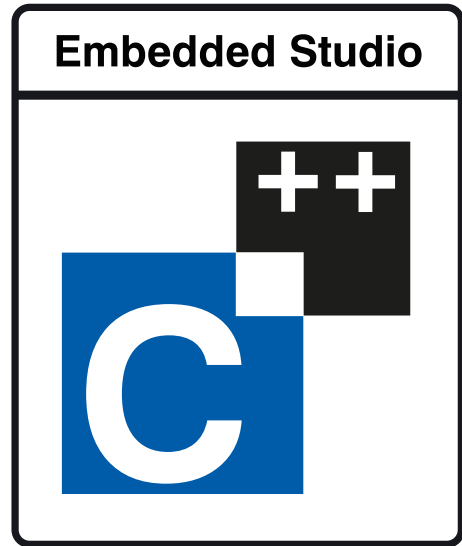


Embedded Studio for RISC-V Reference Manual

Version: 6.10



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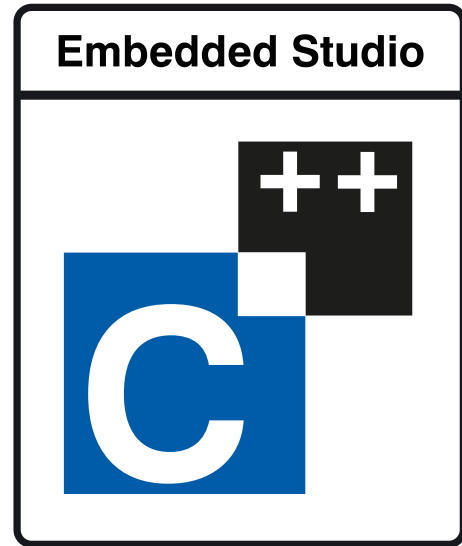
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Introduction

This guide is divided into a number of sections:

Introduction

Covers installing SEGGER Embedded Studio for RISC-V on your machine and verifying that it operates correctly, followed by a brief guide to the operation of the SEGGER Embedded Studio integrated development environment, debugger, and other software supplied in the product.

SEGGER Embedded Studio User Guide

Contains information on how to use the SEGGER Embedded Studio development environment to manage your projects, build, and debug your applications.

library_reference

Contains documentation for the functions in the standard C library supplied in SEGGER Embedded Studio for RISC-V.

riscv_target_support

Contains a description of system files used for startup and debugging of 32-bit RISC-V applications.

What is SEGGER Embedded Studio for RISC-V?

SEGGER Embedded Studio for RISC-V is a complete C/C++ development system for 32-bit RISC-V, microcontrollers and microprocessors that runs on Windows, Mac OS and Linux.

C compiler

SEGGER Embedded Studio for RISC-V C is a faithful implementation of the ANSI and ISO standards for the programming language C. We have added some extensions that enhance usability in a microcontroller environment.

SEGGER Embedded Studio for RISC-V C Library

SEGGER Embedded Studio for RISC-V has its own royalty-free ANSI and ISO C compliant C library that has been specifically designed for use within embedded systems.

SEGGER Embedded Studio IDE

SEGGER Embedded Studio for RISC-V is a streamlined integrated development environment for building, testing, and deploying your applications. SEGGER Embedded Studio provides:

Source Code Editor: A powerful source code editor with multi-level undo and redo, makes editing your code a breeze.

Project System: A complete project system organizes your source code and build rules.

Build System: With a single key press you can build all your applications in a solution, ready for them to be loaded onto a target microcontroller.

Debugger and Flash Programming: You can download your programs directly into Flash and debug them seamlessly from within the IDE using a wide range of target interfaces.

Help system: The built-in help system provides context-sensitive help and a complete reference to the SEGGER Embedded Studio IDE and tools.

Core Simulator: As well as providing cross-compilation technology, SEGGER Embedded Studio for RISC-V provides a PC-based fully functional simulation of the target microcontroller core so you can debug parts of your application without waiting for hardware.

SEGGER Embedded Studio for RISC-V Tools

SEGGER Embedded Studio for RISC-V supplies command line tools that enable you to build your application on the command line using the same project file that the IDE uses.

What we don't tell you

This documentation does not attempt to teach the C or assembly language programming; rather, you should seek out one of the many introductory texts available. And similarly the documentation doesn't cover the RISC-V architecture or microcontroller application development in any great depth.

We also assume that you're fairly familiar with the operating system of the host computer being used.

C programming guides

These are must-have books for any C programmer:

Kernighan, B.W. and Ritchie, D.M., *The C Programming Language* (2nd edition, 1988). Prentice-Hall, Englewood Cliffs, NJ, USA. ISBN 0-13-110362-8.

The original C bible, updated to cover the essentials of ANSI C (1990 version).

Harbison, S.P. and Steele, G.L., *C: A Reference Manual* (second edition, 1987). Prentice-Hall, Englewood Cliffs, NJ, USA. ISBN 0-13-109802-0.

A nice reference guide to C, including a useful amount of information on ANSI C. Co-authored by Guy Steele, a noted language expert.

ANSI C reference

If you're serious about C programming, you may want to have the ISO standard on hand:

ISO/IEC 9899:1990, C Standard and ISO/IEC 9899:1999, C Standard. The standard is available from your national standards body or directly from ISO at <http://www.iso.ch/>.

Getting Started

You will need to install a CPU support package:

Choose **Tools > Package Manager**

Choose the CPU support packages you wish to install and complete the dialog.

You will need to create a project:

Choose **File > New Project**

Select the appropriate Executable project type

Specify a location for the project

Complete the dialog selecting the appropriate **Target Processor** value

You will need to build the project:

Choose **Build | Build 'Project'**

To debug on the simulator

Choose **Project | Options...** to show the project options dialog

In the **Search Options** type in **Simulator**

Choose **Simulator** for the **Target Connection** option

To debug on hardware

Choose **Project | Options...** to show the project options dialog

In the **Search Options** type in **J-Link**

Choose **J-Link** for the **Target Connection** option

To start debugging

Choose **Debug | Go**

The debugger will stop the program at the main, you can now debug the application.

Text conventions

Menus and user interface elements

When this document refers to any user interface element, it will do so in **bold font**. For instance, you will often see reference to the **Project Explorer**, which is taken to mean the project explorer window. Similarly, you'll see references to the **Standard** toolbar which is positioned at the top of the SEGGER Embedded Studio window, just below the menu bar on Windows and Linux.

When you are directed to select an item from a menu in SEGGER Embedded Studio, we use the form *menu-name* > *item-name*. For instance, **File** > **Save** means that you need to click the **File** menu in the menu bar and then select the **Save** item. This form extends to items in sub-menus, so **File** > **Open With Binary Editor** has the obvious meaning.

Keyboard accelerators

Frequently-used commands are assigned keyboard *accelerators* to speed up common tasks. SEGGER Embedded Studio uses standard Windows and Mac OS keyboard accelerators wherever possible.

Windows and Linux have three key modifiers which are **Ctrl**, **Alt**, and **Shift**. For instance, **Ctrl+Alt+P** means that you should hold down the **Ctrl** and **Alt** buttons whilst pressing the **P** key; and **Shift+F5** means that you should hold down the **Shift** key whilst pressing **F5**.

Mac OS has four key modifiers which are (command), (option), (control), and (shift). Generally there is a one-to-one correspondence between the Windows modifiers and the Mac OS modifiers: **Ctrl** is , **Alt** is , and **Shift** is . SEGGER Embedded Studio on Mac OS has its own set of unique key sequences using (control) that have no direct Windows equivalent.

SEGGER Embedded Studio on Windows and Linux also uses *key chords* to expand the set of accelerators. Key chords are key sequences composed of two or more key presses. For instance, the key chord **Ctrl+T, D** means that you should type **Ctrl+T** followed by **D**; and **Ctrl+K, Ctrl+Z** means that you should type **Ctrl+T** followed by **Ctrl+Z**. Mac OS does not support accelerator key chords.

Code examples and human interaction

Throughout the documentation, text printed in **this typeface** represents verbatim communication with the computer: for example, pieces of C text, commands to the operating system, or responses from the computer. In examples, text printed *in this typeface* is not to be used verbatim: it represents a class of items, one of which should be used. For example, this is the format of one kind of compilation command:

hcl *source-file*

This means that the command consists of:

The word **hcl**, typed exactly like that.

A *source-file*: not the text **source-file**, but an item of the *source-file* class, for example **myprog.c**.

Whenever commands to and responses from the computer are mixed in the same example, the commands (i.e. the items which you enter) will be presented in `this typeface`. For example, here is a dialog with the computer using the format of the compilation command given above:

```
c:\code\examples>hcl -v myprog.c
```

The user types the text `hcl -v myprog.c` and then presses the enter key (which is assumed and is not shown); the computer responds with the rest.

Release notes

Version 6.10

Build

Updated segger-cc compiler to version 13.0.0

Updated segger-cc-ng compiler to version 13.91.1

Updated segger-ld to version 4.18.0.

Updated the Andes Technology RISC-V GCC/BINUTILS tools build to use the ast-v3_2_4-release-v5 source release.

Add build support for RV64 instruction set. This is limited to targets that have a 32-bit address space.

Removed legacy Embedded Studio RTL.

The build macro \$(LibExt) now supports Balanced library names.

Added the build macro \$(MemorySegments) to pre/post link commands.

Debug

Updated J-Link software to version V7.58c.

Add debug support for RV64 instruction set. This is limited to targets that have a 32-bit address space.

IDE

Added *pkg* command line package manager tool.

Editor

Added code folding.

Added **Edit > Others > Toggle Split Window**.

Added **Text Editor > Visual Appearance > Show Caret Position In Vertical Scroll Bar** option.

Added **Text Editor > Visual Appearance > Show Breakpoints In Vertical Scroll Bar** option.

Added **Text Editor > Visual Appearance > Show Bookmarks In Vertical Scroll Bar** option.

Added **Text Editor > Visual Appearance > Show Errors In Vertical Scroll Bar** option.

Added **Text Editor > Visual Appearance > Show Warnings In Vertical Scroll Bar** option.

Improved appearance of gutter icons on high resolution displays.

Improved performance of delimiter matching when editing a large file.

Installer

Fixed Linux file association.

Version 5.66

Build

Updated segger-cc compiler to version 12.4.0
Updated segger-cc-ng compiler to version 12.95.0

Debug

Fixed size display of unsized arrays in variables display.
Display C file level statics and C++ static members in globals window.
Updated J-Link software to version V7.56d.

IDE

The **Set Active Project** dialog now initially selects the current active project.

Version 5.64

Build

Updated segger-rtl to version 2.28.0.
Updated segger-ld to version 4.16.1.

Debug

Updated J-Link software to version V7.56a.

Editor

Fixed tab characters not being inserted when in block selection mode.
Fixed positioning of cursor when carrying out a block insertion past the end of a line and the **Use Tabs** option is set to **Yes**.
Editor now syntax colors files with .html file extensions.

IDE

Fixed problem reading the environment.xml file on certain systems.
Project Explorer context menu action **Save Solution As...** now generates a sorted project file.

Version 5.62

Build

Updated segger-cc compiler to version 12.2.4

Updated segger-cc-ng compiler to version 12.93.2
Updated segger-rtl to version 2.24.0.
Add support for clang, segger-cc and segger-cc-ng compilers.
Add support for RV32EC, RV32IC architectures.
Add **Balanced** segger-rtl library builds, selectable with **Library Optimization** property.
Fixed removing of project output files when project items are removed/added/excluded.
Fixed -show option for emBuild.
Updated segger-ld to version 4.14.0.
The **Release** configuration will now set **Debugging Level** to **Level 2** and **Optimization Level** to **Level 2 Balanced**.

Debug

Fixed crash when displaying libcxx containers.
Fixed variable view tooltip truncating uint64_t decimal values to 19 digits.
Add debug project options **Restrict Memory Access** and **Memory Upload Page Size**.
Fix debug project option **Start From Entry Point**.
Add debug project option **Type Interpretation File** and type interpretation files for STLPort, libstdc++ and libc++.
Add disassembly support for V and B extensions.
Add array slice to debug expressions.
Updated J-Link software to version V7.54b.

Editor

Fixed syntax coloring of numerical escape codes.
Fixed syntax coloring of #include filenames.
Fixed incorrect indentation when inserting a tab character before another tab character.

IDE

Fixed the find in files dialog not remembering the "Search In" selection between sessions.
Fixed the find in files dialog not enabling the find button under certain circumstances.
Fixed font selection when using macOS 12 (Monterey) BETA.
The project explorer's build configuration combo box now displays the configuration name as the tooltip if the configuration name is wider than the combo box.
The build configuration search now matches on each word rather than the entire string.
Assembly code syntax colorer now colors FIXME, ATTENTION and Lint comment tags.
Package manager groups can now be collapsed and expanded.
Double clicking in terminal windows now selects words.
Added BuildLinkProject command (Ctrl+P, K).
Added OpenLinkerLogFile command (Ctrl+P, G).
Added OpenLinkerMapFile command (Ctrl+P, M).

Added "Show Labels In Disassembly" and "Show Source In Disassembly" environment options to disassembly window context menu.

Fixed project window keyboard accelerators not being enabled and disabled correctly when selecting project nodes.

Fixed manual package installation not selecting all dependee packages for installation.

Fixed display of find and replace window results containing tabs.

Version 5.60

Build

Fixed lzss unpacking by the segger-ld runtime initialization code.

Updated segger-ld to version 4.12.1.

Updated segger-rtl to version 2.22.0.

Debug

Updated J-Link software to version V7.52b.

IDE

Fixed crash after closing disassembly window.

Fixed crash when using find in files to search in the current document and there is no editor currently focused.

Build log can now handle colored compiler diagnostics.

Peripheral registers are now displayed in registers window.

Floating point registers will now be displayed in floating point format when Decimal format is selected.

Manual package install now removes existing version of package if already installed.

Improved appearance of macOS combo box dropdowns containing icons.

Fixed external tools not appearing when the *match* element is omitted from the tool definition in external tools file.

Fixed crash when carrying out clipboard operations on files located in output files folder.

Fixed display of tab characters in terminal emulator window.

Fixed property values in project explorer not updating when modified using dark theme.

The selected folder in the find and replace window is now persistent between sessions.

Opening the new project wizard while debugging now shows the "Stop debugging?" prompt.

Fixed editor grouping C/C++ source and header files together in the "Single Title Button For All Documents" file selection menu.

Version 5.50

Debug

Updated J-Link software to version V7.20b.

IDE

Memory usage window no longer displays zero length segments.

Fixed drag and drop of files on macOS.

Version 5.44

Build

Add project property **Enable Use Of __cxa_atexit**.

Updated segger-ld to version 4.10.1.

Updated the GCC/BINUTILS tools build to use the SiFive Freedom Tools 2020-12 source release.

Add support for Andes toolchain.

Add support for target input when RTT/SWO Library I/O is used.

Debug

Copy text selection in the memory window now copies the exact text to the clipboard.

Fixed syntax coloring of disassembly when visible whitespace option is enabled.

Add support for Andes ISA extensions to simulator and debugger.

Updated J-Link software to version V7.20.

Editor

Fixed scrolling with horizontal scroll wheel.

Go to definition and declaration operations now highlight the symbol being searched for.

Fixed the previous horizontal scroll position not being correctly restored when opening a solution and the editor is not docked in the default dock site.

Fixed the previous cursor column position not being restored when opening a solution.

C/C++ syntax coloring is now applied to files with no extension.

Added "String", "String Delimiter", "String Escape", "XML Delimiter", "Spelling Error", "Line Number" and "Line Number Highlight" to customizable color scheme.

Added EditDeleteLine command (Ctrl+Shift+L).

Fixed text appearing behind editor scroll bars when using dark theme.

IDE

Added **Export to Text Editor** to debug terminal.

- Line editor now scrolls when cursor reaches button or status message rather than removing it.
- Fixed file selector combo box not moving file list if parent window is moved.
- Fixed file selector combo box keeping file list on top of all windows.
- Fixed selecting of files from the file selector combo box file list when using the mouse.
- Find dialogs now preserve the state of the show options button.

Version 5.42

Build

- Fixed BinaryFile.pokeUint32() script function ignoring the littleEndian option.
- The build macro \$(RelInputDir) is set to dot for files that are not relative to the project.
- Updated segger-rtl to version 2.4.2.
- Updated segger-ld to version 4.10.0.
- Add project property **Compile C Files As C++**.

Debug

- Fixed GDB server target interface not working with GDB servers that do not support no ACK mode.
- Fixed crash when GDB server terminates during debug session.
- Fixed crash when debugging if evaluating a preprocessor definition that expands to itself.
- Improved error reporting if download fails using J-Link target interface.
- The *target_device_name* property now defaults to *\$(Target:)*.
- Changing the PC value in the registers window will now updated the debugger windows.
- Fixed output window still showing 'Working' after chip erase operation has completed.
- Updated J-Link software to version V6.98c.

Editor

- Fixed syntax coloring of XML comments.
- Fixed incorrect syntax coloring of certain C/C++ comments containing ampersand characters.
- Fixed syntax coloring of XML documents when visible whitespace option is enabled.
- Fixed highlighting of text containing tab characters.
- Fixed highlighting of text containing whitespace characters when visible whitespace option is enabled..
- The editor now supports highlighting of C/C++ raw string literals.
- Improved graying of inactive code on lines containing C preprocessor directives.
- Fixed duplicated " or < characters when selecting #include code suggestions.
- Scroll wheel can now be used while selecting text with the mouse.
- Auto-indentation now uses the indentation level of the last non-empty line if enter is pressed on an empty line.

IDE

Project Explorer context menu action **Convert to Regular Folder** now operates recursively and can subsequently be modified like a regular folder.

Fixed edit actions (cut, copy etc) on project nodes in Project Explorer.

Fixed Code Outline window not updating when editor is saved.

Dropping project files onto the dashboard window will now open the project in the project explorer.

Manual package installation now warns of package dependency errors when the dependee package is unknown to the package system.

Fixed crash when activating J-Link license and user does not have permission to access J-Link.

Line numbers are now shown in find and replace results.

Version 5.40

Build

Replace **Run Static Code Analyzer** with **Analyze** action on project explorer context menu.

clang-tidy now used for **Static Code Analyzer**, checks are specified in project property **Clang Tidy Checks**.

Add project property **Analyze After Compile** to enable the analyzer to run when a source file is compiled.

Debug

Added 64-bit view to memory window.

Updated J-Link software to version V6.94a.

Add debug support for restrict types.

IDE

Fixed memory usage window incorrectly representing empty sections.

Added linker and section placement chooser to new Generic project types.

Debug terminal no longer erases line if the line been output ends with "\r\r\n".

Version 5.34

Build

Debug support added to gcc LTO built executables.

Fixed gcc LTO support for C++ programs that have the same symbol defined multiple times.

Fixed llvm LTO support discarding weak symbol definitions.

The build macros \$(RelInputDir) and \$(RelInputPath) are now defined for project level build commands.

Updated SEGGER linker to version 4.6.0.

Escape ; in exported build commands on Linux/macOS.

Debug

Updated J-Link software to version V6.92.

IDE

Fixed memory usage window incorrectly representing sections that span multiple segments.

Version 5.32

Build

Fixed double counting of initialized data size statistic in project explorer.

Fixed lock up when removing **Externally Built** projects that have the **Clean Command** property set.

Updated SEGGER linker to version 4.2.0.

Debug

Updated J-Link software to version V6.88b.

IDE

Improved appearance of memory usage windows when window is small.

Version 5.30

Build

Add **Disable Function Inlining** option to code generation options.

Updated the GCC/BINUTILS tools build to use the SiFive Freedom Tools 2020-04 source release.

Integrated SEGGER linker.

Added **Enable Linker Relaxation** option to code generation options.

Changed gcc startup code to enable linker relaxation.

Add **Linker Search Path** option to linker options.

Debug

Added **Debug > GDB Server > Breakpoint Types** project option.

Updated J-Link software to version V6.88a.

Improved type interpretation for STLPort, libstdc++ and added support for libc++.

Add support for .debug_macinfo debug sections.

Version 5.20

Build

Symbol renaming of `__vfprintf/__vscanf/__do_debug_operation` done by linker command-line rather than in generated ld script.

rtti can now be used without exceptions enabled.

Fixed crash when adding files to project folder with no project node selected.

Fixed clang/segger-cc compiler option for Merge Globals.

Debug

Object file disassembly now contains intermixed source code.

Improved disassembly window's update speed when scrolling.

Updated J-Link software to version V6.86e.

Editor

Fixed extension of multi-line cursor after multi-line text insert.

Fixed matching of delimiters that are within strings.

Fixed tab characters not being used for auto indentation when tabs are enabled.

Fixed loading of files from a file system that does not support file locking (Windows only).

IDE

Fixed project explorer's **Open With > System Web Browser** menu option doing nothing on Linux.

Fixed opening of package source files from help contents window.

Fixed file selector dialog not remembering selected file type filter.

Fixed GUI locking up when find in files on large files.

Version 5.10

Build

Correct names of 64-bit clz/ctz helper functions.

Fixed vscanf implementation always including support for character classes.

Added missing wide character, float point implementations of vfprintf.

Fixed passing **Additional Assembler Options** to compile step assembler command.

Add SEGGER RTL includes/libraries and project option to select.

Add **Run Preprocessor** option to assembler options.

Added *BinaryFile.loadAppend()* script function.

Debug

Add **Confirm Automatically Build Before Debug** environment option.

Improve cast support in debug expressions.
Error now displayed when GDB server breakpoints cannot be set.
Debugger will now set one breakpoint on the first instruction of a statement.
Fixed GDB server target interface not using software breakpoints when setting breakpoints on RAM addresses.
Add **Erase All** project property.
Fixed watch windows resetting the radix of child nodes when parent node is selected.
Replace **Clear Disassembly Breakpoints On Debug Stop** with **Disassembly Breakpoints** environment option.
Source breakpoints are shown in the disassembly window and vice-versa.
Updated J-Link software to version V6.82c.

