can trigger a procedure call.
- `off` — Disallows command line procedure calls during evaluation of an expression. When this option is disabled, clicking an expression that involves a procedure call will result in a warning message.

For information about the **examine** command, see Chapter 8, "Display and Print Command Reference" in the *MULTI: Debugging Command Reference* book.

allowProcCallinOsaTask [on | off]

- `on` — Permits command line procedure calls via a freeze-mode connection to an operating system kernel in any context. This may lead to overwritten register values and may only be safe if no code on your target uses floating-point registers, vector registers, or other extended registers, or if your target CPU does not have these registers.
- `off` — [default] Disallows command line procedure calls via a freeze-mode connection to an operating system kernel if MULTI detects an executing task.

blockRun [on | off]

- `on` — Run/continue operations block subsequent commands until the run/continue operations have finished.
- `off` — [default] Run/continue operations allow subsequent commands to execute before the run/continue operations have finished. This can cause scripts that use run/continue commands to behave inconsistently.

See "Run Commands" and "Continue Commands" in Chapter 13, "Program Execution Command Reference" in the *MULTI: Debugging Command Reference* book.

See also the **blockStep** option in "The More Debugger Options Dialog" on page 202.

clearButtons

Removes all the Debugger buttons (except for the **Close Debugger** button if it is present) so that you can create them from scratch with the **debugbutton** command (see "Configuring and Customizing Toolbar Buttons" on page 145) or the **Customize Toolbar** window (see "Adding, Removing, and Rearranging Toolbar Buttons" in Appendix A, "Debugger GUI Reference" in the *MULTI: Debugging* book).

cTextSize *num*

Sets the maximum number of scroll back lines available in the **Cmd**, **Trg**, **I/O**, **Srl**, **Py**, and **Tfc** panes.

If a MULTI session is in use for a long period of time, these panes can use a large amount of memory. Setting this option to a smaller value reduces memory usage, but also limits the number of available scroll back lines.

The valid range for *num* is `10` – `10485760`. The default *num* is `10240`.

debugButton

Lists the defined Debugger buttons. See also "Configuring and Customizing Toolbar Buttons" on page 145.

downloadWindow [on | off]

The download window shows the current progress of a program download. Permitted settings for this option are:

- `on` — [default] The download window will be used when downloading a program to the debug server.
- `off` — The download window will not be used.

echoCommandsFromPlaybackFiles [on | off]

- `on` — When executing from a playback file, Debugger commands being executed will be displayed.
- `off` — [default] When executing from a playback file, Debugger commands being executed will not be displayed.

formatStringMaxDepth *num*

Limits the depth to which nested structs are displayed in a Data Explorer.

The valid range for *num* is `1` – unlimited (`0x7fffffff`). The default *num* is `0x7fffffff`.

formatStringMaxLength *num*

Limits the length of the value displayed in each row of a Data Explorer. For example, if this is set to `2000`, only the first 2000 characters of a string will display, followed by `...` to indicate there are more characters that are not displayed. Data values displayed in a single row in a Data Explorer can be very long (when displaying a long string value or a structure with many nested structs, for example).

The valid range for *num* is `1024` to 10 megabytes (`10485760`). The default *num* is `8192`.

geometry *width*x*height* [[+*x_offset*+*y_offset*]|[-*x_offset*-*y_offset*]]

Sets the size and position of the Debugger window, where:

- *width* and *height* — Correspond to the pixel size of the Debugger window.
- *x_offset* and *y_offset* — Are optional values that indicate the pixel offset at which the Debugger window appears from the top-left corner of the screen for the + variant or from the bottom-right corner of the screen for the - variant. For example, the entry: **geometry 500x700+0+0** specifies a 500-pixel-wide by 700-pixel-high Debugger window that appears in the top-left corner of the screen.

The defaults depend on screen size and vary from system to system. The *width* is approximately wide enough to display 80 characters on a line.

Changes to this option affect new Debugger windows, but not currently open windows.

globalHeading [on | off]

- `on` — Enables the global scope entry in the Browse window.
- `off` — [default] Disables global scope entry in the Browse window.

This option corresponds to the **Tools → Global Scope On/Off** menu item in the Browse window. See "Headings in the Procedures Browse Window" in Chapter 12, "Browsing Program Elements" in the *MULTI: Debugging* book.

All MULTI tools opened during the current MULTI session are notified of changes to this option. For more information, see "Propagating Configuration Settings" on page 136.

Changes to **globalHeading** affect new Browse windows, but not currently open windows.

gotoHitsBpAtTargetAddress [on | off]

- `on` — If you are using the Debugger command **g**, any breakpoint at the destination will be hit as soon as execution begins at the new location. See the **g** command in "General Program Execution Commands" in Chapter 13, "Program Execution Command Reference" in the *MULTI: Debugging Command Reference* book.

  This option also controls whether a breakpoint set on the first instruction of a procedure called from the command line is hit.
- `off` — [default] The breakpoint will not be hit.

history *num*

This option specifies how many commands to remember for the Debugger command history mechanism. For more information, see "History Commands" in Chapter 15, "Scripting Command Reference" in the *MULTI: Debugging Command Reference* book.

The default *`num`* is `256`.

iconGeometry *width*x*height*+*x_offset*+*y_offset*

Linux/Solaris only

Specifies the dimensions (ignored by some window managers) for the icon that is used when the Debugger is minimized, where:

- *`width`* and *`height`* — Are the width and height of the icon in pixels.
- *`x_offset`* and *`y_offset`* — Specify the number of pixels that the icon should be offset from the top-left corner of the screen.

The defaults are `32x64+0+0`.

implicitEvalEcho [on | off]

Permitted settings for this option are:

- `on` — [default] The value of an expression is echoed when the expression is entered into the command pane.
- `off` — The value of an expression is not echoed when the expression is entered into the command pane.

Note: This option affects expression evaluation in the `%EVAL{`*`commands`*`}` sequence used with the **substitute** command. For more information, see the **substitute** command in "Command Manipulation and Macro Commands" in Chapter 15, "Scripting Command Reference" in the *MULTI: Debugging Command Reference* book.

interleavedOutput [on | off]

Controls whether output from Debugger panes other than the command pane (**Cmd**) will also be output to the command pane. Permitted settings for this option are:

- `on` — [default] Output from Debugger panes other than the command pane will be output to the command pane. For example, **I/O** pane output will show up in the command pane with the prefix **I/O:**.
- `off` — Output from other panes will not appear in the command pane.

linesNonOverlapped *num*

By default, when the Debugger opens a Data Explorer or monitor window with **useWmPositioning off** (see "Other General Configuration Options" on page 190), the new window is stacked on top of previous windows to save screen space. This option leaves the top *`num`* lines of the previous window visible.

The default *`num`* is `4`.

osaExplorerRefreshTargetList [on | off]

Controls whether all OSA tasks appear in the target list. Permitted settings for this option are:

- `on` — [default] Displays all OSA tasks in the target list when the **OSA Explorer** is open.
- `off` — Does not display all OSA tasks in the target list. A subset of OSA tasks may appear if accessed by the trace analysis tools.

osaSwitchToUserTaskAutomatically [on | off]

Controls whether the Debugger automatically displays the currently executing user-mode task when the kernel is stopped while executing user-mode tasks. (This is in addition to automatically displaying all of the tasks in the system as controlled by the **osaTaskAutoAttachLimit** configuration option below.)

Permitted settings for this option are:

- `on` — [default] Automatically displays the currently executing user-mode task.
- `off` — Does not display the currently executing user-mode task.

See also "Debugging in Freeze Mode" in Chapter 26, "Freeze-Mode Debugging and OS-Awareness" in the *MULTI: Debugging* book.

osaTaskAutoAttachLimit *num*

Specifies the maximum number of OSA tasks to display in the Debugger target list.

If the tasks have been loaded from trace data and the number of tasks exceeds this limit, one task per AddressSpace is displayed in the target list. For information about manually displaying additional tasks loaded from trace, see "Saving and Loading a Trace Session" in Chapter 19, "Analyzing Trace Data with the TimeMachine Tool Suite" in the *MULTI: Debugging* book.

If the tasks are not loaded from trace, they are displayed consecutively until this limit is reached. For example, if *num* is set to 32 and there are 33 tasks, the 33rd task is not displayed in the target list. For information about manually displaying additional tasks that have not been loaded from trace, see "Debugging in Freeze Mode" in Chapter 26, "Freeze-Mode Debugging and OS-Awareness" in the *MULTI: Debugging* book.

The default *num* is `32`.

paddedHex [on | off]

Permitted settings for this option are:

- `on` — Forces hex values to be displayed padded to their full width with zeros. For example, a four-byte variable with a value of `0x8` is displayed as `0x00000008`.
- `off` — [default] Hex values are displayed as entered.

prepareAllCores [on | off]

Permitted settings for this option are:

- `on` — When you prepare a single core of a multi-core target (for example, via the **prepare_target** command), MULTI automatically prepares each remaining core as if you had run **prepare_target -verify=none** on the executable associated with it. (This is equivalent to choosing the **Prepare Target** dialog option **Program already present on target. Verify: Not at all** for each remaining core.) For more information, see "Preparing Multiple Cores to Run a Single Executable" in Chapter 26, "Freeze-Mode Debugging and OS-Awareness" in the *MULTI: Debugging* book.

  See also the **-allcores** option to the **prepare_target** command in "General Target Connection Commands" in Chapter 18, "Target Connection Command Reference" in the *MULTI: Debugging Command Reference* book.
- `off` — [default] Each core of a multi-core target is treated independently when you prepare the target.

  See also the **-onecore** option to the **prepare_target** command.

procQualifiedLocalimpliesOutermostBlock [on | off]

When the current line pointer is in an inner block of a procedure and that inner block defines a variable that has the same name as a variable in the outer block, a procedure qualified reference to the name of the variable can either refer to the variable of that name in the outermost block or to the variable of that name in the current inner block. This option determines which of the two variables is used. Permitted settings for this option are:

- `on` — The variable in the outermost block is used.
- `off` — [default] The variable in the current inner block is used.

quietTogCmd [on | off]

Permitted settings for this option are:

- `on` — The **tog** command does not echo the status of the breakpoint(s) it toggles.

  See also the `q` option for the **tog** command in Chapter 3, "Breakpoint Command Reference" in the *MULTI: Debugging Command Reference* book.
- `off` — [default].

recordCommentedCommandsFromMacros [on | off]

When command recording is enabled, commands executed from playback files are recorded as comments. This option controls whether commands executed from macros are also recorded as comments. Permitted settings for this option are:

- `on` — Commands executed from macros are recorded as comments.
- `off` — [default] Commands executed from macros are not recorded as comments.

runRcScripts [on | off]

Permitted settings for this option are:

- `on` — [default] Runs global, user, command line, and program script files (**.rc**) when a new program is debugged.
- `off` — Only runs command line script files (that is, those explicitly specified on the command line with **-rc**) when a new program is debugged. This setting is equivalent to the **-norc** command line option. See also the `-rc` and `-norc` command line options in Appendix C, "Command Line Reference" in the *MULTI: Debugging* book.

For information about **.rc** script files, see "Using Script Files" on page 142.

setBpAtAdrinitWhenExecing [on | off]

- `on` — [default] MULTI sets a breakpoint at the starting routine of a program when the process is run. Execution is resumed automatically when this breakpoint is hit unless a user breakpoint was set at the same spot. This is necessary to prevent corrupted call stack traces.
- `off` — MULTI does not set a breakpoint at the starting routine of a program when the process is run.

sharedSymbols [on | off]

- `on` — [default] MULTI attempts to debug shared objects.
- `off` — MULTI does not attempt to debug shared objects.

shellConfirm [on | off]

Permitted settings for this option are:

- `on` — [default] On Linux/Solaris, and if MULTI is running in the background, the **shell** command opens a dialog box that allows you to confirm or cancel execution of the shell command. This is helpful when MULTI is running in the background because shell commands have no accessible standard output or standard error.

  On Windows, the command window waits to be dismissed after running the shell command.
- `off` — On Linux/Solaris, MULTI always executes shell commands immediately, without opening the dialog box.

  On Windows, the command window exits immediately after running the shell command.

See also the **shell** command in Chapter 15, "Scripting Command Reference" in the *MULTI: Debugging Command Reference* book.

silentlyReloadSymbols [on | off]

Permitted settings for this option are:

- `on` — The Debugger automatically kills any existing process and reloads the symbols without displaying a dialog box. This is useful if you are using a Debugger primarily to examine symbols and not to debug running processes.
- `off` — [default] When the executable open in the Debugger changes, the Debugger displays a dialog box asking if any existing process should be killed and the symbols reloaded.

stepToBpignoresResumeinBpCmd [on | off]

Controls whether the **c** (continue) command in a breakpoint is ignored during a single-step operation (but not during a run operation). For more information, see the **c** command in "Continue Commands" in Chapter 13, "Program Execution Command Reference" in the *MULTI: Debugging Command Reference* book.

Note: This option determines whether a continue command is ignored, not a resume command.

Permitted settings for this option are:

- `on` — MULTI ignores the **c** command in the breakpoint command list, prints a warning, and stops the process at the breakpoint.
- `off` — [default] MULTI does not ignore the **c** command in the breakpoint command list. For example, if you have a breakpoint with the command list **print x; c** and you step on to this breakpoint, the process starts running because the **c** command causes the process to continue. The **c** command inside a breakpoint always causes the process to start running, which is incorrect behavior if you want to step on to that line.

  Note that the **resume** command should be used inside breakpoint command lists. If the breakpoint's command list is **print x; resume**, the process stops when you step on to the breakpoint. If the process runs and hits the breakpoint, it will keep running (the process resumes whatever it was going to do before hitting the breakpoint). For more information, see the **resume** command in Chapter 3, "Breakpoint Command Reference" in the *MULTI: Debugging Command Reference* book.

targetWindowSwitchViewOnBpHit [on | off]

Controls whether the Debugger automatically switches to a task that is not currently selected in the target list when a breakpoint is hit in that task. Permitted settings for this option are:

- `on` — [default] When a breakpoint is hit in a task that is not currently selected in the target list, the Debugger automatically switches to that task if no other Debugger window is open on it and if the currently selected task is not halted. Switching occurs for both software and hardware breakpoints.
- `off` — The Debugger does not automatically switch to a task when a breakpoint is hit in that task.

tb*Type*Bg *color*

tb*Type*Fg *color*

Specifies the background color (commands end with `Bg`) or foreground color (commands end with `Fg`) for Tree Browser displays, where:

- *`Type`* is one of the following:
  - `FunctionNormal` (`tbFunctionNormalBg` and `tbFunctionNormalFg`) — Functions displayed in the static call Tree Browser which have debugging information.
  - `FunctionNoinfo` (`tbFunctionNoinfoBg` and `tbFunctionNoinfoFg`) — Functions displayed in the static call Tree Browser which do not have debugging information.
  - `FunctionRecursive` (`tbFunctionRecursiveBg` and `tbFunctionRecursiveFg`) — Functions displayed in the static call Tree Browser that may be recursive.
  - `FunctionAdrTaken` (`tbFunctionAdrTakenBg` and `tbFunctionAdrTakenFg`) — Nodes representing the possibility of calls to a function through function pointer in a Tree Browser.
  - `DynNormal` (`tbDynNormalBg` and `tbDynNormalFg`) — Functions displayed in the dynamic call Tree Browser with debugging information.
  - `DynNoinfo` (`tbDynNoinfoBg` and `tbDynNoinfoFg`) — Functions displayed in the dynamic call Tree Browser without debugging information.
  - `FileNormal` (`tbFileNormalBg` and `tbFileNormalFg`) — Files displayed in the file call Tree Browser with debugging information.
  - `FileNoinfo` (`tbFileNoinfoBg` and `tbFileNoinfoFg`) — Files displayed in the file call Tree Browser without debugging information.
  - `ClassUnion` (`tbClassUnionBg` and `tbClassUnionFg`) — Unions displayed in the class Tree Browser.
  - `ClassStruct` (`tbClassStructBg` and `tbClassStructFg`) — Types displayed in the class Tree Browser with debugging information.
  - `ClassNoinfo` (`tbClassNoinfoBg` and `tbClassNoinfoFg`) — Types displayed in the class Tree Browser without debugging information.
  - `ClassClass` (`tbClassClassBg` and `tbClassClassFg`) — Class data types displayed in the class Tree Browser.
  - `ClassEnum` (`tbClassEnumBg` and `tbClassEnumFg`) — Enum data types displayed in the class Tree Browser.
- `Bg` or `Fg` — Specifies whether you are changing the background or foreground color of the displayed items.
- *`color`* — Specifies the new color in RGB format. For more information, see “Colors Configuration Options” on page 235.

viewDef [*number_option*] [*eval_option*] [[-]*other_options*]...

Specifies how data will be displayed in Data Explorers, where:

- *number_option* can be one of the following:
  - NaturalOrHex — Numbers display in their default states unless **hexMode on** is set (see "The Debugger Options Tab" on page 198).
  - Natural — Numbers display in their default states.
  - Hex, Dec, Oct, or Binary — Numbers and characters display in base 16, base 10, base 8, or base 2 notation, respectively.
- *eval_option* specifies how the Debugger re-evaluates expressions when updating Data Explorers, and can be one of the following:
  - ReEvaluate — Each expression is re-evaluated in the same context as when the Data Explorer displaying it was first created.
  - ReEvalContext — Expressions are re-evaluated within the current procedure at the top of the call stack.
  - ReEvalinGlobal — When expressions are re-evaluated, only looks for variables in the global scope.
  - UseAddress — Uses last valid address of variables being displayed.
- *other_options* can include any of the options listed below. (Prepending an option with a dash (-) disables the behavior.)
  - ShowAddress — Displays the address (rather than name) of the variable.
  - ShowFType — Shows the type of each variable, class, or structure.
  - Alternate — Displays data in an alternative format, if available.
  - PadHex — Adds zeros to the left of hexadecimal numbers to maintain same bit width, as needed. (Otherwise, only non-zero hexadecimal digits display.)
  - ShowBases — Displays the base classes of a C++ class along with a derived instance.
  - ShowAllFields — Displays all the fields of a complicated structure.
  - ShowDerived — Determines the most derived C++ class type of the current object and redisplays the object cast to that type.
  - ExpandValue — Displays the value in memory (if in readable memory) that a pointer references.
  - ExpandComplexMemberValue — Displays arrays and structures (if in readable memory) that a pointer references. This options has no effect if ExpandValue is disabled.
  - OpenPointer — Dereferences all pointers.
  - ShowChanges — Highlights values that have changed.

The defaults are `NaturalOrHex ReEvalContext -ShowAddress -ShowFType -Alternate -PadHex ShowBases -ShowAllFields ShowDerived ExpandValue`

`ExpandComplexMemberValue OpenPointer ShowChanges.`
warnOnBpReplacement [on | off] Permitted settings for this option are: • `on` — The Debugger displays a warning before replacing a pre-existing breakpoint with a new breakpoint. This can help prevent the accidental loss of breakpoints with long command lists. • `off` — [default] The Debugger does not warn you before replacing a pre-existing breakpoint.
warnOnCmdAdrLinePromotion [on | off] Permitted settings for this option are: • `on` — The Debugger displays a warning when setting a breakpoint on a line with no corresponding assembly code. • `off` — [default].

MULTI Editor Configuration Options

This section describes configuration options that affect the appearance and behavior of the MULTI Editor. (If you are using an alternative editor, see "Third-Party Editor Configuration Options" on page 183.) Most of these options appear on the **MULTI Editor** tab of the **Options** window.

The MULTI Editor Options Tab

To access the following options, select **Config → Options → MULTI Editor** tab.

For information about setting configuration options from the command pane, see the introduction of Chapter 8, "Configuration Options" on page 175.

Reuse editor windows

Permitted settings for this option are:

- **Selected** (**openFilesinNewBuffers on**) — The first file opened from a MULTI executable such as the Project Manager or Debugger opens in a new Editor window. Subsequently opened files reuse the Editor window initially opened from the MULTI executable.
- **Cleared** (**openFilesinNewBuffers off**) — [default] Every file opens in a new Editor window.

All MULTI tools opened during the current MULTI session are notified of changes to this option. For more information, see "Propagating Configuration Settings" on page 136.

Create backup files when saving

Permitted settings for this option are:

- **Selected** (**editorBackups on**) — A backup of the on-disk version of a file will automatically be created before saving over it. The backup file has the same name as the original file, with a tilde (~) appended to it.
- **Cleared** (**editorBackups off**) — [default] Backup files will not be created.

Allow middle click to paste

Permitted settings for this option are:

- **Selected** (**allowMiddleClick on**) — [default for Linux/Solaris] Clicking the middle mouse button will have the same effect as pasting from the selection buffer.
- **Cleared** (**allowMiddleClick off**) — [default for Windows] Clicking the middle mouse button will not paste from the clipboard.

Enter spaces in place of tabs

Permitted settings for this option are:

- **Selected** (**tabsAreSpaces on**) — **Tab** characters entered into an Editor window will be replaced by an appropriate number of space characters in the Editor buffer, regardless of whether the **Tab** is the result of pressing **Tab**, entering a **paste** command, or auto indenting in the Editor.
- **Cleared** (**tabsAreSpaces off**) — [default] Space characters are not inserted in place of **Tab** characters.

Drag and drop text editing

Permitted settings for this option are:

- **Selected** (**dragAndDrop on**) — Text can be moved in the Editor by selecting a block of text and dragging the mouse to a new location.
- **Cleared** (**dragAndDrop off**) — [default] Text cannot be moved by dragging the mouse.

Allow overtype mode

Permitted settings for this option are:

- **Selected** (**allowOvertypeMode on**) — Allows switching between insert and overtype mode.
- **Cleared** (**allowOvertypeMode off**) — [default] Does not allow switching between insert and overtype mode.

Tab size

(**tabSize** ***spaces***) Specifies the number of spaces used to display a **Tab** in the Editor. The default is `8` spaces.

Indent size

(**editindent** ***spaces***) Specifies the number of spaces in an indentation. The default is `4` spaces.

Ctrl+cursor jump size

(**editSomeSize** ***num***) Specifies the value used by the **UpSome**, **DownSome**, **LeftSome**, and **RightSome** Editor commands. For information about these commands, see "Navigation Commands" on page 350.

The default *`num`* is `5`.

Configure Editor Buttons

Opens the **Configure Editor Buttons** dialog box, which allows you to edit the Editor buttons using the same format as the **editbutton** command (see "Configuring and Customizing Toolbar Buttons" on page 145). The dialog box lists currently defined buttons on the left, and available icons on the right.

More Editor Options

Opens the **More Editor Options** dialog box, which contains additional configuration options for the Editor. See "The More Editor Options Dialog Box" on page 227.

Auto indent as you type

Permitted settings for this option are:

- **Selected** (**aiimplicitindent on**) — [default] The Editor automatically indents the file as you type.
- **Cleared** (**aiimplicitindent off**) — The Editor will not automatically indent your file.

Only auto indent when typing first character in line

Controls auto indentation. This configuration option only takes effect if **Auto indent as you type** (preceding) is selected.

Permitted settings for this option are:

- **Selected** (**aiimplicitOnlyAtinitial on**) — [default] The MULTI Editor only automatically indents a line when the first typed character (includes space characters) is an auto-indent character. See "Auto-Indent Characters" on page 90.
- **Cleared** (**aiimplicitOnlyAtinitial off**) — The MULTI Editor automatically makes indenting adjustments when you type auto-indent characters, regardless of where they appear on the line.

Auto indent comments as you type

Controls auto indentation in comments. This configuration option only takes effect if **Auto indent as you type** (preceding) is selected.

Permitted settings for this option are:

- **Selected** (**aiimplicitindentinComments on**) — [default] Comments will be indented when auto indenting multiple lines.
- **Cleared** (**aiimplicitindentinComments off**) — Comments are not modified unless you auto indent a single line.

Double indent size when indenting body of switch

Permitted settings for this option are:

- **Selected** (**aiSwitchinTwo on**) — [default] For C or C++ source files, switch bodies are indented two levels so that case labels are indented one level from the switch. For Ada source files, select bodies are indented two levels so that labels are indented one level from the select.
- **Cleared** (**aiSwitchinTwo off**) — For C or C++ source files, the case labels are even with the switch. For Ada source files, the labels are even with the select.

Indent comments when indenting multiple lines

Permitted settings for this option are:

- **Selected** (**aiTouchComments on**) — [default] Comments are indented when auto indenting multiple lines.
- **Cleared** (**aiTouchComments off**) — Comments are only indented if you auto indent a single line.

Comments stick flush left

Permitted settings for this option are:

- **Selected** (**aiCommentsStayFlushLeft on**) — [default] All comments will be kept directly on the left margin.

  To indent a comment that is stuck to the left margin while this option is selected, insert a space just before the start of the comment, then auto indent the comment.

  To move a comment to the left margin, regardless of the position where the comment started, insert a number sign (`#`) as the first character of a comment. For example, if you are coding in C, type: `/*#` and the comment is automatically moved to the left margin.
- **Cleared** (**aiCommentsStayFlushLeft off**) — Indents will be applied to comments.

C chars aligned like '*' in comments

(**aiCharsLikeStarinComment** ***char_string***) Allows characters other than asterisks (`*`) to line up in comments as if they were asterisks. The default *`char_string`* is `-` (dash).

The default setting allows correct automatic indentation of comments that have a column of `-` (dashes) down the left side, lined up under the `*` in the `/*` sequence. To have characters other than asterisks (`*`) line up in comments as if they were asterisks, make them part of the *`char_string`*.

C paren indent mode

Controls how the Editor indents a line in a C/C++ source file if it starts within an open parenthesis/close parenthesis pair. Permitted settings for this option are:

- **Even with parentheses (aiParenindentMode evenWithParen)** — If there is a non-whitespace character between the open parenthesis and the end of its line, the lines enclosed in parentheses start at the same column as that character. Otherwise, the lines enclosed in parentheses start in the column just after the open parenthesis. For example:

```
void foo (void)
{
    bar(
        argument_one,
        argument_two
        );
}
```

- **Indent in two (aiParenindentMode indentinTwo)** — [default] Lines enclosed in parentheses start two indent levels in from the line that contains the open parenthesis. For example:

```
void foo (void)
{
    bar(
            argument_one,
            argument_two
            );
}
```

Ada paren mode

Controls how the Editor indents a line in an Ada source file if it starts within an open parenthesis/close parenthesis pair. Permitted settings for this option are:

- **Even with parentheses (aiAdaParenindentMode evenWithParen)** — [default] If there is a non-whitespace character between the open parenthesis and the end of its line, the lines enclosed in parentheses start at the same column as that character. Otherwise, the lines enclosed in parentheses start in the column just after the open parenthesis.
- **Indent in two (aiAdaParenindentMode indentinTwo)** — The lines enclosed in parentheses start two indent levels in from line that contains the open parenthesis.

The More Editor Options Dialog Box

To access this dialog box, select **Config → Options → MULTI Editor** tab and click the **More Editor Options** button.