Editor

Fixed code formatter corrupting characters that cannot be represented using Latin 1 character encoding.
Fixed code formatter marking file as modified when it has made no changes to the file.
Fixed code formatter removing all breakpoints and bookmarks.
Fixed file auto recovery appending characters to the end of recovered file in some circumstances.
Updated code templates to fit SEGGER coding standard.
Selection highlight is now visible on text that has a background color specified in the color scheme.
Fixed syntax coloring of assembly files not working when visible whitespace is enabled.
Shift+Tab now reduces indentation of current line when no text has been selected.
Text editor's horizontal scroll bar now uses maximum line length for maximum scroll value.
Changed the Linux version's default keyboard shortcut for the EditUppercase command to "Ctrl+K, U" in order to avoid a clash with the Ibus input method's default Unicode Code Point shortcut. The original key sequence of "Ctrl+Shift+U" remains defined as an alternative shortcut.
Added **Edit > Selection > Toggle Comment (Ctrl+K, Ctrl+I)** command.
Selection comment and uncomment operations now add and remove comments at indentation level of selection rather than only at the start of the line.
Added syntax highlighting for Python source files.
Fixed inactive code coloring being cleared when file is saved.
Fixed navigation commands being disabled when file is saved.
The **Edit > Others > Duplicate (Ctrl+D)** command will now duplicate selected text.
Spell check now ignores camel case words.

IDE

Fixed launcher presenting option to select from two identical versions of ES when 32-bit Windows variant is installed on 64-bit Windows system.
Fixed crash when opening editors on project load.
Fixed the restoring of main window position when located on a display arranged above or to the left of the display containing the menu bar (macOS only).

Fixed context menus not appearing on a display arranged above the display containing the menu bar (macOS only).

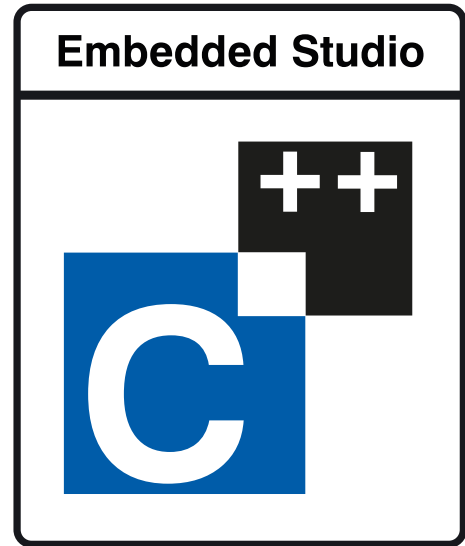
Fixed crash when starting and stopping the debugger using the editor toolbar buttons.

Symbol browser, watch, trace and register windows now save exported text files to the project directory by default.

Memory usage window now shows the percentage used of segments and sections.

Build summary now shows size of segments.

Memory window columns are now grouped in auto column mode.



SEGGER Embedded Studio User Guide

This is the user guide for the SEGGER Embedded Studio integrated development environment (IDE). The SEGGER Embedded Studio IDE consists of:

- a project system to organize your source files
- a build system to build your applications
- programmer aids to navigate and work effectively
- a target programmer to download applications into RAM or flash
- a debugger to pinpoint bugs

SEGGER Embedded Studio standard layout

SEGGER Embedded Studio's main window is divided into the following areas:

Title bar: Displays the name of the current solution.

Menu bar: Menus for editing, building, and debugging your program.

Toolbars: Frequently used actions are quickly accessible on toolbars below the menu bar.

Editing area: A tabbed view of any open editor windows and the HTML viewer.

Docked windows: SEGGER Embedded Studio has many windows that dock to the left, right, or below the editing area. You can configure which windows will be visible, and their placement, when editing and debugging.

Status bar At the bottom of the main window, the status bar contains useful information about the current editor, build status, and debugging environment.

Menu bar

The menu bar contains menus for editing, building, and debugging your program. You can navigate menus using the keyboard or the mouse.

Navigating menus using the mouse

To navigate menus using the mouse:

1. Click a menu title in the menu bar to show the related menu.
2. Click the desired command in the menu to execute that command.

or

1. Click and hold the mouse on a menu title in the menu bar to show the related menu.
2. Drag the mouse to the desired command in the menu.
3. Release the mouse while it is over the command to execute that command.

Navigating menus with the keyboard

To navigate menus using the keyboard:

1. Tap the **Alt** key activate the menu bar.
2. Tap **Return** to display the menu.
3. Use the **Left** and **Right** keys to select the required menu.
4. Use the **Up** or **Down** key to select the required command or submenu.
5. Press **Enter** to execute the selected command.
6. Press **Alt** or **Esc** at any time to cancel menu selection.

After you press the **Alt** key once, each menu on the menu bar has one letter underlined its shortcut key. So, to activate a menu using the keyboard:

While holding down the **Alt** key, type the desired menu's shortcut key.

After the menu appears, you can navigate it using the cursor keys:

Use **Up** and **Down** to move up and down the list of menu items.

Use **Esc** to cancel a menu.

Use **Right** or **Enter** to open a submenu.

Use **Left** or **Esc** to close a submenu and return to the parent menu.

Type the underlined letter in a command's name to execute that command.

Title bar

The first item shown in the title bar is SEGGER Embedded Studio's name. Because SEGGER Embedded Studio can be used to target different processors, the name of the target processor family is also shown, to help you distinguish between instances of SEGGER Embedded Studio when debugging multi-processor or multi-core systems.

The filename of the active editor follows SEGGER Embedded Studio's name; you can configure the presentation of this filename as described below.

After the filename, the title bar displays status information on SEGGER Embedded Studio's state:

[building] SEGGER Embedded Studio is building a solution, building a project, or compiling a file.

[run] An application is running under control of SEGGER Embedded Studio's debugger.

[break] The debugger is stopped at a breakpoint.

[autostep] The debugger is single stepping the application without user interaction (*autostepping*).

Status bar

At the bottom of the window, the status bar contains useful information about the current editor, build status, and debugging environment. The status bar is divided into two regions: one contains a set of fixed panels and the other is used for messages.

The message area

The leftmost part of the status bar is a message area used for things such as status tips, progress information, warnings, errors, and other notifications.

Status bar panels

You can show or hide the following panels on the status bar:

Panel	Description
Target device status	Displays the connected target interface. When connected, this panel contains the selected target interface's name and, if applicable, the processor to which the target interface is connected. The LED icon flashes green when a program is running, is solid red when stopped at a breakpoint, and is yellow when connected to a target but not running a program. Double-clicking this panel displays the Targets pane, and right-clicking it invokes the Target shortcut menu.
Cycle count panel	Displays the number of processor cycles used by the executing program. This panel is only visible if the connected target supports performance counters that can report the total number of cycles executed. Double-clicking this panel resets the cycle counter to zero, and right-clicking it brings up the Cycle Count shortcut menu.
Insert/overwrite status	Indicates whether the current editor is in insert or overwrite mode. In overwrite mode, the panel displays "OVR"; in insert mode, the panel displays "INS".
Read-only status	Indicates whether the editor is in read-only mode. If the editor is editing a read-only file or is in read-only mode, the panel display "R/O"; if the editor is in read-write mode, the panel displays "R/W".
Build status	Indicates the success or failure of the last build. If the last build completed without errors or warnings, the build status pane contains Built OK ; otherwise, it contains the number of errors and warnings reported. If there were errors, double-clicking this panel displays the Build Log in the Output pane.

Caret position	Indicates the insertion position position in the editor window. For text files, the caret position pane displays the line number and column number of the insertion point in the active window; when editing binary files, it displays the address being edited.
Time panel	Displays the current time.

Configuring the status bar panels

To configure which panels are shown on the status bar:

Choose **View > Status Bar**.

From the status bar menu, select the panels to display and deselect the ones you want hidden.

or

Right-click the status bar.

From the status bar menu, select the panels to display and deselect the ones you want to hide.

To show or hide the status bar:

Choose **View > Status Bar**.

From the status bar menu, select or deselect the **Status Bar** item.

You can choose to hide or display the *size grip* when SEGGER Embedded Studio's main window is not maximized. (The size grip is never shown in full-screen mode or when maximized.)

To show or hide the size grip

Choose **View > Status Bar**.

From the status bar menu, select or deselect the **Size Grip** item.

Editing workspace

The main area of SEGGER Embedded Studio is the editing workspace. It contains any files being edited, the on-line help system's HTML browser, and the Dashboard.

Docking windows

SEGGER Embedded Studio has a flexible docking system you can use to position windows as you like them. You can dock windows in the SEGGER Embedded Studio window or in the four *head-up display* windows. SEGGER Embedded Studio will remember the position of the windows when you leave the IDE and will restore them when you return.

Window groups

You can organize SEGGER Embedded Studio windows into *window groups*. A window group has multiple windows docked in it, only one of which is *active* at a time. The window group displays the active window's title for each of the windows docked in the group.

Clicking on the window icons in the window group's header changes the active window. Hovering over a docked window's icon in the header will display that window's title in a *tooltip*.

To dock a window to a different window group:

Press and hold the left mouse button over the title of the window you wish to move.

As you start dragging, all window groups, including hidden window groups, become visible.

Drag the window over the window group to dock in.

Release the mouse button.

Holding **Ctrl** when moving the window will prevent the window from being docked. If you do not dock a window on a window group, the window will float in a new window group.

Perspectives

SEGGER Embedded Studio remembers the dock position and visibility of each window in each *perspective*. The most common use for this is to lay your windows out in the **Standard** perspective, which is the perspective used when you are editing and not debugging. When SEGGER Embedded Studio starts to debug a program, it switches to the **Debug** perspective. You can now lay out your windows in this perspective and SEGGER Embedded Studio will remember how you laid them out. When you stop debugging, SEGGER Embedded Studio will revert to the **Standard** perspective and that window layout for editing; when you return to **Debug** perspective on the next debug session, the windows will be restored to how you laid them out in that for debugging.

SEGGER Embedded Studio remembers the layout of windows, in all perspectives, such that they can be restored when you run SEGGER Embedded Studio again. However, you may wish to revert back to the standard docking positions; to do this:

Dashboard

When SEGGER Embedded Studio starts, it presents the **Dashboard**, a collection of panels that provide useful information, one-click loading of recent projects, and at-a-glance summaries of activity relevant to you.

Tasks

The **Tasks** panel indicates tasks you need to carry out before SEGGER Embedded Studio for RISC-V is fully functional for instance, whether you need to activate SEGGER Embedded Studio for RISC-V, install packages, and so on.

Updates

The **Updates** panel indicates whether any packages you have installed are now out of date because a newer version is available. You can install each new package individually by clicking the **Install** button under each notification, or install all packages by clicking the **Install all updates** link at the bottom of the panel.

Projects

The **Projects** panel contains links to projects you have worked on recently. You can load a project by clicking the appropriate link, or clear the project history by clicking the **Clear List** button. To manage the contents of the list, click the **Manage Projects** link and edit the list of projects in the **Recent Projects** window.

News

The **News** panel summarizes the activity of any RSS and Atom feeds you have subscribed to. Clicking a link will display the published article in an external web browser. You can manage your feed subscriptions to by clicking the **Manage Feeds** link at the end of the **News** panel and *pinning* the feeds in the **Favorites** window you are only subscribed to the pinned feeds.

Links

The **Links** panel is a handy set of links to your favorite websites. If you pin a link in the **Favorites** window, it appears in the **Links** panel.

SEGGER Embedded Studio help and assistance

SEGGER Embedded Studio provides context-sensitive help in increasing detail:

Tooltips

When you position the pointer over a button and keep it still, a small window displays a brief description of the button and its keyboard shortcut, if it has one.

Status tips

In addition to tooltips, SEGGER Embedded Studio provides a longer description in the status bar when you hover over a button or menu item.

Online manual

SEGGER Embedded Studio has links from all windows to the online help system.

The browser

Documentation pages are shown in the **Browser**.

Help using SEGGER Embedded Studio

SEGGER Embedded Studio provides an extensive, HTML-based help system that is available at all times.

To view the help text for a particular window or other user-interface element:

Click to select the item with which you want assistance.

Choose **Help > Help** or press **F1**.

Help within the text editor

The text editor is linked to the help system in a special way. If you place the insertion point within a word and press **F1**, the help-system page most likely to be useful is displayed in the HTML browser. This a great way to quickly find the help text for functions provided in the library.

Browsing the documentation

The **Contents** window lists all the topics in the SEGGER Embedded Studio for RISC-V documentation and gives a way to search through them.

The highlighted entry indicates the current help topic. When you click a topic, the corresponding page appears in the **Browser** window.

The **Next Topic** and **Previous Topic** items in the **Help** menu, or the buttons on the **Contents** window toolbar, help navigate through topics.

To search the online documentation, type a search phrase into the **Search** box on the **Contents** window toolbar.

To search the online documentation:

Choose **Help > Contents** or press **Ctrl+Alt+F1**.

Enter your search phrase in the **Search** box and press **Enter** (or **Return** on Macs).

The search commences and the table of contents is replaced by links to pages matching your query, listed in order of relevance. To clear the search and return to the table of contents, click the clear icon in the **Search** box.

Creating and managing projects

A SEGGER Embedded Studio *project* is a container for everything required to build your applications. It contains all the assorted resources and maintains the relationships between them.

A project is a convenient place to find every file and piece of information associated with your work. You place projects into a *solution*, which can contain one or more projects.

This chapter introduces the various parts of a project, shows how to create projects, and describes how to organize the contents of a project. It describes how to use the **Project Explorer** and **Project Manager** for project-management tasks.

Solutions and projects

To develop a product using SEGGER Embedded Studio, you must understand the concepts of *projects* and *solutions*.

A project contains and organizes everything you need to create a single application or a library.

A solution is a collection of projects and configurations.

Organizing your projects into a solution allows you to build all the projects in a solution with a single keystroke, and to load them onto the target ready for debugging.

In your SEGGER Embedded Studio for RISC-V project, you

organize build-system inputs for building a product.

add information about items in the project, and their relationships, to assist you in the development process.

Projects in a solution can reside in the same or different directories. Project directories are always relative to the directory of the solution file, which enables you to more-easily move or share project-file hierarchies.

The **Project Explorer** organizes your projects and files, and provides quick access to the commands that operate on them. A toolbar at the top of the window offers quick access to commonly used commands.

Solutions

When you have created a solution, it is stored in a project file. Project files are text files, with the file extension **emProject**, that contain an XML description of your project. See [Project file format](#) for a description of the project-file format.

Projects

The projects you create within a solution have a *project type* SEGGER Embedded Studio uses to determine how to build the project. The project type is selected when you use the **New Project** dialog. The available project types depend on the SEGGER Embedded Studio for RISC-V variant you are using, but the following are present in most SEGGER Embedded Studio for RISC-V variants:

Executable: a program that can be loaded and executed.

Externally Built Executable: an executable that is not built by the SEGGER Embedded Studio for RISC-V internal build process.

Library: a group of object files collected into a single file (sometimes called an *archive*).

Externally Built Library: a library that is not built by the SEGGER Embedded Studio for RISC-V internal build process.

Object File: the result of a single compilation.

Staging: a project that will apply a user-defined command to each file in a project.

Combining: a project that can be used to apply a user-defined command when any files in a project have changed.

Project options and configurations

Project options are attached to project nodes. They are usually used in the build process, for example, to define C preprocessor symbols. You can assign different values to the same project option, based on a configuration: for example, you can assign one value to a C preprocessor symbol for release build and a different value for a debug build.

Folders and Dynamic Folders

Projects can contain *folders*, which are used to group related files. Automated grouping uses the files' extensions to, for example, put all .c files in one folder, etc. Grouping also can be done manually by explicitly creating a file within a folder. Note that these project folders do not map onto directories in the file system, they are used solely to structure the display of content shown in the **Project Explorer**.

Projects can also contain *dynamic folders* which will can show the directories and files contained in the file system in the project explorer. You can specify if the dynamic folder is recursive and use wildcards to include and exclude files.

Source files

Source files are all the files used to build a product. These include source code files and also section-placement files, memory-map files, and script files. All the source files you use for a particular product, or for a suite of related products, are managed in a SEGGER Embedded Studio project. A project can also contain files that are not directly used by SEGGER Embedded Studio to build a product but contain information you use during development, such as documentation. You edit source files during development using SEGGER Embedded Studio's built-in text editor, and you organize files into a target (described next) to define the build-system inputs for creating the product.

The source files of your project can be placed in folders or directly in the project. Ideally, the paths to files placed in a project should be relative to the project directory, but at times you might want to refer to a file in an absolute location and this is supported by the project system.

When you add a file to a project, the project system detects whether the file is in the project directory. If a file is not in the project directory, the project system tries to make a relative path from the file to the project directory. If the file isn't relative to the project directory, the project system detects whether the file is relative to

the `$(StudioDir)` directory; if so, the filename is defined using `$(StudioDir)`. If a file is not relative to the project directory or to `$(StudioDir)`, the full, absolute pathname is used.

The project system will allow (with a warning) duplicate files to be put into a project.

The project system uses a file's extension to determine the appropriate build action to perform on the file:

A file with the extension `.c` will be compiled by a C compiler.

A file with the extension `.s` or `.asm` will be compiled by an assembler.

A file with the object-file extension `.hzo` will be linked.

A file with the library-file extension `.hza` will be linked.

A file with the extension `.xml` will be opened and its file type determined by the XML document type.

Files with other file extensions will not be compiled or linked.

You can modify this behavior by setting a file's **File Type** project option with the **Common** configuration selected, which enables files with non-standard extensions to be compiled by the project system.

Externally Built Executables

You can use an external build process for **Externally Built Executable** project types by setting the **Build Command** project option, for example to **make target**. Alternatively you can set command lines for specific build steps to compile/assemble and link. When you create an **Externally Built Executable** project type configurations will be created that create command lines for a variety of external tool chains.

Solution links

You can create links to existing project files from a solution, which enables you to create hierarchical builds. For example, you could have a solution that builds a library together with a stub test driver executable. You can link to that solution from your current solution by right-clicking the solution node of the **Project Explorer** and selecting **Add Existing Project**. Your current solution can then use the library built by the other project.

Session files

When you exit SEGGER Embedded Studio for RISC-V, details of your current session are stored in a *session file*. Session files are text files, with the file extension **emSession**, that contain details such as which files you have opened in the editor and what breakpoints you have set in the **Breakpoint** window.

Creating a project

You can create a new solution for each project or place multiple projects in an existing solution.

To create a new project in an existing solution:

1. Choose **Project > Add New Project**.
2. In the **New Project** wizard, select the type of project you wish to create and specify where it will be placed.
3. Ensure that **Add the project to current solution** is checked.
4. Click **OK** to go to next stage or **Cancel** to cancel the project's creation.

The project name must be unique to the solution and, ideally, the project directory should be relative to the solution directory. The project system will use the project directory as the *current directory* when it builds your project. Once complete, the **Project Explorer** displays the new solution, project, and files contained in the project. To add another project to the solution, repeat the above steps.

To create a new project in a new solution:

1. Choose **File > New Project** or press **Ctrl+Shift+N**.
2. Select the type of project you wish to create and where it will be placed.
3. Click **OK**.

Adding existing files to a project

You can add existing files to a project in a number of ways.

To add existing files to the active project:

Choose **Project > Add Existing File** or press **Ctrl+P, A**.

Using the **Open File** dialog, navigate to the directory containing the files and select the ones you wish to add to the project.

Click **OK**.

The selected files are added to the folders whose filter matches the extension of each of the files. If no filter matches a file's extension, the file is placed underneath the project node.

To add existing files to a specific project:

1. In the **Project Explorer**, right-click the project to which you wish to add a new file.
2. Choose **Add Existing File**.

To add existing files to a specific folder:

1. In the **Project Explorer**, right-click the folder to which you wish to add a new file.
2. Choose **Add Existing File**.

The files are added to the specified folder without using filter matching.

To create a dynamic folder:

1. In the **Project Explore**, right click on the project to which you wish to add a new folder.
2. Choose **New Folder...**
3. Using the **New Folder** dialog name the folder and then show the dynamic folder options.
4. Specify the required **Source Folder** and the **Filter Specification**.

The files that match the filter specification in the source folder will appear in the newly created folder.

Adding new files to a project

You can add new files to a project in a number of ways.

To add new files to the active project:

Choose **Project > Add New File** or press **Ctrl+N**.

To add a new file to a project:

1. In the **Project Explorer**, right-click the project to which you wish to add a new file.
2. Choose **Add New File**.

When adding a new file, SEGGER Embedded Studio displays the **New File** dialog, from which you can choose the type of file to add, its filename, and where it will be stored. Once created, the new file is added to the folder whose filter matches the extension of the newly added file. If no filter matches the newly added file extension, the new file is placed underneath the project node.

To add new files to a folder:

1. In the **Project Explorer**, right-click the folder to which you wish to add a new file.
2. Choose **Add New File**.

The new file is added to the folder without using filter matching.

Removing a file, folder, project, or project link

You can remove whole projects, folders, or files from a project, or you can remove a project from a solution, using the **Remove** button on the **Project Explorer** toolbar. Note that removing a source file from a project does not remove it from disk.

To remove an item from the solution:

1. In the **Project Explorer**, select the item to remove.
2. Choose **Edit > Delete** or press **Del**.

or

1. In the **Project Explorer**, right-click the item to remove.
2. Choose **Remove**.

Building your application

SEGGER Embedded Studio builds your application using the resources and build rules it finds in your solution.

When SEGGER Embedded Studio builds your application, it tries to avoid building files that have not changed since they were last built. It does this by comparing the modification dates of the generated files with the modification dates of the dependent files together with the modification dates of the project options that pertain to the build. But if you are copying files, sometimes the modification dates may not be updated when the file is copied in this instance, it is wise to use the **Rebuild** command rather than the **Build** command.

You can see the build rationale SEGGER Embedded Studio currently is using by setting the **Environment Options > Building > Show Build Information** environment option. To see the build commands themselves, set the **Environment Options > Building > Echo Build Command** environment option.

You may have a solution that contains several interdependent projects. Typically, you might have several executable projects and some library projects. The **Project Dependencies** dialog specifies the dependencies between projects and to see the effect of those dependencies on the solution build order. Note that dependencies can be set on a per-configuration basis, but the default is for dependencies to be defined in the **Common** configuration.