Note

The settings under **Per File Settings Defaults** are used when a file is first opened. Changes to the default settings will automatically be applied to all files open in the Editor. To change the settings for an individual file without affecting other open files, choose **View → Per File Settings** in the Editor.

For information about setting configuration options from the command pane, see the introduction of Chapter 8, "Configuration Options" on page 175.

Print 2 columns if landscape orientation is selected Windows only Permitted settings for this option are: • **Selected** (**editPrint2Column on**) — The Editor prints files with two columns per sheet if landscape orientation is selected. • **Cleared** (**editPrint2Column off**) — [default] The Editor prints one column per sheet.
Temp file directory (**tempFileDir** ***dirpath***) Specifies the directory where MULTI stores its temporary files. The default is blank, which has the following results: • Windows — Uses the values of the `TMP` or `TEMP` environment variables and defaults to the current directory if those variables are not set. • Linux/Solaris — Uses the values of the `TMPDIR` or `TEMP` environment variables and defaults to **/tmp** if those variables are not set.
Initial width in characters (**editWidth** ***width***) Specifies the initial width of Editor windows in characters. This option is only useful when **Save window positions and sizes** is cleared (**rememberWindowPositions off**). See the **Save window positions and sizes** option in "The General Options Tab" on page 177. The default *`width`* is `80`.

Initial height in characters

(**editHeight *height***) Specifies the initial height of Editor windows in characters.

This option is only useful when **Save window positions and sizes** is cleared (**rememberWindowPositions off**). See the **Save window positions and sizes** option in "The General Options Tab" on page 177.

The default *height* is 32.

Selection margin width in pixels

(**selectionMarginWidth *num***) Specifies the width of the left margin in the Editor in pixels. If the width is 0, the left margin does not appear and entire lines of text can no longer be selected by using the margin. Changing the selection margin width only affects new Editor windows. The default *num* is 13.

Generate auto-recover file every x seconds

(**editincrFrequency *num***) Specifies the number of seconds between generation of auto-recover files.

The Editor will create an auto-recover file every *num* seconds as you edit. If the power goes out or the Editor crashes, the next time you open the same file, you will be given the option to re-apply the edits saved in the auto-recover file.

The default *num* is 120.

Spaces per indent for Ada

(**adaindentSize *num***) Specifies the number of spaces in an indentation for Ada files. The default *num* is 3.

Ada continuation line indent

(**adaContinuationSize *num***) Specifies the number of spaces in an indentation for a continuation line in Ada files. The default *num* is 2.

Word wrap

Permitted settings for this option are:

- **Selected** (**wordWrap on**) — If lines are longer than the wrapping width, the Editor will automatically split lines on word boundaries as you type.
- **Cleared** (**wordWrap off**) — [default] Lines will not wrap.

Wrap column

(**wrapColumn *width***) When **Word wrap** is selected (**wordWrap on**), *width* specifies the last column a character can occupy before the Editor wraps to the next line.

The default *width* is 79.

Wrap indent offset

(**wrapindent *num***) When a word wraps to the next line, the word is automatically indented *num* extra spaces from where it would normally appear. The default *num* is 2.

Fill paragraph column

(**fillParagraphColumn *num***) Specifies the column at which each line will be wrapped when using **Ctrl**+**Shift**+**A** to reformat comments.

The default *num* is 79.

Other MULTI Editor Options

The options in this section are not accessible from the **Options** window. To set these options, you can either enter them in a configuration file or in the Debugger command pane (preceded by the **configure** command). For information about setting these options in configuration files, see "Creating and Editing Configuration Files" on page 137. For information about setting configuration options from the command pane, see the introduction of Chapter 8, "Configuration Options" on page 175.

autoGrabHeadFiles [on | off]

Controls whether the MULTI Editor automatically grabs function prototypes from a source file's **include** files when the source file is loaded.

- on — [default] The MULTI Editor automatically grabs function prototypes when opening source files. This setting enables auto-completion of function names.
- off — The MULTI Editor does not grab function prototypes when opening source files. This setting is recommended if you notice poor performance when this option is enabled.

clearEditButtons

Removes all Editor buttons so they can be created from scratch with the **editbutton** command (see "Configuring and Customizing Toolbar Buttons" on page 145).

drawWrapLine [on | off | asWordWrap]

Specifies whether or not to draw the wrap line in the MULTI Editor. Permitted settings for this option are:

- on — [default] Enables the wrap line.
- off — Disables the wrap line.
- asWordWrap — Enables the wrap line if word wrap is enabled.

This option does the same thing as the Editor command **DrawWrapLine**.

editButton

Creates a new Editor button. This option does the same thing as the Debugger command **editbutton**. For usage and information, see “Configuring and Customizing Toolbar Buttons” on page 145.

editParenMatch *time*

Every time you type a right parenthesis, right square bracket, or right curly brace, the Editor briefly selects the matching one. The Editor will pause on this highlight of the previous match for `time` tenths of a second. A value of `0` (zero) will disable matching. The default `time` is `10`.

Session Configuration Options

This section describes configuration options that allow you to control what information from the current session MULTI remembers for use in future sessions. To access the following options, select **Config → Options → Session** tab.

For information about setting configuration options from the command pane, see the introduction of Chapter 8, “Configuration Options” on page 175.

Save command history between sessions

Permitted settings for this option are:

- **Selected** (**saveCommandHistory on**) — [default] The command history for each executable will be saved. If the executable has not been debugged before, it will have no previous command history.
- **Cleared** (**saveCommandHistory off**) — The command history will not be saved.

Save data explorers between sessions

Permitted settings for this option are:

- **Selected** (**saveViewWindows on**) — Saves all variables being viewed in Data Explorers between MULTI sessions on the same executable. When restored, the variables are all added to one Data Explorer, or each is added to a different Data Explorer as dictated by the **Reuse Data Explorer** option. (See the description of this option in “The More Debugger Options Dialog” on page 202.)
- **Cleared** (**saveViewWindows off**) — [default] Data Explorer content is not saved.

Save arguments between sessions

Permitted settings for this option are:

- **Selected** (**saveRunArguments on**) — [default] Saves the last arguments supplied to run the target program between MULTI sessions on the same executable. To run the executable with no arguments, use the **R** command. See the **R** command in "Run Commands" in Chapter 13, "Program Execution Command Reference" in the *MULTI: Debugging Command Reference* book.
- **Cleared** (**saveRunArguments off**) — Arguments are not saved.

Save debugger window position

Permitted settings for this option are:

- **Selected** (**saveDebuggerWindowPos on**) — Saves and restores the size and position of the MULTI Debugger window on a per executable basis. Note that the Debugger window is only sized and positioned on window creation, so debugging a different executable from an already opened MULTI will not have any effect.
- **Cleared** (**saveDebuggerWindowPos off**) — [default] Debugger window position will not be saved.

Remember software breakpoints

Determines whether the Debugger remembers software breakpoints (including shared object breakpoints) that you have set for a program the next time you debug the same program. Permitted settings for this option are:

- **Never** (**rememberBreakpoints never**) — The Debugger clears all software breakpoints whenever you load or reload a program.
- **Across Reloads** (**rememberBreakpoints withinSession**) — [default] The Debugger remembers software breakpoints when you reload the program within a single session. Software breakpoints are lost when you exit MULTI.
- **Across Sessions** (**rememberBreakpoints acrossSessions**) — The Debugger remembers software breakpoints even if you exit and restart MULTI.

Note: The Debugger may not remember group breakpoints and does not remember hardware breakpoints.

Restored breakpoints overwrite breakpoints set by scripts

Permitted settings for this option are:

- **Selected** (**overwriteScriptBreakpoints on**) — Previously saved breakpoints will overwrite breakpoints that have been created by a script run automatically for the current executable.
- **Cleared** (**overwriteScriptBreakpoints off**) — [default] Previously saved breakpoints will not overwrite breakpoints that have been created by a script run automatically for the current executable.

Remember base addresses (e.g. _TEXT)

Determines whether the Debugger remembers address offsets that you have set for a program the next time you debug the same program. This option is only applicable to programs that are compiled for use with position-independent code and/or position-independent data. Permitted settings for this option are:

- **Never** (**rememberBaseAddrs never**) — The Debugger will clear all base addresses whenever you load or reload a program.
- **Across Reloads** (**rememberBaseAddrs acrossReload**) — [default] The Debugger will remember address offsets that you have set when you reload the program within a single session. Address offsets are lost when you exit MULTI.
- **Across Sessions** (**rememberBaseAddrs acrossSessions**) — The Debugger will remember address offsets that you have set for a program even if you exit and restart MULTI.

You can set address offsets by assigning built-in variables `_DATA` and `_TEXT` in the Debugger or by using the command line options **-data *offset*** and **-text *offset***. For more information about system variables, see "System Variables" in Chapter 14, "Using Expressions, Variables, and Procedure Calls" in the *MULTI: Debugging* book. For more information about command line options, see Appendix C, "Command Line Reference" in the *MULTI: Debugging* book.

Remember last connect command used for process

Permitted settings for this option are:

- **Selected** (**saveDebugServer on**) — [default] Saves the most recently used Connection Method on a per-executable basis. If the executable is started and MULTI is not connected, the saved Connection Method will be used as the default in the **Connection Chooser** dialog box.
- **Cleared** (**saveDebugServer off**) — The last Connection Method is not saved.

Automatically save changed connection files

Permitted settings for this option are:

- **Selected** (**autoSaveConnectionsinFiles on**) — [default] MULTI saves any outstanding changes to all Target Connection files loaded in the Connection Organizer when you exit.
- **Cleared** (**autoSaveConnectionsinFiles off**) — Changes to Target Connection files will not be automatically saved.

Automatically save 'User Methods' changes

Permitted settings for this option are:

- **Selected** (**autoSaveUserConnections on**) — [default] MULTI saves any outstanding changes to the "User Methods" Target Connection file when you exit.
- **Cleared** (**autoSaveUserConnections off**) — All changes to the "User Methods" Target Connection file will be lost, even if **Automatically save changed connection files** is selected (**autoSaveConnectionsInFiles on**).

Directory memory

Determine which directory to initially display in the **File Chooser**. Permitted settings for this option are:

- **Across Sessions** (**rememberDirs rememberAcross**) — **File Chooser** will always open in the previously viewed directory for the same operation, even after closing and restarting MULTI. The user directories will only be used on the very first run of MULTI, or if a user settings file cannot be found.
- **Within Sessions** (**rememberDirs rememberWithin**) — [default] **File Chooser** will open in the appropriate previously viewed directory, but it will not remember directories viewed in previous sessions. **File Chooser** will use the User directories initially each time MULTI is restarted.
- **None** (**rememberDirs rememberNever**) — **File Chooser** will always open with the appropriate User directory, and never remember which directory was previously viewed.

User Directories

Opens the **User Directories** dialog box, which sets the directories the file chooser starts with if directory memory is not available or is turned off.

To change any of the settings in this dialog box, select the check box, then enter the full path of the directory.

General Files:

- **Selected** (**genFileSet on**) — Opens the **General Files** directory field, where you can enter the path.
- **Cleared** (**genFileSet off**) — [default] The current working directory is used.
- **General Files** directory (**genFilesDir** ***pathname***) — [default is current working directory] Use this field to enter the directory path for general files.

Source Files:

- **Selected** (**sourceFileSet on**) — Opens the **Source Files** directory field, where you can enter the path.
- **Cleared** (**sourceFileSet off**) — [default] The current working directory is used.
- **Source Files** directory (**sourceFilesDir** ***pathname***) — [default is current working directory] Use this field to enter the directory path for source files.

Project Files:

- **Selected** (**buildFileSet on**) — Opens the **Project Files** directory field, where you can enter the path.
- **Cleared** (**buildFileSet off**) — [default] The current working directory is used.
- **Project Files** directory (**buildFilesDir** ***pathname***) — [default is current working directory] Use this field to enter the directory path for project files.

Executables/Binaries:

- **Selected** (**execFileSet on**) — Opens the **Executables/Binaries** directory field, where you can enter the path.
- **Cleared** (**execFileSet off**) — [default] The current working directory is used.
- **Executables/Binaries** directory (**execFilesDir** ***pathname***) — [default is current working directory] Use this field to enter the directory path for executables.

Debug Servers:

- **Selected** (**debugServerSet on**) — Opens the **Debug Servers** directory field, where you can enter the path.
- **Cleared** (**debugServerSet off**) — [default] The current working directory is used.

- **Debug Servers** directory (**debugServersDir** ***pathname***) — [default is current working directory] Use this field to enter the directory path for debug servers.

Show version control information on file chooser dialog box

Linux/Solaris only

Permitted settings for this option are:

- **Selected** (**showVersionControl on**) — If a user has the file checked out, the **File Chooser** dialog box will display the name of that user next to the filename in a column titled **Version Control**.
- **Cleared** (**showVersionControl off**) — The **Version Control** column will be hidden and the version control system will not be queried.

Warning: Selecting this option causes MULTI to query the version control system for each file. On some version control systems, turning on this option might slow down **File Chooser** performance significantly.

Colors Configuration Options

This section describes configuration options that you can use to change the display colors for MULTI. To access the following options, select **Config → Options → Colors** tab.

To edit colors, double-click the colored box next to any option. The **Color Chooser** opens (for more information, see "The Color Chooser" on page 239).

On Windows, color options are expressed in RGB format as three decimal values. For example, `255 0 0` specifies the color red. In the tables that follow, the default RGB values provided are in hexadecimal, but decimal values appear on the **Colors** tab for Windows users.

On Linux/Solaris, color options are expressed in RGB hexadecimal format as a number sign (`#`) followed by the six-digit hexadecimal value. For example, `#FF0000` specifies the color red.

Unless otherwise stated, all MULTI tools opened during the current MULTI session are notified of changes to color options. For more information, see "Propagating Configuration Settings" on page 136.

For information about setting configuration options from the command pane, see the introduction of Chapter 8, “Configuration Options” on page 175.

Load Color Scheme

Linux/Solaris only

Sets the color scheme. Permitted settings for this option are:

- **Default (color, white background)**
- **Beige (color, light background)**
- **Plum (color, light background)**
- **Dark 1 (color, black background)**
- **Dark 2 (color, black background)**
- **Grey (grey, white background)**
- **Dark Grey (greys, black background)**

Global Colors

Linux/Solaris only

Global colors can only be set on Linux/Solaris systems. They affect the default colors for user interface elements. The following global color options may be set:

- **Background** (**background *color***) — [default is `#ffffff`] Background color of “user areas,” such as the color behind the text you enter.
- **Foreground** (**foreground *color***) — [default is `#000000`] Color of text.
- **Control Area** (**controlColor *color***) — [default is `#c0c0c0`] Background color of “control areas,” such as menu bars and buttons.
- **Selection** (**Select *color***) — [default is `#000080`] Background color of text selections. The foreground color of selections is based on the **foreground** setting and is chosen automatically.

Debugger Colors*

Controls how certain elements are displayed in the Debugger. The colors you can customize are:

- **Assembly** (**assembly *color***) — [default is `#0000ff`] Color of interlaced assembly code.
- **Break Dot** (**bDotColor *color***) — [default is `#00cd00`] Color of break dots, which indicate locations where breakpoints may be set.
- **Status** (**breakColor *color***) — [default is `#ff0000`] Color of the process status and debug server messages ("STOPPED," "RUNNING," etc.).
- **Context Arrow** (**pointerColor *color***) — [default is `#0000ff`] Color of the context arrow, which indicates what context to use for commands in the Debugger.
- **File line #**
  - **Selected** (**useFileRelLineBg on**) — [default] Enables file relative line numbers.
  - **Cleared** (**useFileRelLineBg off**) — Disables file relative line numbers.
  - Color field (**fileRelLineBg *color***) — [default is `#FFFFFF`] Color of the background behind the column of file relative line numbers in the source pane.
- **Proc line #**
  - **Selected** (**useProcRelLineBg on**) — [default] Enables procedure relative line numbers.
  - **Cleared** (**useProcRelLineBg off**) — Disables procedure relative line numbers.
  - Color field (**ProcRelLineBg *color***) — [default is `#e4e4e4`] Color of the background behind the column of procedure relative line numbers in the source pane.

Syntax Coloring

Permitted settings for this option are:

- **Selected** (**colorSyntax on**) — [default] Source code will be syntax colored based upon the **Syntax Color Settings** listed below.
- **Cleared** (**colorSyntax off**) — Source code will not be syntax colored.

If you change the setting of this option but do not save the configuration as the default, only the MULTI tool from which the option was changed is aware of the new setting. If you do save the configuration as the default, however, all MULTI tools launched after the change are also notified of the new setting.

Syntax Color Settings* Colors may be set for the following items: • **Comments** (**comment *color***) — [default is `#008000`] • **Keywords** (**keyword *color***) — [default is `#0000ff`] • **Dead Code** (**deadCode *color***) — [default is `#808080`] Color of code enclosed in an `#if 0 ... #endif` block. • **Numbers** (**number *color***) — [default is `#e000e0`] • **Strings** (**string *color***) — [default is `#800000`] • **Characters** (**character *color***) — [default is `#c000c0`] • **Customized** (**customized *color***) — [default is `#008080`]
Color C++ comments in C Permitted settings for this option are: • **Selected** (**cppCommentsinC on**) — [default] C++ style comments (`//`) will be syntax colored as comments in both C++ and C source files. • **Cleared** (**cppCommentsinC off**) — C++ style comments will not be syntax colored as comments in C source files. If you change the setting of this option but do not save the configuration as the default, only the MULTI tool from which the option was changed is aware of the new setting. If you do save the configuration as the default, however, all MULTI tools launched after the change are also notified of the new setting.
More Color Options Opens the **More Color Options** dialog box, which contains additional colors that you can configure. For more information, see "The More Color Options Dialog Box" on page 238.

*: These colors are used throughout the IDE to highlight text. As a result, changing them may affect other windows, such as the Browse window.

The More Color Options Dialog Box

To access this dialog box, select **Config → Options → Colors** tab and click **More Color Options**.

For information about setting configuration options from the command pane, see the introduction of Chapter 8, "Configuration Options" on page 175.

Connection Organizer Colors Sets the foreground color of the **Connected Targets** list, which is located in the **Connection Organizer**. • **Connected targets** (**startedConnectionFg** ***color***) — [default is `#008000`]
Diffview Colors Sets the background color of the current selection in the **Diff Viewer** foreground. • **Highlight** (**diffHighlight** ***color***) — [default is `#e0ffd0`]

The Color Chooser

You can use the **Color Chooser** to select and customize colors for any of MULTI's color options. To access the **Color Chooser**, double click any of the color boxes in the **Colors** tab of the **Options** window.

On Windows, the standard color chooser is used. For more information, see your Windows documentation.

On Linux/Solaris, the **Color Chooser** consists of a rectangle indicating the current color; three sliders to control the levels of red, green, and blue in the current color; and a number of preset basic colors.

1. To select a basic color — Click one of the colored boxes.

   To select a custom color — Use the color sliders or the text fields beneath them to create a color.
2. Click **OK** to replace the color or **Cancel** to discard your changes and close the **Color Chooser**.

Part III

GUI Reference

Chapter 9

Launcher GUI Reference

Contents

This chapter contains detailed descriptions of the menus and toolbar buttons available in the MULTI Launcher. Many of these items are mentioned in the main text of this book in the context in which they are used. They are listed here together to provide a comprehensive reference. For information about the two display modes of the Launcher—concise mode and detailed mode—see "Launcher Display Modes" on page 54.

Launcher Menus

The following sections describe the menu items available in the Launcher. Menu items are dimmed if they are unavailable in your current context.

The File Menu

The **File** menu contains the following menu items:

Create Workspace Opens the **Select Workspace Type** dialog box, which you can use to create a new workspace. For more information, see "Creating Workspaces" on page 56.
Delete Workspaces Opens the **Delete Workspaces** dialog box, which allows you to select one or more workspaces for deletion.
Recent Workspaces Opens a submenu listing the most recently accessed workspaces. If you select one, it becomes the current workspace.
Load Workspace from File Opens a dialog box that allows you to import a workspace from a **.gmb** file. For more information, see "Importing and Exporting Workspaces" on page 60.
Load Shortcuts from File Opens a dialog box that allows you to import shortcuts from a **.gmb** file. For more information, see "Importing and Exporting Shortcuts" on page 68.
Create or Change Shortcuts Allows you to create a new shortcut or change an existing shortcut. For general information about shortcuts, see the beginning of Chapter 3, "Managing Workspaces and Shortcuts with the Launcher" on page 51. For more information about creating shortcuts, see "Creating MULTI Shortcuts" on page 67.

Create New Project Opens the **Project Wizard**, which helps you create a new project. After you create the project, it loads in the Project Manager. For more information, see Chapter 1, “Creating a Project” on page 3.
Save Changes Saves all workspace, shortcut, and Launcher property changes. The changes are saved into the **index.gmb** file. For more information, see “Saving Workspaces” on page 60 and “Saving Shortcuts” on page 67.
Save Current Workspace into File Opens a dialog box that allows you to export the current workspace to a specified file. For more information, see “Importing and Exporting Workspaces” on page 60.
Save Shortcuts into File Opens a dialog box that allows you to export all of your shortcuts to a specified file. For more information, see “Importing and Exporting Shortcuts” on page 68.
Close Launcher Closes the Launcher. Any unsaved changes to workspaces or Launcher properties are saved automatically.
Exit All Closes all MULTI windows, including the Launcher.

The Components Menu

The **Components** menu contains the following menu items:

Open Project Manager Launches an empty Project Manager.
Open Debugger Launches a file chooser that allows you to select a program to debug. The Debugger opens on the program you select.
Open Editor Launches a file chooser that allows you to select a file to edit. The Editor opens on the file you select.
Open Diff Viewer Opens a window in which you can specify two files for comparison. The files can either be two different files or two different versions of the same file. For more information, see “The Diff Viewer” on page 121.

Open Checkout Browser Launches the Checkout Browser from the current working directory.
Connect Launches the **Connection Chooser** so that you can establish a connection.
Open Connection Organizer Launches the **Connection Organizer** so that you can manipulate your connections.
Open Serial Terminal Launches the Serial Terminal.
Open EventAnalyzer Launches the MULTI EventAnalyzer. This entry will not be present if the MULTI EventAnalyzer is not licensed or if the executable does not exist in your distribution.
Open ResourceAnalyzer Launches the MULTI ResourceAnalyzer. This entry will not be present if the MULTI ResourceAnalyzer is not licensed or if the executable does not exist in your distribution.
Open Python GUI Opens the stand-alone **MULTI Python GUI** window.

The Edit Menu

The **Edit** menu contains the following menu items:

Add Action Sequence Adds a new action sequence to the current workspace. For information about action sequences, see the beginning of Chapter 3, "Managing Workspaces and Shortcuts with the Launcher" on page 51 and "Action Sequences and Actions" on page 61.
Add Action (**Ctrl**+**A**) Opens the **Edit Action** dialog box, which allows you to add an action to the end of the current action sequence. For more information about the **Edit Action** dialog box, see "Creating or Modifying an Action" on page 63. For information about actions, see Chapter 3, "Managing Workspaces and Shortcuts with the Launcher" on page 51.

Edit Selected Object (**Ctrl**+**E**) Opens the **Edit Action Sequence** dialog box if an action sequence is selected. Opens the **Edit Action** dialog box if an action is selected. These dialog boxes allow you to modify the properties of the action or action sequence. For more information about the **Edit Action Sequence** dialog box, see "Creating or Modifying an Action Sequence" on page 61. For more information about the **Edit Action** dialog box, see "Creating or Modifying an Action" on page 63.
Cut Selected Actions (**Ctrl**+**X**) Cuts the selected action(s) and places them in the internal buffer.
Copy Selected Actions (**Ctrl**+**C**) Copies the selected action(s) into an internal buffer.
Paste Actions (**Ctrl**+**V**) Pastes the actions in the internal buffer before the selected action or at the end of the selected action sequence.
Delete Selected Objects (**Ctrl**+**D** or **Delete**) Deletes the selected actions and/or action sequences.
Move Selected Objects Up (**Ctrl**+**UpArrow**) Moves the selected action sequence up by one level or the selected action up by one row (see the note below).
Move Selected Objects Down (**Ctrl**+**DownArrow**) Moves the selected action sequence down by one level or the selected action down by one row (see the note below).
Run Selected Objects (**Ctrl**+**R**) Runs the selected actions and/or action sequences (see the note below).

Note

When you apply a **Move Selected Objects Up**, **Move Selected Objects Down**, or **Run Selected Objects** operation to selected objects in the action tree (either from the **Edit** menu, the right-click shortcut menu, or with a keyboard shortcut), the operation is applied as follows:

- If any actions are selected, the operation is applied only to those selected actions and not to entire action sequences.
- Otherwise, the operation is applied to the selected action sequences.

When you apply the **Run Selected Objects** operation to an object:

- If the object is an action, the action executes even if disabled.
- If the object is an action sequence, only enabled actions in the action sequence execute.

The Utilities Menu

The **Utilities** menu contains the following menu items:

Running Actions Lists running processes (excluding MULTI IDE components) that have been launched by workspace actions. Select a process to terminate it. For more information, see "Managing Running Actions" on page 66.
Clean Last Action Execution Undoes the last high-level operation. For example, selecting this menu item may exit the last MULTI IDE tool you opened, along with closing that tool's associated windows, or it may disconnect from the last target you connected to. Select this menu item once for each operation you want to undo.
License Administrator Opens the **MULTI Licensing Wizard**. For information about licensing, see the *MULTI: Licensing* book.
Probe Administrator Launches the **Green Hills Probe Administrator** to manage the Green Hills probes on your local network. This entry will not be present if the Green Hills Probe Administrator is not licensed or if the executable does not exist in your distribution
Launch Utility Programs Opens the **Utility Program Launcher** dialog box, which allows you to launch one of the Green Hills utility programs. For information about the utility programs, see the *MULTI: Building Applications* book for your target processor family.

The Config Menu

The **Config** menu contains the following menu items:

Show/Hide Detail Pane

Toggles whether the detail pane is visible in the Launcher. For more information about the detail pane, see "Launcher Display Modes" on page 54.

Start with MULTI Launcher

Specifies the effect of entering the **multi** command on the command line.

- If a check mark appears next to this menu item, issuing the **multi** command with no arguments runs the Launcher. This is the default behavior.
- If no check mark appears next to this menu item, issuing the **multi** command with no arguments runs the Project Manager.

To toggle between these settings, click the menu item.

Show Progress Window

Toggles the display of a MULTI Editor progress window that prints output for running workspace actions. For more information about the progress window and when it appears, see "Managing Running Actions" on page 66.

Abort Execution on Error

Toggles whether or not the Launcher stops execution of multiple actions when one of the following errors is encountered in an action:

- The Launcher cannot communicate with the specified MULTI IDE component.
- For **Project Manager** actions, the specified file is not a project file.
- For **Debug Program** actions, the specified program does not exist.

For example, if you select and run three sequential actions, and one of these errors is encountered in the second action, the third action will not execute if this menu item is enabled.

For information about actions, see Chapter 3, "Managing Workspaces and Shortcuts with the Launcher" on page 51.