You will also notice that a new folder titled **Dependencies** has appeared in the **Project Explorer**. This folder contains the list of newly generated files and the files from which they were generated. To see if one of files can be decoded and displayed in the editor, right-click the file to see if the **View** command is available on the shortcut menu.

If you have the **Symbols** window open, it will be updated with the symbol and section information of all executable files built in the solution.

To generalize your builds, you can define macro values that are substituted when the project options are used. These macro values can be defined globally at the solution and project level, and can be defined on a per-configuration basis.

The combination of configurations, project options with inheritance, dependencies, and macros provides a very powerful build-management system. However, such systems can become complicated. To understand the implications of changing build settings, right-click a node in the **Project Explorer** and select **Options** to view a dialog that shows which macros and project options apply to that project node.

To build all projects in the solution:

1. Choose **Build > Build Solution** or press **Shift+F7**.

or

1. Right-click the solution in the **Project Explorer** window.
2. Choose **Build** from the shortcut menu.

To build a single project:

1. Select the required project in the **Project Explorer**.
2. Choose **Build > Build** or press **F7**.

or

1. Right-click the project in the **Project Explorer**.
2. Choose **Build**.

To compile a single file:

1. In the **Project Explorer**, click to select the source file to compile.
2. Choose **Build > Compile** or press **Ctrl+F7**.

or

1. In the **Project Explorer**, right-click the source file to compile.
2. Choose **Compile** from the shortcut menu.

Correcting errors after building

The results of a build are recorded in a **Build Log** that is displayed in the **Output** window. Errors are highlighted in red, warnings are highlighted in yellow. Double-clicking an error, warning, or note will move the insertion point to the line of source code that triggered that log entry.

You can move forward and backward through errors using **Search > Next Location** and **Search > Previous Location**.

When you build a single project in a single configuration, the **Transcript** will display the memory used by the application and a summary for each memory area.

Creating variants using configurations

SEGGER Embedded Studio provides a facility to build projects in various configurations. Project configurations are used to create different software builds for your projects.

A configuration defines a set of project options. For example, the output of a compilation can be put into different directories, dependent upon the configuration. When you create a solution, some default project configurations are created.

Build configurations and their uses

Configurations are typically used to differentiate debug builds from release builds. For example, the compiler options for debug builds will differ from those of a release build: a debug build will set options so the project can be debugged easily, whereas a release build will enable optimization to reduce program size or to increase its speed. Configurations have other uses; for example, you can use configurations to produce variants of software, such as custom libraries for several different hardware variants.

Configurations inherit project options from other configurations. This provides a single point of change for definitions common to several configurations. A particular project option can be overridden in a particular configuration to provide configuration-specific settings.

When a solution is created, two configurations are generated **Debug** and **Release** and you can create additional configurations by choosing **Build > Build Configurations**. Before you build, ensure that the appropriate configuration is set using **Build > Set Active Build Configuration** or, alternatively, the **Active Configuration** combo box in the **Project Explorer**.

Selecting a configuration

To set the configuration that affects your building and debugging, use the combo box in the **Project Explorer** or select **Build > Set Active Build Configuration**

Creating a configuration

To create your own configurations, select **Build > Build Configurations** to invoke the **Configurations** dialog. The **New** button will produce a dialog allowing you to name your configuration. You can now specify the existing configurations from which your new configuration will inherit values.

Deleting a configuration

You can delete a configuration by selecting it and clicking the **Remove** button. This deletion cannot be undone or canceled, so beware.

Private configurations

Some configurations are defined purely for inheriting and, as such, should not appear in the **Build** combo box. When you select a configuration in the **Configuration** dialog, you can choose to hide that configuration.

Project options

For solutions, projects, folders, and files, project options can be defined that are used by the project system in the build process. These project options can be viewed and modified by using the **Options** dialog in conjunction with the **Project Explorer**.

Some project options are only applicable to a given item type. For example, linker project options are only applicable to a project that builds an executable file. However, other project options can be applied either at the file, project, or solution project node. For example, a compiler project option can be applied to a solution, project, or individual file. By setting a project option at the solution level, you enable all files of the solution to use that project option's value.

Unique project options

A unique project option has *one* value. When a build is done, the value of a unique project option is the first one defined in the project hierarchy. For example, the **Treat Warnings As Errors** project option could be set to **Yes** at the solution level, which would then be applicable to every file in the solution that is compiled, assembled, and linked. You can then selectively define project options for other project items. For example, a particular source file may have warnings you decide are allowable, so you set the **Treat Warnings As Errors** to **No** for that particular file.

```
solution  Treat Warnings As Errors = Yes
  project1  Treat Warnings As Errors = Yes
    file1   Treat Warnings As Errors = Yes
    file2   Treat Warnings As Errors = No
  project2  Treat Warnings As Errors = No
    file1   Treat Warnings As Errors = No
    file2   Treat Warnings As Errors = Yes
```

In the above example, the files will be compiled with these values for **Treat Warnings As Errors**:

project1/file1	Yes
project1/file2	No
project2/file1	No
project2/file2	Yes

Aggregate project options

An aggregating project option collects all the values defined for it in the project hierarchy. For example, when a C file is compiled, the **Preprocessor Definitions** project option will take all the values defined at the file, project, and solution levels.

```
solution  Preprocessor Definitions = SolutionDef
```

```
project1 Preprocessor Definitions =  
  file1 Preprocessor Definitions =  
  file2 Preprocessor Definitions = File1Def  
project2 Preprocessor Definitions = ProjectDef  
  file1 Preprocessor Definitions =  
  file2 Preprocessor Definitions = File2Def
```

In the above example, the files will be compiled with these preprocessor definitions:

project1/file1	SolutionDef
project1/file2	SolutionDef, File1Def
project2/file1	SolutionDef, ProjectDef
project2/file2	SolutionDef, ProjectDef, File2Def

Configurations and project options

Project options are defined for a configuration so you can have different values for a project option for different builds. A given configuration can inherit the project options of other configurations. When the project system requires a project option value, it checks for the existence of the project option value in the current configuration and then in the set of inherited configurations. You can specify the set of inherited configurations using the **Configurations** dialog.

A special configuration named **Common** is always inherited by a configuration. The **Common** configuration allows you to set project options that will apply to all configurations you create. If you are modifying a project option of your project, you almost certainly want each configuration to inherit it, so ensure that the **Common** configuration is selected.

If the project option is unique, the build system will use the one defined for the particular configuration. If the project option isn't defined for this configuration, the build system uses an arbitrary one from the set of inherited configurations.

If the option is still undefined, the build system uses the value for the **Common** configuration. If it is still undefined, the build system tries to find the value in the next higher level of the project hierarchy.

```

solution [Common] Preprocessor Definitions = CommonSolutionDef
solution [Debug] Preprocessor Definitions = DebugSolutionDef
solution [Release] Preprocessor Definitions = ReleaseSolutionDef

  project1 - Preprocessor Definitions =
    file1 - Preprocessor Definitions =
      file2 [Common] Preprocessor Definitions = CommonFile1Def
      file2 [Debug] Preprocessor Definitions = DebugFile1Def
    project2 [Common] Preprocessor Definitions = ProjectDef
    file1 Preprocessor Definitions =
      file2 [Common] - Preprocessor Definitions = File2Def

```

In the above example, the files will be compiled with these preprocessor definitions when in **Debug** configuration

File	Setting
project1/file1	CommonSolutionDef, DebugSolutionDef
project1/file2	CommonSolutionDef, DebugSolutionDef, CommonFile1Def, DebugFile1Def
project2/file1	CommonSolutionDef, DebugSolutionDef, ProjectDef

project2/file2	ComonSolutionDef, DebugSolutionDef, ProjectDef, File2Def
----------------	--

and the files will be compiled with these **Preprocessor Definitions** when in **Release** configuration:

File	Setting
project1/file1	CommonSolutionDef, ReleaseSolutionDef
project1/file2	CommonSolutionDef, ReleaseSolutionDef, CommonFile1Def
project2/file1	CommonSolutionDef, ReleaseSolutionDef, ProjectDef
project2/file2	ComonSolutionDef, ReleaseSolutionDef, ProjectDef, File2Def

Project macros

You can use macros to modify the way the project system refers to files.

Macros are divided into four classes:

System macros defined by SEGGER Embedded Studio relay information about the environment, such as paths to common directories.

Global macros are saved in the environment and are shared across all solutions and projects. Typically, you would set up paths to libraries and any external items here.

Project macros are saved as project options in the project file and can define values specific to the solution or project in which they are defined.

Build macros are generated by the project system when you build your project.

System macros

System macros are defined by SEGGER Embedded Studio itself and as such are read-only. System macros can be used in project options, environment settings and to refer to files. See [System macros list](#) for the list of System macros.

Global macros

Global macros are store in the environment option [Build Macros](#).

To define a global macro:

1. Use **Tools > Options** to show the environment options dialog.
2. In the **Environment Options** dialog's **Building** group, select the **Build Macros** option.
3. Click the ellipsis button on the right.
4. Set the macro using the syntax *name = replacement text*.

Project macros

To define a project macro:

To set the project macros:

1. Select the appropriate solution/project in the **Project Explorer**.
2. Use **Project > Options** to show the project options dialog.
3. In the **Project Options** dialog's **General Options** group, select the **Macros** option.
4. Click the ellipsis button on the right.
5. Set the macro using the syntax *name = replacement text*.

Build macros

Build macros are defined by the project system for a build of a given project node. See [Build macros list](#) for the list of build macros.

Using macros

You can use a macro for a project option or environment setting by using the `$(macro)` syntax. For example, the **Object File Name** option has a default value of `$(IntDir)/$(InputName)$(OBJ)`.

You can also specify a default value for a macro if it is undefined using the `$(macro:default)` syntax. For example, `$(MyMacro:0)` would expand to `0` if the macro `MyMacro` has not been defined.

Dependencies and build order

You can set up dependency relationships between projects using the **Project Dependencies** dialog. Project dependencies make it possible to build solutions in the correct order and, where the target permits, to load and delete applications and libraries in the correct order. A typical usage of project dependencies is to make an executable project dependent upon a library executable. When you elect to build the executable, the build system will ensure that the library it depends upon is up to date. In the case of a dependent library, the output file of the library build is supplied as an input to the executable build, so you don't have to worry about it.

Project dependencies are stored as project options and, as such, can be defined differently based upon the selected configuration. You almost always want project dependencies to be independent of the configuration, so the **Project Dependencies** dialog selects the **Common** configuration by default.

To make one project dependent upon another:

1. Choose **Project > Project Dependencies**.
2. From the **Project** dropdown, select the target project that depends upon other projects.
3. In the **Depends Upon** list box, select the projects the target project depends upon and deselect the projects it does not depend upon.

Some items in the **Depends Upon** list box may be dimmed, indicating that a circular dependency would result if any of those projects were selected. In this way, SEGGER Embedded Studio prevents you from constructing circular dependencies using the **Project Dependencies** dialog.

If your target supports loading multiple projects, the **Build Order** also reflects the order in which projects are loaded onto the target. Projects will load, in order, from top to bottom. Generally, libraries need to be loaded before the applications that use them, and you can ensure this happens by making the application dependent upon the library. With this dependency set, the library gets built and loaded before the application does.

Applications are deleted from a target in reverse of their build order; in this way, applications are removed before the libraries on which they depend.

Linking and section placement

Executable programs consist of a number of sections. Typically, there are program sections for code, initialized data, and zeroed data. There is often more than one code section and they must be placed at specific addresses in memory.

To describe how the program sections of your program are positioned in memory, the SEGGER Embedded Studio for RISC-V project system uses *memory-map* files and *section-placement* files. These XML-formatted files are described in [Memory Map file format](#) and [Section Placement file format](#). They can be edited with the SEGGER Embedded Studio for RISC-V text editor. The memory-map file specifies the start address and size of target memory segments. The section-placement file specifies where to place program sections in the target's memory segments. Separating the memory map from the section-placement scheme enables a single hardware description to be shared across projects and also enables a project to be built for a variety of hardware descriptions.

For example, a memory-map file representing a device with two memory segments called **FLASH** and **SRAM** could look something like this in the memory-map editor.

```
<Root name="Device1">
  <MemorySegment name="FLASH" start="0x10000000" size="0x10000" />
  <MemorySegment name="SRAM" start="0x20000000" size="0x1000" />
</Root>
```

A corresponding section-placement file will refer to the memory segments of the memory-map file and will list the sections to be placed in those segments. This is done by using a memory-segment name in the section-placement file that matches the corresponding memory-segment name in the memory-map file.

For example, a section-placement file that places a section called **.stack** in the **SRAM** segment and the **.vectors** and **.text** sections in the **FLASH** segment would look like this:

```
<Root name="Flash Section Placement">
  <MemorySegment name="FLASH" >
    <ProgramSection name=".vectors" load="Yes" />
    <ProgramSection name=".text" load="Yes" />
  </MemorySegment>
  <MemorySegment name="SRAM" >
    <ProgramSection name=".stack" load="No" />
  </MemorySegment>
</Root>
```

Note that the order of section placement within a segment is top down; in this example **.vectors** is placed at lower addresses than **.text**.

The memory-map file and section-placement file to use for linkage can be included as a part of the project or, alternatively, they can be specified in the project's [linker options](#).

You can create a new program section using either the assembler or the compiler. For the C compiler, this can be achieved using one of the **#pragma** directives. For example:

```
#pragma codeseg(".foo")
```

```
void foobar(void);
#pragma codeseq(default)
```

This will allocate **foobar** in the section called **.foo**. Alternatively, you can specify the names for the code, constant, data, and zeroed-data sections of an entire compilation unit by using the **Section Options** options.

You can now place the section into the section placement file using the editor so that it will be located after the vectors sections as follows:

```
<Root name="Flash Section Placement">
  <MemorySegment name="FLASH">
    <ProgramSection name=".vectors" load="Yes" />
    <ProgramSection name=".foo" load="Yes" />
    <ProgramSection name=".text" load="Yes" />
  </MemorySegment>
  <MemorySegment name="SRAM">
    <ProgramSection name=".stack" load="No" />
  </MemorySegment>
</Root>
```

If you are modifying a section-placement file that is supplied in the SEGGER Embedded Studio for RISC-V distribution, you will need to import it into your project using the **Project Explorer**.

Sections containing code and constant data should have their **load** project option set to **Yes**. Some sections don't require any loading, such as stack sections and zeroed-data sections; such sections should have their **load** project option set to **No**.

You can specify that initialization data is stored in the default program section using the `INIT` directive, and you can refer to the start and end of the section using the `SFE` and `SFB` directives. If, for example, you create a new data section called `IDATA2`, you can store this in the program by putting the following into the startup code:

```
_data2_init_begin::
  INIT "IDATA2"
_data2_init_end::
```

You can then use these symbols to copy the stored section information into the data section using (an assembly-coded version of):

```
/* Section image located in flash */
extern const unsigned char data2_init_begin[];
extern const unsigned char data2_init_end[];

memcpy(SFB(IDATA2), data2_init_begin, data2_init_end-data2_init_end)
```

Using source control

Source control is an essential tool for individuals or development teams. SEGGER Embedded Studio integrates with several popular source-control systems to provide this feature for files in your SEGGER Embedded Studio for RISC-V projects.

Source-control capability is implemented by a number of third-party providers, but the set of functions provided by SEGGER Embedded Studio for RISC-V aims to be provider independent.

Source control capabilities

The source-control integration capability provides:

- Connecting to the source-control *repository* and mapping files in the SEGGER Embedded Studio for RISC-V project to those in source control.

- Showing the source-control status of files in the project.

- Adding files in the project to source control.

- Fetching files in the project from source control.

- Optionally locking and unlocking files in the project for editing.

- Comparing a file in the project with the latest version in source control.

- Updating a file in the project by merging changes from the latest version in source control.

- Committing changes made to project files into source control.

Configuring source-control providers

SEGGER Embedded Studio supports Subversion, Git, and Mercurial as source-control systems. To enable SEGGER Embedded Studio to utilize source-control features, you need to install, on your operating system, the appropriate command line client for the source-control systems that you will use.

Once you have installed the command line client, you must configure SEGGER Embedded Studio to use it.

To configure Subversion:

1. Choose **Tools > Options** or press **Alt+,**.
2. Select the **Source Control** category in the options dialog.
3. Set the **Executable** environment option of the **Subversion Options** group to point to Subversion `svn` command. On Windows operating systems, the Subversion command is `svn.exe`.

To configure Git:

1. Choose **Tools > Options** or press **Alt+,**.
2. Select the **Source Control** category in the options dialog.
3. Set the **Executable** environment option of the **Git Options** group to point to Git `git` command. On Windows operating systems, the Git command is `git.exe`.

To configure Mercurial:

1. Choose **Tools > Options** or press **Alt+,**.
2. Select the **Source Control** category in the options dialog.
3. Set the **Executable** environment option of the **Mercurial Options** group to point to Git `hg` command. On Windows operating systems, the Git command is `hg.exe`.

Connecting to the source-control system

When SEGGER Embedded Studio loads a project, it examines the file system folder that contains the project to determine the source-control system the project uses. If SEGGER Embedded Studio cannot determine, from the file system, the source-control system in use, it disables source-control integration.

That is, if you have not set up the paths to the source-control command line clients, even if a working copy exists and the appropriate command line client is installed, SEGGER Embedded Studio cannot establish source-control integration for the project.

User credentials

You can set the credentials that the source-control system uses, for commands that require credentials, using **VCS > Options > Configure**. From here you can set the user name and password. These details are saved to the session file (the password is encrypted) so you won't need to specify this information each time the project is loaded.

Note

SEGGER Embedded Studio has no facility to create repositories from scratch, nor to clone, pull, or checkout repositories to a working copy: it is your responsibility to create a working copy outside of SEGGER Embedded Studio using your selected command-line client or Windows Explorer extension.

The "Tortoise" products are a popular set of tools to provide source-control facilities in the Windows shell. Use Google to find **TortoiseSVN**, **TortoiseGit**, and **TortoiseHG** and see if you like them.

File source-control status

Determining the source-control status of a file can be expensive for large repositories, so SEGGER Embedded Studio for RISC-V updates the source-control status in the background. Priority is given to items that are displayed.

A file will be in one of the following states:

Clean:The file is in source control and matches the tip revision.

Not Controlled:The file is not in source control.

Conflicted:The file is in conflict with changes made to the repository.

Locked:The file is locked.

Update Available:The file is older than the most-recent version in source control.

Added:The file is scheduled to be added to the repository.

Removed:The file is scheduled to be removed from the repository.

If the file has been modified, its status is displayed in red in the **Project Explorer**. Note that if a file is not under the local root, it will not have a source-control status.

You can reset any stored source-control file status by choosing **VCS > Refresh**.

Source-control operations

Source-control operations can be performed on single files or recursively on multiple files in the **Project Explorer** hierarchy. Single-file operations are available on the **Source Control** toolbar and on the text editor's shortcut menu. All operations are available using the **VCS** menu. The operations are described in terms of the **Project Explorer** shortcut menu.

Adding files to source control

To add files to the source-control system:

1. In the **Project Explorer**, select the file to add. If you select a folder, project, or solution, any eligible child items will also be added to source control.
2. choose **Source Control > Add** or press **Ctrl+R, A**.
3. The dialog will list the files that can be added.
4. In that dialog, you can deselect any files you don't want to add to source control.
5. Click **Add**.

Note

Files are scheduled to be added to source control and will only be committed to source control (and seen by others) when you commit the file.

Enabling the **VCS > Options > Add Immediately** option will bypass the dialog and immediately add (but not commit) the files.

Updating files

To update files from source control:

1. In the **Project Explorer**, select the file to update. If you select a folder, project, or solution, any eligible child items will also be updated from source control.
2. choose **Source Control > Update** or press **Ctrl+R, U**.
3. The dialog will list the files that can be updated.
4. In that dialog, you can deselect any files you don't want to update from source control.
5. Click **Update**.

Note

Enabling the **VCS > Options > Update Immediately** option will bypass the dialog and immediately update the files.

Committing files

To commit files:

1. In the **Project Explorer**, select the file to commit. If you select a folder, project, or solution, any eligible child items will also be committed.
2. Choose **Source Control > Commit** or press **Ctrl+R, C**.
3. The dialog will list the files that can be committed.
4. In that dialog, you can deselect any files you don't want to commit and enter an optional comment.
5. Click **Commit**.

Note

Enabling the **VCS > Options > Commit Immediately** option will bypass the dialog and immediately commit the files without a comment.

Reverting files

To revert files:

1. In the **Project Explorer**, select the file to revert. If you select a folder, project, or solution, any eligible child items will also be reverted.
2. Choose **Source Control > Revert** or press **Ctrl+R, V**.
3. The dialog will list the files that can be reverted.
4. In that dialog, you can deselect any files you don't want to revert.
5. Click **Revert**.

Note

Enabling the **VCS > Options > Revert Immediately** option will bypass the dialog and immediately revert files.

Locking files

To lock files:

1. In the **Project Explorer**, select the file to lock. If you select a folder, project, or solution, any eligible child items will also be locked.
2. Choose **Source Control > Lock** or press **Ctrl+R, L**.
3. The dialog will list the files that can be locked.
4. In that dialog, you can deselect any files you don't want to lock and enter an optional comment.
5. Click **Lock**.

Note

Enabling the **VCS > Options > Lock Immediately** option will bypass the dialog and immediately lock files without a comment.

Unlocking files

To unlock files:

1. In the **Project Explorer**, select the file to lock. If you select a folder, project, or solution, any eligible child items will also be unlocked.
2. Choose **Source Control > Unlock** or press **Ctrl+R, N**.
3. The dialog will list the files that can be unlocked.
4. In that dialog, you can deselect any files you don't want to unlock.
5. Click **Unlock**.

Note

Enabling the **VCS > Options > Unlock Immediately** option will bypass the dialog and immediately unlock files.

Removing files from source control

To remove files from source control:

1. In the **Project Explorer**, select the file to remove. If you select a folder, project, or solution, any eligible child items will also be removed.
2. choose **Source Control > Remove** or press **Ctrl+R, R**.
3. The dialog will list the files that can be removed.
4. In that dialog, you can deselect any files you don't want to remove.
5. Click **Remove**.

Note

Files are scheduled to be removed from source control and will still be and seen by others, giving you the opportunity to revert the removal. When you commit the file, the file is removed from source control.

Enabling the **VCS > Options > Remove Immediately** option will bypass the dialog and immediately remove (but not commit) files.

Showing differences between files

To show the differences between the file in the project and the version checked into source control, do the following:

1. In the **Project Explorer**, right-click the file.
2. From the shortcut menu, choose **Source Control > Show Differences**.

You can use an external diff tool in preference to the built-in SEGGER Embedded Studio for RISC-V diff tool. To define the diff command line SEGGER Embedded Studio for RISC-V generates, choose **Tools > Options > Source Control > Diff Command Line**. The command line is defined as a list of strings to avoid problems with spaces in arguments. The diff command line can contain the following macros:

\$(localfile):The filename of the file in the project.

\$(remotefile):The filename of the latest version of the file in source control.

\$(localname):A display name for *\$(localfile)*.

\$(remotename):A display name for *\$(remotefile)*.

Source-control properties

When a file in the project is in source control, the **Properties** window shows the following properties in the **Source Control Options** group:

Property	Description
SEGGER Embedded Studio Status	The source-control status of working copy as viewed by SEGGER Embedded Studio.
last Author	The author of the file's head revision.
Path: Relative	The item's path relative to the repository root.
Path: Repository	The pathname of the file in the source-control system, typically a URL.
Path: Working Copy	The pathname of the file in the working copy.
Provider	The name of the source-control system managing this file.
Provider Status	The status of the file as reported by the source-control provider.
Revision: Local	The revision number/name of the local file.
Revision: Remote	The revision number/name of the most-recent version in source control.
Status: In Conflict?	If Yes , updates merged into the file using Update conflict with the changes you made locally; if No , the file is not locked. When conflicted, must resolve the conflicts and mark them Resolved before committing the file.
Status: Locked?	If Yes , the file is lock by you; if No , the file is not locked.
Status: Modified?	If Yes , the checked-out file differs from the version in the source control system; if No , they are identical.
Status: Update Available?	If Yes , the file in the project location is an old version compared to the latest version in the source-control system use Update to merge in the latest changes.

Subversion provider

The Subversion source-control provider has been tested with SVN 1.4.3.

Provider-specific options

The following environment options are supported:

Property	Description
Executable	The path to the <code>svn</code> executable.
Lock Supported	If Yes , check out and undo check out operations are supported. Check out will issue the <code>svn lock</code> command; check in and undo check out will issue the <code>svn unlock</code> command.
Authentication	Selects whether authentication (user name and password) is sent with every command.
Show Updates	Selects whether the update (<code>-u</code> flag) is sent with status requests in order to show that new versions are available in the repository. Note that this requires a live connection to the repository: if you are working without a network connection to your repository, you can disable this switch and continue to enjoy source control status information in the Project Explorer and Pending Changes windows.

Connecting to the source-control system

When connecting to source control, the provider checks if the local root is in SVN control. If this is the case, the local and remote root will be set accordingly. If the local root is not in SVN control after you have set the remote root, a `svn checkout -N` command will be issued to make the local root SVN controlled. This command will also copy any files in the remote root to the local root.

The user name and password you enter will be supplied with each `svn` command the provider issues.

Source control operations

The SEGGER Embedded Studio for RISC-V source-control operations are implemented using Subversion commands. Mapping SEGGER Embedded Studio for RISC-V source-control operations to Subversion source-control operations is straightforward:

Operation	Command
Commit	<code>svn commit</code> for the file, with optional comment.
Update	<code>svn update</code> for each file.

Revert	<code>svn revert</code> for each file.
Resolved	<code>svn resolved</code> for each file.
Lock	<code>svn lock</code> for each file, with optional comment.
Unlock	<code>svn unlock</code> for each file.
Add	<code>svn add</code> for each file.
Remove	<code>svn remove</code> for each file.
Source Control Explorer	<code>svn list</code> with a remote root. <code>svn mkdir</code> to create directories in the repository.

CVS provider

The CVS source-control provider has been tested with CVSNT 2.5.03. The CVS source-control provider uses the `CVS rls` command to browse the repository; this command is implemented in CVS 1.12 but usage of `.` as the root of the module name is not supported.

Provider-specific options

The following environment options are supported:

Property	Description
CVSROOT	The CVSROOT value to access the repository.
Edit/Unedit Supported	If Yes , Check Out and Undo Check Out commands are supported. Any check-out operation will issue the <code>cvs edit</code> command; any check-in or undo-check-out operation will issue the <code>cvs unedit</code> command; the status operation will issue the <code>cvs ss</code> command.
Executable	The path to the <code>cvs</code> executable.
Login/Logout Required	If Yes , Connect will issue the <code>cvs login</code> command.

Connecting to the source-control system

When connecting to source control, the provider checks if the local root is in CVS control. If this is the case, the local and remote root will be set accordingly. If the local root is not in CVS control after you have set the remote root, a `cvs checkout -l -d` command will be issued to make the local root CVS controlled. This command will also copy any files in the remote root to the local root.

Source-control operations

The SEGGER Embedded Studio for RISC-V source-control operations have been implemented using CVS commands. There are no multiple-file operations, each operation is done on a single file and committed as part of the operation.

Operation	Command
Get Status	<code>cvs status</code> and optional <code>cvs editors</code> for local directories in CVS control. <code>cvs rls -e</code> for directories in the repository.
Add To Source Control	<code>cvs add</code> for each directory not in CVS control. <code>cvs add</code> for the file. <code>cvs commit</code> for the file and directories.

Get Latest	<code>cvs update -l -d</code> for each directory not in CVS control. <code>cvs update</code> to merge the local file. <code>cvs update -C</code> to overwrite the local file.
Check Out	Optional <code>cvs update -C</code> to get the latest version. <code>cvs edit</code> to lock the file.
Undo Check Out	<code>cvs unedit</code> to unlock the file. Optional <code>cvs update</code> to get the latest version.
Check In	<code>cvs commit</code> for the file.
Source Control Explorer	<code>cvs rls -e</code> with a remote root starting with <code>..</code> <code>cvs import</code> to create directories in the repository.

Package management

Additional target-support functions can be added to, and removed from, SEGGER Embedded Studio for RISC-V with *packages*.

A SEGGER Embedded Studio for RISC-V package is an archive file containing a collection of target-support files. Installing a package involves copying the files it contains to an appropriate destination directory and registering the package with SEGGER Embedded Studio for RISC-V's package system. Keeping target-support files separate from the main SEGGER Embedded Studio for RISC-V installation allows us to support new hardware and issue bug fixes for existing hardware-support files between SEGGER Embedded Studio for RISC-V releases, and it allows third parties to develop their own support packages.

Installing packages

Use the **Package Manager** to automate the download, installation, upgrade and removal of packages.

To activate the Package Manager:

Choose **Tools > Manage Packages**.

In some situations, such as using SEGGER Embedded Studio for RISC-V on a computer without Internet access or when you want to install packages that are not on the website, you cannot use the **Package Manager** to install packages and it will be necessary to manually install them.

To manually install a package:

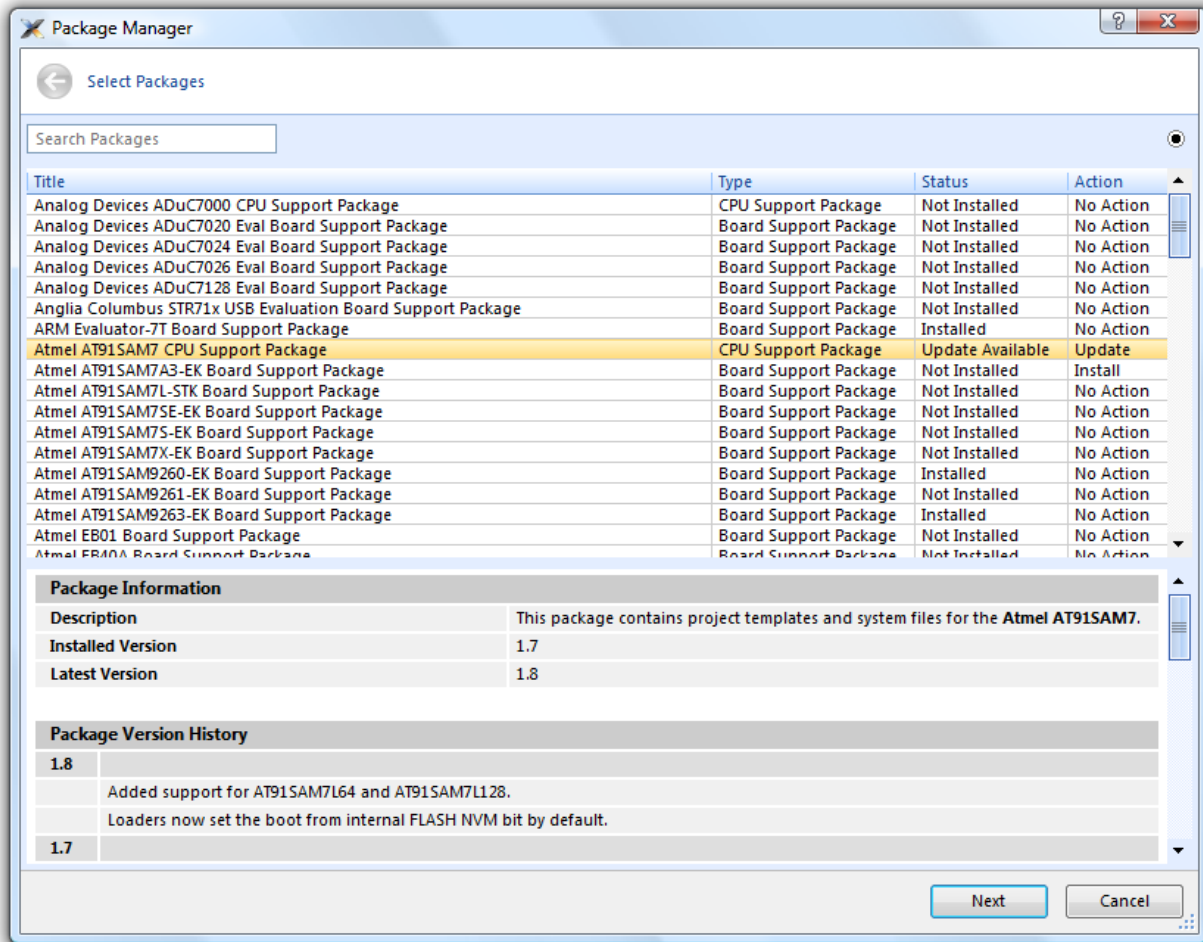
1. Choose **Tools > Manually Install Packages**.
2. Select one or more package files you want to install.
3. Click **Open** to install the packages.

Choose **Tools > Show Installed Packages** to see more information on the installed packages.

The **Package Manager** window will remove manually installed packages.

The package manager

The **Package Manager** manages the support packages installed on your system. It lists the available packages, shows the installed packages, and allows you to install, update, reinstall, and remove them.



To activate the Package Manager:

Choose **Tools > Manage Packages**.

Filtering the package list

By default, the **Package Manager** lists all available and installed packages. You can filter the displayed packages in a number of ways.

To filter by package status:

- Click on the disclosure icon near the top-right corner of the dialog.
- Use the pop-up menu to choose how to filter the list of packages.

The list-filter choices are:

- Display All** Show all packages irrespective of their status.
- Display Not Installed** Show packages that are available but are not currently installed.

Display Installed Only show packages that are installed.

Display Updates Only show packages that are installed but are not up-to-date because a newer version is available.

You can also filter the list of packages by the text in the package's title and documentation.

To filter packages by keyword:

Type the keyword into the **Search Packages** box at the top-left corner of the dialog.

Installing a package

The package-installation operation downloads a package to $\$(\text{PackagesDir})/\text{downloads}$, if it has not been downloaded already, and unpacks the files contained within the package to their destination directory.

To install a package:

1. Choose **Tools > Package Manager** and set the status filter to **Display Not Installed**.
2. Select the package or packages you wish to install.
3. Right-click the selected packages and choose **Install Selected Packages** from the shortcut menu.
4. Click **Next**; you will see the actions the **Package Manager** is about to carry out.
5. Click **Next** and the **Package Manager** will install the selected packages.
6. When installation is complete, click **Finish** to close the **Package Manager**.

Updating a package

The package-update operation first removes existing package files, then it downloads the updated package to $\$(\text{PackagesDir})/\text{downloads}$ and unpacks the files contained within the package to their destination directory.

To update a package:

1. Choose **Tools > Package Manager** and set the status filter to **Display Updates**.
2. Select the package or packages you wish to update.
3. Right-click the selected packages and choose **Update Selected Packages** from the shortcut menu.
4. Click **Next**; you will see the actions the **Package Manager** is about to carry out.
5. Click **Next** and the **Package Manager** will update the package(s).
6. When the update is complete, click **Finish** to close the **Package Manager**.

Removing a package

The package-remove operation removes all the files that were extracted when the package was installed.

To remove a package:

1. Choose **Tools > Package Manager** and set the status filter to **Display Installed**.
2. Select the package or packages you wish to remove.
3. Right-click the selected packages and choose **Remove Selected Packages** from the shortcut menu.
4. Click **Next**; you will see the actions the **Package Manager** is about to carry out.
5. Click **Next** and the **Package Manager** will remove the package(s).
6. When the operation is complete, click **Finish** to close the **Package Manager**.

Reinstalling a package

The package-reinstall operation carries out a package-remove operation followed by a package-install operation.

To reinstall a package:

1. Choose **Tools > Package Manager** and set the status filter to **Display Installed**.
2. Select the package or packages you wish to reinstall.
3. Right-click the packages to reinstall and choose **Reinstall Selected Packages** from the shortcut menu.
4. Click **Next**; you will see the actions the **Package Manager** is about to carry out.
5. Click **Next** and the **Package Manager** will reinstall the packages.
6. When the operation is complete, click **Finish** to close the **Package Manager**.

Exploring your application

In this section, we discuss the SEGGER Embedded Studio tools that help you examine how your application is built.

Project explorer

The **Project Explorer** is the user interface of the SEGGER Embedded Studio for RISC-V project system. It organizes your projects and files and provides access to the commands that operate on them. A toolbar at the top of the window offers quick access to commonly used commands for the selected project node or the active project. Right-click to reveal a shortcut menu with a larger set of commands that will work on the selected project node, ignoring the active project.

The selected project node determines what operations you can perform. For example, the **Compile** operation will compile a single file if a file project node is selected; if a folder project node is selected, each of the files in the folder are compiled.

You can select project nodes by clicking them in the **Project Explorer**. Additionally, as you switch between files in the editor, the selection in the **Project Explorer** changes to highlight the file you're editing.

To activate the Project Explorer:

Choose **View > Project Explorer** or press **Ctrl+Alt+P**.



Left-click operations







The following operations are available in the **Project Explorer** with a left-click of the mouse:

Action	Description
Single click	Select the node. If the node is already selected and is a solution, project, or folder node, a rename editor appears.
Double click	Double-clicking a solution node or folder node will reveal or hide the node's children. Double-clicking a project node selects it as the active project. Double-clicking a file opens the file with the default editor for that file's type.

Toolbar commands

The following buttons are on the toolbar:

Button	Description
	Add a new file to the active project using the New File dialog.
	Add existing files to the active project.

	Remove files, folders, projects, and links from the project.
	Create a new folder in the active project.
	Menu of build operations.
	Disassemble the active project.
	Menu of Project Explorer options.
	Display the properties dialog for the selected item.

Shortcut menu commands

The shortcut menu, displayed by right-clicking, contains the commands listed below.

For solutions:

Item	Description
Build and Batch Build	Build all projects under the solution in the current or batch build configuration.
Rebuild and Batch Rebuild	Rebuild all projects under the solution in the current or batch build configuration.
Clean and Batch Clean	Remove all output and intermediate build files for the projects under the solution in the current or batch build configuration.
Export Build and Batch Export Build	Create an editor with the build commands for the projects under the solution in the current or batch build configuration.
Add New Project	Add a new project to the solution.
Add Existing Project	Create a link from an existing solution to this solution.
Paste	Paste a copied project into the solution.
Remove	Remove the link to another solution from the solution.
Rename	Rename the solution node.
Source Control Operations	Source-control operations on the project file and recursive operations on all files in the solution.
Edit Solution As Text	Create an editor containing the project file.
Save Solution As	Change the filename of the project file that the saved project file is not reloaded.
Properties	Show the Properties dialog with the solution node selected.

For projects:

Item	Description
Build and Batch Build	Build the project in the current or batch build configuration.
Rebuild and Batch Rebuild	Reuild the project in the current or batch build configuration.
Clean and Batch Clean	Remove all output and intermediate build files for the project in the current or batch build configuration.
Export Build and Batch Export Build	Create an editor with the build commands for the project in the current or batch build configuration.
Link	Perform the project node build operation: link for an Executable project type, archive for a Library project type, and the combine command for a Combining project type.
Set As Active Project	Set the project to be the active project.
Debugging Commands	For Executable and Externally Built Executable project types, the following debugging operations are available on the project node: Start Debugging, Step Into Debugging, Reset And Debug, Start Without Debugging, Attach Debugger, and Verify.
Memory-Map Commands	For Executable project types that don't have memory-map files in the project and have the memory-map file project option set, there are commands to view the memory-map file and to import it into the project.
Section-Placement Commands	For Executable project types that don't have section-placement files in the project but have the section-placement file project option set, there are commands to view the section-placement file and to import it into the project.
Target Processor	For Executable and Externally Built Executable project types that have a Target Processor option group, the selected target can be changed.
Add New File	Add a new file to the project.
Add Existing File	Add an existing file to the project.
New Folder	Create a new folder in the project.
Cut	Cut the project from the solution.
Copy	Copy the project from the solution.
Paste	Paste a copied folder or file into the project.
Remove	Remove the project from the solution.
Rename	Rename the project.

Source Control Operations	Source-control, recursive operations on all files in the project.
Find in Project Files	Run Find in Files in the project directory.
Properties	Show the Project Manager dialog and select the project node.

For folders:

Item	Description
Add New File	Add a new file to the folder.
Add Existing File	Add an existing file to the folder.
New Folder	Create a new folder in the folder.
Cut	Cut the folder from the project or folder.
Copy	Copy the folder from the project or folder.
Paste	Paste a copied folder or file into the folder.
Remove	Remove the folder from the project or folder.
Rename	Rename the folder.
Source Control Operations	Source-control recursive operations on all files in the folder.
Compile	Compile each file in the folder.
Properties	Show the properties dialog with the folder node selected.

For files:

Item	Description
Open	Edit the file with the default editor for the file's type.
Open With	Edit the file with a selected editor. You can choose from the Binary Editor , Text Editor , and Web Browser .
Select in File Explorer	Create a operating system file system window with the file selected.
Compile	Compile the file.
Export Build	Create an editor window containing the commands to compile the file in the active build configuration.
Exclude From Build	Set the Exclude From Build option to Yes for this project node in the active build configuration.
Disassemble	Disassemble the output file of the compile into an editor window.
Preprocess	Run the C preprocessor on the file and show the output in an editor window.
Cut	Cut the file from the project or folder.

Copy	Copy the file from the project or folder.
Remove	Remove the file from the project or folder.
Import	Import the file into the project.
Source Control Operations	Source-control operations on the file.
Properties	Show the properties dialog with the file node selected.

Source navigator window

One of the best ways to find your way around your source code is using the **Source Navigator**. It parses the active project's source code and organizes classes, functions, and variables in various ways.

To activate the Source Navigator:

Choose **View > Source Navigator** or press **Ctrl+Alt+N**.

The main part of the **Source Navigator** window provides an overview of your application's functions, classes, and variables.

SEGGER Embedded Studio displays these icons to the left of each object:

Icon	Description
	A C or C++ structure or a C++ namespace.
	A C++ class.
	A C++ member function declared <code>private</code> or a function declared with <code>static</code> linkage.
	A C++ member function declared <code>protected</code> .
	A C++ member function declared <code>public</code> or a function declared with <code>extern</code> linkage.
	A C++ member variable declared <code>private</code> or a variable declared with <code>static</code> linkage.
	A C++ member variable declared <code>protected</code> .
	A C++ member variable declared <code>public</code> or a variable declared with <code>extern</code> linkage.

Re-parsing after editing

The **Source Navigator** does not update automatically, only when you ask it to. To parse source files manually, click the **Refresh** button on the **Source Navigator** toolbar.

SEGGER Embedded Studio re-parses all files in the active project, and any dependent project, and updates the **Source Navigator** with the changes. Parsing progress is shown as a progress bar in the in the **Source Navigator** window. Errors and warnings detected during parsing are sent to the Source Navigator Log in the **Output** window you can show the log quickly by clicking the **Show Source Navigator Log** tool button on the **Source Navigator** toolbar.

Setting indexing threads

You can configure how many threads SEGGER Embedded Studio launches to index your project.

To set the number of threads launched when indexing a project:

Choose **View > Source Navigator** or press **Ctrl+Alt+N**.

Click the **Options** dropdown button at the right of the toolbar.

Move the slider to select the number of threads to launch.

Increasing the number of threads will complete indexing faster, but may reduce the responsiveness of SEGGER Embedded Studio when editing, for example. You should choose a setting that you are comfortable with for your PC. By default, SEGGER Embedded Studio launches 16 threads to index the project and is a good compromise for a desktop quad-core PC.

Sorting and grouping

You can group objects by their type; that is, whether they are classes, functions, namespaces, structures, or variables. Each object is placed into a folder according to its type.

To group objects by type:

1. On the **Source Navigator** toolbar, click the arrow to the right of the **Cycle Grouping** button.
2. Choose **Group By Type**

References window

The **References** window shows the results of the last **Find References** operation. The **Find References** facility is closely related to the **Source Navigator** in that it indexes your project and searches for references within the active source code regions.