Options

Opens the **Options** window. For information about the **Options** window, see Chapter 8, "Configuration Options" on page 175.

Customize Menus

Opens the **Customize Menus** window, which allows you to configure menus in a number of MULTI tools. For information about how to use this window, see "Configuring and Customizing Menus" on page 148.

Save Configuration as User Default Saves the current configuration options in the default location. For more information, see "Saving to the User Configuration File" on page 134.
Clear User Default Configuration Clears the default configuration file and restores the default system configuration. The Launcher prompts you before performing this action.
Save Configuration As Opens the **Save Configuration to what file?** dialog box, which allows you to specify the filename and location in which to save the configuration. For more information, see "Saving Configuration Settings" on page 134.
Load Configuration Opens the **Load Configuration from what file?** dialog box, which allows you to specify the filename and location of the configuration file to load.
Set INTEGRITY Distribution Opens the **Default INTEGRITY Distribution** dialog box, where you can set the location of your INTEGRITY installation directory. For more information, see "Configuring MULTI for Use with INTEGRITY or u-velOSity" in Chapter 2, "MULTI Tutorial" in the *MULTI: Getting Started* book.
Set u-velOSity Distribution Opens the **Default u-velOSity Distribution** dialog box, where you can set the location of your u-velOSity installation directory. For more information, see "Configuring MULTI for Use with INTEGRITY or u-velOSity" in Chapter 2, "MULTI Tutorial" in the *MULTI: Getting Started* book.

The Windows Menu

The **Windows** menu lists all open windows in the MULTI IDE. Select an item from the menu to bring the corresponding window to the top.

The **Windows** menu may contain the following menu items:

IDE_tool Opens a submenu that lists windows corresponding to the *IDE_tool*. If there are no other MULTI windows in the system, this menu item is not displayed.
Misc Lists all other open MULTI windows in the system. If there are no other MULTI windows in the system, this menu item is not displayed.

Minimize All Windows Minimizes all MULTI windows. If the Launcher is the only window open, this menu item is not displayed.
Show All Windows Restores all MULTI windows to their normal sizes. If the Launcher is the only window open, this menu item is not displayed.
Close All Windows Closes all MULTI windows. Before certain windows close, you may be prompted. For example: • Before a Debugger is closed, you may be asked whether to kill the process being debugged. • Before an Editor is closed, you may be asked whether to save outstanding changes. If the Launcher is the only window open, this menu item is not displayed.
No Windows Indicates that no MULTI windows (except for the Launcher itself) are open.

The Help Menu

The **Help** menu contains the following menu items:

Show Information Shows the Launcher information in the Detail Pane. This information includes a brief overview of how to use the Launcher.
Help Opens MULTI's online help system.
Manuals Opens the **Manuals** submenu, which displays a list of manuals appropriate to your version of MULTI. Select one of these manuals to open the online help to the first page of that manual.
Bookmarks Opens the **Bookmarks** submenu, which displays all Help Viewer bookmarks you have created. Bookmarks function across manuals and MULTI sessions. Select a bookmark to display the bookmarked page in online help. Select **Manage bookmarks** to open a window that allows you to display bookmarked pages and rename, delete, or reorder bookmarks.
About MULTI Launcher Shows basic information about MULTI, including the version number and revision date.

License Info
Opens the **Active Licenses** dialog box, which displays the licenses in use.
Troubleshooting Info
Launches the **gbugrpt** utility, which collects information about your MULTI installation and allows you to save it or email it. In the event of problems, it can be useful to email the information to Green Hills Technical Support or to your product support contact.

The Launcher Toolbar

The Launcher toolbar contains buttons that allow you to access workspaces, shortcuts, and major MULTI IDE components.

The following list gives a full description of each Launcher item:

- ***Workspace*** drop-down menu — Displays the current workspace. You can view the full list of available workspaces by clicking the drop-down button. Imported workspaces are indicated by  .

  To change the current workspace, select a different workspace from the drop-down. For information about workspaces, see Chapter 3, "Managing Workspaces and Shortcuts with the Launcher" on page 51.

 (**Run Action Sequences or Shortcuts**) — Lists the following items:

- ***Action sequences*** — Executes the selected action sequence. Action sequences appear in the order they are defined in the current workspace.
- ***Shortcuts*** — Executes the selected shortcut. Shortcuts appear in the order they were used, with the most recently used shortcut appearing first.
- **Create Workspace** — Opens a window in which you can create a new workspace. For more information, see "Creating Workspaces" on page 56.
- **Create or Change Shortcut** — Allows you to create or modify shortcuts just as you would action sequences for a workspace. For more information, see "Creating MULTI Shortcuts" on page 67.

 (**Launch Project Manager**) — Lists the following items:

- ***Projects*** — Opens the selected project in the Project Manager. If the current workspace uses projects as arguments to **Project Manager** actions, these projects are listed first. Recently used projects are listed next.
- **Open Project Manager** — Launches an empty Project Manager.
- **Create Project** — Opens the **Project Wizard**, which helps you create a new project. After you create the project, it loads in the Project Manager.

 (**Launch Debugger**) — Lists the following items:

- ***Programs*** — Opens the selected program in the Debugger. If the current workspace uses programs as arguments to **Debug Program** actions, these programs are listed first. Recently used programs are listed next.
- **Open Debugger** — Launches a file chooser that allows you to select a program to debug. The Debugger opens on the program you select.

 (**Launch Editor**) — Lists the following items:

- ***Files*** — Opens the selected file in the Editor. If the current workspace uses files as arguments to **Editor** actions, these files are listed first. Recently used Editor files are listed next.
- **Open Editor** — Launches a file chooser that allows you to select a file to edit. The Editor opens on the file you select.

 (**Launch Checkout Browser**) — Lists the following items:

- ***Directories*** — Opens a Checkout Browser on the selected directory. If the current workspace uses directories as arguments to **Checkout Browser** actions, these directories are listed first. Recently used Checkout Browser directories are listed next.
- **Open Checkout Browser** — Launches the Checkout Browser from the current working directory.

 (**Connect to Target**) — Lists the following items:

- ***Connection Methods*** — Establishes a connection to your target. If the current workspace uses Connection Methods as arguments to **Connection** actions,

these Connection Methods are listed first. Recently used Connection Methods are listed next.

- **Disconnect: *target*** — Terminates the specified system connection.
- **Connect** — Launches the **Connection Chooser**, which you can use to establish a connection.
- **Open Connection Organizer** — Launches the **Connection Organizer**, which you can use to manipulate your connections.

 (**Connect to Serial Terminal**) — Lists the following items:

- Serial Terminal Targets — Establishes a serial terminal connection to the selected serial target. If the current workspace uses serial terminal targets as arguments to **Serial Terminal** actions, these serial targets are listed first. Recently used serial terminal targets are listed next.
- **Open Terminal** — Launches the Serial Terminal.

 (**Launch EventAnalyzer**) — This button will not be present if the MULTI EventAnalyzer is not licensed or if the executable does not exist in your distribution. Lists the following items:

- Event Stream Files — Opens the selected event stream file in the MULTI EventAnalyzer. If the current workspace uses event stream files as arguments to **EventAnalyzer** actions, these files are listed first. Recently used event stream files are listed next.
- **Open EventAnalyzer** — Launches the MULTI EventAnalyzer.

 (**Launch ResourceAnalyzer**) — This button will not be present if the MULTI ResourceAnalyzer is not licensed or if the executable does not exist in your distribution. Lists the following items:

- ResourceAnalyzer Targets — Launches the MULTI ResourceAnalyzer, which tries to connect to the selected target. If the current workspace uses ResourceAnalyzer targets as arguments to **ResourceAnalyzer** actions, these targets are listed first. Recently used ResourceAnalyzer targets are listed next.
- **Open ResourceAnalyzer** — Launches the MULTI ResourceAnalyzer GUI.

 (**Quit**) — Closes the Launcher. Whether this button appears on your toolbar depends on the setting of the option **Display close (x) buttons**. To access this option, select **Config → Options → General Tab**.

 (**Show Detail Pane**) or (**Hide Detail Pane**) — Expands or shrinks the Launcher window to show or hide the detail pane.

Chapter 10

Project Manager GUI Reference

Contents

This chapter contains detailed information about GUI elements of the Project Manager, as well as descriptions of some of the windows and dialog boxes you can open via the Project Manager. Many of the GUI elements documented in this chapter are mentioned in the main text of this book in the context in which they are used. They are listed here together to provide a comprehensive reference.

Project Manager Menus

The following sections describe the menu items available in the Project Manager. Corresponding toolbar buttons (if any) appear alongside their menu equivalents.

The File Menu

The following table lists the selections available from the Project Manager **File** menu:

New Top Project (Ctrl+N)  Opens the **Project Wizard**, which guides you through the process of creating a new project. For more information, see "Creating a Project" on page 4.
Open Project (Ctrl+O)  Opens a project.
Open Reference BSP Project Opens the BSP Selector dialog box that allows you to select an installed BSP from your Green Hills operating system installation directory. This BSP project file is opened in a new window as a reference for you to find examples and other files included in the BSP project. For more information about the contents of the BSP project, see the documentation for your Green Hills operating system.
Close Project Closes the current project.
Save Project (Ctrl+S)  Saves the current project.
Reload Saved Project Reloads the current project from disk, discarding any changes made since the last save.

Print Current View (Ctrl+P) Prints the currently displayed project hierarchy. The hierarchy will be printed in the exact state that it is displayed in the source pane. If you want to print the contents of subprojects, you need to expand them first so that they are displayed.
Print Expanded Project Prints the fully expanded project hierarchy. Does not change the displayed project hierarchy.
Write Expanded Project to File Writes the fully expanded project hierarchy to a text file.
Recent Files This submenu contains recently opened files. Select one to open it in the Editor.
Recent Projects This submenu contains recently opened projects. Select one to open it in the Project Manager.
New Window Opens a new Project Manager window with no open project.
Close Project Manager (Ctrl+Q) Closes the current Project Manager window, prompting to save any outstanding changes.
Exit All Closes all open windows in MULTI.

The Edit Menu

The following table lists the selections available from the Project Manager **Edit** menu:

Configure Opens a dialog box to configure the selected component.
Set Build Options Opens the **Build Options** window for the selected file. For more information, see “Setting Builder Options” on page 32.

Modify Project

Contains actions appropriate to the selected component. These actions can include:

- **Add Item** — Opens a **Select Item to Add** dialog box. You can use this dialog box to add context-appropriate components to your project.
- **Comment Out** — Marks the item so that it is not included when the project is built. The item is still visible in the Project Manager, but is disabled. This is different from adding a comment to a project file with the # character.
- **Resolve Requirements** — For stand-alone projects, this menu item checks the selected component and its children for dependencies on customized libraries in your target resources project. If those libraries are not present, they are added to your project.

  For INTEGRITY projects, this menu item checks for many different types of dependencies specific to INTEGRITY, and attempts to resolve those that are unsatisfied.
- **Uncomment** — Removes the comment mark added by **Comment Out** from the item so that it is included when the project is built. This menu item is different from removing the # character at the beginning of an existing comment.

In INTEGRITY projects, additional options may be available. For more information, see the *INTEGRITY Development Guide*.

Edit (Ctrl+E) 

Opens the selected file in an Editor window.

Graphically Edit

This item is only available for some file types.

Opens a customized graphical editor for the file, such as the **Connection Organizer** (see Chapter 3, “Connecting to Your Target” in the *MULTI: Debugging* book).

Add Item into *selected file* (Ctrl+I)

Opens a component selector for you to add a context-appropriate component into the current project. If only one component is appropriate, it will skip straight to the add dialog for that component. The files are added into the selected project.

Add File into *selected file*

Opens a browser window that allows you to choose a file to add into the current project.

To make the project file portable, MULTI uses relative or base names for the added files whenever possible by resolving them relative to the set source directories.

Add File after *selected file*
Similar to **Add File Into *selected file***, except that this menu item is not shown when you have a container project selected, and the file you insert goes immediately after the selected file (in the same parent project).

Undo (Ctrl+Z)  Undoes the last change made to your project by the Project Manager during your current session. You can use this item repeatedly to undo multiple changes. If you make changes to a file outside of the Project Manager, those changes will be lost if an **Undo** operation affects that file.
Redo(Ctrl+Y)  Re-applies the last change made by **Undo**. You can use this item repeatedly to redo multiple changes made by **Undo**. If you make changes to a file outside of the Project Manager, those changes will be lost if a **Redo** operation affects that file.
Copy *selected file* as Link Copies the selected items to the clipboard. Use this item if you intend to **Paste as Link**.
Copy *selected file* Local Copies the selected items to the clipboard. Use this item if you intend to **Paste Local**.
Paste as Link Pastes the clipboard items and creates a reference to them in the selected context.
Paste Local Pastes the clipboard items and makes a recursive copy of each item within the selected context.
Remove *selected file* Removes the currently selected files from the project. The file itself is not deleted.
Delete *selected file* Deletes the currently selected files from the project and also from the disk.
Set Build Target Opens the **Target Selector** dialog box, which allows you to change the board and processor for which your project will be built. For more information, see “Changing the Build Target” on page 26.
Set Build Macros Opens the **Set Build Macros** dialog box, which allows you to define macros to stand in for commonly used strings in option settings. For more information, see “Setting Build Macros” on page 42.

Advanced

Displays the **Advanced** submenu, which contains the following items:

- **Create Auto-Include Subproject** — Opens the **Add new auto-include project** dialog box that allows you to specify patterns of files to automatically include in the selected project. For more information, see "Automatically Including Files" on page 23.
- **Set File Type** — Opens the **Set Type** dialog box that allows you to change the file type of the selected file. This operation is not available for project files.
- **Set Options in Parent** — Opens the **Build Options** window to set Builder options for the selected file, but stored in the parent. For source files, this is the normal behavior provided by **Set Build Options**, but for projects this allows options to be set for a particular occurrence of the project. For more information, see "Setting Options for Projects and Subprojects" on page 46.
- **Set Imported Environment Variables** — Opens a dialog box that allows you to import variables from your environment to stand in for strings used in your option settings. For more information, see "Importing Environment Variables" on page 44.
- **Simplify All Filenames** — Attempts to convert any absolute filenames into filenames relative to the set source directories. This command modifies your project. Specifically, if the path of a file is removed and if the file can still be found by searching the source directories list, then the full pathname is replaced by the filename without a path. This is a simple means of converting absolute pathnames in projects to short relative pathnames, which increases portability. This resolving is done automatically when files are added, so this functionality is usually only useful after changing source directories.

The View Menu

The following table lists the selections available from the Project Manager **View** menu:

Search in Source Files in *selected file*

Opens the **Search in Selected Files** dialog box to perform a full-text search of all source files contained within the selected project file. For more information, see "Searching Files" on page 30.

Search in *selected file*

Opens the **Search in Selected Files** dialog box to perform a full-text search of your selected source file. For more information, see "Searching Files" on page 30.

Search in All Source Files

Opens the **Search in Selected Files** dialog box to perform a full-text search of all source files.

Expand Project Recursively expands the selected file to show all its children.
Contract Project Recursively contracts the selected file to hide all its children.
Show Paths Displays the **Show Paths** submenu, which offers options to display the following: • **Full Paths** — Displays the full path information for files in the Project Manager window. • **Relative Paths** — Displays the relative path information for files in the Project Manager window. This item is enabled by default. • **Filenames Only** — Only displays the filenames in the Project Manager window.
Highlight Selections Toggles the highlighting of all the files that are included within the currently-selected project file. This setting is saved across sessions.
Show All Views Enables or disables the view of the content panes.
Show Type Column Displays the file type in the project tree.
Show Options Column Displays compiler options that are set at this level of the hierarchy.
Show Size Column Displays the size of executable files and the size of the compiled output of your source files.
Filter Project View Displays the **Filter** submenu, which offers options to show or hide various file types in the **Project** view pane. Selecting **Show All** makes all files visible.

The Build Menu

The following table lists the selections available from the Project Manager **Build** menu:

Compile *selected file* (**Ctrl**+**F7**) Invokes the compiler on the currently selected source file. Does not link or relink this file into an executable. This is only available if you have a source file selected.

Build *selected file* (F7)  Invokes the compiler, assembler, and linker as appropriate, to build the currently selected files and projects.
Stop Build  Stops the build process. If MULTI is in the process of generating an output file when you stop the build, that output file may be left in an incomplete state. If you have problems building or running your project after using this menu item, clean and rebuild your project. This item is only available while you are building files.
Preprocess *selected file* Preprocesses the selected file. This item is only supported for source files.
Rebuild *selected file* Builds the currently selected files after first removing the intermediate output files.
Build Ignoring Errors *selected file* Builds the current project, ignoring any detected errors. Normally, the build stops when an error occurs to prevent downstream failures like a link failing because of missing objects.
Clean *selected file* Deletes all of the files that are normally created when building the project. This includes object files, libraries, and executables. In other words, at each step where a file would be created in a normal build, the file is deleted instead. The only files that remain will be the source files necessary for building the project from scratch.
Advanced Build Opens the **Advanced Build** dialog box, through which you can execute builds with less common options. For more information, see “The Advanced Build Dialog Box” on page 274.
View Build Details (F6) Opens a window displaying all status output from the latest build.

The Connect Menu

The following table lists the selections available from the Project Manager **Connect** menu:

Connect (F4)  Opens the **Connection Chooser** dialog box, which allows you to connect to a target or simulator.

Connection Organizer Opens the **Connection Organizer**. For more information, see Chapter 3, “Connecting to Your Target” in the *MULTI: Debugging* book.
Load Module This submenu is only available for multitasking debug servers. It allows you to download a new object module to the target. Choose **Load Module** again from the submenu to choose the module to download from a dialog box, or choose one of the recently downloaded modules from the list provided. **Load Module** is only available when you are connected to a run-mode target that supports and was configured with a dynamic loader (for example, the `LoaderTask` on INTEGRITY). For more information, see “Establishing Run-Mode Connections” in Chapter 25, “Run-Mode Debugging” in the *MULTI: Debugging* book.
1 ***connection*** **2** ***connection*** **3** ***connection*** **4** ***connection*** Lists the most recently connected debug servers. To connect to one of them, select it.

The Debug Menu

The following table lists the selections available from the Project Manager **Debug** menu:

Debug ***selected program*** **(F5)**  Opens the Debugger on the currently selected project.
Debug Other Executable Opens a file chooser that allows you to select the executable you want to debug.
1 ***pathname*** **2** ***pathname*** **3** ***pathname*** **4** ***pathname*** Lists the most recent programs opened in the Debugger. Select a program to open it in the Debugger.

The Tools Menu

The following table lists the selections available from the Project Manager **Tools** menu:

Configuration Opens a submenu offering the following options: • **Save Configuration as User Default** — Saves the current configuration into the default user configuration (**.cfg**) file for MULTI, so that it will be used for future sessions. • **Clear User Default Configuration** — Deletes the default user configuration file for MULTI. • **Save Configuration As** — Opens a file chooser dialog box for you to choose a file and then saves the current configuration into it. • **Load Configuration** — Opens a file chooser dialog box that allows you to load a configuration file. • **Set INTEGRITY Distribution** — Opens the **Default INTEGRITY Distribution** dialog box, where you can set the location of your INTEGRITY installation directory. • **Set u-velOSity Distribution** — Opens the **Default u-velOSity Distribution** dialog box, where you can set the location of your u-velOSity installation directory.
Editor Opens a file chooser to select a file to open in the Editor.
Launcher Opens the Launcher.
Flash *selected program* Opens the **Write to Flash Memory** dialog box, which allows you to write the selected program to flash memory on the target. The **Flash** menu item is not available if MULTI is connected to multiple targets.
View DoubleCheck Report Opens the default Web browser on your system and displays a DoubleCheck report. For more information, see the documentation about DoubleCheck in the *MULTI: Building Applications* book.
Checkout Browser Opens the Checkout Browser.

Use Utilities Opens the **Utility Program Launcher** dialog box. For more information, see "The Utility Program Launcher Dialog Box" on page 275.
Options Opens the **Options** dialog box for you to change options that affect the way the Project Manager and other MULTI tools look and behave. For a description of each Project Manager option, see "Project Manager Configuration Options" on page 194.
Customize Menus Opens the **Customize Menus** window, which allows you to add new menus to the end of the menu bar; add new submenus and menu items to the end of existing menus; and remove menus, submenus, and menu items. For information about how to use this window, see "Configuring and Customizing Menus" on page 148.

The Windows Menu

The **Windows** menu provides a submenu for each kind of window open in MULTI, allowing you easy access to any of them.

The Help Menu

The following table lists the selections available from the Project Manager **Help** menu:

MULTI Project Manager Help (F1) Opens online help for the Project Manager.
Manuals Opens the **Manuals** submenu, which displays a list of manuals appropriate to your version of MULTI.
Bookmarks Opens the **Bookmarks** submenu, which displays all the Help Viewer bookmarks you have created. Bookmarks function across manuals and MULTI sessions. Select a bookmark to display the bookmarked page in online help. Select **Manage bookmarks** to open a window that allows you to display bookmarked pages and rename, delete, or reorder bookmarks.
About MULTI Project Manager Displays version information about MULTI.

License Info
Displays the active licenses for MULTI.
Troubleshooting Info
Launches the **gbugrpt** utility, which collects information about your MULTI installation and allows you to save it or email it. In the event of problems, it can be useful to email the information to Green Hills Technical Support or to your product support contact.

The File Shortcut Bar

The **File Shortcut Bar** is located in the Project Manager under the toolbar.

Use the **File Shortcut Bar** to find or build files that match a search string. Your search string can contain wildcards (for example, `*` and `?`). The bar has two components; a drop-down list that enables you to select which action the Project Manager will perform, and a text box, where you specify your search and any options. The Project Manager always searches your entire Top Project for files that match the search string. The following table lists each action, along with the appropriate syntax for the text box:

Build: ***options files***
Builds any files specified. You can also specify **gbuild** ***options*** (see the documentation about gbuild in the *MULTI: Building Applications* book). For example, to delete all previous output files and build the projects **foo.gpj** and **bar.gpj**, select the **Build:** setting and enter: `-cleanfirst foo.gpj bar.gpj`
Find: ***file***
Locates *an instance* of the specified file in the project tree. This option is best suited to finding **.gpj** files or uniquely named files quickly.
Next: ***file***
Locates *the next instance* of the specified file in the project tree. This option is best suited to finding files with commonly used names.

Search: ***search_string***
Performs a full-text search of the selected source file or of all source files contained within the selected project file.
Search All: ***search_string***
Performs a full-text search of all source files.

Note

When you specify a file in conjunction with the **Build:**, **Find:**, or **Next:** action, do not include a path. The **File Shortcut Bar** will search for:

- Project files (for example, **foo.gpj**)
- The executable output of a project file (for example, **foo**)
- C (or other source) language input files (for example, **foo.c**)
- The object file output of a source language file (for example, **foo.o**)

You can use wildcards (for example, `*` and `?`) in your **File Shortcut Bar** search string. For example, selecting **Find** and entering `*svc*` locates all projects and source files whose names contain `svc`. If there is exactly one matching file and **Find:** or **Next:** is selected, the Project Manager selects that file in the project tree. If there is more than one match, the Project Manager opens a **Find Results** window with a list that contains each matching file's name, type, parent project, and path.

If **Build:**, **Find:**, or **Next:** is selected and there are no matches for your search string, the Project Manager will append a `*` wildcard to the end of the string and search again. For example, if you try to find `svc` and there are no files named `svc`, the Project Manager performs your search again as `svc*`. It will then select the one file in your project beginning with `svc`, or display the **Find Results** window with a list of files that begin with `svc`.

You can also use wildcards when the **Build** action is selected in the shortcut bar. The behavior is the same as the preceding, except that instead of opening a **Find Results** window, the matching file or files are built. If there are no matches for your search string, the Project Manager will append `*` to the string and build all matching files.

The Project Tree Pane

The **Project Tree** pane is located in the Project Manager under the **File Shortcut Bar**. It displays files and other configurable items in the current project and may contain up to four columns:

- **Name** — The name of each file and its position in the project hierarchy.
- **Type** — The type of file, which is usually determined from its extension. For more information, see the next section.
- **Options** — The compiler options that are set at this level of the hierarchy.
- **Size** — The amount of memory required for the file. Files must be built for this data to appear. If you hover your mouse over a value in this column, a tooltip containing the breakdown of memory needed for read-only and read-write sections appears.

By default, the **Options** and **Size** columns are not visible. To display these columns, enable **View → Show Options Column**, or **View → Show Size Column**.

File Types

Project files and the files they reference have a type associated with them. That type or another descriptive name is displayed for each file in the **Type** column of the **Project Tree** pane.

For INTEGRITY and velOSity project files (**.gpj**), you may see these types in the **Project Tree** pane:

- **Dynamic Download** — A project file that contains one or more virtual AddressSpaces which can be downloaded via MULTI onto an INTEGRITY kernel already running on your target.
- **Kernel** — A project file to output a stand-alone executable linked with INTEGRITY libraries suitable for running directly on a target.
- **Monolith** — A project file that contains a kernel and virtual AddressSpaces and outputs a stand-alone executable, suitable for running directly on a target.
- **Virtual AddressSpace** — A project file to output an executable which will run in a memory-protected environment on an INTEGRITY system.

For more detailed information about these application types and other INTEGRITY-specific types, see the *INTEGRITY Development Guide*.

For information about other file types, see the documentation about file types in the *MULTI: Building Applications* book.

The Project Tab

To display the **Project** tab in the Project Manager, select **View → Show All Views**, or click the arrow on the right edge of the window, just below the **File Shortcut Bar**.

The **Project** tab of the advanced views pane displays the important components in your project using a layout that is similar to what you might draw on a white board. Projects (**.gpj**) have a small plus or minus sign that allows you to expand or collapse their contents. The **Project** tab displays the current selection in the **Project Tree**. If you select multiple items, the display does not change.

Double-clicking any item in the **Project** tab allows you to configure that item. For example, if you double-click a project, MULTI opens the project's settings. If you double-click a source file or text file, MULTI displays a dialog that allows you to rename the file.

You can show or hide various file types by changing the settings in the **View → Filter Project View** menu.

The Memory Layout Tab

To display the **Memory Layout** tab in the Project Manager, select **View → Show All Views**, or click the arrow on the right edge of the window, just below the **File Shortcut Bar**.

The **Memory Layout** tab of the advanced views pane is a graphical representation of section maps defined by your executable.

You can navigate the **Memory Layout** pane by using the following buttons:

-  — Zooms in.
-  — Zooms out.

- — Displays the detailed memory layout data about each section. The data is equivalent to the information output by the **gdump -map** command.
- — Displays all of the program sections for the selected project file.

You can navigate the colored chart area by clicking and dragging on the colored program sections in the active window. By performing this action, you are zooming in on a specific range of memory. You can also drag the currently displayed range on the scale to view different parts of memory.