To activate the References window:

If you have hidden the **References** window and want to see it again:

Choose **View > References** or press **Ctrl+Alt+R**.

To find all references in a project:

1. Open a source file that is part of the active project, or one of its dependent projects.
2. In the editor, move the insertion point within the name of the function, variable, method, or macro to find.
3. Choose **Navigate > Find References** or press **Alt+R**.
4. SEGGER Embedded Studio shows the **References** window, without moving focus, and searches your project in the background.

You can also find references directly from the text editor's context menu: right-click the item to find and choose **Find References**. As a convenience, SEGGER Embedded Studio is configured to also run **Find References** when you Alt+Right-click in the text editor see [Mouse-click accelerators](#).

To search within the results:

Type the text to search for in the Reference window's search box. As you type, the search results are narrowed.

Click the close button to clear the search text and show all references.

To replace within the results:

Type the replacement text in the Reference window's replace box.






Use the buttons to navigate and replace the text.

The documents that have had replaced text will appear unsaved in the text editor.








Symbol browser window

The **Symbol Browser** shows useful information about your linked application and complements the information displayed in the **Project Explorer** window. You can select different ways to filter and group the information in the **Symbol Browser** to provide an at-a-glance overview of your application. You can use the **Symbol Browser** to *drill down* to see the size and location of each part of your program. The way symbols are sorted and grouped is saved between runs; so, when you rebuild an application, SEGGER Embedded Studio automatically updates the **Symbol Browser** so you can see the effect of your changes on the memory layout of your program.

User interface

Button	Description
	Group symbols by source filename.
	Group symbols by symbol type (equates, functions, labels, sections, and variables).
	Group symbols by the section where they are defined.
	Move the insertion point to the statement that defined the symbol.
	Select columns to display.

The main part of the **Symbol Browser** displays each symbol (both external and static) that is linked into an application. SEGGER Embedded Studio displays the following icons to the left of each symbol:

Icon	Description
	<i>Private Equate</i> A private symbol not defined relative to a section.
	<i>Public Equate</i> A public symbol that is not defined relative to a section.
	<i>Private Function</i> A private function symbol.
	<i>Public Function</i> A public function symbol.
	<i>Private Label</i> A private data symbol, defined relative to a section.
	<i>Public Label</i> A public data symbol, defined relative to a section.
	<i>Section</i> A program section.

Choosing what to show

To activate the Symbol Browser window:

Choose **View > Symbol Browser** or press **Ctrl+Alt+Y**.

You can choose to display the following fields for each symbol:

Value:The value of the symbol. For labels, code, and data symbols, this will be the address of the symbol. For absolute or symbolic equates, this will be the value of the symbol.

Range:The range of addresses the code or data item covers. For code symbols that correspond to high-level functions, the range is the range of addresses used for that function's code. For data addresses that correspond to high-level **static** or **extern** variables, the range is the range of addresses used to store that data item. These ranges are only available if the corresponding source file was compiled with debugging information turned on: if no debugging information is available, the range will simply be the first address of the function or data item.

Size:The size, in bytes, of the code or data item. The **Size** column is derived from the **Range** of the symbol: if the symbol corresponds to a high-level code or data item and has a range, **Size** is calculated as the difference between the start and end addresses of the range. If a symbol has no range, the size column is blank.

Section:The section in which the symbol is defined. If the symbol is not defined within a section, the **Section** column is blank.

Type:The high-level type for the data or code item. If the source file that defines the symbol is compiled with debugging information turned off, type information is not available and the **Type** column is blank.

Frame Size:The amount of stack space used by a call to the function symbol. If the source file that defines the symbol is compiled with debugging information turned off, frame size information is not available and the **Type** column is blank.

Initially the **Range** and **Size** columns are shown in the **Symbol Browser**. To select which columns to display, use the **Field Chooser** button on the **Symbol Browser** toolbar.

To select the fields to display:

1. Click the **Field Chooser** button on the **Symbol Browser** toolbar.
2. Select the fields you wish to display and deselect the fields you wish to hide.

Organizing and sorting symbols

When you group symbols by section, each symbol is grouped underneath the section in which it is defined. Symbols that are absolute or are not defined within a section are grouped beneath (No Section).

To group symbols by section:

1. On the **Symbol Browser** toolbar, click the arrow next to the **Cycle Grouping** button.

2. From the pop-up menu, choose **Group By Section**.

The **Cycle Grouping** icon will change to indicate that the **Symbol Browser** is grouping symbols by section.

When you group symbols by type, each symbol is classified as one of the following:

An *Equate* has an absolute value and is not defined as relative to, or inside, a section.

A *Function* is defined by a high-level code sequence.

A *Variable* is defined by a high-level data declaration.

A *Label* is defined by an assembly language module. *Label* is also used when high-level modules are compiled with debugging information turned off.

When you group symbols by source file, each symbol is grouped underneath the source file in which it is defined. Symbols that are absolute, are not defined within a source file, or are compiled without debugging information, are grouped beneath (Unknown).

To group symbols by type:

1. On the **Symbol Browser** toolbar, click the arrow next to the **Cycle Grouping** button.
2. Choose **Group By Type** from the pop-up menu.

The **Cycle Grouping** icon will change to indicate that the **Symbol Browser** is grouping symbols by type.

To group symbols by source file:

1. On the **Symbol Browser** toolbar, click the arrow next to the **Cycle Grouping** button.
2. Choose **Group By Source File**.

The **Cycle Grouping** icon will change to indicate that the **Symbol Browser** is grouping symbols by source file.

When you sort symbols alphabetically, all symbols are displayed in a single list in alphabetical order.

To list symbols alphabetically:

1. On the **Symbol Browser** toolbar, click the arrow next to the **Cycle Grouping** button.
2. Choose **Sort Alphabetically**.

The **Cycle Grouping** icon will change to indicate that the **Symbol Browser** is grouping symbols alphabetically.

Filtering and finding symbols

When you're dealing with big projects with hundreds, or even thousands, of symbols, a way to filter those symbols in order to isolate just the ones you need is very useful. The **Symbol Browser**'s toolbar provides an editable *combobox* you can use to specify the symbols you'd like displayed. You can type * to match a sequence of zero or more characters and ? to match exactly one character.

The symbols are filtered and redisplayed as you type into the combo box. Typing the first few characters of a symbol name is usually enough to narrow the display to the symbol you need. *Note:* the C compiler prefixes all high-level language symbols with an underscore character, so the variable `extern int u` or the function `void fn(void)` have low-level symbol names `_u` and `_fn`. The **Symbol Browser** uses the low-level symbol name when displaying and filtering, so you must type the leading underscore to match high-level symbols.

To display symbols that start with a common prefix:

Type the desired prefix text into the combo box, optionally followed by a `"*"`.

For instance, to display all symbols that start with `"i2c_"`, type `"i2c_"` and all matching symbols are displayed. You don't need to add a trailing `"*"` in this case, because it is implied.

To display symbols that end with a common suffix:

Type `*` into the combo box, followed by the required suffix.

For instance, to display all symbols that end in `_data`, type `*_data` and all matching symbols are displayed. In this case, the leading `*` is required.

When you have found the symbol you're interested in and your source files have been compiled with debugging information turned on, you can jump to a symbol's definition using the **Go To Definition** button.

To jump to the definition of a symbol:

1. Select the symbol from the list of symbols.
2. On the **Symbol Browser** toolbar, click **Go To Definition**.

or

1. Right-click the symbol in the list of symbols.
2. Choose **Go To Definition** from the shortcut menu.

Watching symbols

If a symbol's range and type is known, you can add it to the most recently opened **Watch** window or **Memory** window.

To add a symbol to the Watch window:

1. In the **Symbol Browser**, right-click the symbol you wish to add to the **Watch** window.
2. On the shortcut menu, choose **Add To Watch**.

To add a symbol to the Memory window:

1. In the **Symbol Browser**, right-click the symbol you wish to add to the **Memory** window.

2. Choose **Locate Memory** from the shortcut menu.

Using size information

Here are a few common ways to use the **Symbol Browser**:

What function uses the most code space? What requires the most data space?

1. Choose **View > Symbol Browser** or press **Ctrl+Alt+Y**.
2. In the **Grouping** button menu on the **Symbol Browser** toolbar, select **Group By Type**.
3. Ensure the **Size** field is checked in the **Field Chooser** button's menu.
4. Ensure that the filter on the **Symbol Browser** toolbar is empty.
5. Click on the **Size** field in the header to sort by data size.
6. The sizes of variables and of functions are shown in separate lists.





What's the overall size of my application?

1. Choose **View > Symbol Browser** or press **Ctrl+Alt+Y**.
2. In the **Grouping** button menu on the **Symbol Browser** toolbar, select **Group By Section**.
3. Ensure the **Range** and **Size** fields are checked in the **Field Chooser** button's menu.
4. Read the section sizes and ranges of each section in the application.

Stack usage window

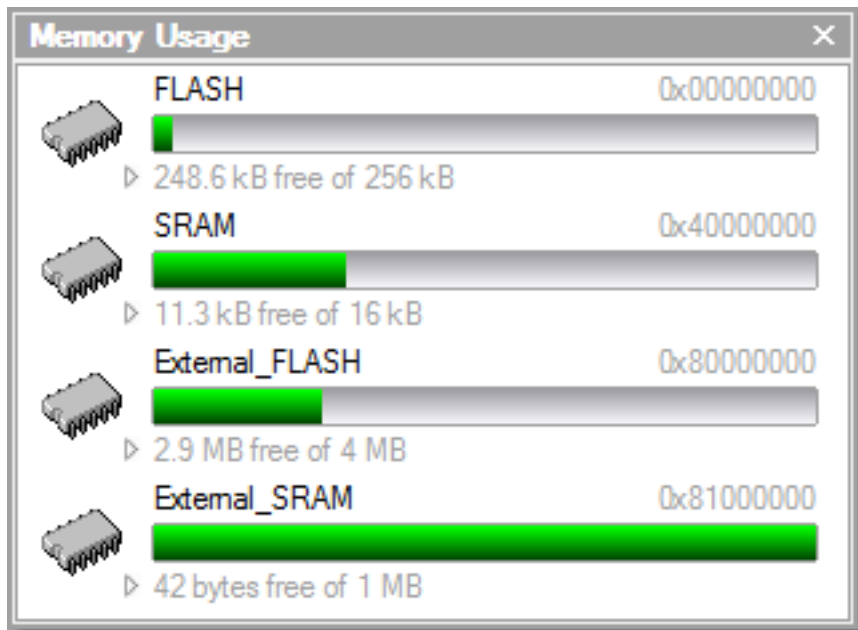
The **Stack Usage Window** finds the call paths of your linked application and displays them as a call tree together with their minimal stack requirements. A call path of your application is any function that has been linked in but has no direct call made to it but will make calls to other functions. The main function is the most obvious example of a call path, an interrupt handler or a function that is called only as a function pointer are other examples. To use the stack usage window your linked application must be compiled with debugging information enabled.

User interface

Button	Description
	Move the insertion point to the statement that defined the symbol.
	Collapse the selected open call tree.
	Open the selected open call tree.
	Show only the deepest call path through the selected call tree.

Memory usage window

The **Memory Usage** window displays a graphical summary of how memory has been used in each memory segment of a linked application.



Each bar represents an entire memory segment. Green represents the area of the segment that contains code or data.

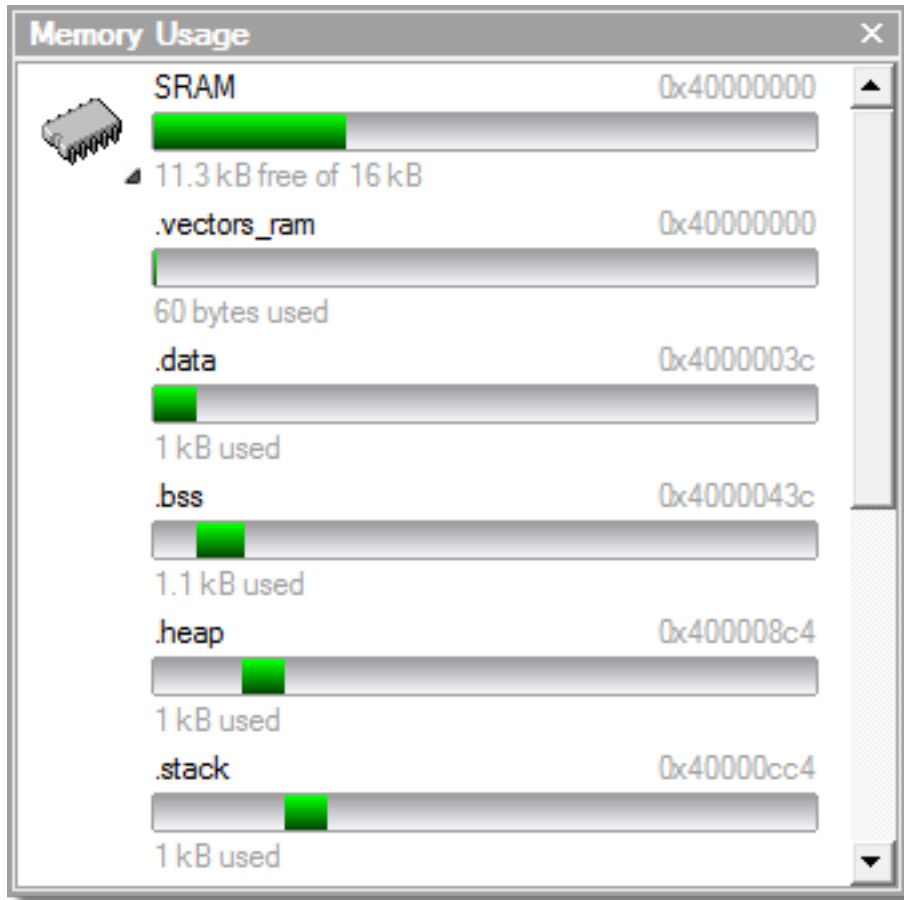
To activate the Memory Usage window:

Choose **View > Memory Usage** or press **Ctrl+Alt+Z**.

The memory-usage graph will only be visible if your active project's target is an executable file and the file exists. If the executable file has not been linked by SEGGER Embedded Studio, memory-usage information may not be available.

Displaying section information

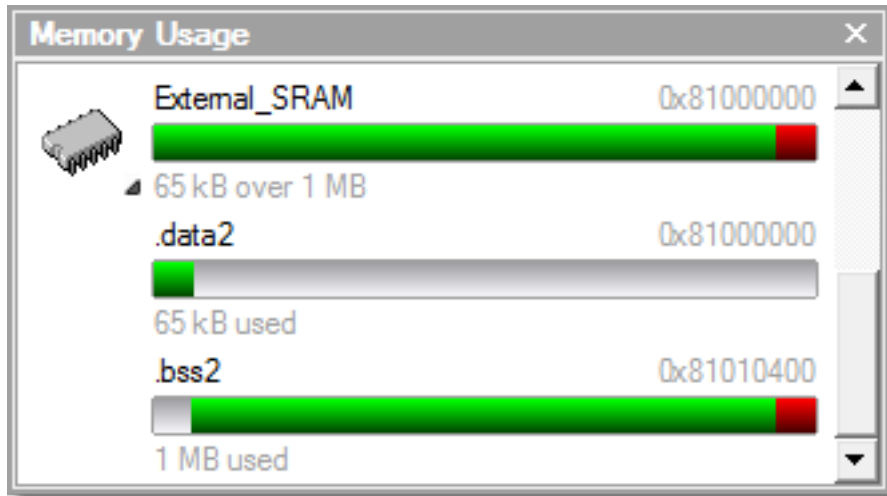
The **Memory Usage** window can also be used to visualize how program sections have been placed in memory. To display the program sections, simply click the memory segment to expand it; or, alternatively, right-click and choose **Show Memory Sections** from the shortcut menu.



Each bar represents an entire memory segment. Green represents the area of the segment that contains the program section.

Displaying segment overflow

The **Memory Usage** window also displays segment overflows when the total size of the program sections placed in a segment is larger than the segment size. When this happens, the segment and section bars represent the total memory used, green areas represent the code or data within the segment, and red areas represent code or data placed outside the segment.








Getting more-detailed information

If you require more-detailed information than that provided by the **Memory Usage** window, such as the location of specific objects within memory, use the [Symbol browser window](#).

Bookmarks window

The **Bookmarks** window contains a list of bookmarks that are set in the project. The bookmarks are stored in the session file associated with the project and persist across runs of SEGGER Embedded Studio if you remove the session file, the bookmarks associated with the project are lost.

User interface

Button	Description
	Toggle a bookmark at the insertion point in the active editor. Equivalent to choosing Edit > Bookmarks > Toggle Bookmark or pressing Ctrl+F2 .
	Go to the previous bookmark in the bookmark list. Equivalent to choosing Edit > Bookmarks > Previous Bookmark or pressing Alt+Shift+F2 .
	Go to the next next bookmark in the bookmark list. Equivalent to choosing Edit > Bookmarks > Next Bookmark or pressing Alt+F2 .
	Clear all bookmarks you confirm the action using a dialog. Equivalent to choosing Edit > Bookmarks > Clear All Bookmarks or pressing Ctrl+K, Alt+F2 .
	Selects the fill color for newly created bookmarks.

Double-clicking a bookmark in the bookmark list moves focus to the the bookmark.

You can set bookmarks with the mouse or using keystrokes see [Using bookmarks](#).

Code Outline Window

The **Code Outline** window shows the structure of the text of the focused code editor. For C and C++ documents the top level symbols and types are displayed, for XML documents the nodes are displayed. For C and C++ documents the **Preview** tab can display documentation on the top level symbols and types. The default standard doxygen commands are supported for example:

```
/**
 * \brief Convert a given full parsed comment to an XML document.
 *
 * A Relax NG schema for the XML can be found in comment-xml-schema.rng file
 * inside clang source tree.
 *
 * \param Comment a \c CXComment_FullComment AST node.
 *
 * \returns string containing an XML document.
 */
CINDEX_LINKAGE CXString clang_FullComment_getAsXML(CXComment Comment);
```

Analyzing Source Code

The **Analyze** action is available on the context menu of the project explorer at project, folder and file level. The analyze action will run the <https://clang.llvm.org/extra/clang-tidy> linter tool on the C/C++ files selected by the project explorer node and display warnings in the output window. The default checks will be the same as the clang analyzer. You can enable additional checks by setting the **Clang Tidy Checks** project option. For example you can enable the bugprone code constructs check and disable a specific clang analyzer diagnostic check as follows

```
bugprone-*  
-clang-diagnostic-parentheses-equality
```

You can also set the project option **Analyze After Compile** which will run the analyzer each time the compiler is run.

Editing your code

SEGGER Embedded Studio has a built-in editor that allows you to edit text, but some features make it particularly well suited to editing code.

You can open multiple code editors to browse or edit project source code, and you can copy and paste among them. The **Windows** menu contains a list of all open code editors.

The code editor supports the language of the source file it is editing, showing code with syntax highlighting and offering smart indenting.

You can open a code editor in several ways, some of which are:

- By double-clicking a file in the **Project Explorer** or by right-clicking a file and selecting **Open** from the shortcut menu.

- Using the **File > New File** or **File > Open** commands.

Elements of the code editor

The code editor is composed of several elements, which are described here.

*Code pane:*The area where you edit code. You can set options that affect the code pane's text indents, tabs, drag-and-drop behavior, and so forth.

*Margin gutter:*A gray area on the left side of the code editor where margin indicators such as breakpoints, bookmarks, and shortcuts are displayed. Clicking this area sets a breakpoint on the corresponding line of code.

*Horizontal and vertical scroll bars:*You can scroll the code pane horizontally and vertically to view code that extends beyond the edges of the pane.

Basic editing

This section is a whirlwind tour of the basic editing features SEGGER Embedded Studio's code editor provides.

Whether you are editing code, HTML, or plain text, the code editor is just like many other text editors or word processors. For code that is part of a project, the project's programming language support provides syntax highlighting (colorization), indentation, and so on.

This section *is not* a reference for everything the code editor provides; for that, look in the following sections.

Moving the insertion point

The most common way to navigate through text is to use the mouse or the keyboard's cursor keys.

Using the mouse

You can move the insertion point within a document by clicking the mouse inside the editor window.

Using the keyboard

The keystrokes most commonly used to navigate through a document are:

Keystroke	Description
Up	Move the insertion point up one line
Down	Move the insertion point down one line
Left	Move the insertion point left one character
Right	Move the insertion point right one character
Home	Move the insertion point to the first non-whitespace character on the line pressing Home a second time moves the insertion point to the leftmost column
End	Move the insertion point to the end of the line
PageUp	Move the insertion point up one page
PageDown	Move the insertion point down one page
Ctrl+Home	Move the insertion point to the start of the document
Ctrl+End	Move the insertion point to the end of the document
Ctrl+Left	Move the insertion point left one word
Ctrl+Right	Move the insertion point right one word

SEGGER Embedded Studio offers additional movement keystrokes, though most users are more comfortable using repeated simple keystrokes to accomplish the same thing:

Keystroke	Description
Alt+Up	Move the insertion point up five lines
Alt+Down	Move the insertion point down five lines
Alt+Home	Move the insertion point to the top of the window
Alt+End	Move the insertion point to the bottom of the window
Ctrl+Up	Scroll the document up one line in the window without moving the insertion point

Ctrl+Down	Scroll the document down one line in the window without moving the insertion point
------------------	--

If you are editing source code, the are source-related keystrokes too:

Keystroke	Description
Ctrl+PgUp	Move the insertion point backwards to the previous function or method.
Ctrl+PgDn	Move the insertion point forwards to the next function or method.

Adding text

The editor has two text-input modes:

Insertion mode: As you type on the keyboard, text is entered at the insertion point and any text to the right of the insertion point is shifted along. A visual indication of insertion mode is that the cursor is a flashing line.

Overstrike mode: As you type on the keyboard, text at the insertion point is replaced with your typing. A visual indication of insertion mode is that the cursor is a flashing block.

Insert and overstrike modes are common to *all* editors: if one editor is in insert mode, *all* editors are in insert mode. To configure the cursor appearance, choose **Tools > Options**.

To toggle between insertion and overstrike mode:

Click **Insert**.

When overstrike mode is enabled, the mode indicator changes from **INS** to **OVR** and the cursor will change to the overstrike cursor.

To add or insert text:

1. Move the insertion point to the place text is to be inserted.
2. Enter the text using the keyboard.

To overwrite characters in an existing line, press the **Insert** key to place the editor into overstrike mode.

To add or insert text on multiple lines:

1. Hold down the **Alt** key and use block selection to mark the place text is to be inserted.
2. Enter the text using the keyboard.

Deleting text

The text editor supports the following common editing keystrokes:

Keystroke	Description
Backspace	Delete the character before the insertion point
Delete	Delete the character after the insertion point
Ctrl+Backspace	Delete one word before the insertion point
Ctrl+Delete	Delete one word after the insertion point

To delete characters or words:

1. Place the insertion point before the word or letter you want to delete.
2. Press **Delete** as many times as needed.

or

1. Place the insertion point after the letter or word you want to delete.
2. Press **Backspace** as many times as needed.

To delete text that spans more than a few characters:

1. Select the text you want to delete.
2. Press **Delete** or **Backspace** to delete it.

To delete a text block:

1. Hold down the **Alt** key and use block selection to mark the text you want to delete.
2. Press **Delete** or **Backspace** to delete it.

To delete characters on multiple lines:

1. Hold down the **Alt** key and use block selection to mark the lines.
2. Press **Delete** or **Backspace** as many times as needed to delete the characters.

Using the clipboard

You can select text by using the keyboard or the mouse.

To select text with the keyboard:

Hold down the **Shift** key while using the cursor keys.

To select text with the mouse:

1. Click the start of the selection.
2. Drag the mouse to mark the selection.
3. Release the mouse to end selecting.

To select a block of text with the keyboard:

Hold down the **Shift+Alt** keys while using the cursor keys.

To select a block of text with the mouse:

1. Hold down the **Alt** key.
2. Click the start of the selection.
3. Drag the mouse to mark the selection.
4. Release the mouse to end selecting.

To copy selected text to the clipboard:

Choose **Edit > Copy** or press **Ctrl+C**.

The standard Windows key sequence **Ctrl+Ins** also copies text to the clipboard.

To cut selected text to the clipboard:

Choose **Edit > Cut** or press **Ctrl+X**.

The standard Windows key sequence **Shift+Del** also cuts text to the clipboard.

To insert the clipboard content at the insertion point:

Choose **Edit > Paste** or press **Ctrl+V**.

The standard Windows key sequence **Shift+Ins** also inserts the clipboard content at the insertion point.

Undo and redo

The editor has an *undo* facility to undo previous editing actions. The *redo* feature can be used to re-apply previously undone actions.

To undo one editing action:

Choose **Edit > Undo** or press **Ctrl+Z**.

The standard Windows key sequence **Alt+Backspace** also undoes an edit.

To undo multiple editing actions:

1. On the **Standard** toolbar, click the arrow next to the **Undo** button.
2. Select the editing operations to undo.

To undo all edits:

Choose **Edit > Others > Undo All** or press **Ctrl+K, Ctrl+Z**.

To redo one editing action:

Choose **Edit > Redo** or press **Ctrl+Y**.

The standard Windows key sequence **Alt+Shift+Backspace** also redoes an edit.

To redo multiple editing actions:

1. On the **Standard** toolbar, click the arrow next to the **Redo** tool button.
2. From the pop-up menu, select the editing operations to redo.

To redo all edits:

Choose **Edit > Others > Redo All** or press **Ctrl+K, Ctrl+Y**.

Drag and drop

You can select text, then drag it to another location. You can drop the text at a different location in the same window or in another one.

To drag and drop text:

1. Select the text you want to move.
2. Press and hold the mouse button to drag the selected text to where you want to place it.
3. Release the mouse button to drop the text.

Dragging text *moves* it to the new location. To *copy* it to a new location, hold down the **Ctrl** key while dragging the text: the mouse pointer changes to indicate a copy operation. Press the **Esc** key while dragging text to cancel the drag-and-drop edit.

By default, drag-and drop-editing is *disabled* and you must enable it if you want to use it.

To enable or disable drag-and-drop editing:

1. Choose **Tools > Options** or press **Alt+,**.
2. Click **Text Editor**.
3. Set **Allow Drag and Drop Editing** to **Yes** to enable or to **No** to disable drag-and-drop editing.

Searching

To find text in the current file:

1. Press **Ctrl+F**.
2. Enter the string to search for.

As you type, the editor searches the file for a match. The pop-up shows how many matches are in the current file. To move through the matches while the **Find** box is still active, press **Tab** or **F3** to move to the next match and **Shift+Tab** or **Shift+F3** to move to the previous match.

If you press **Ctrl+F** a second time, SEGGER Embedded Studio pops up the standard **Find** dialog to search the file. If you wish to bring up the **Find** dialog without pressing **Ctrl+F** twice, choose **Search > Find**.

Advanced editing

You can do anything using its basic code-editing features, but the SEGGER Embedded Studio text editor has a host of labor-saving features that make editing programs a snap.

This section describes the code-editor features intended to make editing source code easier.

Indenting source code

The editor uses the **Tab** key to increase or decrease the indentation level of the selected text.

To increase indentation:

Select the text to indent.

Choose **Selection > Increase Line Indent** or press **Tab**.

To decrease indentation:

Select the text to indent.

Choose **Selection > Decrease Line Indent** or press **Shift+Tab**.

The indentation size can be changed in the **Language Properties** pane of the editor's **Properties** window, as can all the indent-related features listed below.

To change indentation size:

Choose **Tools > Options** or press **Alt+,**.

Select the **Languages** page.

Set the **Indent Size** environment option for the required language.

You can choose to use spaces or tab characters to fill whitespace when indenting.

To set tab or space fill when indenting:

Choose **Tools > Options** or press **Alt+,**.

Select the **Languages** page.

Set the **Use Tabs** environment option for the required language. *Note:* changing this setting does not add or remove existing tabs from files, the change will only affect new indents.

The editor can assist with source code indentation while inserting text. There are three levels of indentation assistance:

*None:*The indentation of the source code is left to the user.

*Indent:*This is the default. The editor maintains the current indentation level. When you press **Return** or **Enter**, the editor moves the insertion point down one line and indented to the same level as the now-previous line.

*Smart:*The editor analyzes the source code to compute the appropriate indentation level for each line. You can change how many lines before the insertion point will be analyzed for context. The smart-indent mode can be configured to indent either open and closing braces or the lines following the braces.

Changing indentation options:

To change the indentation mode:

Set the **Indent Mode** environment option for the required language.

To change whether opening braces are indented in smart-indent mode:

Set the **Indent Opening Brace** environment option for the required language.

To change whether closing braces are indented in smart-indent mode:

Set the **Indent Closing Brace** environment option for the required language.

To change the number of previous lines used for context in smart-indent mode:

Set the **Indent Context Lines** environment option for the required language.

Commenting out sections of code

To comment selected text:

Choose **Selection > Comment** or press **Ctrl+.**

To uncomment selected text:

Choose **Selection > Uncomment** or press **Ctrl+Shift+.**

You can also toggle the commenting of a selection by typing `/`. This has no menu equivalent.

Adjusting letter case

The editor can change the case of the current word or the selection. The editor will change the case of the selection, if there is a selection, otherwise it will change the case of word at the insertion point.

To change text to uppercase:

Choose **Selection > Make Uppercase** or press **Ctrl+K, U**.

This changes, for instance, Hello to HELLO.

To change text to lowercase:

Choose **Selection > Make Lowercase** or press **Ctrl+U**.

This changes, for instance, Hello to hello.

To switch between uppercase and lowercase:

Choose **Selection > Switch Case**.

This changes, for instance, Hello to hELLO.

With large software teams or imported source code, sometimes identifiers don't conform to your local coding style. To assist in conversion between two common coding styles for identifiers, SEGGER Embedded Studio's editor offers the following two shortcuts:

To change from split case to camel case:

Choose **Selection > Camel Case** or press **Ctrl+K, Ctrl+Shift+U**.

This changes, for instance, this_is_wrong to thisWrong.

To change from camel case to split case:

Choose **Selection > Split Case** or press **Ctrl+K, Ctrl+U**.

This changes, for instance, thisWrong to this_is_wrong.

Using bookmarks

To edit a document elsewhere and then return to your current location, add a bookmark. The **Bookmarks** window maintains a list of the bookmarks set in source files see [Bookmarks window](#).

To place a bookmark:

1. Move the insertion point to the line you wish to bookmark.
2. Choose **Edit > Bookmarks > Toggle Bookmark** or press **Ctrl+F2**.

A bookmark symbol appears next to the line in the indicator margin to show the bookmark is set.

To place a bookmark using the mouse:

1. Right-click the margin gutter where the bookmark should be set.
2. Choose **Toggle Bookmark**.

The default color to use for new bookmarks is configured in the **Bookmarks** window. You can choose a specific color for the bookmark as follows:

1. Press and hold the **Alt** key.
2. Click the margin gutter where the bookmark should be set.
3. From the palette, click the bookmark color to use for the bookmark.

To navigate forward through bookmarks:

1. Choose **Edit > Bookmarks > Next Bookmark In Document** or press **F2**.
2. The editor moves the insertion point to the next bookmark in the document.

If there is no following bookmark, the insertion point moves to the first bookmark in the document.

To navigate backward through bookmarks:

1. Choose **Edit > Bookmarks > Previous Bookmark In Document** or press **Shift+F2**.
2. The editor moves the insertion point to the previous bookmark in the document.

If there is no previous bookmark, the insertion point moves to the last bookmark in the document.

To remove a bookmark:

1. Move the insertion point to the line containing the bookmark.
2. Choose **Edit > Bookmarks > Toggle Bookmark** or press **Ctrl+F2**.

The bookmark symbol disappears, indicating the bookmark is no longer set.

To remove all bookmarks in a document:

Choose **Edit > Bookmarks > Clear Bookmarks In Document** or press **Ctrl+K, F2**.

Quick reference for bookmark operations

Keystroke	Menu	Description
Ctrl+F2	Edit > Bookmarks > Toggle Bookmark	Toggle a bookmark at the insertion point.
Ctrl+K, 0		Clear the bookmark at the insertion point.
F2	Edit > Bookmarks > Next Bookmark In Document	Move the insertion point to next bookmark in the document.
Shift+F2	Edit > Bookmarks > Previous Bookmark In Document	Move the insertion point to previous bookmark in the document.
Ctrl+Q, F2	Edit > Bookmarks > First Bookmark In Document	Move the insertion point to the first bookmark in the document.
Ctrl+Q, Shift+F2	Edit > Bookmarks > Last Bookmark In Document	Move the insertion point to the last bookmark in the document.
Ctrl+K, F2	Edit > Bookmarks > Clear Bookmarks In Document	Clear all bookmarks in the document.
Alt+F2	Edit > Bookmarks > Next Bookmark	Move the insertion point to the next bookmark in the Bookmarks list.
Alt+Shift+F2	Edit > Bookmarks > Previous Bookmark	Move the insertion point to the previous bookmark in the Bookmarks list.
Ctrl+Q, Alt+F2	Edit > Bookmarks > First Bookmark	Move the insertion point to the first bookmark in the Bookmarks list.
Ctrl+Q, Alt+Shift+F2	Edit > Bookmarks > Last Bookmark	Move the insertion point to the last bookmark in the Bookmarks list.
Ctrl+K, Alt+F2	Edit > Bookmarks > Clear All Bookmarks	Clear all bookmarks in all documents.

Find and Replace window

The **Find and Replace** window allows you to search for and replace text in the current document or in a range of specified files.

To activate the Find and Replace window:

Choose **Search > Replace in Files** or press **Ctrl+Alt+F**.

To find text in a single file:

Select **Current Document** in the context combo box.

Enter the string to be found in the text edit input.

If the search will be case sensitive, set the **Match case** option.

If the search will be for a whole word i.e., there will be whitespace, such as spaces or the beginning or end of the line, on both sides of the string being searched for set the **Whole word** option.

If the search string is a regular expression, set the **Use regexp** option.

Click the **Find** button to find all occurrences of the string in the current document.

To find and replace text in a single file:

Click the **Replace** button on the toolbar.

Enter the string to search for into the **Find what** input.

Enter the replacement string into the **Replace with** input. If the search string is a regular expression, the *n* back-reference can be used in the replacement string to reference captured text.

If the search will be case sensitive, set the **Match case** option.

If the search will be for a whole word i.e., there will be whitespace, such as spaces or the beginning or end of the line, on both sides of the string being searched for set the **Match whole word** option.

If the search string is a regular expression, set the **Use regular expression** option.

Click the **Find Next** button to find next occurrence of the string, then click the **Replace** button to replace the found string with the replacement string; or click **Replace All** to replace all occurrences of the search string without prompting.

To find text in multiple files:

Click the **Find In Files** button on the toolbar.

Enter the string to search for into the **Find what** input.

Select the appropriate option in the **Look in** input to select whether to carry out the search in all open documents, all documents in the current project, all documents in the current solution, or all files in a specified folder.

If you have specified that you want to search in a folder, select the folder you want to search by entering its path in the **Folder** input and use the **Look in files matching** input to specify the type of files you want to search.

If the search will be case sensitive, set the **Match case** option.

If the search will be for a whole word i.e., there will be whitespace, such as spaces or the beginning or end of the line, on both sides of the string being searched for set the **Match whole word** option.

If the search string is a regular expression, set the **Use regular expression** option.

Click the **Find All** button to find all occurrences of the string in the specified files, or click the **Bookmark All** button to bookmark all the occurrences of the string in the specified files.

To replace text in multiple files:

Click the **Replace In Files** button on the toolbar.

Enter the string to search for into the **Find what** input.

Enter the replacement string into the **Replace with** input. If the search string is a regular expression, the *n* back-reference can be used in the replacement string to reference captured text.

Select the appropriate option in the **Look in** input to select whether you want to carry out the search and replace in the current or in all open documents.

If you have specified that you want to search in a folder, select the folder you want to search by entering its path in the **Folder** input and use the **Look in files matching** input to specify the type of files you want to search.

If the search will be case sensitive, set the **Match case** option.

If the search will be for a whole word i.e., there will be whitespace, such as spaces or the beginning or end of the line, on both sides of the string being searched for set the **Match whole word** option.

If the search string is a regular expression, set the **Use regular expression** option.

Click the **Replace All** button to replace all occurrences of the string in the specified files.

Clipboard Ring window

The code editor captures all cut and copy operations, and stores the cut or copied item on the *clipboard ring*. The clipboard ring stores the last 20 cut or copied text items, but you can configure the maximum number by using the environment options dialog. The clipboard ring is an excellent place to store scraps of text when you're working with many documents and need to cut and paste between them.

To activate the clipboard ring:

Choose **Edit > Clipboard Ring > Clipboard Ring** or press **Ctrl+Alt+C**.

To paste from the clipboard ring:

1. Cut or copy some text from your code. The last item you cut or copy into the clipboard ring is the current item for pasting.
2. Press **Ctrl+Shift+V** to paste the clipboard ring's current item into the current document.
3. Repeatedly press **Ctrl+Shift+V** to cycle through the entries in the clipboard ring until you get to the one you want to permanently paste into the document. Each time you press **Ctrl+Shift+V**, the editor replaces the last entry you pasted from the clipboard ring, so you end up with just the last one you selected. The item you stop on then becomes the current item.
4. Move to another location or cancel the selection. You can use **Ctrl+Shift+V** to paste the current item again or to cycle the clipboard ring to a new item.

Clicking an item in the clipboard ring makes it the current item.

To paste a specific item from the clipboard ring:

1. Move the insertion point to the position to paste the item in the document.
2. Click the arrow at the right of the item to paste.
3. Choose *Paste* from the pop-up menu.

or

1. Click the item to paste to make it the current item.
2. Move the insertion point to the position to paste the item in the document.
3. Press **Ctrl+Shift+V**.

To paste all items into a document:

To paste all items on the clipboard ring into the current document, move the insertion point to where you want to paste the items and do one of the following:

Choose **Edit > Clipboard Ring > Paste All**.

or

On the **Clipboard Ring** toolbar, click the **Paste All** button.

To remove an item from the clipboard ring:

1. Click the arrow at the right of the item to remove.
2. Choose **Delete** from the pop-up menu.

To remove all items from the clipboard ring:

Choose **Edit > Clipboard Ring > Clear Clipboard Ring**.

or

On the **Clipboard Ring** toolbar, click the **Clear Clipboard Ring** button.

To configure the clipboard ring:

1. Choose **Tools > Options** or press **Alt+,**.
2. Click the **Windows** category to show the **Clipboard Ring Options** group.
3. Select **Preserve Contents Between Runs** to save the content of the clipboard ring between runs, or deselect it to start with an empty clipboard ring.
4. Change **Maximum Items Held In Ring** to configure the maximum number of items stored on the clipboard ring.

Mouse-click accelerators

SEGGER Embedded Studio provides a number of mouse-click accelerators in the editor that speed access to commonly used functions. The mouse-click accelerators are user configurable using **Tools > Options**.

Default mouse-click assignments

Click	Default
Left	Not configurable start selection.
Shift+Left	Not configurable extend selection.
Ctrl+Left	Select word.
Alt+Left	Execute Go To Definition .
Middle	No action.
Shift+Middle	Display Go To Include menu.
Ctrl+Middle	No action.
Alt+Middle	Display Go To Method menu.
Right	Not configurable show context menu.
Shift+Right	No action.
Ctrl+Right	No action.
Alt+Right	Execute Find References .

Each accelerator can be assigned one of the following actions:

*Default:*The system default for that click.

*Go To Definition:*Go to the definition of the item clicked, equivalent to choosing **Navigate > Go To Definition** or pressing **Alt+G**.

*Find References:*Find references to the item clicked, equivalent to choosing **Navigate > Find References** or pressing **Alt+R**.

*Find in Solution:*Textually find the item clicked in all the files in the solution, equivalent to choosing **Search > Find Extras > Find in Solution** or pressing **Alt+U**.

*Find Help:*Use F1-help on the item clicked, equivalent to choosing **Help > Help** or pressing **F1**.

*Go To Method:*Display the **Go To Method** menu, equivalent to choosing **Navigate > Find Method** or pressing **Ctrl+M**.

*Go To Include:*Display the **Go To Include** menu, equivalent to choosing **Navigate > Find Include** or pressing **Ctrl+Shift+M**.

*Paste:*Paste the clipboard at the position clicked, equivalent to choosing **Edit > Paste** or pressing **Ctrl+V**.

Configuring Mac OS X

On Mac OS X you must configure the mouse to pass middle clicks and right clicks to the application if you wish to use mouse-click accelerators in SEGGER Embedded Studio. Configure the mouse preferences in the **Mouse** control panel in Mac OS X **System Preferences** to the following:

Right mouse button set to **Secondary Button**.

Middle mouse button set to **Button 3**.

Regular expressions

The editor can search and replace text using *regular expressions*. A regular expression is a string that uses special characters to describe and reference patterns of text. The regular expression system used by the editor is modeled on Perl's regex language. For more information on regular expressions, see *Mastering Regular Expressions*, Jeffrey E F Freidl, ISBN 0596002890.

Summary of special characters

The following table summarizes the special characters the SEGGER Embedded Studio editor supports

Pattern	Description
\d	Match a numeric character.
\D	Match a non-numeric character.
\s	Match a whitespace character.
\S	Match a non-whitespace character.
\w	Match a word character.
\W	Match a non-word character.
[c]	Match set of characters; e.g., [ch] matches characters c or h. A range can be specified using the - character; e.g., [0-27-9] matches if the character is 0, 1, 2, 7 8, or 9. A range can be negated using the ^ character; e.g., [^a-z] matches if the character is anything other than a lowercase alphabetic character.
\c	Match the literal character c. For example, you would use * to match the character *.
\a	Match ASCII bell character (ASCII code 7).
\f	Match ASCII form feed character (ASCII code 12).
\t	Match ASCII horizontal tab character (ASCII code 9).
\v	Match ASCII vertical tab character.
\x <hhhh< td=""> <td>Match Unicode character specified by hexadecimal number <i>hhhh</i>.</td> </hhhh<>	Match Unicode character specified by hexadecimal number <i>hhhh</i> .
.	Match any character.
*	Match zero or more occurrences of the preceding expression.
+	Match one or more occurrences of the preceding expression.
?	Match zero or one occurrences of the preceding expression.

<code>{n}</code>	Match <i>n</i> occurrences of the preceding expression.
<code>{n,}</code>	Match at least <i>n</i> occurrences of the preceding expression.
<code>{,m}</code>	Match at most <i>m</i> occurrences of the preceding expression.
<code>{n,m}</code>	Match at least <i>n</i> and at most <i>m</i> occurrences of the preceding expression.
<code>^</code>	Beginning of line.
<code>\$</code>	End of line.
<code>\b</code>	Word boundary.
<code>\B</code>	Non-word boundary.
<code>(e)</code>	Capture expression <i>e</i> .
<code>\n</code>	Back-reference to <i>n</i> th captured text.

Examples










The following regular expressions can be used with the editor's search-and-replace operations. To use the regular expression mode, the **Use regular expression** checkbox must be set in the search-and-replace dialog. Once enabled, regular expressions can be used in the **Find what** search string. The **Replace With** strings can use the "*n*" back-reference string to reference any captured strings.

"Find what"	"Replace With"	Description
<code>u\w.d</code>		Search for any-length string containing one or more word characters beginning with the character <i>u</i> and ending in the character <i>d</i> .
<code>^.*;\$</code>		Search for any lines ending in a semicolon.
<code>(typedef.+s+)(\S+);</code>	<code>\1TEST_\2;</code>	Find C type definition and insert the string TEST onto the beginning of the type name.

Locals window

The **Locals** window displays a list of all variables that are in scope of the selected stack frame in the **Call Stack**.

The **Locals** window has a toolbar and a main data display.