Click to display the **Memory Layout Data** dialog box, which lists all program sections that can be viewed. In the **Memory Layout Data** window, you can single-click a section to scroll to that section, or you can double-click a section to zoom into that section. If your embedded target uses the Green Hills linker, you can find more information in the documentation about linker directives files in the *MULTI: Building Applications* book.

The Build Options Window

To open the **Build Options** window, right-click the file that you want to set options in, and select **Set Build Options**.

The Build Options Toolbar

The following buttons are available on the **Build Options** window:

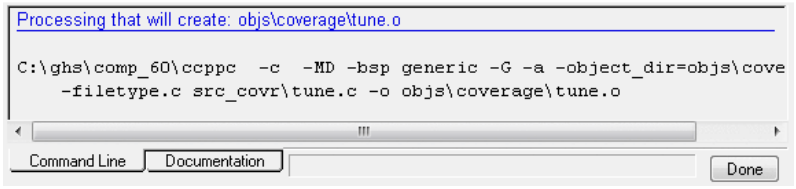
- (**Show Driver Options**) — Toggles the display of driver option names.
- (**Show Description**) — Toggles the display of option descriptions.
- (**Edit Selected Option**) — Opens the project in the MULTI Editor where the selected option is set.
- (**Expand All**) — Displays all sub-categories.
- (**Contract All**) — Hides all sub-categories.
- (**Goto Parent**) — Goes to the options for the parent of the current file.
- (**Goto Child**) — Goes to the options for the child of the current file.
- (**Search for Options**) — Opens the **Search** dialog box, which allows you to perform text searches on the option category tree.

- (**Close**) — Closes the **Build Options** window. Whether this button appears on the toolbar depends on the setting of the option **Display close (x) buttons**. To access this option, select **Tools → Options → General Tab**.

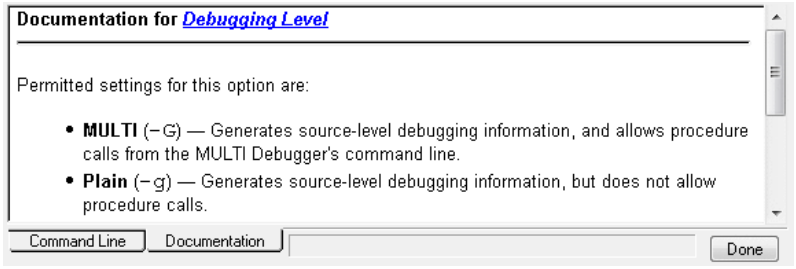
Build Options Tabs

Two tabs are available from the lower portion of the **Build Options** window:

- The **Command Line** tab, which shows the driver options that will be passed to the compiler when you build the selected file:

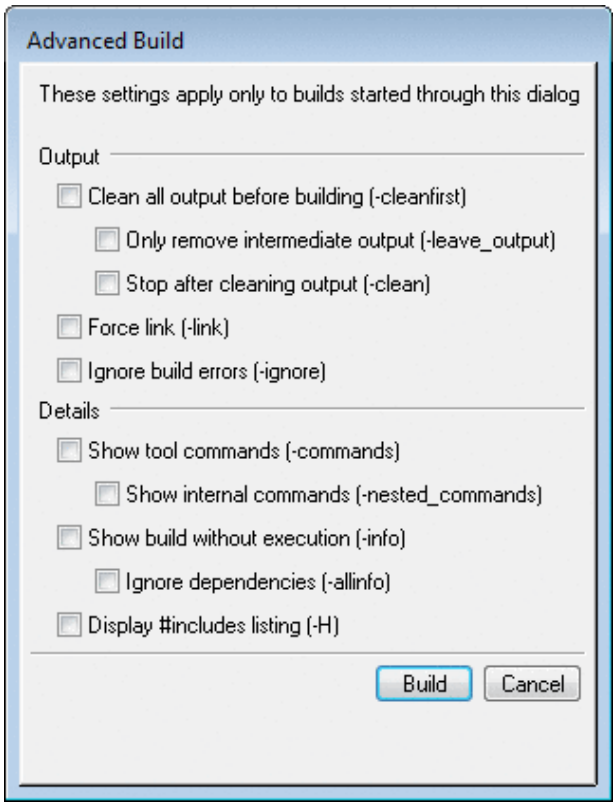


- The **Documentation** tab, which provides documentation for whichever build option is currently selected:



The Advanced Build Dialog Box

To open the **Advanced Build** window, select **Build → Advanced Build**:



Note

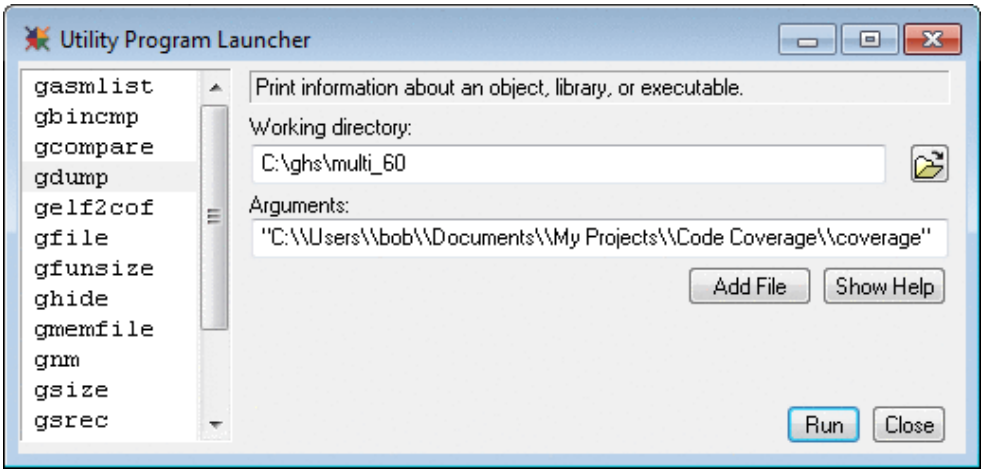
These options apply only to the current build. Corresponding **gbuild** options are displayed in parentheses.

Clean all output before building (-cleanfirst) Deletes all previous output files, and then builds.
Only remove intermediate output (-leave_output) Deletes intermediate output files, and then builds.
Stop after cleaning output (-clean) Deletes all previous output files, without building.
Force link (-link) Forces linking. The default behavior is to re-link the executable only if any of its components have changed.

Ignore build errors (-ignore) Continues building, even if errors are encountered.
Show tool commands (-commands) Displays commands as they are executed.
Show internal commands (-nested_commands) Displays full commands (including internal commands) as they are executed.
Show build without execution (-info) Simulates the build without executing the commands.
Ignore dependencies (-allinfo) Simulates the build, ignoring dependency information (rebuilding all files even if they are up to date), without executing the commands.
Display #includes Listing (-H) Displays a list of files opened by `#include` directives during the current build only.

The Utility Program Launcher Dialog Box

To open the **Utility Program Launcher**, select **Tools → Use Utilities**.



To use a utility:

1. Select the utility from the list on the left.
2. Click to navigate to the **Working Directory** where you will run the command.

3. Enter any **Arguments** you want to pass. As a minimum, you must generally pass the name of the file to be processed. To display information about the syntax of arguments, click **Show Help**.

   If you open the **Utility Program Launcher** from the Project Manager while you have an item selected in your project, the path to that item may appear in the **Arguments** box.
4. Click **Run** to run the utility.

For more information, see the documentation about utility programs in the *MULTI: Building Applications* book.

Chapter 11

Editor GUI Reference

Contents

This chapter contains detailed information about GUI elements of the MULTI Editor, as well as descriptions of some of the windows and dialog boxes you can open via the Editor. Many of the GUI elements documented in this chapter are mentioned in the main text of this book in the context in which they are used. They are listed here together to provide a comprehensive reference.

Editor Menus

The following sections describe the menu items available in the Editor.

The File Menu

The **File** menu contains the following items:

New Editor (Ctrl+N) Opens a file in a new Editor window. Select a file from the **Edit File** dialog box and click **Edit**; or to create a new file, enter the new filename and click **Edit**. This menu item is bound to the **LoadFileWithNewEditor** command (see "File Commands" on page 342).
Open (Ctrl+O)  Opens a file in the current Editor window. Select a file from the **Edit File** dialog box and click **Edit**; or to create a new file, enter the new filename and click **Edit**. The selected file is pushed to the top of the context stack for the current window. This menu item is bound to the **OpenFile** command (see "File Commands" on page 342).
Save (Ctrl+S)  Saves the current file. This menu item is bound to the **Save** command (see "File Commands" on page 342).
Save As (Ctrl+Shift+S) Saves the current file with a new name. Specify the new path and filename in the **Save As** dialog box. This menu item is bound to the **SaveAs** command (see "File Commands" on page 342).

Save All

Opens the **Save All** dialog box. All open files with changes that have not been saved will be listed. Select the check boxes next to the files you want to save, then click **Save Selected**. To save all of the listed files, click **Save All**.

This menu item is bound to the **QuerySaveAll** command (see "File Commands" on page 342).

Toggle Write Permission

Toggles the permission for the file between read-only and read/write mode, if possible. A stop sign in the right corner of the status bar indicates that the file is currently read-only. This menu item changes both the file's window permission and the file's permission on disk. See also the **Read Only Window** menu item in "The View Menu" on page 282.

This menu item is bound to the **ToggleWritePermission** command (see "View Commands" on page 366).

Revert to Saved

Undoes all changes made to the current file since the last time it was saved.

This menu item is bound to the **Revert** command (see "File Commands" on page 342).

Revert to Backup

Undoes all changes made to the current file since the last time it was backed up. For information about enabling backups, see the configuration option **Create backup files when saving** in "The MULTI Editor Options Tab" on page 221.

This menu item is bound to the **RevertToBackup** command (see "File Commands" on page 342).

Page Setup

Windows only

Opens the **Page Setup** dialog box, which allows you to set printing options for the current file.

This menu item is bound to the **PageSetup** command (see "File Commands" on page 342).

Print

Opens the **Print** dialog box, which allows you to print the current file to a printer or to a file. For information about the Linux/Solaris **Print** dialog box, see "The Print Setup Dialog Box" on page 298.

This menu item is bound to the **Print** command (see "File Commands" on page 342).

Properties

Displays information the Editor is able to obtain about the current file, including:

- Full file path
- Language
- Number of include files
- Cross reference file
- Extra syntax information
- Enclosing project name
- Progress information about the cross reference files for the enclosing project

This menu item is bound to the **FileProperties** command (see "File Commands" on page 342).

1, 2, 3, 4, 5, 6, 7, 8

Lists a maximum of eight previously viewed files. Select any of the files to open it in the current Editor window.

Close File (Ctrl+Shift+P)

Closes the current file and prompts you to save any unsaved changes. If the file was checked out of version control during this session, you will be prompted to check it back in.

Close Editor (Ctrl+Q)

Prompts you to save the changes made to open files, then exits the Editor.

This menu item is bound to the **Close** command (see "File Commands" on page 342).

Exit All

Prompts you to save the changes made to all open files, then quits all MULTI IDE tools.

This menu item is bound to the **Quit** command (see "File Commands" on page 342).

The Edit Menu

The **Edit** menu contains the following items:

Undo (Ctrl+Z)

Reverts the last change made to the current file. Each **Undo** reverts one more change. This process can be repeated until all changes made since the file was opened are undone.

This menu item is bound to the **Undo** command (see "Undo/Redo Commands" on page 363).

Redo (Ctrl+Y)

Restores the last edit that was removed by **Undo**. You can **Redo** multiple **Undo**s, until you make new changes to the file.

This menu item is bound to the **Redo** command (see "Undo/Redo Commands" on page 363).

Repeat Last Edit (Ctrl+.)

Repeats the last edit you made to the file.

You can only use this feature with certain types of edits: text input or replacement. For example, if you just selected text and replaced it with new text, then **Repeat Last Edit** will delete a similar selection contiguous to the cursor and insert the new text.

For example, your file contains the text:

```
This is a block of text.
```

You select the word `block` and type `string`, to change the text to:

```
This is a string of text.
```

If you move the cursor to the beginning of the word `text` (you do not have to highlight the word) and select **Edit → Repeat Last Edit**, the text will change to:

```
This is a string of string.
```

This menu item is bound to the **RepeatLast** command (see "Undo/Redo Commands" on page 363).

Cut (Ctrl+X)

Deletes the current selection and places it on the clipboard.

This menu item is bound to the **Cut1** command (see "Clipboard Commands" on page 336).

Copy (Ctrl+C)

Copies the current selection to the clipboard.

This menu item is bound to the **Copy1** command (see "Clipboard Commands" on page 336).

Paste (Ctrl+V)

Pastes the clipboard contents to the current location.

This menu item is bound to the **Paste1** command (see "Clipboard Commands" on page 336).

Delete (Ctrl+D)

Deletes the current selection. If there is no current selection, deletes the character after the insertion point.

This menu item is bound to the **Delete** command (see "Text Deletion Commands" on page 360).

Select All (Ctrl+A)

Selects the entire contents of the current file and moves the cursor to the end of the file.

This menu item is bound to the **SelectAll** command (see "Selection Commands" on page 356).

Find (Ctrl+Shift+F)

Opens the Search dialog box which allows you to set criteria for an interactive search. For more information, see "Interactive Searching Using the Search Dialog Box" on page 84.

Alternatively, use **Ctrl+F** to perform an incremental search for a string without using the dialog box. For more information, see "Incremental Searching" on page 83.

These items are bound to the **Search** and **iSearch** commands (see "Search Commands" on page 355).

Goto (Ctrl+Shift+G)

Opens the **GoTo** dialog box, which allows you to go to a file, line number or function. For more information, see "Using the GoTo Dialog Box" on page 81.

Use **Ctrl+G** to quickly go to a line number without using the dialog box. For more information, see "Go To a Line Quickly" on page 82.

These items are bound to the **Goto** and **EditLine** commands (see "Navigation Commands" on page 350).

DOS Format

Toggles the file format between DOS format and Linux/Solaris format. A check mark next to this menu item indicates that the current file format is DOS. (The DOS format saves the file with carriage returns.)

This menu item is bound to the **DosFormat** command (see "File Commands" on page 342).

The View Menu

The **View** menu contains the following items:

Language

Specifies the programming language used in the current source file. The Editor uses this setting for syntax coloring, commenting, and auto-indenting features.

This menu item is bound to the **SelectLanguage** command (see "File Commands" on page 342).

Per Language Settings

Opens the **Language Settings** dialog box which lists settings for the selected language. The items in this dialog box are:

- **Auto-Complete** — Indicates whether auto-completion is active for the selected language. For more information, see "Configuring Editor Auto-Complete" on page 170.
- **Auto-completion Match Algorithm** — Select **Best Match** or **First Match**
- **Min String Length for Auto-completion** — The number of characters to be entered before auto-completion attempts to match the string.
- **Max Number of Objects to Show for Auto-completion** — The number of matched objects to display when you enter **Ctrl**+/ or **Ctrl**+**'** to show the matched object names or function prototypes.
- **Dynamically Grab Function Prototype** — For C and C++ code, the Editor can automatically grab the function prototypes in the edited files. The default is specified in the corresponding language's configuration file (see "The language.gsc Syntax Definition Files" on page 166).
- **Show Function Prototype** — If checked, the Editor displays a function's prototype when you type in a function name followed by `(`. The default is specified in the language's configuration file (see "The language.gsc Syntax Definition Files" on page 166).

The setting defaults are specified in the corresponding language's configuration file (see "The language.gsc Syntax Definition Files" on page 166).

This menu item is bound to the **LanguageOptions** command (see "File Commands" on page 342).

Per File Settings

Opens the **Per File Settings** dialog box which lists variables that can be set for an individual file. These settings are used only for the current session. See "The Per File Settings Dialog Box" on page 300 for details.

This menu item is bound to the **EditorFlags** command (see "File Commands" on page 342).

Next File (Ctrl+Tab)

Switches to the next open file in the Editor stack.

This menu item is bound to the **CyclePushBack** command (see "View Commands" on page 366).

Previous File (Ctrl+Shift+Tab)

Switches to the previous open file in the Editor stack.

This menu item is bound to the **CyclePush** command (see "View Commands" on page 366).

Flash Cursor (Esc)

Scrolls to and flashes the line containing the cursor.

This menu item is bound to the **FlashCursor** command (see "Navigation Commands" on page 350).

Match (Shift+Right-click)

Searches backward from the cursor for the first *paired character* (parenthesis, square bracket, or curly brace) at the same nesting level as the cursor, and selects the paired characters and all text enclosed by them.

This menu item is bound to the **SelectToMatch** command (see "Selection Commands" on page 356).

Read Only Window

Toggles the window permission for the file between read-only and read/write mode, if possible. A check next to this menu item indicates that the Editor treats the file as read-only. This does not affect the file's permission on disk. See also the **Toggle Write Permission** menu item in "The File Menu" on page 278.

This menu item is bound to the **ToggleReadOnly** command (see "File Commands" on page 342).

Go To Definition of Selected Object

Displays the current selection's definition (if available) in the Editor source pane. This menu item only appears when you are editing C, C++, or Ada files.

This menu item is bound to the **GotoObjDef** command (see "View Commands" on page 366).

Go To Declaration of Selected Object

Displays the current selection's declaration (if available) in the Editor source pane. This menu item only appears when you are editing C, C++, or Ada files.

This menu item is bound to the **GotoObjDecl** command (see "View Commands" on page 366).

Browse References of Selected Object

Displays the object's cross references, if any, in a Browse window. For more information, see "Browse References" on page 80. This menu item only appears when you are editing C, C++, or Ada files.

This menu item is bound to the **BrowseObjXRef** command (see "View Commands" on page 366).

Generate Cross References / Regenerate Cross References

Obtains complete cross reference information based on the project to which the source file belongs. When you select this menu item, the Editor will search for the enclosing project and generate cross reference information for the whole project.

Once cross reference information for the enclosing project is generated, the menu item will change to **Regenerate Cross References**. If any of the source files in the project have changed, the cross references for the enclosing project must be regenerated for the information to be accurate.

These menu items only appear when you are editing C or C++ files.

These menu items are bound to the **GenerateXrefInfo** and **RegenerateXrefInfo** commands.

Close Dependent Windows

Deletes all cross reference **Browse** windows.

This menu item is bound to the **CloseDependentWindows** command (see "View Commands" on page 366).

The Block Menu

The **Block** menu contains the following items:

Indent (**Ctrl**+**i**)

Indents at the beginning of the current line or selected lines. The default size is four spaces. To change the indent size, select **Config → Options**, then select the **MULTI Editor** tab and edit the **Indent size** field.

This menu item is bound to the **Indent** command (see "Indentation Commands" on page 346).

Unindent (**Ctrl**+**Shift**+**i**)

Deletes a number of spaces equal to or less than the size of an indent from the beginning of the current line.

This menu item is bound to the **Unindent** command (see "Indentation Commands" on page 346).

Auto Indent (**Ctrl**+**2**)

Indents the current line or block of lines to the position indicated by the syntax of the code. This option is only available for the C, C++, Java, and Ada languages. For more information, see "Auto Indenting Code" on page 89.

This menu item is bound to the **AutoIndent** command (see "Indentation Commands" on page 346).

Comment (**Ctrl**+*****)

Inserts language specific characters to signify that the selected text is a comment, and not code.

This menu item is bound to the **CommentBlock** command (see "Block Commands" on page 334).

UnComment (**Ctrl**+**Shift**+**U**)

Removes comment characters from the selected text to make it active code.

This menu item is bound to the **UnCommentBlock** command (see "Block Commands" on page 334).

UpperCase (**Ctrl**++)

Changes all the characters in the current selection to uppercase.

This menu item is bound to the **UpperCaseBlock** command (see "Block Commands" on page 334).

LowerCase (Ctrl+–)

Changes all the characters in the current selection to lowercase.

This menu item is bound to the **LowerCaseBlock** command (see "Block Commands" on page 334).

Rect Copy

Copies a rectangular subsection of the current selection to the clipboard. For more information, see "Working with Columns" on page 91.

This menu item is bound to the **RectCopy1** command (see "Clipboard Commands" on page 336).

Rect Cut

Deletes a rectangular subsection of the current selection, and copies it to the clipboard. For more information, see "Working with Columns" on page 91.

This menu item is bound to the **RectCut1** command (see "Clipboard Commands" on page 336).

Rect Paste

Pastes a clipboard selection created with **Rect Copy** or **Rect Cut** to the current location without line breaks. If you use **Edit → Paste (Ctrl+V)** to paste a rectangular selection, line breaks will be added. For more information, see "Working with Columns" on page 91.

This menu item is bound to the **RectPaste1** command (see "Clipboard Commands" on page 336).

Cut Lines (Ctrl+M)

Extends the current selection to the closest line boundaries, deletes the selection, and places it on clipboard number one.

This menu item is bound to the **SelectLine**; **Cut1** command combination (see "Selection Commands" on page 356 and "Clipboard Commands" on page 336).

Join Lines (Ctrl+P)

Joins two lines of text by replacing the new line character from the end of the current line and all initial whitespace on the next line with a single space.

This menu item is bound to the **JoinLines** command (see "Block Commands" on page 334).

Insert File

Opens the **Insert** dialog box, which allows you to select a file to be inserted. The contents of the inserted file are placed on the line above the cursor.

This menu item is bound to the **InsertFile** command (see "Insert Commands" on page 348).

The Tools Menu

The **Tools** menu contains the following items:

Insert Date (**Ctrl**+**Shift**+**D**)

Inserts the current date, as a formatted string, at the current location.

This menu item is bound to the **Date** command (see "Insert Commands" on page 348).

Search in Files

Opens the Search in Files dialog box, which allows you to search for an expression in all open files. See "Searching in Files" on page 86 for a description of this window and how to use it.

This menu item is bound to the **Grep** command (see "Tools Commands" on page 361).

Launcher

Opens the MULTI Launcher, which provides easy access to all the primary MULTI components. The Launcher provides a convenient way to create new files and projects, to access recent ones, and to manage your open windows.

This menu item is bound to the **MultiBar** command (see "Tools Commands" on page 361).

Execute Shell Command

Linux/Solaris only

Opens the **Shell Command to execute?** dialog box, which allows you to execute a command in the shell, then inserts the output into the open file.

The command uses the current selection in the Editor as `stdin`, and replaces that selection with `stdout`. If nothing is selected, the output from the command is inserted into the open file after the cursor's current position.

The following macro sequences are recognized in the command:

- `%FILE` — Replaced with the name of the current open file.
- `%SEL` — Replaced with the current selection.
- `%LINE` — Replaced with the current line number.
- `%COMMENTS` — Replaced with text from a dialog box that prompts for input.

This menu item is bound to the **ExecuteCmd** command (see "Tools Commands" on page 361).

Command to Window

Linux/Solaris only

Opens the **Command to Window** dialog box, which allows you to execute a command in the shell. Output will appear in a new temporary Editor window. This command does not modify the open file.

The following macro sequences are recognized in the command:

- `%FILE` — Replaced with the name of the current open file.
- `%SEL` — Replaced with the current selection.
- `%LINE` — Replaced with the current line number.
- `%COMMENTS` — Replaced with text from a dialog box that prompts for input.

This menu item is bound to the **CommandToWindow** command (see "Tools Commands" on page 361).

Execute Editor Commands

Opens the **Execute Editor Commands** dialog box, which allows you to enter Editor commands.

This menu item is bound to the **Minibuffer** command (see "Tools Commands" on page 361).

Merge Files

Opens the **Choose files to merge** dialog box, which allows you to merge two or three files. For more information, see "Merging Files" on page 93.

This menu item is bound to the **MergeFiles** command ("Tools Commands" on page 361).

Diff Files

Opens the **Choose two files** dialog box, which allows you to find and display the differences between two files. For more information, see "Comparing Files" on page 98.

This menu item is bound to the **DiffFiles** command (see "Tools Commands" on page 361).

The Version Menu

Most of the items in the **Version** menu are enabled only if the current file uses version control. The availability of the items listed in the table varies according to which version control system is being used. Check the section corresponding to the version control system you are using to determine which items are available and any special notes on the item specific to your version control system. See Chapter 5, "Integrating MULTI with a Version Control System" on page 101.

Check Out

Retrieves a writable copy of the latest version and locks the file so that other users cannot change the file while you work on it. Checks out the current file from version control for editing. (Files cannot be edited unless they are checked out.) This action is not available if you are using CVS or Subversion.

This menu item is bound to the **CheckOut** command (see "Version Control Commands" on page 364).

Update

Issues an update command. If the repository version corresponding to the version of the local file has changed, the changes are merged into the local file. This menu item is only available for CVS and Subversion.

Check In/Commit

Saves any changes you have made to the current file. With some version control systems, the file becomes read only in MULTI, and the lock is removed from the file. You will be asked for comments to be saved in the log file along with your changes (see "The Commit Changes Dialog Box" on page 119). **Commit** is used for CVS and Subversion, and **Check In** is used for other version control systems.

This menu item is bound to the **CheckIn** command (see "Version Control Commands" on page 364).

Check In All

Saves the changes you have made to all the files you have checked out. With some version control systems, the files become read only in MULTI, and the lock is removed from the files. You will be asked for comments to be saved in the log file along with your changes.

This menu item is bound to the **QuerySaveCheckinAll** command (see "Version Control Commands" on page 364).

Discard Changes

Undoes all changes made to the file since it was checked out from version control, and reverts to the latest version. With some version control systems, the file becomes read only in MULTI, and the lock is removed from the file. This function updates the timestamp on a file in case the modified version was used in a previous build. Use this to undo a checkout without making any changes.

This menu item is bound to the **Discard** command (see "Version Control Commands" on page 364).

Place Under VC

Puts the current file under version control, prompting you to insert comments (if desired). With some version control systems, the file must be checked out before changes can be made.

This menu item is bound to the **PlaceUnderVC** command (see "Version Control Commands" on page 364).

Auto Checkout

Enables or disables Auto Checkout mode. If **Auto Checkout** is not selected, you must manually check out a file that uses version control before you can edit the file. If **Auto Checkout** is enabled, files will be automatically checked out from the version control system when you initiate an editing action. This option is only applicable to version control systems that require a file to be checked out before changes can be made to it.

This option functions on a per-file basis and defaults to the value of the **Automatic Checkout** configuration option. For more information, see Chapter 7, "Configuring and Customizing MULTI" on page 131 .

This menu item is bound to the **AllowAutoCheckout** and **PreventAutoCheckout** commands (see "Version Control Commands" on page 364).

Show History

Opens the History Browser, which displays information about all versions of the current file. This window displays the check-in comment, who checked the file in, and the date of the check-in. You can double-click any entry in the history to open the Editor on a temporary copy of that version. (If you are using ClearCase, this command opens the ClearCase history browser rather than the MULTI History Browser.)

This menu item is bound to the **ShowHistory** command (see "Version Control Commands" on page 364).

Show Last Edit

Finds the version of the current file in which the selected text was last changed, or, if no text is selected, finds the version of the current file that was last changed. A **Diff Viewer** window opens and displays the changed text. (For more information about this window, see "Using the Diff Viewer" on page 125.)

This menu item is bound to the **ShowLastEdit** command (see "Version Control Commands" on page 364).

Revert To History

Opens the History Browser, which lists all versions of the current file, and from which you can select a version to load into the Editor. (This is not supported for all version control systems.)

This menu item is bound to the **RevertHistory** command (see "Version Control Commands" on page 364).

Revert To Date

Opens a dialog box in which you can enter a revision date. The Editor will load the version that was current on the date you specify.

This menu item is bound to the **RevertDate** command (see "Version Control Commands" on page 364).

Revert To Version

Opens a dialog box in which you can enter a version number of the current file to load into the Editor. (This is not supported for all version control systems.)

This menu item is bound to the **RevertVersion** command (see "Version Control Commands" on page 364).

The Config Menu

The **Config** menu contains the following items:

Options

Opens the **Options** window to change options that affect the appearance and behavior of the Editor and other MULTI tools. This window is covered in detail in Chapter 8, "Configuration Options" on page 175.

This menu item is bound to the **ConfigOptions** command (see "Configuration Commands" on page 339).

Customize Menus

Opens the **Customize Menus** window, which allows you to configure menus in a number of MULTI tools. For information about how to use this window, see "Configuring and Customizing Menus" on page 148.

This menu item is bound to the **CustomizeMenus** command (see "Configuration Commands" on page 339).

Save Configuration as User Default

Saves the current configuration options in a file in the default location. For more information, see "Saving to the User Configuration File" on page 134.

This menu item is bound to the **SaveConfig** command (see "Configuration Commands" on page 339).

Clear User Default Configuration

Prompts before clearing the default configuration file and restoring the default system configuration.

This menu item is bound to the **ClearConfig** command (see "Configuration Commands" on page 339).

Save Configuration As Opens the **Save Configuration to what file?** dialog box, which allows you to specify the filename and location for the configuration file. For more information, see "Saving Configuration Settings" on page 134. This menu item is bound to the **SaveConfigToFile** command (see "Configuration Commands" on page 339).
Load Configuration Opens the **Load Configuration from what file?** dialog box, which allows you to specify the filename and location of the configuration file you want to load. This menu item is bound to the **LoadConfigFromFile** command (see "Configuration Commands" on page 339).

The Windows Menu

The **Windows** menu is used to jump between all of the windows created by MULTI. If you choose an entry in the **Windows** menu, the corresponding window is brought to the front.

The following are menu items that may appear in the **Windows** menu:

debugging_window Gives focus to a debugging-related window that has been launched from the local executable.
application_name Gives focus to the main Debugger window for the local application.
IDE_tool Opens a submenu that lists windows corresponding to the *IDE_tool*. The windows listed in this submenu might be created from the local execution or from other executions. If only one MULTI Launcher is open, that tool does not have a submenu; it has a menu entry instead.
Misc Opens a submenu listing other windows types that do not fall into any of the above categories.

The Help Menu

The **Help** menu contains the following items:

Editor Help (F1) Opens MULTI's online help system. This menu item is bound to the **Help** command (see "Help Commands" on page 346).
Manuals Opens the **Manuals** submenu, which displays a list of manuals appropriate to your version of MULTI. Select one of these manuals to open the online help to the first page of that manual.
Bookmarks Opens the **Bookmarks** submenu, which displays all the Help Viewer bookmarks you have created. Bookmarks function across manuals and MULTI sessions. Select a bookmark to display the bookmarked page in online help. Select **Manage bookmarks** to open a window that allows you to display bookmarked pages and rename, delete, or reorder bookmarks.
Identify Waits until the next key or mouse click sequence, and displays help for that command instead of executing the command. This menu item is bound to the **Identify** command (see "Help Commands" on page 346).
About MULTI Opens the **About** banner. This menu item is bound to the **About** command (see "Help Commands" on page 346).
License Info Opens the **Active Licenses** dialog box, which displays the licenses in use.

The Shortcut Menu

You can right-click anywhere in the Editor source pane to open a **Shortcut Menu** of common editing operations. The shortcut menu includes some or all of the following items, depending on the cursor's position and the type of file that is being edited.

- **Cut**, **Copy**, **Paste** and **Undo** — For information, see "The Edit Menu" on page 280.
- **Go To Definition** — For information, see "Go To a Definition" on page 79.
- **Go To Declaration** — For information, see "Go To a Declaration" on page 79

- **Browse References** — For information, see “Browse References” on page 80.
- **Generate Cross References** — For information, see “Generate or Regenerate Cross References” on page 80.
- **Regenerate Cross References** — For information, see “Generate or Regenerate Cross References” on page 80.
- **Show Last Edit** — For information, see “The Version Menu” on page 288.
- **Open New Editor Window** — For information, see “The File Menu” on page 278.
- **Properties** — For information, see “The File Menu” on page 278.
- **Comment**, **Uncomment** and **Auto Indent** — For information, see “The Block Menu” on page 285.

The Editor Toolbar

The Editor Toolbar contains the following buttons that provide access to some of the most common Editor actions:

 (**Open**) — Opens the **Edit File** dialog box, which is used to select a file to open in the Editor.

 (**Save**) — Saves the current file.

 (**Cut**) — Deletes the current selection and places it on the clipboard.

 (**Copy**) — Copies the current selection to the clipboard.

 (**Paste**) — Pastes the contents of the clipboard to the current cursor location.

 (**Find**) — Opens the Search dialog box, which is used to conduct an interactive search (see “Interactive Searching Using the Search Dialog Box” on page 84).

 (**Goto**) — Opens the **GoTo** dialog box, which is used to go to a file, line or procedure (see “Using the GoTo Dialog Box” on page 81).

 (**Undo**) — Undoes the last edit.

 (**Redo**) — Re-implements the last edit that was undone.

(**Previous File**) — Switches to the previous open file in the Editor's stack.

(**Next File**) — Switches to the next open file in the Editor's stack.

(**Retry Build**) — Retries building the project containing the open source file. This button is available in the Editor window that opens when a build error is encountered.

(**Previous Error**) — Navigates to the previous build error. This button is available in the Editor window that opens when a build error is encountered.

(**Next Error**) — Navigates to the next build error. This button is available in the Editor window that opens when a build error is encountered.

(**Save and Close**) — Saves files without prompting, then quits the Editor.

(**Close File**) — Closes the current file.

(**Close Editor**) — Quits the Editor. The presence or absence of this button on the toolbar is a configurable option (see the configuration option **Display close (x) buttons** in "The General Options Tab" on page 177). By default, the button does not appear.

The File and Procedure Fields

Below the Editor toolbar are three fields you can use to navigate within and between files.

- **File** — This field displays the name and path of the file you are currently editing. You can type another filename in the field to open it in the Editor window. The drop-down menu provides access to your most recently used files. Files open in the current Editor session appear at the top, and other recently used files appear below.
- **Procedure** — The drop-down menu displays all procedures defined in the file. You can use this box to go to a procedure in the file. Select a procedure from the drop-down menu, or type a procedure name in the field. This field only appears when you are editing C or C++ files.

  As you type characters in this field, the Editor will auto-complete with procedures that match the characters you type. You can type part of a procedure

name, then select the drop-down menu to view a list of all procedures that match the string you have entered. If you are uncertain about a procedure's name, you can use `*` and `?` wildcard characters.

- **Line Number** — This field displays the number of the line where the cursor is located. The tooltip that appears when you hover over the field displays complete line and column numbers. To go to a specific line in the file, type the line number in this field, and press **Enter**.

The Status Bar

The status bar is located at the very bottom of the Editor window. It displays the following information:

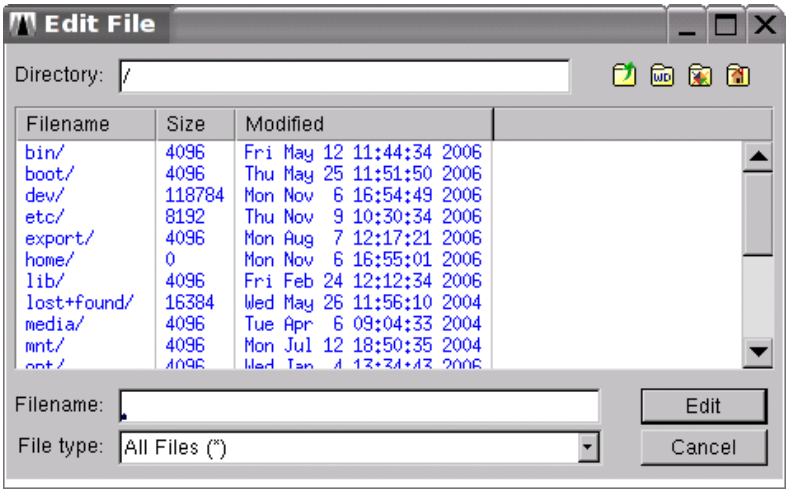
- **Status box** — The left corner of the status bar displays status, usage, and error messages. For example, when you press **Ctrl**+**F** (see "Incremental Searching" on page 83), the left corner of the status bar displays the search text as you type it.
- **Cursor position indicator** — Displays the current line and column position of the cursor. If the line number exceeds 99999 or if the column number exceeds 999, only a partial number is displayed. To view complete line and column numbers, hover your mouse over the line number field in the upper-right corner of the window.
- **Read-only window indicator** — A stop sign appears near the right corner of the status bar if the window permission for the current file is read-only. See also **Toggle Write Permission** in "The File Menu" on page 278 and **Read Only Window** in "The View Menu" on page 282.
- **Change dot** — A small red star appears near the right corner of the status bar if changes have been made to the file since the last time it was saved.
- **Version control status** — The letters `VC` appear in the right corner of the status bar if the current file is under version control. The letters will be red if the file has been checked out. Otherwise they will be black.

Linux/Solaris Dialog Boxes

The following sections describe dialog boxes that only appear in the Editor on Linux/Solaris systems.

The File Chooser Dialog Box (Linux/Solaris)

A file chooser dialog box opens if you initiate an action (using a menu, button, command, or shortcut) for which a file must be specified, but you have not yet specified a file. A chooser also opens if you click a **Browse** or  button on a dialog box. A sample Linux/Solaris file chooser follows. (For information about Windows file choosers, see your Windows documentation.)



The title bar of the file chooser will vary depending on the action you are performing. The following table describes the main elements of the file chooser.

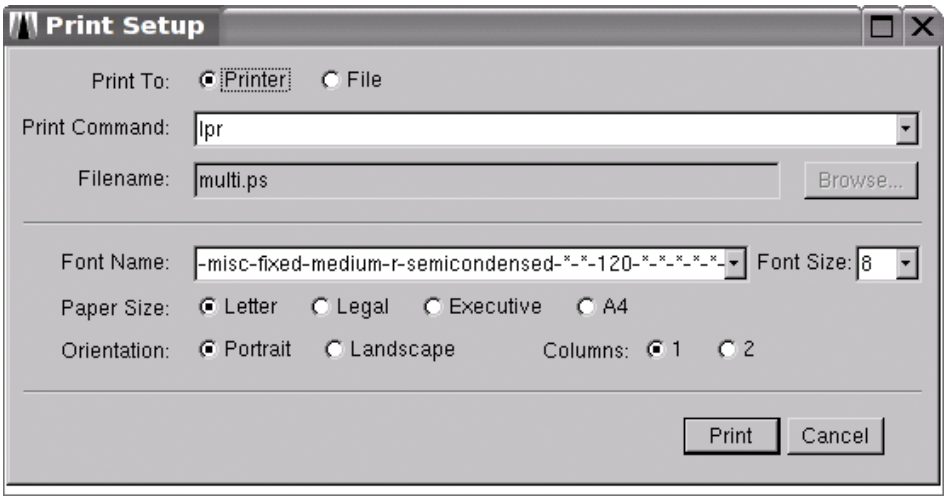
Item	Meaning
Directory	Displays the directory whose contents are shown in the **File List**. Type in a new directory name and press **Enter** to display a different directory.
Directory Buttons	With this set of buttons, you can quickly go to different important directories. The buttons that appear are:  — **Up One Directory** from the current directory.  — Jumps to the current **Working Directory**.  — Jumps to the **IDE Installation Directory**.  — Jumps to the **User Home Directory**.

Item	Meaning
File List	Below the directory text field is the file list. To enter a directory, double-click the directory. To choose a file, single-click the filename. You can click any column header to sort the list in ascending or descending order. If multiple files are allowed for the present operation (for example, **Open** is selected in the editor menu), use the **Shift** key to select a consecutive list of files; use the **Ctrl** key to select non-consecutive files.
Filename	Type a filename or directory name into this text field. As you type in this field, the selection in the file list will change to reflect the closest match. If you type a directory name and press **Enter**, or follow the directory name by a slash (/), the file list will change to the specified directory.
File type	If you select a file type, the **File List** will only display files with suffixes that match the selected file type.
Action buttons	There are two buttons in the lower right corner of the file chooser window. The upper button displays the action that will occur, such as **Edit** (in the example above), **OK**, or **Open**. The lower button is the **Cancel** button, which closes the window without taking any action.

The Print Setup Dialog Box

On Windows, selecting a printing operation from the **File** menu opens a standard **Print** dialog box with settings and options appropriate for your version of Windows and your printer and printer driver. See your Windows and printer documentation for details about the settings on this dialog.

On Linux/Solaris systems, selecting a printing operation from the **File** menu opens the following **Print Setup** dialog box.



The settings of the **Print Setup** dialog box are described in the following table.

Item	Meaning
Print To	Specifies where to send the print output. Select either **Printer** (the default) or **File** (to write to a postscript file).
Print Command	Specifies the print command that will be run when you click **Print**. Enter the appropriate command and options for printing a file on your specific system (for example, **lpr** on Linux/Solaris). You can also set the print command with the **configure printCommand** command. For information about the **configure** command, see "Using the configure Command" in Chapter 7, "Configuring and Customizing MULTI" in the *MULTI: Managing Projects and Configuring the IDE* book. This field is only available if you have chosen the **Printer** radio button above.
Filename	Specifies the output post-script file for print to file operations. This field is only available if you have selected the **File** radio button above. Enter the file to write to, or click **Browse** to open a chooser and navigate to an existing file. (See "The File Chooser Dialog Box (Linux/Solaris)" on page 297 for a description of the chooser.)
Font Name	Specifies the font for your printing operations. Select your desired font from the drop-down list, which contains a list of available fonts on your system. You can also type a font name into this field if it is not in the list.
Font Size	Specifies the font size used for printing. Select your desired size from the drop-down list. The default font size is 8 point.

Item	Meaning
Paper Size	Specifies your paper size. Select **Letter**, **Legal**, **Executive**, or **A4**. The default setting is **Letter**.
Orientation	Specifies the layout for your printed document. Select **Portrait** or **Landscape**. The default setting is **Portrait**.
Columns	Specifies whether to print the output in one or two columns. The default setting is **1**.
Print	Executes the print request.
Cancel	Cancels the print request and discards any settings you have changed.

The Per File Settings Dialog Box

This dialog box lists a number of indenting and text wrapping options that you can set for the current file and current session only.

To open this dialog box, select **View → Per File Settings**.

Note

These settings default to the Editor options in **Config → Options**. For more information about these settings, see "The MULTI Editor Options Tab" on page 221 and "The More Editor Options Dialog Box" on page 227.

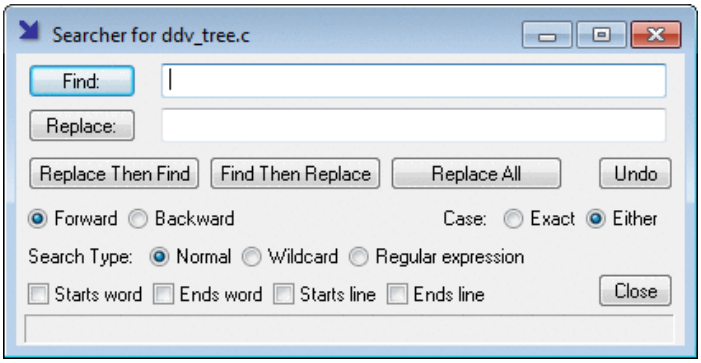
The **Per File Settings** dialog box contains the following fields:

Indent size Controls the number of spaces the Editor inserts when you press the **Tab** key. The default is 4 spaces. If you enter 0 to disable tabs, pressing **Tab** will insert a single space.
Ada indent size For Ada language file types only. Sets the indentation size. The default is 3 spaces. For more information, see "The MULTI Editor Options Tab" on page 221.
Ada continuation size For Ada language file types only. Determines how far a line of Ada source code is indented if it continues on multiple lines.

Wrap column If **Word wrap** is enabled, this setting specifies the column at which word wrap takes effect. If a line grows to longer than this number of columns as you are typing, the Editor will insert a line break at the first whitespace character before the column. It will indent the newly formed line by the same amount as the line above it, plus the wrap indent offset, described below.
Wrap indent offset If **Word wrap** is enabled, this setting determines how much the wrapped line will be indented past the indentation of the line above it.
Word wrap Check this box to enable word wrap, or clear it to disable word wrap. If **Word wrap** is enabled, the Editor will wrap lines automatically as you type, but will not wrap long lines while loading a file.
Disk format Determines whether the file will be saved in Linux/Solaris format or DOS format (with carriage returns). It defaults to the appropriate setting.
Procedure list order Selects the order in which procedures will display in the **Procedure** drop-down menu (see "The File and Procedure Fields" on page 295). Permitted settings for this option are: • **Base Name** — Displays procedures sorted by the procedure's base name. • **Full Name** — Displays procedures sorted by their class name, then procedure name. • **Position** — Displays procedures in the order they appear in the file.

The Search Dialog Box

To open the Search dialog box, select **Edit → Find**.



The fields and options in the Search dialog box are described in the following table.

Item	Meaning
Find	Searches for and highlights the next occurrence of the string entered in this field. To search for the next occurrence, click the **Find** button again, or press **Enter**.
Replace	Replaces the current selection with the string entered in this field.
Replace Then Find	Replaces the current selection and then searches again.
Find Then Replace	Searches for the next occurrence of the search string, and replaces it with the replacement string.
Replace All	Starts at the beginning of the file and replaces all occurrences of the search string with the replacement string.
Undo	Undoes the last Editor command. Note that this button will **Undo** the last change in the file, not just changes made from the Search dialog box.
Forward **Backward**	Determines whether the search proceeds forward or backward from the current location. (The default is **Forward**.) The Editor searches from the current location in the file toward the end of the file for a forward search, and toward the beginning of the file for a backward search. If the search string is not found before it reaches the end or the beginning, the search stops and the status bar displays an error message. If you start the search again, it resumes from the beginning or the end of the file.
Case	Determines whether or not the search is case-sensitive. Select one of the following: • **Exact** — Selects a case-sensitive search. For example, `Fly` matches `Fly`, but not `fly` or `FLY`. • **Either** — Selects a case-insensitive search. For example, `Fly` matches both `fly` and `FLY`. (This is the default.)

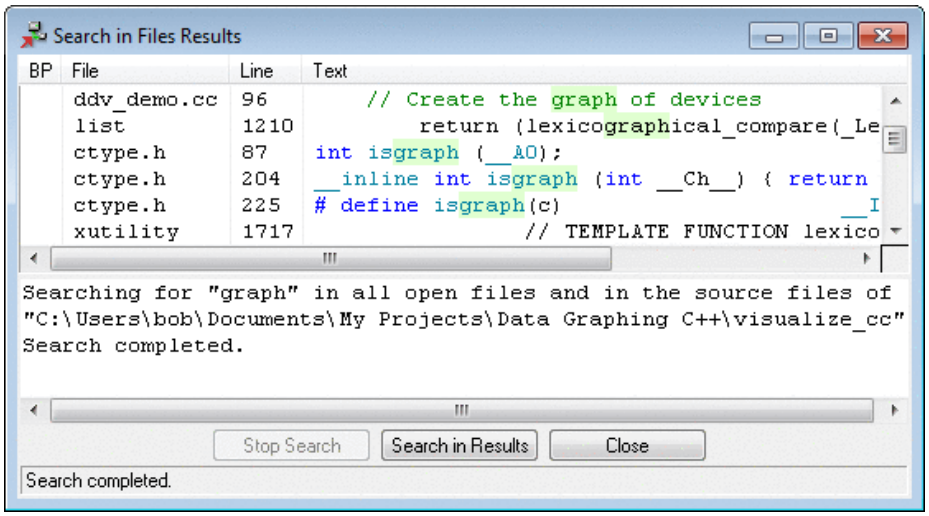
Item	Meaning
Search Type	Determines the type of search to conduct. Select one of the following: • **Normal** — No special characters in the search; that is, characters only match themselves. (This is the default.) • **Wildcard** — The following characters have a special meaning in the search string: `?` (question mark) — Matches any single character except a newline character. `*` (asterisk) — Matches any number of characters except newline characters. • **Regular Expression** — The characters listed in "Searching for Regular Expressions" on page 85 can be used in the search string.
Starts word **Ends word**	Specifies whether the search string must appear at the beginning or end of a word. If **Starts word** is checked, the search string must appear at the beginning of a word. For example, `fly` matches `fly` or `flybat`, but not `batfly`. If **Ends word** is checked, the search string must appear at the end of a word. For example, `fly` matches `fly` or `batfly`, but not `flybat`. If both are checked, the string string must form a complete word. For example, `fly` matches `fly`, but not `flybat` or `batfly`. If neither box is checked, any occurrence of the string is found.
Starts line **Ends line**	Specifies whether the search string must appear at the beginning or the end of a line. These options function similarly to **Starts word** and **Ends word**, described above, except that they apply to the beginning and end of a line. Selecting both of these boxes specifies that the entire line must match the search text.
Close	Cancels the search and closes the Search dialog box.

Note

Some of the settings in this dialog box set the defaults for the next incremental search (see "Incremental Searching" on page 83).

The Search in Files Results Window

The **Search in Files Results** window displays the results of a Search in Files operation (**Tools → Search in Files**).



The main components of this window are:

- Results pane — Contains columns that display information about the matching lines in the files searched.
  - **BP** column — Displays whether or not a breakpoint is set on the matching line. You can also use this column to set and remove breakpoints on certain lines. To set a breakpoint on the matching line, click the breakdot. To delete a breakpoint, click the breakpoint icon. (This column only appears if the Editor or the Search in Files dialog box has been launched from the MULTI Debugger.)
  - **File** column — Displays the name of the file that contains the matching line. Place your mouse pointer over this field to display the path to the file, if available, in a tooltip.
  - **Line** column — Displays the line number of the matching line.
  - **Text** column — Displays the text of the matching line.
- Text pane — Contains a description of the search and displays any errors printed by the **grep** utility.
- **Stop Search** button — Stops the current search, but does not close the results window. When the search is complete, this button is unavailable.

- **Search in Results** button — Opens a new search window that allows you to search only in the results of your previous search. This search window is identical to the Search in Files dialog box pictured in "Searching in Files" on page 86, except that it has an additional check box labeled **Select Non-matching Lines**. If cleared (the default), the lines in the previous **Search in Files Results** window that match the specified string are displayed in the new **Search in Files Results** window. If selected, the lines in the previous **Search in Files Results** window that do *not* match the specified string are displayed in the new **Search in Files Results** window.
- **Close** button — Closes the results window.
- Status bar — Displays the progress of the search. Located at the bottom of the window, this bar displays **Searching**, **Search completed**, or **Search stopped**.

Chapter 12

Version Control Tools GUI Reference

Contents

This chapter contains detailed descriptions of the menus and toolbar buttons (if applicable) available in MULTI's version control tools. Many of these items are mentioned in the main text of this book in the context in which they are used. They are listed here together to provide a comprehensive reference.

Checkout Browser Menus

The following menus and menu items are available from the **Checkout Browser**.

The File Menu

The following table describes the options available from the **File** menu.

New Window Opens another **Checkout Browser**.
Launcher Opens the MULTI Launcher.
Full Rescan Gathers information from the remote repository and provides information about local and remote changes to files. After this scan the **Checkout Browser** shows the status of each file in your checkout, and it shows the corresponding repository.
Update Checkout Brings the local checkout up to date with the remote repository, performs a scan for local changes, and displays the results in the **Checkout Browser**.
Halt Scan / Update Stops any **Rescan** or **Update** in progress.
CVS Checkout Editor Opens the **CVS Checkout Editor**. This feature is only supported when using CVS. You can use the **CVS Checkout Editor** to create a new checkout or to modify the contents of an entire checkout or portion of a checkout, such as reverting a checkout to a certain date. For more information, see “Creating or Modifying a Checkout (CVS only)” on page 115.
Close Closes the **Checkout Browser**.

The Show Menu

The following table describes the options available from the **Show** menu. This menu is used to select what type of files are displayed in the **Checkout Browser**. A check mark appears next to items that are currently selected for display. Selecting a menu item toggles the display on or off for that particular type of file. You can choose to display any combination of file types from the menu.

No Changes Displays files with no changes.
Conflicts Displays files with conflicts that must be resolved before you can commit your local version to the repository (files with **Status** listed as **Needs Merge**, **Will Conflict**, or **Has Conflict**).
Local Changes Displays files that have been changed locally.
Remote Changes Displays files that have been changed remotely.
Not Under VC Displays files that are not currently under Version Control.

The Config Menu

The **Checkout Browser's Config** menu contains the same menu items that appear in the **Config** menus of other MULTI tools. You can use this menu to modify configuration options for MULTI. For a description of each **Config** menu item, see “The Config Menu” on page 291.

The Shortcut Menu

When you right-click files or directories in the **Checkout Browser**, a shortcut menu appears. The menu displays some or all of the following options, depending on which version control system you use and what files or directories you have selected. For example, if you select a directory, the **Show History** and **Diff** menu options will be unavailable. Similarly, you cannot **Commit** a file if no changes have been made, **Add** a file that already exists in the repository, or **Update** a file that does not contain any remote changes.

Diff with Local Version Opens a **Diff Viewer** that shows differences between the local files and the versions of the files listed in the **Local Version** column. See "The Diff Viewer" on page 121.
Diff with Remote Version Opens a **Diff Viewer** that shows differences between the latest version in the repository and your local version. This menu item is only available for files that have been remotely modified (files with **Status** listed as **Remotely Modified**, **Needs Merge**, or **Will Conflict**).
Edit Opens an editor on the selected files.
Show History Opens a **History Browser** that displays information about all versions of the file (see "The History Browser" on page 120). If you select multiple files, a separate **History Browser** will open for each file.
Rescan Updates the status of the selected files or directory. Useful for determining whether either the repository or local versions have been modified since the last full scan.
Update Brings the selected files or directory in your checkout up to date with the versions in the repository.
Commit / Check In Checks in local changes of the files or directory selected, creating new versions in the repository. This launches the **Commit Changes** dialog box. For more information, see "The Commit Changes Dialog Box" on page 119.
Check Out Checks out the selected files from the repository, locking them. Only available for SourceSafe.
Resolve Conflict Clears the conflict state of the selected files. As a side effect, this may remove files that were generated by the conflict. Only available for Subversion.
Unlock Releases the lock on the selected files. Only available for SourceSafe.
Place Under VC Adds the selected files to the repository, creates an initial version, and checks that version out. Only available for SourceSafe.