Button	Description
	Display the selected item in binary.
	Display the selected item in octal.
	Display the selected item in decimal.
	Display the selected item in hexadecimal.
	Display the selected item as a signed decimal.
	Display the selected item as a character or Unicode character.
	Set the range displayed in the active Memory window to span the memory allocated to the selected item.
	Sort variables alphabetically by name.
	Sort variables numerically by address or register number (default).

Using the Locals window

The **Locals** window shows the local variables of the active function when the debugger is stopped. The contents of the **Locals** window changes when you use the **Debug Location** toolbar items or select a new frame in the **Call Stack** window. When the program stops at a breakpoint, or is stepped, the **Locals** window updates to show the active stack frame. Items that have changed since they were previously displayed are highlighted in red.

To activate the Locals window:

Choose **View > Locals** or press **Ctrl+Alt+L**.

When you select a variable in the main part of the display, the display-format button highlighted on the **Locals** window toolbar changes to show the selected item's display format.

To change the display format of a local variable:

Right-click the item to change.

From the shortcut menu, choose the desired display format.

or

Click the item to change.

On the **Locals** window toolbar, select the desired display format.

To modify the value of a local variable:

Click the value of the local variable to modify.

Enter the new value for the local variable. Prefix hexadecimal numbers with **0x**, binary numbers with **0b**, and octal numbers with **0**.

or

Right-click the value of the local variable to modify.

From the shortcut menu, select one of the commands to modify the local variable's value.










Globals window

The **Globals** window displays a list of all variables that are global to the program. The operations available on the entries in this window are the same as the **Watch** window, except you cannot add or delete variables from the **Globals** window.

Globals window user interface

The **Globals** window consists of a toolbar and main data display.

Globals toolbar

Button	Description
	Display the selected item in binary.
	Display the selected item in octal.
	Display the selected item in decimal.
	Display the selected item in hexadecimal.
	Display the selected item as a signed decimal.
	Display the selected item as a character or Unicode character.
	Set the range displayed in the active Memory window to span the memory allocated to the selected item.
	Sort variables alphabetically by name.
	Sort variables numerically by address or register number (default).

Using the Globals window

The **Globals** window shows the global variables of the application when the debugger is stopped. When the program stops at a breakpoint, or is stepped, the **Globals** window updates to show the active stack frame and new variable values. Items that have changed since they were previously displayed are highlighted in red.

To activate the Globals window:

Choose **View > Globals** or press **Ctrl+Alt+G**.

Changing the display format

When you select a variable in the main part of the display, the display-format button highlighted on the **Globals** window toolbar changes to show the item's display format.

To change the display format of a global variable:

Right-click the item to change.

From the shortcut menu, choose the desired display format.

or

Click the item to change.

On the **Globals** window toolbar, select the desired display format.

To modify the value of a global variable:










Click the value of the global variable to modify.

Enter the new value for the global variable. Prefix hexadecimal numbers with **0x**, binary numbers with **0b**, and octal numbers with **0**.








Watch window




The **Watch** window provides a means to evaluate expressions and to display the results of those expressions. Typically, expressions are just the name of a variable to be displayed, but they can be considerably more complex; see [Debug expressions](#). *Note:* expressions are always evaluated when your program stops, so the expression you are watching is the one that is in scope of the stopped program position.

The **Watch** window is divided into a toolbar and the main data display.

Button	Description
	Display the selected item in binary.
	Display the selected item in octal.
	Display the selected item in decimal.
	Display the selected item in hexadecimal.
	Display the selected item as a signed decimal.
	Display the selected item as a character or Unicode character.
	Set the range displayed in the active Memory window to span the memory allocated to the selected item.
	Remove the selected watch item.
	Remove all the watches.

Right-clicking a watch item shows a shortcut menu with commands that are not available from the toolbar.

Button	Description
	View pointer or array as a null-terminated string.
	View pointer or array as an array.
	View pointer value.
	Set watch value to zero.
	Set watch value to one.
	Increment watched variable by one.
	Decrement watched variable by one.

	Negated watched variable.
	Invert watched variable.
	View the properties of the watch value.

You can view details of the watched item using the **Properties** dialog.

Filename

The filename context of the watch item.

Line number

The line number context of the watch item.

(Name)

The name of the watch item.

Address

The address or register of the watch item.

Expression

The debug expression of the watch item.

Previous Value

The previous watch value.

Size In Bytes

The size of the watch item in bytes.

Type

The type of the watch item.

Value

The value of the watch item.

Using the Watch window

Each expression appears as a row in the display. Each row contains the expression and its value. If the value of an expression is structured (for example, an array), you can open the structure to see its contents.

The display updates each time the debugger locates to source code. So it will update each time your program stops on a breakpoint, or single steps, and whenever you traverse the call stack. Items that have changed since they were previously displayed are highlighted in red.

To activate the Watch window:

Choose **View > Watch > Watch 1** or press **Ctrl+T, W, 1**.

You can show other **Watch** windows similarly.

You can add a new expression to be watched by clicking and typing into the last entry in the **Watch** window.

You can change an expression by clicking its entry and editing its contents.

When you select a variable in the main part of the display, the display format button highlighted on the **Watch** window toolbar changes to show the item's display format.

To change the display format of an expression:

Right-click the item to change.

From the shortcut menu, choose the desired display format.

or

Click the item to change.

On the **Watch** window toolbar, select the desired display format.

The selected display format will then be used for all subsequent displays and will be preserved after the debug session stops.

For C programs, the interpretation of pointer types can be changed by right-clicking and selecting from the shortcut menu. A pointer can be interpreted as:

a null-terminated ASCII string

an array

an integer

dereferenced

To modify the value of an expression:

Click the value of the local variable to modify.

Enter the new value of the local variable. Prefix hexadecimal numbers with **0x**, binary numbers with **0b**, and octal numbers with **0**.

or







Right-click the value of the local variable to modify.

From the shortcut menu, choose one of the commands to modify the variable's value.

Register window

The **Register** windows show the values of both CPU registers and the processor's special function or peripheral registers. Because microcontrollers are becoming very highly integrated, it's not unusual for them to have hundreds of special function registers or peripheral registers, so SEGGER Embedded Studio provides four register windows. You can configure each register window to display one or more register groups for the processor being debugged.

A **Register** window has a toolbar and a main data display.

Button	Description
	Display the CPU, special function register, and peripheral register groups.
	Display the CPU registers.
	Hide the CPU registers.
	Force-read a register, ignoring the access attribute of the register.
	Update the selected register group.
	Set the active memory window to the address and size of the selected register group.

Using the registers window

Both CPU registers and special function registers are shown in the main part of the **Registers** window. When the program stops at a breakpoint, or is stepped, the **Registers** windows update to show the current values of the registers. Items that have changed since they were previously displayed are highlighted in red.

To activate the first register window:

Choose **View > Registers > Registers 1** or press **Ctrl+T, R, 1**.

Other register windows can be similarly activated.

Displaying CPU registers

The values of the CPU registers displayed in the **Registers** window depend up upon the selected context. The selected context can be:

The register state the CPU stopped in.

The register state when a function call occurred using the Call Stack window.

The register state of the currently selected thread using the the **Threads** window.

The register state you supplied with the **Debug > Locate** operation.

To display a group of CPU registers:

On the **Registers** window toolbar, click the **Groups** button.

From the pop-up menu, select the register groups to display and deselect the ones to hide.

You can deselect all CPU register groups to allow more space in the display for special function registers or peripheral registers. So, for instance, you can have one register window showing the CPU registers and other register windows showing different peripheral registers.

Displaying special function or peripheral registers

The **Registers** window shows the set of register groups defined in the memory-map file the application was built with. If there is no memory-map file associated with a project, the **Registers** window will show only the CPU registers.

To display a special function or peripheral register:

On the **Registers** toolbar, click the **Groups** button.

From the pop-up menu, select the register groups to display and deselect the ones to hide.

Changing display format

When you select a register in the main part of the display, the display-format button highlighted on the **Registers** window toolbar changes to show the item's display format.

To change the display format of a register:

Right-click the item to change.

From the shortcut menu, choose the desired display format.

or

Click the item to change.

On the **Registers** window toolbar, select the desired display format.

Modifying register values

To modify the value of a register:

Click the value of the register to modify.

Enter the new value for the register. Prefix hexadecimal numbers with **0x**, binary numbers with **0b**, and octal numbers with **0**.

or

Right-click the value of the register to modify.














From the shortcut menu, choose one of the commands to modify the register value.




Modifying the saved register value of a function or thread may not be supported.

Memory window

The **Memory** window shows the contents of the connected target's memory areas and allows the memory to be edited. SEGGER Embedded Studio provides four memory windows, you can configure each memory window to display different memory ranges.

The **Memory** window has a toolbar and a data display/edit area

Field/Button	Description
<i>Address</i>	Address to display. This can be a numeric value or a debug expression.
<i>Size</i>	Number of bytes to display. This can be a number or a debug expression. If unspecified, the number of bytes required to fill the window will be automatically calculated.
<i>Columns</i>	Number of columns to display. If unspecified, the number of columns required to fill the window will be automatically calculated.
	Select binary display.
	Select octal display.
	Select unsigned decimal display.
	Select signed decimal display.
	Select hexadecimal display (<i>default</i>).
	Select byte display (<i>default</i>).
	Select 2-byte display.
	Select 4-byte display.
	Display both data and text (<i>default</i>).
	Display data only.
	Display text only.
	Display an incrementing address range that starts from the selected address (<i>default</i>).
	Display a decrementing address range that starts from the selected address.

	Display an incrementing address range that ends at the selected address.
	Display a decrementing address range that ends at the selected address.
	Evaluate the address and size expressions, and update the Memory window.

Using the memory window

The memory window does not show the complete address space of the target, instead you must enter both the address and the number of bytes to display. You can specify the address and size using numeric values or **debug expressions** which enable you to position the memory display at the address of a variable or at the value of a register. You can also specify whether you want the expressions to be evaluated each time the memory window is updated, or you can re-evaluate them yourself with the press of a button. Memory windows update each time your program stops on a breakpoint, after a single step and whenever you traverse the call stack. If any values that were previously displayed have changed, they are highlighted in red.

To activate the first Memory window:

Choose **View > Memory > Memory 1** or press **Ctrl+T, M, 1**.

Other register windows can be similarly activated.

Using the mouse

You can move the memory window's edit cursor by clicking on a data or text entry.

The vertical scroll bar can be used to modify the address being viewed by clicking the up and down buttons, the page up and down areas or using the vertical scroll wheel when the scroll bar is at its furthest extent. Holding down the **Shift** key while scrolling will prevent the address being modified.

Using the keyboard

Keystroke	Description
Up	Move the cursor up one line, or if the cursor is on the first line, move the address up one line.
Down	Move the cursor down one line, or if the cursor is on the last line, move the address down line line.
Left	Move the cursor left one character.
Right	Move the cursor right one character.
Home	Move the cursor to the first entry.
End	Move the cursor to the last entry.

PageUp	Move the cursor up one page, or if the cursor is on first page, move the address up one page.
PageDown	Move the cursor down one page, or if the cursor is on the last page, move the address down one page.
Ctrl+E	Toggle the cursor between data and text editing.

Editing memory

To edit memory, simply move the cursor to the data or text entry you want to modify and start typing. The memory entry will be written and read back as you type.

Shortcut menu commands

The shortcut menu contains the following commands:

Action	Description
Access Memory By Display Width	Access memory in terms of the display width.
Address Order	Specify whether the address range shown uses Address as the start or end address and whether addresses should increment or decrement.
Auto Evaluate	Re-evaluate Address and Size each time the Memory window is updated.
Auto Refresh	Specify how frequently the memory window should automatically refresh.
Export To Binary Editor	Create a binary editor with the current Memory window contents.
Save As	Save the current Memory window contents to a file. Supported file formats are Binary File , Motorola S-Record File , Intel Hex File , TI Hex File , and Hex File .
Load From	Load the current Memory window from a file. Supported file formats are Binary File , Motorola S-Record File , Intel Hex File , TI Hex File , and Hex File .

Display formats

You can set the **Memory** window to display 8-bit, 16-bit, and 32-bit values that are formatted as hexadecimal, decimal, unsigned decimal, octal, or binary. You can also specify how many columns to display.

Saving memory contents

You can save the displayed contents of the memory window to a file in various formats. Alternatively, you can export the contents to a binary editor to work on them.

You can save the displayed memory values as a binary file, Motorola S-record file, Intel hex file, or a Texas Instruments TXT file.

To save the current state of memory to a file:

Select the start address and number of bytes to save by editing the **Start Address** and **Size** fields in the **Memory** window toolbar.

Right-click the main memory display.

From the shortcut menu, select **Save As**, then choose the format from the submenu.

To export the current state of memory to a binary editor:

Select the start address and number of bytes to save by editing the **Start Address** and **Size** fields in the **Memory** window toolbar.

Right-click the main memory display.

Choose **Export to Binary Editor** from the shortcut menu.

Note that subsequent modifications in the binary editor will not modify memory in the target.

Copying to clipboard

You can copy the contents of the memory window to the clipboard as text. If an address range is selected, the data or text of the selected range will be copied to the clipboard depending on whether the selection has been made in the data or text view. If no address range is selected, the current memory window view will be copied to the clipboard.

Breakpoints window

The **Breakpoints** window manages the list of currently set breakpoints on the solution. Using the **Breakpoints** window, you can:









- Enable, disable, and delete existing breakpoints.
- Add new breakpoints.
- Show the status of existing breakpoints.

Breakpoints are stored in the session file, so they will be remembered each time you work on a particular project. When running in the debugger, you can set breakpoints on assembly code addresses. These low-level breakpoints appear in the **Breakpoints** window for the duration of the debug run but are not saved when you stop debugging.

When a breakpoint is reached, the matching breakpoint is highlighted in the **Breakpoints** window.

Breakpoints window layout




The **Breakpoints** window has a toolbar and a main breakpoint display.

Button	Description
	Create a new breakpoint using the New Breakpoint dialog.
	Toggle the selected breakpoint between enabled and disabled states.
	Remove the selected breakpoint.
	Move the insertion point to the statement where the selected breakpoint is set.
	Delete all breakpoints.
	Disable all breakpoints.
	Enable all breakpoints.
	Create a new breakpoint group and makes it active.

The main part of the **Breakpoints** window shows what breakpoints are set and the state they are in. You can organize breakpoints into folders, called *breakpoint groups*.

SEGGER Embedded Studio displays these icons to the left of each breakpoint:

Icon	Description
------	-------------

	Enabled breakpoint An enabled breakpoint will stop your program running when the breakpoint condition is met.
	Disabled breakpoint A disabled breakpoint will not stop the program when execution passes through it.
	Invalid breakpoint An invalid breakpoint is one where the breakpoint cannot be set; for example, no executable code is associated with the source code line where the breakpoint is set or the processor does not have enough hardware breakpoints.

Showing the Breakpoints window

To activate the Breakpoints window:

Choose **Breakpoints > Breakpoints** or press **Ctrl+Alt+B**.

Managing single breakpoints

You can manage breakpoints in the **Breakpoint** window.

To delete a breakpoint:

In the **Breakpoints** window, click the breakpoint to delete.

From the **Breakpoints** window toolbar, click the **Delete Breakpoint** button.

To edit a breakpoint:

In the **Breakpoints** window, right-click the breakpoint to edit.

Choose **Edit Breakpoint** from the shortcut menu.

Edit the breakpoint in the **New Breakpoint** dialog.

To toggle the enabled state of a breakpoint:

In the **Breakpoints** window, right-click the breakpoint to enable or disable.

Choose **Enable/Disable Breakpoint** from the shortcut menu.

or

In the **Breakpoints** window, click the breakpoint to enable or disable.

Press **Ctrl+F9**.

Breakpoint groups

Breakpoints are divided into *breakpoint groups*. You can use breakpoint groups to specify sets of breakpoints that are applicable to a particular project in the solution or for a particular debug scenario. Initially, there is a single breakpoint group, named *Default*, to which all new breakpoints are added.

To create a new breakpoint group:

From the **Breakpoints** window toolbar, click the **New Breakpoint Group** button.

or

From the **Debug** menu, choose **Breakpoints** then **New Breakpoint Group**.

or

Right-click anywhere in the **Breakpoints** window.

Choose **New Breakpoint Group** from the shortcut menu.

In the **New Breakpoint Group** dialog, enter the name of the breakpoint group.

When you create a breakpoint, it is added to the active breakpoint group.

To make a group the active group:

In the **Breakpoints** window, right-click the breakpoint group to make active.

Choose **Set as Active Group** from the shortcut menu.

To delete a breakpoint group:

In the **Breakpoints** window, right-click the breakpoint group to delete.

Choose **Delete Breakpoint Group** from the shortcut menu.

You can enable all breakpoints within a group at once.

To enable all breakpoints in a group:

In the **Breakpoints** window, right-click the breakpoint group to enable.

Choose **Enable Breakpoint Group** from the shortcut menu.

You can disable all breakpoints within a group at once.

To disable all breakpoints in a group:

In the **Breakpoints** window, right-click the breakpoint group to disable.

Choose **Disable Breakpoint Group** from the shortcut menu.

Managing all breakpoints

You can delete, enable, or disable all breakpoints at once.

To delete all breakpoints:

Choose **Breakpoints > Clear All Breakpoints** or press **Ctrl+Shift+F9**.

or

On the **Breakpoints** window toolbar, click the **Delete All Breakpoints** button.

To enable all breakpoints:

Choose **Breakpoints > Enable All Breakpoints** or press **Ctrl+B, N**.

or

On the **Breakpoints** window toolbar, click the **Enable All Breakpoints** button.

To disable all breakpoints:

Choose **Breakpoints > Disable All Breakpoints** or press **Ctrl+B, X**.







or

On the **Breakpoints** window toolbar, click the **Disable All Breakpoints** button.

Call Stack window




The **Call Stack** window displays the list of function calls (stack frames) that were active when program execution halted. When execution halts, SEGGER Embedded Studio populates the call-stack window from the active (currently executing) task. For simple, single-threaded applications not using the SEGGER Embedded Studio for RISC-V tasking library, there is only a single task; but for multi-tasking programs that use the SEGGER Embedded Studio for RISC-V Tasking Library, there may be any number of tasks. SEGGER Embedded Studio updates the **Call Stack** window when you change the active task in the **Threads** window.

The **Call Stack** window has a toolbar and a main call-stack display.

Button	Description
	Move the insertion point to where the call was made to the selected frame.
	Set the debugger context to the selected stack frame.
	Move the debugger context down one stack to the called function.
	Move the debugger context up one stack to the calling function.
	Select the fields to display for each entry in the call stack.
	Set the debugger context to the most recent stack frame and move the insertion point to the currently executing statement.

The main part of the **Call Stack** window displays each unfinished function call (active stack frame) at the point when program execution halted. The most recent stack frame is displayed at the bottom of the list and the oldest is displayed at the top of the list.

SEGGER Embedded Studio displays these icons to the left of each function name:

Icon	Description
	Indicates the stack frame of the current task.
	Indicates the stack frame selected for the debugger context.
	Indicates that a breakpoint is active and when the function returns to its caller.

These icons can be overlaid to show, for instance, the debugger context and a breakpoint on the same stack frame.

Showing the call-stack window

To activate the Call Stack window:

Choose **View > Call Stack** or press **Ctrl+Alt+S**.

Configuring the call-stack window

Each entry in the **Call Stack** window displays the function name and, additionally, parameter names, types, and values. You can configure the **Call Stack** window to show varying amounts of information for each stack frame. By default, SEGGER Embedded Studio displays all information.

To show or hide a field:

1. On the **Call Stack** toolbar, click the **Options** button on the far right.
2. Select the fields to show, and deselect the ones that should be hidden.

Changing the debugger context

You can select the stack frame for the debugger context from the **Call Stack** window.

To move the debugger context to a specific stack frame:

In the **Call Stack** window, double-click the stack frame to move to.

or

In the **Call Stack** window, select the stack frame to move to.

On the **Call Stack** window's toolbar, click the **Switch To Frame** button.

or

In the **Call Stack** window, right-click the stack frame to move to.

Choose **Switch To Frame** from the shortcut menu.

The debugger moves the insertion point to the statement where the call was made. If there is no debug information for the statement at the call location, SEGGER Embedded Studio opens a disassembly window at the instruction.

To move the debugger context up one stack frame:

On the **Call Stack** window's toolbar, click the **Up One Stack Frame** button.

or

On the **Debug Location** toolbar, click the **Up One Stack Frame** button.

or

Press **Alt+-**.

The debugger moves the insertion point to the statement where the call was made. If there is no debug information for the statement at the call location, SEGGER Embedded Studio opens a disassembly window at the instruction.

To move the debugger context down one stack frame:

On the **Call Stack** window's toolbar, click the **Down One Stack Frame** button.

or

On the **Debug Location** toolbar, click the **Down One Stack Frame** button.

or

Press **Alt++**.

The debugger moves the insertion point to the statement where the call was made. If there is no debug information for the statement at the call location, SEGGER Embedded Studio opens a disassembly window at the instruction.

Setting a breakpoint on a return to a function

To set a breakpoint on return to a function:

In the **Call Stack** window, click the stack frame on the function to stop at on return.

On the **Build** toolbar, click the **Toggle Breakpoint** button.

or

In the **Call Stack** window, click the stack frame on the function to stop at on return.

Press **F9**.

or

In the **Call Stack** window, right-click the function to stop at on return.

Choose **Toggle Breakpoint** from the shortcut menu.

Threads window

The **Threads** window displays the set of executing contexts on the target processor structured as a set of queues.

To activate the Threads window:

Choose **View > More Debug Windows > Threads** or press **Ctrl+Alt+H**.

The window is populated using the threads script, which is a JavaScript program store in a file whose file-type project option is "Threads Script" (or is called `threads.js`) and is in the project that is being debugged.

When debugging starts, the threads script is loaded and the **function init()** is called to determine which columns are displayed in the **Threads** window.

When the application stops on a breakpoint, the function **update()** is called to create entries in the **Threads** window corresponding to the columns that have been created together with the saved execution context (register state) of the thread. By double-clicking one of the entries, the debugger displays its saved execution context to put the debugger back into the default execution context, use **Show Next Statement**.

Writing the threads script

The threads script controls the **Threads** window with the **Threads** object.