Revert to Repository Reverts the selected file to its previous state. For example, if you select a locally added file and then select this option, the file is removed from the repository and returns to the **Not Under VC** state. If you select a locally modified file and then select this option, local changes are removed and the file reverts to the version located in the repository.
Add Marks files to be added to the version control system. Files will not be added to the remote repository until you **Commit** them.
Delete Marks files to be deleted from the version control system. If the files selected are not under version control they will be deleted from your checkout. If the files exist in the repository they will be removed from your checkout and marked for deletion. They will not be removed from the repository until you **Commit** them.

The Checkout Browser Toolbar

The **Checkout Browser** toolbar contains buttons that allow you to perform various version control operations on selected files. The following table describes the buttons in the **Checkout Browser**.

Button	Effect
Diff with local version	Opens a **Diff Viewer** that shows differences between the locally modified version of the selected files and the versions in the repository that match the values in the **Local Version** field. If the files have not been changed in the repository since the last time the files were updated, the **Local Version** is also the latest version in the repository. If the files have since been changed, **Local Version** indicates particular file versions in the repository that the locally modified versions are compared against. To compare against the latest versions in the repository in this case, use **Diff with remote version**, described below.
Diff with remote version	Opens a **Diff Viewer** that shows differences between the latest version in the repository and your local version. This button is only available for files that have been remotely modified (files with **Status** listed as **Remotely Modified**, **Needs Merge**, or **Will Conflict**).

Button	Effect
Diff all locally modified files	Opens a **Diff Viewer** showing differences between local and original versions of all modified files.
Edit	Opens the Editor on the selected file(s).
Show history	Opens a **History Browser** that displays information about all versions of the selected file (see "The History Browser" on page 120). If you select multiple files, a separate **History Browser** opens for each file.
Rescan	Updates the status of the selected files or directory. This is useful for determining whether either the repository or local versions have been modified since the last scan.
Update	Brings the selected files or directory in your checkout up to date with the versions in the repository.
Commit	Checks in local changes of the files or directories selected, creating new versions in the repository. This launches the **Commit Changes** dialog box. For more information, see "The Commit Changes Dialog Box" on page 119.
Commit all locally modified, added, and removed files	Checks in changes for all the files or directories that have been locally modified, added, or removed, creating new versions in the repository. This launches the **Commit Changes** dialog box. For more information, see "The Commit Changes Dialog Box" on page 119.
Revert	Reverts the selected file to its previous state. For example, if you select a locally added file and then click this button, the file is removed from the repository and returns to the **Not Under VC** state. If you select a locally modified file and then click this button, local changes are removed and the file reverts to the version located in the repository.
Add	Marks files to be added to the version control system. Files will not be added to the remote repository until you **Commit** them.
Delete	Marks files to be deleted from the version control system. If the files selected are not under version control, they will be deleted from your checkout. If the files exist in the repository, they will be removed from your checkout and marked for deletion. They will not be removed from the repository until you **Commit** them.

Button	Effect
Rescan All	Updates the status of all files and directories located in the **Roots** directory. This is useful for determining whether either the repository or local versions have been modified since the last full scan.
Add Checkout	Allows you to add another directory to the current **Checkout Browser**. A window in which you can specify the additional directory appears when you click the button.

Checkout Browser Columns

The following information is displayed in the Checkout Browser.

Filename

Names of files in the folder you selected. By default, the Checkout Browser only displays changed files. For information about changing the default, see “The Show Menu” on page 309.

You can click the ⊞ and ⊟ buttons to expand or contract the file list.

Status

Current version control status of the file. The possible values for the status are:

- **No changes** — The file has not been changed.
- **Locally Modified** — Changes have been made to the file in your checkout that do not exist in the remote repository. There is a chance that updating the file will result in conflicts if changes have been made to the repository since your last scan.
- **Locally Added** — The file exists in your checkout and has been marked to be added to the remote repository when committed.
- **Locally Removed** — The file has been marked to be removed from the remote repository when committed. The file no longer exists in your checkout.
- **Remotely Modified** — The version in the repository is newer than the version in your checkout, perhaps because another user has checked in a new version of the file.
- **Remotely Added** — The file exists in the remote repository, but is not in your checkout. This is most likely because someone else has added the file to the repository.
- **Remotely Removed** — The file has been removed from the repository, but is still in your checkout.
- **Not under VC** — The file is not recognized by the version control system. This identifies files that have been created inside your checkout, but have not been added or marked to be added to the repository.
- **Needs Merge** — The file has been modified in your checkout, but a newer version exists in the repository than the version you started with. You must update your checkout to merge the changes between your local version and the repository version before you can commit your changes to the repository. There is a chance that the process of updating the file will result in a conflict.
- **Will Conflict** — Similar to **Needs Merge**, except when you update your checkout, the merge will create conflicts that must be resolved before you will be able to commit the file to the remote repository.
- **Has Conflict** — The file in your checkout contains conflicts that must be resolved before you will be able to commit it to the remote repository.
- **Generated by Conflict** — The file was generated by the version control system when it updated a different file, which resulted in a conflict. When the conflict is resolved, this file is removed. Only available for Subversion.

Local Version

Version of the file as it currently exists in the local checkout.

Tag

The branch tag, if applicable.

Locked By
A list of user names that have the file locked. Only available for SourceSafe.

Checkout Browser Status

The **Checkout Browser** performs many operations that can take a long time. Information about the operation the **Checkout Browser** is performing at any given time is displayed in two places, both located in the bottom portion of the window.

- The status pane displays a continuously updated stream of status messages when the **Checkout Browser** performs modify, scan, or create operations. Depending on your version control system, you may see messages about the number of directories that have been scanned and the current output from the executable.
- The status bar lists current activity when the **Checkout Browser** is performing operations such as committing files.

The Commit Changes Dialog Box

The following menu items are available from the **File** menu in the **Commit Changes** dialog box. Some of these menu items are also present in the shortcut menu that appears when you right-click a file or directory. Where applicable, corresponding toolbar buttons are displayed beside menu items.

Save Commit Log 
Opens a dialog box that you can use to save the current log message to a file.
Import Commit Log 
Opens a dialog box that allows you to import a log message. The imported message replaces the currently displayed log message (if any).
Use Recent Commit Log
Opens a submenu that displays shortened versions of recent commit log messages. Selecting one of these messages replaces the current message (if any).
Add New Files 
Opens a dialog box from which you can choose additional files to be committed.

Remove Selected Files Removes the selected file(s) from the list of files to commit. If no files are selected in the bottom portion of the dialog box, this option is unavailable.
Edit Selected Files  Opens the Editor on the selected file(s). If no files are selected in the bottom portion of the dialog box, this option is unavailable.
Diff Selected Files  Opens a **Diff Viewer** on the selected files. The **Diff Viewer** shows differences between the local file and the version of the file that was originally checked out. See "The Diff Viewer" on page 121. If no files are selected in the bottom portion of the dialog box, this option is unavailable.
Close  Closes the **Commit Changes** dialog box.

History Browser Menus

The following menu items are available from the **History Browser**.

The File Menu

The **History Browser** has one menu, the **File** menu, which contains the following items:

Diff with Local Version Opens a **Diff Viewer** that shows the differences between the selected version of the file and your local version of the file. See "The Diff Viewer" on page 121.
Diff 2 Versions Opens a **Diff Viewer** that shows the differences between two selected versions of the file. If you select a range of versions, **Diff 2 Versions** will perform a diff between the upper and lower bounds of the range. See "The Diff Viewer" on page 121.
View Selected Version Opens the selected version of the file in an editor.
Revert to Selected Version Overwrites the local copy of the file with the selected version.

Edit Local Version Opens the local copy of the file in an editor.
Refresh History Updates the information in the **History Browser**.
Checkout Browser Opens the **Checkout Browser**. See “The Checkout Browser” on page 114.
Close Closes the **History Browser**.

The Shortcut Menu

The following shortcut menu can be accessed by right-clicking a version in the **History Browser**:

Diff with Local Version Opens a **Diff Viewer** that shows differences between the selected version of the file and your local version of the file. See “The Diff Viewer” on page 121.
Diff 2 Versions Opens a **Diff Viewer** that shows difference between the two selected versions of the file. If you select a range of versions, **Diff 2 Versions** will performs a diff on the upper and lower bounds of range. See “The Diff Viewer” on page 121.
View Opens the selected version of the file in an editor.
Revert to Overwrites the local copy of the file with the selected version.

The History Browser Window

The **History Browser** displays the following information:

Status Current version control status of the file.
Current Tag Identifying label that was last used to update your local machine. A version might have several labels associated with it in the version control system, but only the label used to update the file on your local machine will appear.
Displaying Shows the number of history entries and whether a **Partial history** or a **Full history** is being displayed. If you are using Subversion and there are more than 100 history entries, **Partial history** is shown. In this case, the **History Browser** also displays the **Get more** and **Get all** buttons, which retrieve up to 100 additional entries or all entries, respectively.
Version List The top half of the **History Browser** window displays a table containing the following information for all versions logged in version control: • **Date** — Lists the date and time each version was checked into the repository. • **Version** — Lists the revision number assigned to each version of the file. If possible, version numbers are grouped by branches with the +/- construct. • **User** — Lists the user who saved each version. • **Tag** — Lists the tags corresponding to each version. This is only available for CVS. Information is displayed sorted by **Version**. You can change the sort criteria by clicking any of the column headings.
Comment area The bottom half of the History Browser window displays comments associated with the version selected in the top half of the window. It also lists tags associated with this version.

Diff Viewer Menus

The following menus and menu items are available from the **Diff Viewer**.

The File Menu

The following **Diff Viewer** actions can be executed via the **File** menu or the keyboard shortcuts listed.

Open Diff (**Ctrl**+**O**) Opens a diff file selection dialog box that adds a new diff to the current **Diff Viewer** window.
Open New Diff (**Ctrl**+**Shift**+**O**) Opens a new diff file selection dialog box that shows the new diff in a new **Diff Viewer** window.
Show Current Diff (**Ctrl**+*****) Re-positions the **Diff Viewer** panes to the current diff (highlighted in the highlight color).
Close (**Ctrl**+**Q**) Closes the **Diff Viewer**.

The View Menu

You can use the **Diff Viewer** in several different modes to alter what types of differences it shows. The following modes can be set via the **Diff Viewer's View** menu.

Note

In the following table, the term *whitespace* refers to space and tab characters. It does not refer to newline characters.

Ignore Whitespace Amount

Ignores differences in the amounts of whitespace between two otherwise identical lines. For example, in this mode, the following text is considered to be the same:

```
void func(int a);
```

and

```
void     func(int    a);
```

If one line uses ten spaces while its counterpart uses only one, this difference is not considered significant. However, if the second line uses no whitespace, a difference is shown.

You can only select one whitespace option at a time.

Ignore Whitespace for C

Ignores whitespace using heuristic C tokenization of a file. Whitespace differences within a line that do not affect compilation do not show up as differences. For example, in this mode, the following text is considered to be the same:

```
void func(int a);
```

and

```
  void func      (  int    a  ) ;
```

Because it does not have enough information available to perform a true compilation of the file, the heuristic parser that C tokenization uses cannot perfectly account for all cases.

You can only select one whitespace option at a time.

Ignore All Whitespace

Ignores all whitespace differences between files. For example, in this mode, the following text is considered to be the same:

```
voidfunc(inta);
```

and

```
void func (int a);
```

You can only select one whitespace option at a time.

Case Insensitive

Ignores all differences in capitalization between lines. For example, in this mode, the following text is considered to be the same:

```
void func(int a);
```

and

```
void Func(int A);
```

This mode can be selected along with one of the whitespace modes.

Display Changes Within Lines

Highlights differences within non-matching lines, making it easier to identify changes in each line. Portions of the line that match appear in dark gray.

If this option is not selected, the entire line is highlighted if it is different than the corresponding line in the other pane.

Display Changes Word by Word Within Lines

Divides each line into words before displaying changes within lines. This option can make changes within lines easier to read, even when two different words happen to share one or more letters.

This option has no effect unless **Display Changes Within Lines** is also selected.

Line up Columns for Changes Within Lines

Treats characters as if they are different if they appear in different columns. This option can be useful when you compare files in which column position is significant (S-Record files, for example).

This option has no effect unless **Display Changes Within Lines** is also selected.

Ignore Changes in Numbers (0-9)

Ignores all differences in decimal numbers between lines. For example, in this mode, the following text is considered to be the same:

```
  stw  r4, 8(r9)
```

and

```
  stw  r5, 4(r8)
```

This mode can be selected along with one of the whitespace modes.

Ignore Changes in Hex Numbers (0-9A-Fa-f)

Ignores all differences in hexadecimal numbers between lines. For example, in this mode, the following text is considered to be the same:

```
.boottable      0x47000
```

and

```
.boottable      0x474c0
```

When this option is enabled, the Diff Viewer does not distinguish among A-F characters. For example, the following sentences are considered to be the same:

```
The cafe is green.
```

and

```
The bead is green.
```

This mode can be selected along with one of the whitespace modes.

The Shortcut Menu

When you right-click in either of the two main **Diff Viewer** panes, a shortcut menu provides the following options:

Edit File on Disk

Opens the selected file in a text editor.

Show Last Edit

Diffs the right-clicked version of the file against the most recent version of the file in which the selected text changed. Both panes update as needed to display applicable versions.

This option only applies to files that are under version control. It only appears when you have selected a region of text.

Show Last Edit in File

Diffs the right-clicked version of the file against the most recent version of the file that changed. Both panes update as needed to display applicable versions.

This option only applies to files that are under version control. It only appears when you have *not* selected a region of text.

Show History

Opens a **History Browser** for the selected file. See “The History Browser” on page 120.

This option only applies to files that are under version control.

Set to Current Diff

Specifies that the diff containing the cursor is the current diff (highlighted in the highlight color).

Part IV

Appendices

Appendix A

The MULTI IDE Directory Structure

Most MULTI IDE executables, such as **mstart**, **me**, and **multi**, are stored in the top level of the MULTI IDE installation directory.

The following list outlines the contents of most MULTI IDE installation subdirectories. The presence of subdirectories for separately licensed products such as the TimeMachine tool suite are dependent upon your purchase.

- **config** — Contains configuration files including **ghs.cfg**. For information about configuration files, see Chapter 7, "Configuring and Customizing MULTI" in the *MULTI: Managing Projects and Configuring the IDE* book.
- **copyright** — Contains copyright information for third-party tools included with the MULTI installation.
- **defaults** — Contains default configuration files and extension files.
- **manuals** — Contains online help files and PDF documentation.
- **python** — Contains a Python installation. For information about the MULTI-Python integration, see the *MULTI: Scripting* book.
- **restore** — Contains patches created when products or patches are installed into the top-level MULTI IDE installation directory. Patches named **uninstall*** are simple uninstallers used to remove files. Patches named **restore*** are restoration patches that will, when possible, replace patched versions of files with the previous version.
- **timemachine_api** — Contains example programs that use the TimeMachine API for custom analysis of trace data. For more information, see "The TimeMachine API" in Chapter 19, "Analyzing Trace Data with the TimeMachine Tool Suite" in the *MULTI: Debugging* book.

Appendix B

Editor Commands

Contents

Most of the commands listed in this chapter are bound to Editor GUI menu items, keyboard shortcuts, and/or mouse buttons. This command reference is provided so you can customize the Editor to help you work more efficiently. For example:

- If you do not want to use the mouse when you are editing, you can bind any command to a keystroke combination.
- If you find that you are often performing a particular sequence of actions, you can combine the commands for these actions into a single keystroke, key sequence, mouse button combination, GUI button, or menu item.

For more information about binding commands to menu choices, keystrokes, mouse clicks, and buttons, see Chapter 7, “Configuring and Customizing MULTI” on page 131. For a list of all default key and mouse bindings, see Appendix C, “Default Key and Mouse Bindings” on page 371.

Note

You can also execute these commands via the MULTI-Python integration (see Chapter 2, “Introduction to the MULTI-Python Integration” in the *MULTI: Scripting* book). Alternatively, you can issue them by selecting **Tools → Execute Editor Commands** and entering them in the text box that appears. However, since most of these commands are bound to menu choices, keystrokes, mouse clicks, and/or buttons, there should be little need to enter them in this way.

Note

Editor commands are case-insensitive, thus `DiffFiles` and `difffiles` are equivalent and are both valid. In this chapter, we use mixed-case notation where it makes the commands more readable.

if Conditional Commands

Conditional commands are useful for constructing scripts and key bindings that apply to a particular state or mode in the Editor. For example, **if** commands can be used to make your key bindings respond differently depending on whether the Editor is in insert mode or whether text is selected.

The basic construction of a conditional command is:

if *condition* {*cmds1*} [else {*cmds2*}]

If *condition* is true, the commands given for *cmds1* are executed. If *condition* is false, *cmds2* executes.

Specifying the keyword else is optional. If else is included and the *condition* is not true, then the second command executes.

The following table provides valid values for *condition*.

<allowmiddleclick> This condition is true if the configuration option **allowMiddleClick** is on (for information, see "The MULTI Editor Options Tab" on page 221).
<beforenonwhite> This condition is true if there is no selection and the cursor is before all non-whitespace characters on the line (i.e., all characters before the cursor are whitespace).
<bsearch> This condition is true if the Editor is in backward-search mode.
<col=eof> This condition is true if the first selected character or the cursor position (if there is no selection) is at the end of the last character (not inclusive) in the corresponding file.
<col=eol> This condition is true if the first selected character or the cursor position (if there is no selection) is at the end of the last character (not inclusive) in the corresponding line.
<col=sof> This condition is true if the first selected character or the cursor position (if there is no selection) is the first character of a file.

`<col=sol>` This condition is true if the first selected character or the cursor position (if there is no selection) is the first column of a line.
`<fsearch>` This condition is true if the Editor is in forward-search mode.
`<HaveUnconfirmedAcString>` This condition is true if an auto-completed string that was not accepted by the user exists in the Editor.
`<insertmode>` This condition is true if the Editor is in insert mode (see **EnterInsertMode** in "Mode Commands" on page 349).
`<lang=`*`language_name`*`>` This condition is true if the language used to color the active Editor source file is the one specified. The language name is the name specified in the `general` section of the corresponding language's syntax configuration file (see "The language.gsc Syntax Definition Files" on page 166 for details).
`<noselection>` This condition is true if there is no primary selection.
`<nosselection>` This condition is true if there is no secondary selection.
`<searching>` This condition is true if an incremental search is currently in progress, and false otherwise (see **iSearch** in "Search Commands" on page 355).
`<select `*`num`*`=line>` This condition is true if the selection number *`num`* aligns on line boundaries. The primary selection is number `0`, and the secondary selection is number `1`.
`<wrapsearch>` This condition is true if the Editor is searching and has wrapped.

Example B.1. Conditional Commands

```
if <noselection> {SelectLine}; Cut1
```

If there is no selection, the entire line is selected. The **Cut1** command is always executed.

```
if <noselection> {ContinueSelection; SOL} else {Delete}
```

If there is no selection, the current cursor position to the end of the line is selected. If there is a selection, it is deleted.

Auto-Completion Commands

The MULTI Editor provides the following auto-completion commands. These commands function even when auto-completion is disabled.

AcceptAcString

Accepts the string auto-completed by the MULTI Editor.

The Editor deletes the auto-completed string if you click the mouse, type a character (depending on your key-stroke configuration), etc. before accepting the string.

By default, **AcceptAcString; MoveToEndOfSelectionAndUnselect** is bound to:

- **Tab**

AutoCompleteList

Displays a list of auto-completion strings from which you can choose an entry to complete the text at the cursor or, if only one match is possible, automatically completes the text at the cursor.

The maximum number of strings listed is determined by the following entry in the corresponding language definition file:

```
max_match = num
```

where *num* is the maximum number of matches to display. The default is `10`.

By default, this command is bound to:

- **Ctrl**+/

AutoCompletePrototypeList

Displays a list of function prototypes matching the name of the function at the cursor. You can select an entry to complete the text at the cursor.

The maximum number of function prototypes listed is determined by the option **max_match** in the corresponding **.gsc** file.

By default, this command is bound to:

- **Ctrl**+'

DelUnconfirmedAcString

Deletes the string that has been auto-completed by the MULTI Editor but not accepted.

MoveToEndOfSelectionAndUnselect

Moves the cursor to the end of the selected text and clears the selection. There is no effect if there is no selection.

By default, **AcceptAcString; MoveToEndOfSelectionAndUnselect** is bound to:

- **Tab**

NextAutoCompleteString

Auto-completes the characters with the next string that matches the pattern.

By default, this command is bound to:

- **Ctrl+]**

PrevAutoCompleteString

Auto-completes the characters with the previous string that matches the pattern.

By default, this command is bound to:

- **Ctrl+[**

Block Commands

The following commands allow you to modify text in the current primary selection. Although they are designed to operate on selected text, most of these commands have a default behavior that occurs even when there is no selection.

CommentBlock

Inserts language-specific characters to signify that the selected text is a comment and not code. For more information, see “Working with Comments” on page 90.

By default, this command is bound to:

- **Comment** menu item (see “The Block Menu” on page 285)
- **Ctrl+***

JoinLines

Joins the selected lines of text by replacing the new line character at the end of a line and all initial whitespace on the next line with a single space.

By default, this command is bound to:

- **Join Lines** menu item (see "The Block Menu" on page 285)
- **Ctrl**+**P**

LowerCaseBlock

Changes all characters in the current selection to lowercase.

By default, this command is bound to:

- **LowerCase** menu item (see "The Block Menu" on page 285)
- **Ctrl**+**–** `(Ctrl + minus)`

UnCommentBlock

Removes comment-style characters from the selected text to make it active code. The selected text must begin with comment-start symbols and end with comment-stop symbols. For more information, see "Working with Comments" on page 90.

By default, this command is bound to:

- **UnComment** menu item (see "The Block Menu" on page 285)
- **Ctrl**+**Shift**+**U**

UpperCaseBlock

Capitalizes all characters in the current selection.

By default, this command is bound to:

- **UpperCase** menu item (see "The Block Menu" on page 285)
- **Ctrl**++ `(Ctrl + plus)`

Clipboard Commands

The MULTI Editor provides four internal clipboards.

On Windows, the first clipboard is the same as the Windows clipboard. Text or data stored there is available to other Windows applications.

On Linux/Solaris, the content of the first clipboard can be made available to other applications with the clipboard manager. **Launch clipboard manager** is a configurable option on the **Config → Options → General** tab (see "The General Options Tab" on page 177).

Copy*n*

Copies the selected text to clipboard number *n*. When this command is issued, the specified clipboard's previous content is lost; other clipboards are unaffected.

By default, **Copy1** is bound to:

- **Copy** menu item (see "The Edit Menu" on page 280)
- **Ctrl**+**C**
- **Copy** or **L6** (Solaris only)

By default, **Copy2** is bound to:

- **Ctrl**+**Shift**+**C**
- **Shift**+**Copy** or **Shift**+**L6** (Solaris only)

On Linux/Solaris, **Copy3** is bound to:

- **Meta**+**Ctrl**+**C**
- **Ctrl**+**Copy** or **Ctrl**+**L6** (Solaris only)

On Linux/Solaris, **Copy4** is bound to:

- **Meta**+**Ctrl**+**Shift**+**C**
- **Ctrl**+**Shift**+**Copy** or **Ctrl**+**Shift**+**L6** (Solaris only)

Cut*n*

Deletes the selected text and places it on clipboard number `n`. When this command is issued, the specified clipboard's previous content is lost; other clipboards are unaffected.

By default, **Cut1** is bound to:

- **Cut** menu item (see "The Edit Menu" on page 280)
- **Ctrl**+**X**
- **Cut** or **L10** (Solaris only)

Cut2 is bound to:

- **Ctrl**+**Shift**+**X**
- **Shift**+**Cut** or **Shift**+**L10** (Solaris only)

On Linux/Solaris, **Cut3** is bound to:

- **Meta**+**Ctrl**+**X**
- **Ctrl**+**Cut** or **Ctrl**+**L10** (Solaris only)

On Linux/Solaris, **Cut4** is bound to:

- **Meta**+**Ctrl**+**Shift**+**X**
- **Ctrl**+**Shift**+**Cut** or **Ctrl**+**Shift**+**L10** (Solaris only)

NoSelection; ContinueSelection; Left; Cut2; Left; Paste2; Right

Transposes the previous two characters.

By default, this command is bound to:

- **Ctrl**+**Shift**+**T**

Paste*n*

Inserts text from clipboard number *n*.

By default, **Paste1** is bound to:

- **Paste** menu item (see "The Edit Menu" on page 280)
- **Ctrl**+**V**
- **Paste** or **L8** (Solaris only)

Paste2 is bound to:

- **Ctrl**+**Shift**+**V**
- **Shift**+**Paste** or **Shift**+**L8** (Solaris only)

On Linux/Solaris, **Paste3** is bound to:

- **Meta**+**Ctrl**+**V**
- **Ctrl**+**Paste** or **Ctrl**+**L8** (Solaris only)

On Linux/Solaris, **Paste4** is bound to:

- **Meta**+**Ctrl**+**Shift**+**V**
- **Ctrl**+**Shift**+**Paste** or **Ctrl**+**Shift**+**L8** (Solaris only)

RectCopy1

Copies a rectangular subsection of the current selection to clipboard number 1. Only this clipboard is available for rectangular selections. For more information, see "Working with Columns" on page 91.

By default, this command is bound to:

- **Rect Copy** menu item (see "The Block Menu" on page 285)

RectCut1

Deletes a rectangular subsection of the current selection, and copies it to clipboard number 1. Only this clipboard is available for rectangular selections. For more information, see "Working with Columns" on page 91.

By default, this command is bound to:

- **Rect Cut** menu item (see "The Block Menu" on page 285)

RectPaste1

Pastes a clipboard selection created with **RectCopy1** or **RectCut1** to the current location. Only one clipboard is available for rectangular selections. For more information, see “Working with Columns” on page 91.

By default, this command is bound to:

- **Rect Paste** menu item (see “The Block Menu” on page 285)
- **Ctrl**+**V**

Configuration Commands

The following commands allow you to configure the Editor's appearance and behavior.

ClearConfig

Prompts before clearing the default configuration file.

By default, this command is bound to:

- **Clear User Default Configuration** menu item (see “The Config Menu” on page 291).

ConfigOptions

Opens the **Options** window.

By default, this command is bound to:

- **Options** menu item (see “The Config Menu” on page 291)

configure *config_option* [= | :] *value*

configure *config_option*

configure ?

Changes the value of a MULTI configuration option. The `configure ?` command displays a list of configurable options. You can separate *`config_option`* from *`value`* with an equal sign (=), a colon (**:**), or a whitespace character ( ). If *`value`* is a Boolean, you can omit it and MULTI will toggle the option's setting. For more information, see “Using the configure Command” on page 132.

CustomizeMenus Opens the **Customize Menus** window, which allows you to configure menus in a number of MULTI tools. For information about how to use this window, see "Configuring and Customizing Menus" on page 148. By default, this command is bound to: • **Customize Menus** menu item (see "The Config Menu" on page 291)
LoadConfigFromFile Opens the **Load Configuration from what file?** dialog box. By default, this command is bound to: • **Load Configuration** menu item (see "The Config Menu" on page 291)
SaveConfig Saves the current configuration options in a file in the default location. By default, this command is bound to: • **Save Configuration as User Default** menu item (see "The Config Menu" on page 291).
SaveConfigToFile Opens the **Save Configuration to what file?** dialog box. By default, this command is bound to: • **Save Configuration As** menu item (see "The Config Menu" on page 291)

Drag-and-Drop Commands

The Editor supports drag-and-drop actions such as moving text in an open file and, in Windows, dragging a file from a Windows Explorer to an Editor to open it. The drag-and-drop feature is controlled by the configuration option **dragAndDrop**, which is `off` by default (for more information, see "The MULTI Editor Options Tab" on page 221). The following commands perform various functions associated with this drag-and-drop behavior. Since they are all dependent upon the location of the mouse pointer, these commands are generally useful only when bound to mouse buttons and actions (see "Default Mouse Bindings" on page 383).

SelectionDrop

Completes the drag-and-drop or drag-and-drop-add operation. Legal drag spots are anywhere in the Editor text pane, except on the current selection, and are indicated by the mouse cursor changing into the **drop** (or **drop-add**) cursor. Illegal drop spots are indicated by the **no mouse** cursor.

Note: This command will be executed whenever the left mouse button is released during a drag-and-drop or a drag-and-drop-add operation.

SelectionStartDrag

Starts a drag-and-drop operation using the text of the primary selection. When the mouse moves over a legal drop spot, the cursor will change into the **drop** cursor, so you can drop the text to the new location. At the completion of the drag-and-drop operation, the text of the primary selection will be deleted from its original location, and pasted to the drop location. If there is no primary selection, this command has no effect.

Note: This command must be followed by a **SelectionDrop** command.

By default, this command is bound to:

- Left-click

SelectionStartDragAdd

Starts a drag-and-drop-add operation using the text of the primary selection. When the mouse is over a legal drop spot, the cursor will change into the **drop-add** cursor, so you can copy the text to a new location. At the completion of the drag-and-drop-add operation, the text will be copied to the drop location. If there is no primary selection, this command has no effect.

To execute this command, left-click and drag selected text, while holding down the **Ctrl** key. If you press **Ctrl** any time during a normal drag-and-drop operation, the operation will turn into a drag-and-drop-add operation.

Note: This command must be followed by a **SelectionDrop** command.

By default, this command is bound to:

- **Ctrl+Left-click**

File Commands

The following commands allow you to open, save, close, and otherwise manipulate files.

Close

Closes the current Editor window. If changes were made to open files, you will be prompted to save the files before closing.

By default, this command is bound to:

- **Close Editor** menu item (see "The File Menu" on page 278)
- **Ctrl**+**Q**

Done

Closes and saves changes to all open files without prompting, then exits the Editor.

By default, this command is bound to:

- **Save and Close** Toolbar button (see "The File Menu" on page 278).
- **Ctrl**+**Shift**+**Q**

DosFormat [-dos | -unix]

Sets the file format to DOS format or Linux/Solaris format. (The DOS format saves the file with carriage returns.) If you do not specify any arguments, this command toggles the file format.

By default, this command is bound to:

- **Edit → DOS Format** (see "The Edit Menu" on page 280).

EditorFlags

Opens the **Per File Settings** dialog box, which lists control settings for the current file. See "The Per File Settings Dialog Box" on page 300.

By default, this command is bound to:

- **Per File Settings** menu item (see "The View Menu" on page 282)

FileProperties

Displays the language name and other information the Editor is able to obtain about the currently edited file.

By default, this command is bound to:

- **Properties** menu item (see "The File Menu" on page 278)

LanguageOptions

Opens the **Language Settings** dialog box, which lists settings for the selected language.

By default, this command is bound to:

- **Per Language Settings** menu item (see "The View Menu" on page 282).

LoadFile [*filename*]

Opens the given file in either a new Editor window or the current Editor window, depending on the current setting of the **openFilesinNewBuffers** option (see "The MULTI Editor Options Tab" on page 221). If no parameters are specified, this command opens the **Edit File** dialog box for you to open or create a file.

By default, this command is bound to:

- **Ctrl**+**Shift**+**O**

LoadFileWithNewEditor [*filename*]

Opens the given file in a new Editor window. If no parameters are specified, this command opens the **Edit File** dialog box for you to open or create a file.

By default, this command is bound to:

- **New Editor** menu item (see "The File Menu" on page 278)
- **Ctrl**+**N**

OpenFile [*filename*]

Opens the given file in the current Editor window. If no parameters are specified, this command opens the **Edit File** dialog box for you to open or create a file.

By default, this command is bound to:

- **Open** menu item (see "The File Menu" on page 278)
- **Ctrl**+**O**
- **Open** or **L7** (Solaris only)

PageSetup

(Windows only)

Opens the **Page Setup** dialog box.

By default, this command is bound to:

- **Page Setup** menu item (see "The File Menu" on page 278)

Print

Opens the **Print** dialog box for you to print the file or current selection. For information about the Linux/Solaris **Print** dialog box, see “The Print Setup Dialog Box” on page 298.

By default, this command is bound to:

- **Print** menu item (see “The File Menu” on page 278)

QuerySaveAll

Opens the **SaveFiles?** dialog box, which lists all the currently edited files. To choose to save any combination of these files, select the box next to the file's name. To save all of the selected files, click **OK**. This is equivalent to saving all of the files at once.

By default, this command is bound to:

- **Save All** menu item (see “The File Menu” on page 278)

Quit

Prompts you to save the changes made to all open files, then quits all currently running MULTI tools (including Debugger windows).

By default, this command is bound to:

- **Exit All** menu item (see “The File Menu” on page 278)

Revert

Reverts the file to the last saved version, discarding any changes that have not been saved.

By default, this command is bound to:

- **Revert to Saved** menu item (see “The File Menu” on page 278)

Save

Saves the current file.

By default, this command is bound to:

- **Save** menu item (see “The File Menu” on page 278)
- **Ctrl+S**

SaveAll

Automatically saves all open files without prompting.

SaveAs

Opens the **Save As** dialog box.

By default, this command is bound to:

- **Save As** menu item (see "The File Menu" on page 278)
- **Ctrl**+**Shift**+**S**

SelectLanguage [*language_index*]

Selects the language to use for color syntax, auto indentation, etc.

language_index is the sequential index (starting from 1) for each language defined in **index.gsc** (see "The index.gsc Configuration File" on page 164).

Note: The C and C++ syntax highlighting module attempts to gray out any code that is enclosed by the `#if 0` preprocessor directive. However, if several such directives are nested, only the outermost one will be highlighted correctly.

By default, this command is bound to:

- **Language** menu item (See "The View Menu" on page 282.)

ToggleReadOnly

Toggles the window permission for the current file between read-only and read/write mode, if possible. This does not affect the file's permission on disk.

By default, this command is bound to:

- **Read Only Window** menu item (See "The View Menu" on page 282.)

ToggleWritePermission

Toggles the permission for the file between read-only and read/write mode, if possible. A stop sign in the right corner of the Editor's status bar indicates that the file is currently read-only. This command changes both the file's window permission and the file's permission on disk.

By default, this command is bound to:

- **Toggle Write Permission** menu item (see "The File Menu" on page 278)

Help Commands

The following commands access the MULTI **Editor's** help features.

About

Opens the **About** dialog box.

By default, this command is bound to:

- **About MULTI** menu item (see "The Help Menu" on page 293)

BugReport

Launches the **gbugrpt** utility program, which collects information about your MULTI installation and allows you to append it to a bug report form that you can fill out and email to Green Hills Technical Support.

Help

Opens MULTI's online help.

By default, this command is bound to:

- **Editor Help** menu item (see "The Help Menu" on page 293)
- **F1**

Identify

Waits until you execute another command, either by key presses or mouse clicks, and then displays help for that command instead of executing the command.

By default, this command is bound to:

- **Identify** menu item (see "The Help Menu" on page 293)

Indentation Commands

Indentation is whitespace at the beginning of each line that may be used to denote the hierarchical structure of your code more clearly, thus making it more readable. For more information about indents, see "Indenting Code" on page 88.

AutoIndent

Indents the current line or block of lines to the position indicated by the syntax of the code. This command is only available for C, C++, and Ada. Several configuration options affect the operation of **AutoIndent** (see "The MULTI Editor Options Tab" on page 221).

By default, this command is bound to:

- **Auto Indent** menu item (see "The Block Menu" on page 285)
- **Ctrl**+**2**

AutoIndentImplicit

Performs the same function as **AutoIndent**, except that it can be turned off by setting the configuration option **aiimplicitindent** to `off`.

By default, this command is bound to:

- **Auto indent as you type** check box (see "The MULTI Editor Options Tab" on page 221)

AutoIndentOrTab

Performs the same function as **AutoIndent**, except that if the current file is in a language not supported by **AutoIndent**, a **Tab** is inserted instead.

By default, this command is bound to:

- **Tab**

Indent

Adds an indent at the beginning of the current line or selection.

By default, this command is bound to:

- **Indent** menu item (see "The Block Menu" on page 285)
- **Ctrl**+**i**

Unindent

Removes an indent from the beginning of the current line or selection.

By default, this command is bound to:

- **Unindent** menu item (see "The Block Menu" on page 285)
- **Ctrl**+**Shift**+**i**

Insert Commands

These commands add text to the open file at the cursor's current position.

"*any_string*"

Inserts the string between the double quotation marks into the open file at the cursor's current position. The current selection, if any, is replaced with the text between the quotes. Standard C quoting sequences (for example, `\n`, `\t`, `\\`) are allowed.

AddStr [-pos -1 | 0 | 1] *string*

Adds the specified *`string`* to a position based on the value of `pos`, where:

- `-1` — Specifies the beginning of the file.
- `0` — [default] Specifies the current selection. (The string replaces the current selection.)
- `1` — Specifies the end of the file.

Date

Inserts the date and time into the open file at the cursor's current position.

By default, this command is bound to the menu item:

- **Insert Date** (see “The Tools Menu” on page 287).

InsertFile

Opens the **Insert** dialog box, which allows you to select a file to be inserted at the current line. The contents of the selected file are placed on the line above the cursor.

By default, this command is bound to:

- **Insert File** menu item (see “The Block Menu” on page 285)

InsertNewline

Inserts a newline (`\n`) character into the open file at the cursor's current position. The current selection, if any, is replaced with the newline.

By default, **InsertNewline; AutoIndent** is bound to:

- **Enter**

By default, **EOL; InsertNewLine** is bound to:

- **Ctrl**+**Shift**+**R**

Tab

Inserts a tab (`\t`) character into the open file at the cursor's current position. The current selection, if any, is replaced with the tab.

UserName

Inserts the current user name (in lowercase letters) into the open file at the cursor's current position.

Mode Commands

The following commands change the Editor's mode.

AlterMode [*mode number*]

Creates bindings for sequences of key combinations, instead of just single-stroke key combinations. This command is typically only bound to keys. For more information about binding commands to keys, see the **keybind** command in "Customizing Keys and Mouse Behavior" on page 153.

The **AlterMode** command switches the Editor to any of 10 modes, called `Edit0` through `Edit9`. In each mode, keystrokes can have different behaviors depending on what bindings have been set for that particular mode. This is useful because any given key combination can have up to 10 meanings, depending on whether or not it was preceded by a key that is bound to the **AlterMode** command.

Usually, you use the **keybind** command to bind a command to a key with modifiers, such as **Ctrl** or **Shift** keys. However, with **AlterMode** you can bind commands to a key sequence. The **keybind** command requires the specification of an editing *mode*. When you press the key in that mode, the given command executes. Keys bound to commands in the MULTI Editor are usually bound with the mode set to `Edit` (which refers to the same mode as `Edit0`). However, if this command is specified and the mode is set to *`Edit1`* – *`Edit9`*, the next key press in the Editor will execute the command that it is bound to in the new mode. For example:

```
keybind "x"|Control@Edit=AlterMode Edit2
keybind "s"|Control@Edit2=SaveFile
```

With this command, pressing **Ctrl**+**X** in the Editor changes the Editor mode to `Edit2` for the next key press. Then pressing **Ctrl**+**S** in the Editor saves the current file, because the Editor is now in `Edit2` mode.

Any command issued while in an alternate mode will switch the mode back to `Edit0`, the default mode.

EnterInsertMode

Puts the Editor into insert mode, so you can enter literal keystrokes into your file, even if the keys are bound to commands.

For example, suppose you customized the Editor so that every time you press `d`, the cursor moves down one line. This makes it impossible to type the letter `d` in the file. When you turn on insert mode and press `d`, the letter `d` appears in the file, and the cursor does not move down one line.

Insert mode may be turned off by the **FlashCursor** command (see **FlashCursor** in "Navigation Commands" on page 350).

Quote

Forces the character generated by the next key press to be literally entered in the file, even if the key is bound to a command. This is useful for entering characters that have commands bound to them.

By default, this command is bound to:

- **Ctrl**+\ (backslash)

Navigation Commands

These commands change the location of the cursor, scrolling the open file as necessary to keep the cursor within the Editor's window. None of these commands modify the contents of the open file.

Down

Moves the cursor down one line.

By default, this command is bound to:

- **DownArrow**
- **Ctrl**+**J**

DownSome

Moves the cursor down by *n* lines, where *n* defaults to 5, but may be changed via the **Ctrl+cursor jump size** field located on the **Config → Options**+**Editor** tab. For more information, see the **Ctrl+cursor jump size** option in "The MULTI Editor Options Tab" on page 221.

By default, this command is bound to:

- **Ctrl**+**DownArrow**

EditLine

Displays the `Goto Line:` prompt, which allows you to move to a specific line by typing in the line number and pressing **Enter**.

See also the **Goto** and **LineD** commands below.

By default, this command is bound to:

- **Ctrl**+**G**

EOF

Moves the cursor to the last column of the last line of the open file (*end of file*).

By default, this command is bound to:

- **Ctrl**+**End**

EOL

Moves the cursor to the last column of the current line (*end of line*).

By default, this command is bound to:

- **End**
- **Ctrl**+**E**

FlashCursor

Flashes the line the cursor is on. This command also turns insert mode off (see the **EnterInsertMode** command in "Mode Commands" on page 349).

By default, this command is bound to:

- **Flash Cursor** menu item (see "The View Menu" on page 282)
- The command **NoSelection; FlashCursor** is bound to the **Esc** key.

Goto

Opens the **GoTo** dialog box. See "Using the GoTo Dialog Box" on page 81 for more information.

By default, this command is bound to:

- **Goto** menu item (see "The Edit Menu" on page 280)
- **Ctrl**+**Shift**+**G**

Left

Moves the cursor one character to the left. If the cursor is already in the first column of the line, this command has no effect.

LeftSome

Moves the cursor to the left by *n* characters, where *n* defaults to 5, but may be changed via the **Ctrl+cursor jump size** field located on the **Config → Options+Editor** tab. For more information, see the **Ctrl+cursor jump size** option in "The MULTI Editor Options Tab" on page 221.

LeftU

Moves the cursor one character to the left. If the cursor is in the first column of the line, then it will move to the last column of the previous line. If the cursor is already in the first column of the first line of the open file, this command has no effect.

By default, this command is bound to:

- **LeftArrow**
- **Ctrl+H**

LineD [*line_number*]

Moves the cursor to the specified line. If no parameter is specified, this command opens a dialog box for you to specify the line to which the cursor should be moved.

MoveCursor [-gui | -string] *line_number*, *column_position*

Moves the cursor to the specified `line_number` and `column_position`. Pass the `-gui` option to specify a GUI column position, or pass the `-string` option to specify a string column position. The GUI and string column positions differ when a **Tab** character is present. By default, **Tab** is interpreted as 8 characters in the GUI and as 1 character in a string. Line numbers are 1-based; that is, they start at one. Column positions are 0-based; that is, they start at zero.

PageDown

Moves the cursor down one screen.

By default, this command is bound to:

- **PageDown**
- **Ctrl+Shift+N**

PageUp

Moves the cursor up one screen.

By default, this command is bound to:

- **PageUp**
- **Ctrl+Shift+B**

Return

Moves the cursor to the first column of the next line.

ReverseWord

Moves the cursor to the beginning of the current word. If the cursor is not currently within a word (a group of consecutive alphanumeric characters), it moves to the beginning of the previous word in the open file.

By default, this command is bound to:

- **Ctrl**+**LeftArrow**

Right

Moves the cursor one character to the right. If the cursor is already in the last column of the line, this command has no effect.

RightD

Moves the cursor one character to the right. If the cursor is in the last column of the line, then it will move to the first column of the next line. If the cursor is already in the last column of the last line of the open file, this command has no effect.

By default, this command is bound to:

- **RightArrow**
- **Ctrl**+**L**

RightSome

Moves the cursor to the right by *n* characters, where *n* defaults to 5, but may be changed via the **Ctrl+cursor jump size** field located on the **Config → Options**+**Editor** tab. For more information, see the **Ctrl+cursor jump size** option in "The MULTI Editor Options Tab" on page 221.

SOF

Moves the cursor to the first column of the first line of the open file (*start of file*)

By default, this command is bound to:

- **Ctrl**+**Home**

SOL

Moves the cursor to the immediate left of the first non-whitespace character on the line (*start of line*). If the cursor is already to the left of the first non-whitespace character, then it will move to the first column of the current line.

By default, this command is bound to:

- **Ctrl**+**W**

SOL0

Moves the cursor to the first column of the current line (before any indentation) even if the first character is indented.

By default, this command is bound to:

- **Home**
- **Ctrl**+**0** (zero)

SOL1

Moves the cursor immediately to the left of the first non-whitespace character on the line, even if the cursor is currently to the left of the first non-whitespace character. If the line has only whitespace characters, the cursor moves to the end of the line.

Up

Moves the cursor up one line.

By default, this command is bound to:

- **UpArrow**
- **Ctrl**+**K**

UpSome

Moves the cursor up by *n* lines, where *n* defaults to 5, but may be changed via the **Ctrl+cursor jump size** field located on the **Config → Options**+**Editor** tab. For more information, see the **Ctrl+cursor jump size** option in “The MULTI Editor Options Tab” on page 221.

By default, this command is bound to:

- **Ctrl**+**UpArrow**

Word

Moves the cursor to the end of the current word. If the cursor is not currently within a word (a group of consecutive alphanumeric characters), it moves to the end of the next word in the open file.

By default, this command is bound to:

- **Ctrl**+**RightArrow**

Search Commands

The MULTI Editor supports two methods of searching: incremental searching and interactive searching. For more information about each type of searching, see "Searching in the Editor" on page 83.

BackiSearch

Starts an incremental search that proceeds backward from the current location. See "Incremental Searching" on page 83 for more information.

By default, this command is bound to:

- **Ctrl**+**B**

On Solaris, **BackiSearch; Search** is bound to:

- **Shift**+**Find** or **Shift**+**L9**

iSearch

Starts an incremental search that proceeds forward from the current location. See "Incremental Searching" on page 83 for more information.

By default, this command is bound to:

- **Ctrl**+**F**

Search Opens the Search dialog box, which allows you to specify interactive search criteria. See “Interactive Searching Using the Search Dialog Box” on page 84 for more information. By default, this command is bound to: • **Find** menu item (see “The Edit Menu” on page 280) • **Ctrl**+**Shift**+**F** • **Find** or **L9** (Solaris only)
StopSearch Stops an incremental or interactive search. The most recently matched or partially matched text will remain selected. See “Incremental Searching” on page 83 for more information. By default, this command is bound to: • **Esc**
TruncateSearch Restarts the incremental search at the current location. See “Incremental Searching” on page 83 for more information.

Selection Commands

Selection commands can be used to create or cancel the following two types of selections:

- The *primary selection*, which is created by dragging over text with the left mouse button, can be manipulated by many commands, such as clipboard commands, indentation commands, and drag-and-drop commands. The primary selection is replaced by any typed or inserted text and is canceled by any navigation command. One end of the primary selection, the *cursor-end*, is always at the cursor's current location, and may be either the start or the end of the selection.
- The *secondary selection*, which is created by dragging over text with the middle mouse button, can be replaced using either the command **SecondarySelectionReplace** or **SecondarySelectionReplaceClip**. When the middle button is released, **SecondarySelectionReplace** is executed. Any other non-selection Editor command or keystroke cancels a secondary selection if it

exists. For more information about the middle mouse button, see **allowMiddleClick** in "The MULTI Editor Options Tab" on page 221.

Many commands operate differently upon selected text. These differences are documented in the individual command descriptions. Commands that do not explicitly mention the secondary selection operate on the primary selection only. With the exception of the commands **SecondarySelectionReplace** and **SecondarySelectionReplaceClip**, none of the commands in this section modify the contents of the open file.

ContinueSelection Extends the selection. This command can be used in combination with the navigation commands. For example: **ContinueSelection; Down** extends the selection down one line. For keyboard shortcuts that make use of the **ContinueSelection** command, see "Selecting Text" on page 378.
GetSelectedString Outputs the selected string to a client (for example, the **MULTI Python GUI**) or to a dialog box if there is no client.
GetSelection [-gui | -string] Outputs the current selection range to a client (for example, the **MULTI Python GUI**) or to a dialog box if there is no client. Specify `-gui` to get the GUI range, or specify `-string` to get the string range. The GUI and string ranges differ when a **Tab** character is present. By default, **Tab** is interpreted as 8 characters in the GUI and as 1 character in a string. In the output, line numbers are 1-based; that is, they start at one. Column numbers are 0-based; that is, they start at zero.
NoSelection Moves the cursor to the beginning of the current primary selection and cancels the selection. If there is no primary selection, this command has no effect.
SecondarySelectAll, **SecondarySelectLine**, **SecondarySelectWord** Identical to their primary selection counterparts, except that these commands operate on the secondary selection.
SecondarySelectionAdjust, **SecondarySelectionExtend**, **SecondarySelectionStart** Identical to their primary selection counterparts, except that these commands operate on the secondary selection.

SecondarySelectionReplace

Deletes the text in the secondary selection, and replaces it with a copy of the text in the primary selection. This command also cancels the secondary selection.

SecondarySelectionReplaceClip

Deletes the text in the secondary selection, and replaces it with a copy of the text in the clipboard. This command also cancels the secondary selection. For more information about the clipboard, see "Clipboard Commands" on page 336.

SelectAll

Selects the entire open file.

By default, this command is bound to:

- **Select All** menu item (see "The Edit Menu" on page 280)
- **Ctrl**+**A**
- Quadruple-Left-click

SelectionAdjust, **SelectionExtend**, **SelectionGrab**

Create and manipulate selections in a way that is dependent upon the mouse. To be useful, these commands should be bound to mouse buttons and used in conjunction with one another. For a sense of how these commands are used, see "Default Mouse Bindings" on page 383.

SelectionStart

Starts a new primary selection.

By default, this command is bound to:

- Left-click

SelectLine

Selects the current line—including any indentation—and moves the cursor to the end of the line.

By default, this command is bound to:

- Triple-Left-click

SelectMatch

Selects the corresponding paired character if the character immediately following the cursor is a paired character such as a parenthesis, square bracket, quote, or curly brace. If the cursor is not in front of a paired character, or if there is no match, this command has no effect.

SelectRange [-gui | -string] *begin_line*, *begin_column*, *end_line*, *end_column*

Selects a range from *begin_line*, *begin_column* to *end_line*, *end_column*. Pass the `-gui` option to specify a GUI column position, or pass the `-string` option to specify a string column position. The GUI and string column positions differ when a **Tab** character is present. By default, **Tab** is interpreted as 8 characters in the GUI and as 1 character in a string.

Line numbers start at one. Column numbers start at zero.

SelectToLines

Extends the current selection so that it completely includes the first and last lines of the current selection. The new selection will begin at the first column of the first line of the current selection and will end at the last column of the last line of the current selection. If there is no current selection, this command will select the current line, exactly like the command **SelectLine**.

SelectToMatch

Extends the selection to include the nearest paired characters that enclose the current selection and all text between them. If the cursor is not between paired characters, this command selects the nearest paired characters on either side of the cursor.

By default, this command is bound to:

- **Match** menu item (see "The View Menu" on page 282)
- **Shift**+**Right-click**

SelectWord

Selects the current word and moves the cursor to the end of the word.

By default, this command is bound to:

- Double-Left-click

SOLSecondary

Starts the secondary selection at the first column of the current line, and changes the secondary selection to zero length. That is, the secondary selection will contain no characters.

Text Deletion Commands

The following commands delete text in the open file, either at the cursor or in the primary selection. After text is deleted by these commands, it can only be recovered with the **Undo** command. For more information, see "Undo/Redo Commands" on page 363.

Backspace

Deletes the text in the current primary selection and cancels the primary selection. If there is no selection, then this command deletes the character immediately before the cursor.

By default, this command is bound to:

- **Backspace** key

if <noselection> { ContinueSelection; RightD }; Delete

Deletes the text in the current primary selection and cancels the primary selection. If there is no primary selection, then this command does nothing.

By default, this command is bound to:

- **Delete**
- **Ctrl**+**D**

if <noselection> { ContinueSelection; ReverseWord }; Backspace

Deletes the previous word.

By default, this command is bound to:

- **Ctrl**+**Backspace**

if <noselection> { ContinueSelection; SOL }; Cut1

Cuts to the beginning of the line.

By default, this command is bound to:

- **Ctrl**+**U**

if <noselection> { ContinueSelection; Word }; Delete

Deletes the next word.

By default, this command is bound to:

- **Ctrl**+**Delete**

SelectToLines; Cut1

Cuts an entire line to clipboard number 1.

By default, this command is bound to:

- **Ctrl**+**M**

Tools Commands

The Editor provides several file utilities that perform such functions as merging, comparing, and executing shell commands. The following commands provide access to these utilities and to other tools.

! [*command*;] (Linux/Solaris only)

Identical to the **ExecuteCmd** below.

CommandToWindow [*command*;] (Linux/Solaris only)

Sends the given `command` to the shell and displays the output in a new Editor window.

The parameter must end with a semicolon (`;`). If no parameters are specified, this command opens the **Command to Window** dialog box.

By default, this command is bound to:

- **Command to Window** menu item (see "The Tools Menu" on page 287)

DiffFiles

Opens the **Choose two files** dialog box, which allows you to find and display the differences between two files. For more information, see "Comparing Files" on page 98.

By default, this command is bound to:

- **Diff Files** menu item (see "The Tools Menu" on page 287)

ExecuteCmd [*command*;] (Linux/Solaris only)

Sends the given `command` to the shell as a command and inserts the output into the open file. The parameter must end with a semicolon (`;`).

If no parameters are specified for this command, it opens the **Shell Command to execute?** dialog box.

By default, this command is bound to:

- **Execute Shell Command** menu item (see "The Tools Menu" on page 287)

Grep

Opens the Search in Files dialog box, which allows you to search for an expression in all open files. See “Searching in Files” on page 86 for a description of this window and how to use it.

By default, this command is bound to:

- **Search in Files** menu item (see “The Tools Menu” on page 287)

MergeFiles

Opens the **Choose files to merge** dialog box to merge two or three files. For more information, see “Merging Files” on page 93.

By default, this command is bound to:

- **Merge Files** menu item (see “The Tools Menu” on page 287)

Minibuffer

Opens the **Execute Editor Commands** dialog box, which allows you to enter commands.

By default, this command is bound to:

- **Execute Editor Commands** menu item (see “The Tools Menu” on page 287)

MultiBar

Opens the MULTI Launcher.

Shell [*command*;]

Sends the given command to the shell as a command. The parameter must end with a semi-colon (`;`). The output is sent to the console from which MULTI was launched. This command does not modify the open file.

If no parameters are specified, this command opens the **Shell Command to execute?** dialog box.

Undo/Redo Commands

The following commands allow you to undo, repeat, or cancel other commands and actions that have already executed or are currently executing.

Abort

Aborts any ongoing command, such as a search.

By default, this command is bound to:

- **Esc**

Redo

Restores the edit that was removed by **Undo**.

By default, this command is bound to:

- **Redo** menu item (see "The Edit Menu" on page 280)
- **Ctrl+Y**
- **Again** or **L2** (Linux/Solaris only)

RepeatLast

Repeats the last edit made to the file.

By default, this command is bound to:

- **Repeat Last Edit** menu item (see "The Edit Menu" on page 280)
- **Ctrl+.** (period)

ShowContextMenu

Opens a context-sensitive shortcut menu at the cursor. This command should only be bound to mouse buttons.

By default, this command is bound to:

- Right-click

Undo

Reverses the last change made to the current file.

By default, this command is bound to:

- **Undo** menu item (see "The Edit Menu" on page 280)
- **Ctrl+Z**
- **Undo** or **L4** (Linux/Solaris only)

Version Control Commands

The following commands are used with version control.

AllowAutoCheckout

Enables auto checkout from version control. This only affects files that are under version control.

By default, this command is bound to:

- **Auto Checkout** menu item (see "The Version Menu" on page 288)

CheckIn

Checks the file into version control, prompting you for comments.

By default, this command is bound to:

- **Check In/Commit** menu item (see "The Version Menu" on page 288)

CheckOut

Checks the file out of version control.

By default, this command is bound to:

- **Check Out** menu item (see "The Version Menu" on page 288)

Discard

Discards changes to the current file.

By default, this command is bound to:

- **Discard Changes** menu item (see "The Version Menu" on page 288)

PlaceUnderVC

Places the current file under version control.

By default, this command is bound to:

- **Place Under VC** menu item (see "The Version Menu" on page 288)

PreventAutoCheckout

Opposite of **AllowAutoCheckout**.

By default, this command is bound to:

- **Auto Checkout** menu item (see "The Version Menu" on page 288)

QuerySaveCheckinAll

Saves the changes you have made to all the files you have checked out, makes the files read only in MULTI, and removes the lock from the files. You will be asked for comments to be saved in the log file along with your changes.

By default, this command is bound to:

- **Check In All** menu item (see "The Version Menu" on page 288)

RevertDate

Displays a dialog box which allows you to enter a version date.

By default, this command is bound to:

- **Revert to Date** menu item (see "The Version Menu" on page 288)

RevertHistory

Opens a dialog box which allows you to select a version to revert the file to.

By default, this command is bound to:

- **Revert to History** menu item (see "The Version Menu" on page 288)

RevertToBackup

Reverts the current file to the backup file. This command is only valid if the **editorBackups** configuration option is set to `on`. For more information, see "The MULTI Editor Options Tab" on page 221.

By default, this command is bound to:

- **Revert to Backup** menu item (see "The File Menu" on page 278)

RevertVersion Opens a dialog box to enter a version number to load into the Editor. By default, this command is bound to: • **Revert to Version** menu item (see "The Version Menu" on page 288)
ShowHistory Opens a dialog box that displays the version control history. By default, this command is bound to: • **Show History** menu item (see "The Version Menu" on page 288) • **Ctrl**+**Shift**+**H**
ShowLastEdit Finds the version of the current file that changed the selected text. This command functions the same as the GUI menu item (see "The Version Menu" on page 288). By default, this command is bound to: • **Show Last Edit** menu item (see "The Version Menu" on page 288) • **Ctrl**+**Shift**+**L**
ShowView Displays the user's current view. **Note**: This command is only supported when using ClearCase.
VCBuffer Opens a dialog box that prompts you for a version control command. The full name of the current file is appended at the end of the command.

View Commands

The following table lists view commands.

BrowseObjXRef Displays the object's cross references (if any) in a Browse window. This command is available for use with C, C++, and Ada files. For more information, see "Browse References" on page 80. By default, this command is bound to: • **Browse References of Selected Object** menu item (see "The View Menu" on page 282).

CloseDependentWindows

Deletes all cross reference Browse windows.

By default, this command is bound to:

- **Close Dependent Windows** menu item (see “The View Menu” on page 282).

CyclePush

Accesses the previous open file in the Editor's stack.

By default, this command is bound to:

- **Previous File** menu item (see “The View Menu” on page 282)
- **Ctrl**+**Shift**+**Tab**

CyclePushBack

Accesses the next open file in the **Editor's** stack.

By default, this command is bound to:

- **Next File** menu item (see “The View Menu” on page 282)
- **Ctrl**+**Tab**

DrawWrapLine [On | Off | AsWordWrap]

Specifies whether or not to draw the wrap line in the MULTI Editor. Permitted settings for this command are:

- `On` — [default] Enables the wrap line.
- `Off` — Disables the wrap line.
- `AsWordWrap` — Enables the wrap line if word wrap is enabled.

This command does the same thing as the configuration option **drawWrapLine**.

GenerateXrefInfo

Obtains complete cross reference information based on the project to which the source file belongs. This command is available for use with C and C++ files.

After cross reference information for the enclosing project is generated, use the **RegenerateXrefInfo** command.

By default, this command is bound to:

- **Generate Cross References** menu item (see “The View Menu” on page 282).

GotoObjDecl [-new] [*object_name*]

Displays the declaration (if available) of `object_name` or, if `object_name` is not specified, of the current selection. If `-new` is specified, the definition is shown in a new Editor window; otherwise, it is shown in the current Editor.

This command is available for use with C, C++, and Ada files.

By default, this command is bound to:

- **Go To Declaration of Selected Object** menu item (see "The View Menu" on page 282).

GotoObjDef [-new] [*object_name*]

Displays the definition (if available) of `object_name` or, if `object_name` is not specified, of the current selection. If `-new` is specified, the definition is shown in a new Editor window; otherwise, it is shown in the current Editor.

This command is available for use with C, C++, and Ada files.

By default, this command is bound to:

- **Go To Definition of Selected Object** menu item (see "The View Menu" on page 282).

NextWindow

Moves the cursor into the next Editor window and raises that window to the foreground. Using this command repeatedly will eventually cycle through all of the open Editor windows.

RegenerateXrefInfo

Regenerates cross reference information based on the project to which the source file belongs. This command is available for use with C and C++ files.

This command is used after **GenerateXrefInfo** has already been used to generate cross reference information for the enclosing project.

By default, this command is bound to:

- **Regenerate Cross References** menu item (see "The View Menu" on page 282).

Miscellaneous Commands

Beep

Sounds an audible tone.

Deprecated Commands

The following commands are deprecated.

- **AlterLocation** (Use the **AlterMode** command instead. See “Mode Commands” on page 349.)
- **CmdPrompt2Wnd** (Use the **CommandToWindow** command instead. See “Tools Commands” on page 361.)
- **CreateLog** (Use the **PlaceUnderVC** command instead. See “Version Control Commands” on page 364.)
- **OpenText** (Use the **OpenFile** command instead. See “File Commands” on page 342.)

Appendix C

Default Key and Mouse Bindings

Contents

This chapter lists the default key and mouse bindings. For information about how you can change key and mouse bindings, see "Customizing Keys and Mouse Behavior" on page 153.

Default Keyboard Shortcuts

The following tables list default key bindings. You can create or change your key bindings with the **keybind** command (see "Customizing Keys and Mouse Behavior" on page 153).

Navigating

The following key bindings control cursor movement in MULTI windows or navigation through buffers. For more information about the commands, see "Navigation Commands" on page 350.

UpArrow **Ctrl+K** Moves the cursor up one line. By default, these keyboard shortcuts are bound to the **Up** command.
Ctrl+UpArrow Moves the cursor up multiple lines [default is 5]. By default, this keyboard shortcut is bound to the **UpSome** command.
PageUp **Ctrl+Shift+B** Moves the cursor up one screen. By default, these keyboard shortcuts are bound to the **PageUp** command.
DownArrow **Ctrl+J** Moves the cursor down one line. By default, these keyboard shortcuts are bound to the **Down** command.
Ctrl+DownArrow Moves the cursor down multiple lines [default is 5]. By default, this keyboard shortcut is bound to the **DownSome** command.

PageDown **Ctrl**+**Shift**+**N** Moves the cursor down one screen. By default, these keyboard shortcuts are bound to the **PageDown** command.
LeftArrow **Ctrl**+**H** Moves the cursor left one character. By default, these keyboard shortcuts are bound to the **LeftU** command.
Ctrl+**LeftArrow** Moves the cursor to the previous word. By default, this keyboard shortcut is bound to the **ReverseWord** command.
Ctrl+**W** **Ctrl**+^ Moves the cursor to the first character of the line. By default, these keyboard shortcuts are bound to the **SOL** command.
Home **Ctrl**+**0** Moves the cursor to the beginning of the line. By default, these keyboard shortcuts are bound to the **SOL0** command.
Ctrl+**Home** Moves the cursor to the beginning of the file. By default, this keyboard shortcut is bound to the **SOF** command.
RightArrow **Ctrl**+**L** Moves the cursor right one character. By default, these keyboard shortcuts are bound to the **RightD** command.
Ctrl+**RightArrow** Moves the cursor to the next word. By default, this keyboard shortcut is bound to the **Word** command.

End **Ctrl**+**E** Moves the cursor to the end of line. By default, these keyboard shortcuts are bound to the **EOL** command.
Ctrl+**Enter** Moves the cursor to the beginning of the next line. By default, this keyboard shortcut is bound to the **EOL; RightD** command.
Ctrl+**End** Moves the cursor to the end of the file. By default, this keyboard shortcut is bound to the **EOF** command.
Ctrl+**G** Prompts for a new line number to go to. By default, this keyboard shortcut is bound to the **EditLine** command.
Ctrl+**Tab** Cycles through open file buffers forward. By default, this keyboard shortcut is bound to the **CyclePushBack** command. For more information about the command, see “View Commands” on page 366.
Ctrl+**Shift**+**Tab** Cycles through open file buffers backward. By default, this keyboard shortcut is bound to the **CyclePush** command. For more information about the command, see “View Commands” on page 366.

Opening, Saving, and Closing

The following keyboard shortcuts are used to open, save, and close files. For more information about the commands, see “File Commands” on page 342.

Ctrl+**O** Opens a file in the current window. By default, this keyboard shortcut is bound to the **OpenFile** command.
Ctrl+**N** Opens a file in a new Editor window. By default, this keyboard shortcut is bound to the **LoadFileWithNewEditor** command.

Ctrl+**Shift**+**O** Opens a file in a new Editor window or in the current Editor window, depending on the current setting of the **openFilesinNewBuffers** option (see "The MULTI Editor Options Tab" on page 221). By default, this keyboard shortcut is bound to the **LoadFile** command.
Ctrl+**S** Saves the current file. By default, this keyboard shortcut is bound to the **Save** command.
Ctrl+**Shift**+**S** Saves the current file. By default, this keyboard shortcut is bound to the **SaveAs** command.
Ctrl+**Shift**+**Q** Saves the current file, then closes the window. By default, this keyboard shortcut is bound to the **Done** command.
Ctrl+**Q** Closes the current window. By default, this keyboard shortcut is bound to the **Close** command.

Undo/Redo

The following keyboard shortcuts are used to undo and redo edits. For more information about the commands, see "Undo/Redo Commands" on page 363.

Ctrl+**Z** Reverts the last edit. By default, this keyboard shortcut is bound to the **Undo** command.
Ctrl+**Y** Reverts the last undo. By default, this keyboard shortcut is bound to the **Redo** command.

Cutting, Copying, and Pasting

The following keyboard shortcuts are used to copy, cut, and paste text to and from clipboards. For more information about the commands, see “Clipboard Commands” on page 336.

Ctrl+**X** Cuts the selected text to the clipboard. By default, this keyboard shortcut is bound to the **Cut1** command.
Ctrl+**Shift**+**X** Cuts the selected text to the second buffer. By default, this keyboard shortcut is bound to the **Cut2** command.
Alt+**Ctrl**+**X** (Windows only) **Meta**+**Ctrl**+**X** (Linux/Solaris only) Cuts the selected text to the third buffer. By default, these keyboard shortcuts are bound to the **Cut3** command.
Alt+**Ctrl**+**Shift**+**X** (Windows only) **Meta**+**Ctrl**+**Shift**+**X** (Linux/Solaris only) Cuts the selected text to the fourth buffer. By default, these keyboard shortcuts are bound to the **Cut4** command.
Ctrl+**C** Copies the selected text to the clipboard. By default, this keyboard shortcut is bound to the **Copy1** command.
Ctrl+**Shift**+**C** Copies the selected text to the second buffer. By default, this keyboard shortcut is bound to the **Copy2** command.
Alt+**Ctrl**+**C** (Windows only) **Meta**+**Ctrl**+**C** (Linux/Solaris only) Copies the selected text to the third buffer. By default, these keyboard shortcuts are bound to the **Copy3** command.

Alt+**Ctrl**+**Shift**+**C** (Windows only) **Meta**+**Ctrl**+**Shift**+**C** (Linux/Solaris only) Copies the selected text to the fourth buffer. By default, these keyboard shortcuts are bound to the **Copy4** command.
Ctrl+**V** Pastes from the clipboard. By default, this keyboard shortcut is bound to: **if <noselection> { if <select1=lines> { if <col=sol> {} else {Down;SOL0} }} Paste1**.
Ctrl+**Shift**+**V** Pastes from the second buffer. By default, this keyboard shortcut is bound to: **if <noselection> { if <select1=lines> { if <col=sol> {} else {Down;SOL0} }} Paste2**.
Alt+**Ctrl**+**V** (Windows only) **Meta**+**Ctrl**+**V** (Linux/Solaris only) Pastes from the third buffer. By default, these keyboard shortcuts are bound to: **if <noselection> { if <select1=lines> { if <col=sol> {} else {Down;SOL0} }} Paste3**.
Alt+**Ctrl**+**Shift**+**V** (Windows only) **Meta**+**Ctrl**+**Shift**+**V** (Linux/Solaris only) Pastes from the fourth buffer. By default, these keyboard shortcuts are bound to: **if <noselection> { if <select1=lines> { if <col=sol> {} else {Down;SOL0} }} Paste4**.

Deleting Text

The following keyboard shortcuts are used to delete text. For more information about the commands, see “Text Deletion Commands” on page 360.

Backspace Deletes the previous character or the selection. By default, this keyboard shortcut is bound to the **Backspace** command.

Ctrl+Backspace Deletes the previous word or the selection. By default, this keyboard shortcut is bound to: **if <noselection> { ContinueSelection; ReverseWord }; Backspace**.
Delete **Ctrl+D** Deletes the next character or the selection. By default, these keyboard shortcuts are bound to: **if <noselection> { ContinueSelection; RightD }; Delete**.
Ctrl+Delete Deletes the next word or the selection. By default, this keyboard shortcut is bound to: **if <noselection> { ContinueSelection; Word }; Delete**.
Ctrl+U Cuts to the beginning of the current line or the selection. By default, this keyboard shortcut is bound to: **if <searching> { TruncateSearch } else { if <noselection> { ContinueSelection; SOL }; Cut1 }**.
Ctrl+M Cuts the current line or the lines in the selection to the first buffer. By default, this keyboard shortcut is bound to: **SelectToLines; Cut1**.
Ctrl+P Joins the current line with the next or the lines in the selection. By default, this keyboard shortcut is bound to the **JoinLines** command.

Selecting Text

The following key bindings control how text is selected. For more information about the commands, see “Selection Commands” on page 356.

Shift+UpArrow Extends the selection up one line. By default, this keyboard shortcut is bound to **ContinueSelection; Up**.

Ctrl+Shift+UpArrow Extends the selection up multiple lines [default is 5]. By default, this keyboard shortcut is bound to: **ContinueSelection; UpSome**.
Shift+PageUp Extends the selection up one screen. By default, this keyboard shortcut is bound to: **ContinueSelection; PageUp**.
Shift+DownArrow Extends the selection down one line. By default, this keyboard shortcut is bound to: **ContinueSelection; Down**.
Ctrl+Shift+DownArrow Extends the selection down multiple lines [default is 5]. By default, this keyboard shortcut is bound to: **ContinueSelection; DownSome**.
Ctrl+Shift+PageDown Extends the selection down one screen. By default, this keyboard shortcut is bound to: **ContinueSelection; PageDown**.
Shift+LeftArrow Extends the selection left one character. By default, this keyboard shortcut is bound to: **ContinueSelection; LeftU**.
Ctrl+Shift+LeftArrow Extends the selection to previous word. By default, this keyboard shortcut is bound to: **ContinueSelection; ReverseWord**.
Shift+Home Extends the selection to beginning of line. By default, this keyboard shortcut is bound to: **ContinueSelection; SOL0**.
Shift+RightArrow Extends the selection right one character. By default, this keyboard shortcut is bound to: **ContinueSelection; RightD**.
Ctrl+Shift+RightArrow Extends the selection to next word. By default, this keyboard shortcut is bound to: **ContinueSelection; Word**.

Shift+**End** Extends the selection to the end of the line. By default, this keyboard shortcut is bound to: **ContinueSelection; EOL**.
Ctrl+**Shift**+**Enter** Extends the selection to beginning of next line. By default, this keyboard shortcut is bound to: **ContinueSelection; Return**.
Ctrl+**A** Selects the entire document. By default, this keyboard shortcut is bound to: **SelectAll**.

Searching

The following key bindings are used to control searches. For more information about the commands, see “Search Commands” on page 355.

Ctrl+**F** Starts or continues an incremental search forward. By default, this keyboard shortcut is bound to the **iSearch** command.
Ctrl+**B** Starts or continues an incremental search backward. By default, this keyboard shortcut is bound to the **BackiSearch** command.
Esc Cancels a search. By default, this keyboard shortcut is bound to the **Abort** command.
Ctrl+**Shift**+**F** Opens the Search dialog box. By default, this keyboard shortcut is bound to the **Search** command.
Shift+**F9** (Windows only) **Shift** + F19 (Linux/Solaris only) Starts an incremental search backwards, then opens the Search dialog box. By default, these keyboard shortcuts are bound to: **BackiSearch; Search**.

Auto-Completion

The following keyboard shortcuts are used to perform auto-completion functions, even when auto-completion is disabled.

For information about auto-completion commands, see "Auto-Completion Commands" on page 333.

Ctrl+] Auto-completes the characters with the next string that matches the pattern. By default, this keyboard shortcut is bound to the **NextAutoCompleteString** command.
Ctrl+[Auto-completes the characters with the previous string that matched the pattern. By default, this keyboard shortcut is bound to the **PrevAutoCompleteString** command.
Ctrl+/ Displays a list of matched strings. You can select a string from the list. By default, this keyboard shortcut is bound to the **AutoCompleteList** command.
Ctrl+' Displays a list of matched function prototypes. You can select a function prototype from the list. By default, this keyboard shortcut is bound to the **AutoCompletePrototypeList** command.
Tab Accepts the string auto-completed by the MULTI Editor, moves the cursor to the end of the selected text, then clears the selection from the text.

Indenting Text

The following keyboard shortcuts are used to indent your text. For more information about the commands, see "Indentation Commands" on page 346.

Ctrl+i Indents the current line or the selection. By default, this keyboard shortcut is bound to the **Indent** command.

Ctrl+**Shift**+**i** Unindents the current line or the selection. By default, this keyboard shortcut is bound to the **Unindent** command.
Tab Auto indents the current line or the selection. By default, this keyboard shortcut is bound to: **if <searching> {Tab} else {if <beforenonwhite> {AutoIndentOrTab} else {if <noselection> {Tab} else {if <HaveUnconfirmedAcString> {AcceptAcString; MoveToEndOfSelectionAndUnselect} else {AutoIndentOrTab} } } }**.

Version Control

The following keyboard shortcuts are used to access version control options. For more information about the commands, see “Version Control Commands” on page 364.

Ctrl+**Shift**+**L** Opens the MULTI **Diff Viewer** on the last edit of the current selection. By default, this keyboard shortcut is bound to the **ShowLastEdit** command.
Ctrl+**Shift**+**H** Opens a version history browser. By default, this keyboard shortcut is bound to the **ShowHistory** command.

Miscellaneous

The following are miscellaneous keyboard shortcuts.

Ctrl+\ Enters the next key press sequence literally. By default, this keyboard shortcut is bound to the **Quote** command.
Ctrl+**.** Repeats the last command. By default, this keyboard shortcut is bound to the **RepeatLast** command.

Ctrl+**Shift**+**A** When entered in a comment, the comment text will be reformatted to wrap across multiple lines. By default, this keyboard shortcut is bound to the **FillParagraph** command.
Ctrl+**Shift**+**R** Inserts a new line at the end of the current line. By default, this keyboard shortcut is bound to: **EOL; InsertNewLine**.
Ctrl+**Shift**+**T** Transposes the previous two characters. By default, this keyboard shortcut is bound to: **NoSelection; ContinueSelection; Left; Cut2; Left; Paste2; Right**.
Ctrl+**T** Selects the current word and, if the file has function prototype information and the word is a function name, opens a new editor on the function. By default, this keyboard shortcut is bound to: **SelectWord; GotoObjDecl -new**.
Esc Cancels the current selection and flashes the line containing the cursor. By default, this keyboard shortcut is bound to: **NoSelection; FlashCursor**.

Default Mouse Bindings

The following tables list default mouse bindings. While mouse bindings may be assigned to up to five mouse buttons, these tables assume that your mouse has only three buttons: left (**button1**), middle (**button2**), and right (**button3**). For information about changing mouse bindings, see the **mouse** command, in “Customizing Keys and Mouse Behavior” on page 153.

First (Left) Mouse Button

The following are default mouse bindings for the left mouse button (**button1**). For more information about the commands, see “Selection Commands” on page 356.

Left-click Starts new (primary) selection. By default, this mouse action is bound to the **SelectionStartDrag** command.

Left-click + Drag Selects text for the primary selection
Shift+Left-click Extends the primary selection to the mouse pointer.
Ctrl+Left-click Copies selection when in drag-and-drop mode. See “Drag-and-Drop Commands” on page 340.
Double Left-click Selects the current word. By default, this mouse action is bound to the **SelectWord;SelectionAdjust** command.
Triple Left-click Selects the current line. By default, this mouse action is bound to the **SelectLine;SelectionAdjust** command.
Quadruple Left-click Selects the entire file. By default, this mouse action is bound to the **SelectAll;SelectionGrab** command.

Second (Middle) Mouse Button

The following are default mouse bindings for the middle mouse button (**button2**). The middle button may not be available, depending on your mouse and the **Allow middle click to paste** configuration option (for more information see “The MULTI Editor Options Tab” on page 221).

Middle-click Makes a secondary selection and replaces it with the primary selection.
Double Middle-click Replaces a current word with the primary selection.
Triple Middle-click Replaces a current line with the primary selection.
Quadruple Middle-click Replaces an entire file with the primary selection.

Third (Right) Mouse Button

The following are default mouse bindings for the right mouse button (**button3**).

Right-click Opens the shortcut menu for performing operations on the current object.
Ctrl+Right-click Edits the definition of the selected procedure when cross reference information is available.
Shift+Double Right-click Selects a matching curly brace `{}`, square bracket `[]`, or parenthesis `()`. By default, this mouse action is bound to the **SelectToMatch** command.
Shift+Right-click If the cursor is located inside of, or immediately outside of, a pair of curly braces `{}`, square brackets `[]`, or parentheses `()`, selects everything inside of and including the curly braces, square brackets, or parentheses.

Appendix D

Third-Party Tools

Contents

This chapter describes how to use various third-party tools with the MULTI Editor.

Note

For information about using third-party compilers, see the documentation about generating debugging information for applications compiled with third-party compilers in the *MULTI: Building Applications* book. For information about using the MULTI Debugger with third-party tools, see Appendix D, "Using Third-Party Tools with the MULTI Debugger" in the *MULTI: Debugging* book.

Third-Party Version Control Systems

MULTI can be configured to integrate with the following third-party version control systems:

- ClearCase (see "Integrating with ClearCase" on page 104).
- CVS (see "Integrating with CVS" on page 105.)
- SourceSafe (see "Integrating with SourceSafe" on page 105).
- Subversion (see "Integrating with Subversion" on page 108).

Third-Party Editors

You can configure MULTI to use another editor in place of MULTI's built-in Editor. To specify an alternate editor, you can either set options using the **Other Editor Configuration** dialog box or you can use the appropriate configuration options. For instructions on how to specify an alternate editor, see "Third-Party Editor Configuration Options" on page 183.

Using the Editor with Third-Party Tools

You can configure the Editor to launch third-party tools from buttons or menus. The following Editor commands are useful for this purpose:

! [*command*;] (Linux/Solaris only) Takes the current selection in the Editor, if any, and pipes it to the standard input of the specified command. If there is a selection in the Editor, the selection is replaced with the output of the specified command. If there is no selection, the command receives no input, and the output is inserted at the cursor. This is equivalent to the **ExecuteCmd** command.
CommandToWindow [*command*;] (Linux/Solaris only) Runs a shell command and opens a new Editor window to which the standard output of the command is redirected.
Shell [*command*;] Runs a shell command with no input/output redirection.

For more information about these commands, see Appendix B, “Editor Commands” on page 329.

Here is an example configuration file that runs some simple Linux/Solaris commands:

```
menu: MyTools { \
    {'insert pretty date' ! date "+%l:%M %p on %B %e, %Y"} \
    {'count words' CommandToWindow \
     "printf %8s%8s%8s%9s\\\\n lines words chars filename ; wc %FILE"}}

menu: EditMenuBar { \
    {&File ->EditFile} \
    {&Edit ->EditEdit} \
    {V&iew ->EditView} \
    {&Block ->EditBlock} \
    {&Tools ->EditTools} \
    {MyTools ->MyTools} \
    {&Version ->EditVersion} \
    {&Config ->Config} \
    {&Windows ->WindowsMenu} \
    {&Help ->EditHelp}}
```

Note

The backslashes at the end of lines indicate a line wrap. In the actual configuration file, there should not be any line wraps.

To configure the Editor menus from the GUI, choose **Config → Options**, choose the **General** tab, and click the **Menus** button.

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