The methods **Threads.setColumns**, **Threads.setSortByNumber** and **Threads.setColor** can be called from the **function init()**.

```
function init()
{
  Threads.setColumns("Name", "Priority", "State", "Time");
  Threads.setSortByNumber("Time");
  Threads.setColor("State", "Ready", "Executing", "Waiting");
}
```

The above example creates the named columns **Name**, **Priority**, **State**, and **Time** in the **Threads** window, with the **Time** column sorted numerically rather than alphabetically. The states **Ready**, **Executing** and **Waiting** will have yellow, green and red colored pixmaps respectively.

If you don't supply the **function init()** in the threads script, the **Threads** window will create the default columns **Name**, **Priority**, and **State**.

The methods **Threads.clear()**, **Threads.newqueue()**, and **Threads.add()** can be called from the **function update()**.

The **Threads.clear()** method clears the **Threads** window.

The **Threads.newqueue()** function takes a string argument and creates a new, top-level entry in the **Threads** window. Subsequent entries added to this window will go under this entry. If you don't call this, new entries will all be at the top level of the **Threads** window.

The **Threads.add()** function takes a variable number of string arguments, which should correspond to the number of columns displayed by the **Threads** window. The last argument to the **Threads.add()** function should be an array (possibly empty) containing the registers of the thread or, alternatively, a handle that can be supplied a call to the threads script **function getregs(handle)**, which will return an array when the thread is selected in the **Threads** window. The array containing the registers should have elements in the same order in which they are displayed in the CPU **Registers** display typically this will be in register-number order, e.g., **r0**, **r1**, and so on.

```
function update()
{
  Threads.clear();
  Threads.newqueue("My Tasks");
  Threads.add("Task1", "0", "Executing", "1000", [0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16]);
  Threads.add("Task2", "1", "Waiting", "2000", [0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16]);
}
```

The above example will create a fixed output on the **Threads** window and is here to demonstrate how to call the methods.

To get real thread state, you need to access the debugger from the threads script. To do this, you can use the JavaScript method **Debug.evaluate("expression")**, which will evaluate the string argument as a debug expression and return the result. The returned result will be an object if you evaluate an expression that denotes a structure or an array. If the expression denotes a structure, each field can be accessed by using its field name.

So, if you have structs in the application as follows

```
struct task {
  char *name;
  unsigned char priority;
  char *state;
  unsigned time;
  struct task *next;
  unsigned registers[17];
  unsigned thread_local_storage[4];
};

struct task task2 =
{
  "Task2",
  1,
  "Waiting",
  2000,
  0,
  { 0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16 },
  { 0,1,2,3 }
};

struct task task1 =
{
  "Task1",
  0,
  "Executing",
  1000,
  &task2,
  { 0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16 },
};
```



```
{ 0,1,2,3 }
};
```

you can **update()** the **Threads** window using the following:

```
task1 = Debug.evaluate("task1");
Threads.add(task1.name, task1.priority, task1.state, task1.time, task1.registers);
```

You can use pointers and C-style cast to enable linked-list traversal.

```
var next = Debug.evaluate("&task1");
while (next)
{
    var xt = Debug.evaluate("*(struct task*"+next);
    Threads.add(xt.name, xt.priority, xt.state, xt.time, xt.registers);
    next = xt.next;
}
```

Note that, if the threads script goes into an endless loop, the debugger and consequently SEGGER Embedded Studio will become unresponsive and you will need to kill SEGGER Embedded Studio using a task manager.

Therefore, the above loop is better coded as follows:

```
var next = Debug.evaluate("&task1");
var count = 0;
while (next && count < 10)
{
    var xt = Debug.evaluate("*(struct task*"+next);
    Threads.add(xt.name, xt.priority, xt.state, xt.time, xt.registers);
    next = xt.next;
    count++;
}
```

You can speed up the **Threads** window update by not supplying the registers of the thread to the **Threads.add()** function. To do this, you should supply a handle/pointer to the thread as the last argument to the **Threads.add()** function. For example:

```
var next = Debug.evaluate("&task1");
var count = 0;
while (next && count < 10)
{
    var xt = Debug.evaluate("*(struct task*"+next);
    Threads.add(xt.name, xt.priority, xt.state, xt.time, next);
    next=xt.next;
    count++;
}
```

When the thread is selected, the **Threads** window will call **getregs(x)** in the threads script. That function should return the array of registers, for example:

```
function getregs(x)
{
    return Debug.evaluate("((struct task*"+x+"->registers)");
}
```

If you use thread local storage, implementing the **gettls(x)** function enables you to return the base address of the thread local storage, for example:

```
function gettls(x)
{
    return Debug.evaluate("((struct task*)" + x + ")->thread_local_storage");
}
```

The **gettls(x)** function can also be called with null as a parameter. In this case you will have to evaluate an expression that returns the current thread local storage, for example:

```
function gettls(x)
{
    if (x==null)
        x = Debug.evaluate("&currentTask");
    return Debug.evaluate("((struct task*)" + x + ")->thread_local_storage");
}
```

The debugger may require the name of a thread which you can provide by implementing the **getname(x)** function, for example:

```
function getname(x)
{
    return Debug.evaluate("((struct task*)" + x + ")->name");
}
```

Adding extra queues to the threads window

You can add extra information to the threads window to display other RTOS queues. In the **function init()** you can use **Threads.setColumns2** to create an additional display in the threads window, for example:

```
function init()
{
    ...
    Threads.setColumns2("Timers", "Id(Timers)", "Name", "Hook", "Timeout", "Period", "Active");
}
```

The first argument is identifier of the queue which is also supplied to **Threads.add2** in the **function update()** as follows

```
function update()
{
    ...
    Threads.add2("Timers", "0x1FF0A30", "MyTimer", "0x46C8 (Timer50)", "50(550)", "50", "1");
}
```

Execution Profile window

The **Execution Profile** window shows a list of source locations and the number of times those source locations have been executed. This window is only available for targets that support the collection of jump trace information.

To activate the Execution Profile window:

Choose **View > More Debug Windows > Execution Profile** or press **Ctrl+T, P**.

The count value displayed is the number of times the first instruction of the source code location has been executed. The source locations displayed are target dependent: they could represent each statement of the program or each jump target of the program. If however the debugger is in intermixed or disassembly mode then the count values will be displayed on a per instruction basis.

The execution counts window is updated each time your program stops and the window is visible so if you have this window displayed then single stepping may be slower than usual.

Execution Trace window

The trace window displays historical information on the instructions executed by the target.

To activate the Trace window:

Choose **View > More Debug Windows > Execution Trace** or press **Ctrl+T, T**.

The type and number of the trace entries depends upon the target that is connected when gathering trace information. Some targets may trace all instructions, others may trace jump instructions, and some may trace modifications to variables. You'll find the trace capabilities of your target on the shortcut menu.

Each entry in the trace window has a unique number, and the lower the number the earlier the trace. You can click on the header to show earliest to latest or the latest to earliest trace entries. If a trace entry can have source code located to it then double-clicking the trace entry will show the appropriate source display.

Some targets may provide timing information which will be displayed in the ticks column.

The trace window is updated each time the debugger stops when it is visible so single stepping is likely to be slower if you have this window displayed.

Debug file search editor

When a program is built with debugging enabled, the debugging information contains the paths and filenames of all the source files for the program in order to allow the debugger to find them. If a program or library linked into the program is on a different machine than the one on which it was compiled, or if the source files were moved after the program was compiled, the debugger will not be able to find the source files.

In this situation, the simplest way to help SEGGER Embedded Studio find the source files is to add the directory containing the source files to one of its source-file search paths. Alternatively, if SEGGER Embedded Studio cannot find a source file, it will prompt you for its location and will record its new location in the source-file map.

Debug source-file search paths

Debug's source-file search paths can be used to help the debugger locate source files that are no longer located where they were at compile time. When a source file cannot be found, the search-path directories will be checked, in turn, to see if they contain the source file. SEGGER Embedded Studio maintains two debug source-file search paths:

*Project-session search path:*This path is for the current project session and does not apply to all projects.

*The global search path:*This system-wide path applies to all projects.

The project-session search path is checked before the global search path.

To edit the debug search paths:

Choose **Debug > Options > Search Paths**.

Debug source file map

If a source file cannot be found while debugging and the debugger has to prompt the user for its location, the results are stored in the debug source file map. The debug source file map simply correlates, or *maps*, the original pathnames to the new locations. When a file cannot be found at its original location or in the debug search paths, the debug source file map is checked to see if a new location has been recorded for the file or if the user has specified that the file does not exist. Each project session maintains its own source file map, the map is not shared by all projects.

To view the debug source file map:

Choose **Debug > Options > Search Paths**.

To remove individual entries from the debug source file map:

Choose **Debug > Options > Search Paths**.

Right-click the mapping to delete.
Choose **Delete Mapping** from the shortcut menu.

To remove all entries from the debug source file map:

Choose **Debug > Options > Search Paths**.
Right-click any mapping.
Choose **Delete All Mappings** from the shortcut menu.

Debug Terminal window

The **Debug Terminal** window displays debug output from the target application and can also be used to provide debug input to the target application.

To activate the Debug Terminal window:

Choose **View > Debug Terminal**.

Breakpoint expressions

The debugger can set breakpoints by evaluating simple C-like expressions. Note that the exact capabilities offered by the hardware to assist in data breakpointing will vary from target to target; please refer to the particular target interface you are using and the capabilities of your target silicon for exact details. The simplest expression supported is a symbol name. If the symbol name is a function, a breakpoint occurs when the first instruction of the symbol is about to be executed. If the symbol name is a variable, a breakpoint occurs when the symbol has been accessed; this is termed a *data breakpoint*. For example, the expression `x` will breakpoint when `x` is accessed. You can use a debug expression (see [Debug expressions](#)) as a breakpoint expression. For example, `x[4]` will breakpoint when element 4 of array `x` is accessed, and `@sp` will breakpoint when the `sp` register is accessed.

Data breakpoints can be specified, using the `==` operator, to occur when a symbol is accessed with a specific value. The expression `x == 4` will breakpoint when `x` is accessed and its value is 4. The operators `<`, `>=`, `>`, `>=`, `==`, and `!=` can be used similarly. For example, `@sp <= 0x1000` will breakpoint when register `sp` is accessed and its value is less than or equal to `0x1000`.

You can use the operator `&` to mask the value you wish to break on. For example, `(x & 1) == 1` will breakpoint when `x` is accessed and has an odd value.

You can use the operator `&&` to combine comparisons. For example

```
(x >= 2) && (x <= 14)
```

will breakpoint when `x` is accessed and its value is between 2 and 14.

You can specify an arbitrary memory range using an array cast expression. For example, `(char[256])(0x1000)` will breakpoint when the memory region `0x10000x10FF` is accessed.

You can specify an inverse memory range using the `!` operator. For example `!(char[256])(0x1000)` will breakpoint when memory outside the range `0x10000x10FF` is accessed.

Debug expressions

The debugger can evaluate simple expressions that can be displayed in the **Watch** window or as a tool-tip in the code editor.

The simplest expression is an identifier the debugger tries to interpret in the following order:

- an identifier that exists in the scope of the current context.

- the name of a global identifier in the program of the current context.

Numbers can be used in expressions. Hexadecimal numbers must be prefixed with `0x`.

Registers can be referenced by prefixing the register name with `@`.

The standard C and C++ operators `!`, `~`, `*`, `/`, `%`, `+`, `-`, `>>`, `<<`, `<`, `<=`, `>`, `>=`, `==`, `|`, `&`, `^`, `&&`, and `||` are supported on numeric types.

The standard assignment operators `=`, `+=`, `-=`, `*=`, `/=`, `%=`, `>>=`, `>>=`, `<<=`, `&=`, `|=`, `^=` are supported on numeric types.

The array subscript operator `[]` is supported on array and pointer types.

The structure access operator `.` is supported on structured types (this also works on pointers to structures), and `->` works similarly.

The dereference operator (prefix `*`) is supported on pointers, the address-of (prefix `&`) and **sizeof** operators are supported.

The `addressof (filename, linenumber)` operator will return the address of the specified source code line number.

Function calling with parameters and return results.

Casting to basic pointer types is supported. For example, `(unsigned char *)0x300` can be used to display the memory at a given location.

Casting to basic array types is supported. For example, `(unsigned char[256])0x100` can be used to reference a memory region.

Arrays can be sliced using `[a:b]` where `a` is the first element and `b` is the last element to display.

Operators have the precedence and associativity one expects of a C-like programming language.

Terminal emulator window

The **Terminal Emulator** window contains a basic serial-terminal emulator that allows you to receive and transmit data over a serial interface.

To activate the Terminal Emulator window:

Choose **Tools > Terminal Emulator > Terminal Emulator** or press **Ctrl+Alt+M**.

To use the terminal emulator:

1. Set the required terminal emulator properties.
2. Connect the terminal emulator to the communications port by clicking the button on the toolbar or by selecting **Connect** from the shortcut menu.

Once connected, any input in the **Terminal Emulator** window is sent to the communications port and any data received from the communications port is displayed on the terminal.

Connection may be refused if the communication port is in use by another application or if the port doesn't exist.

To disconnect the terminal emulator:

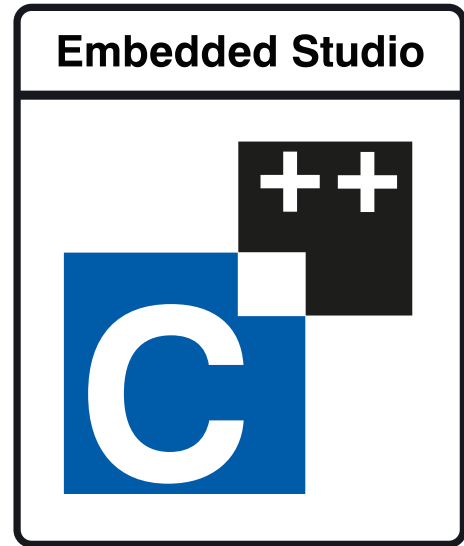
1. Disconnect the communications port by clicking the **Disconnect** icon on the toolbar or by right-clicking to select **Disconnect** from the shortcut menu.

This will release the communications port for use in other applications.

Supported control codes

The terminal supports a limited set of control codes:

Control code	Description
<BS>	Backspace
<CR>	Carriage return
<LF>	Linefeed
<ESC>[<i>{attr1}</i> ; <i>;</i> ...; <i>{attrn}</i> m	Set display attributes. The attributes 2-Dim, 5-Blink, 7-Reverse, and 8-Hidden are not supported.



Command-line options

This section describes the command-line options accepted by SEGGER Embedded Studio.

Usage

emStudio [*options*] [*files*]

-D (Define macro)

Syntax

`-D macro=value`

Description

Define a SEGGER Embedded Studio for RISC-V macro value.

-noclang (Disable Clang support)

Syntax

`-noclang`

Description

Disable Clang support.

-noload (Disable loading of last project)

Syntax

`-noload`

Description

Disable loading of last project on startup.

-packagesdir (Specify packages directory)

Syntax

-packagesdir *dir*

Description

Override the default value of the `$(PackagesDir)` macro.

-permit-multiple-studio-instances (Permit multiple studio instances)

Syntax

-permit-multiple-studio-instances

Description

Allow multiple instances of SEGGER Embedded Studio to run at the same time. This behaviour can also be enabled using the **Environment > Startup Options > Allow Multiple SEGGER Embedded Studios** environment option.

-rootuserdir (Set the root user data directory)

Syntax

-rootuserdir *dir*

Description

Set the SEGGER Embedded Studio for RISC-V root user data directory.

-save-settings-off (Disable saving of environment settings)

Syntax

`-save-settings-off`

Description

Disable the saving of modified environment settings.

-set-setting (Set environment setting)

Syntax

-set-setting *environment_setting=value*

Description

Sets an environment setting to a specified value. For example:

```
-set-setting "Environment/Build/Show Command Lines=Yes"
```

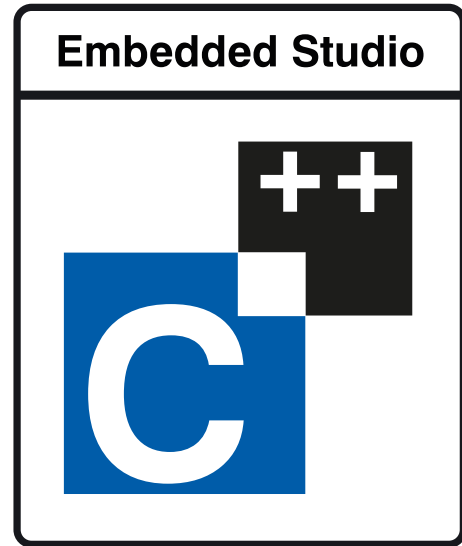
-templatesfile (Set project templates path)

Syntax

-templatesfile *path*

Description

Sets the search path for finding project template files.



Uninstalling SEGGER Embedded Studio for RISC-V

This section describes how to completely uninstall SEGGER Embedded Studio for RISC-V for each supported operating system:

[Uninstalling SEGGER Embedded Studio for RISC-V from Windows](#)

[Uninstalling SEGGER Embedded Studio for RISC-V from Mac OS X](#)

[Uninstalling SEGGER Embedded Studio for RISC-V from Linux](#)

Uninstalling SEGGER Embedded Studio for RISC-V from Windows

Removing user data and settings

The uninstaller does not remove any user data such as settings or installed packages. To completely remove the user data you will need to carry out the following operations for each user that has used SEGGER Embedded Studio for RISC-V on your system.

To remove user data using SEGGER Embedded Studio:

1. Start SEGGER Embedded Studio.

2. Click **Tools > Admin > Remove All User Data...**

Alternatively, if SEGGER Embedded Studio for RISC-V has already been uninstalled you can manually remove the user data as follows:

1. Click the Windows Start button.
2. Type `%LOCALAPPDATA%` in the search field and press enter to open the local application data folder.
3. Open the *SEGGER* folder.
4. Open the *SEGGER Embedded Studio for RISC-V* folder.
5. Delete the *v6* folder.
6. If you want to delete user data for all versions of the software, delete the *SEGGER Embedded Studio for RISC-V* folder as well.

Uninstalling SEGGER Embedded Studio for RISC-V

To uninstall SEGGER Embedded Studio for RISC-V:

1. If SEGGER Embedded Studio is running, click **File > Exit** to shut it down.
2. Click the Start Menu and select Control Panel. The Control Panel window will open.
3. In the Control Panel window, click the **Uninstall a program** link under the Programs section.
4. From the list of currently installed programs, select **SEGGER Embedded Studio for RISC-V 6.10**.
5. To begin the uninstall, click the **Uninstall** button at the top of the list.

Uninstalling SEGGER Embedded Studio for RISC-V from Mac OS X

Removing user data and settings

Uninstalling does not remove any user data such as settings or installed packages. To completely remove the user data you will need to carry out the following operations for each user that has used SEGGER Embedded Studio for RISC-V on your system.

To remove user data using SEGGER Embedded Studio:

1. Start SEGGER Embedded Studio.
2. Click **Tools > Admin > Remove All User Data...**

Alternatively, if SEGGER Embedded Studio for RISC-V has already been uninstalled you can manually remove the user data as follows:

1. Open Finder.
2. Go to the `$HOME/Library/SEGGER/SEGGER Embedded Studio for RISC-V` directory.

3. Drag the v6 folder to the Trash.
4. If you want to delete user data for all versions of the software, drag the *SEGGER Embedded Studio for RISC-V* folder to the Trash as well.

Uninstalling SEGGER Embedded Studio for RISC-V

To uninstall SEGGER Embedded Studio for RISC-V:

1. If SEGGER Embedded Studio is running, shut it down.
2. Open the *Applications* folder in Finder.
3. Drag the *SEGGER Embedded Studio for RISC-V 6.10* folder to the Trash.

Uninstalling SEGGER Embedded Studio for RISC-V from Linux

Removing user data and settings

The uninstaller does not remove any user data such as settings or installed packages. To completely remove the user data you will need to carry out the following operations for each user that has used SEGGER Embedded Studio for RISC-V on your system.

To remove user data using SEGGER Embedded Studio:

1. Start SEGGER Embedded Studio.
2. Click **Tools > Admin > Remove All User Data...**

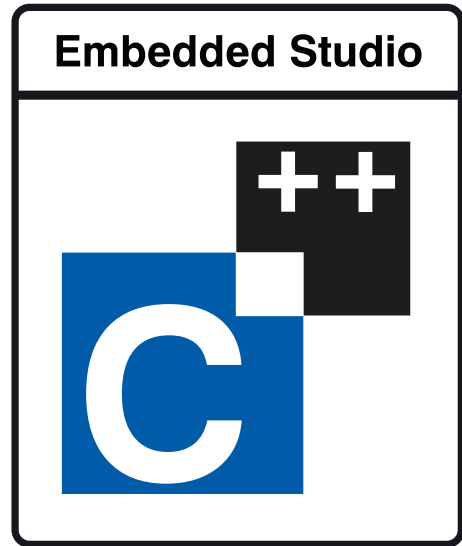
Alternatively, if SEGGER Embedded Studio for RISC-V has already been uninstalled you can manually remove the user data as follows:

1. Open a terminal window or file browser.
2. Go to the `$HOME/.segger/SEGGER Embedded Studio for RISC-V` directory.
3. Delete the v6 directory.
4. If you want to delete user data for all versions of the software, delete the *SEGGER Embedded Studio for RISC-V* directory as well.

Uninstalling SEGGER Embedded Studio for RISC-V

To uninstall SEGGER Embedded Studio for RISC-V:

1. If SEGGER Embedded Studio is running, click **File > Exit** to shut it down.
2. Open a terminal window.
3. Go to the SEGGER Embedded Studio for RISC-V bin directory (this is `/usr/share/segger_embedded_studio_for_risc-v_6.10/bin` by default).
4. Run `sudo ./uninstall` to start the uninstaller.



Using the SEGGER Linker

You can create a new project that builds using the SEGGER linker by choosing the project template

A C executable (segger-ld) for a RISC-V processor

from the New Project wizard. Alternatively you can modify an existing project as follows:

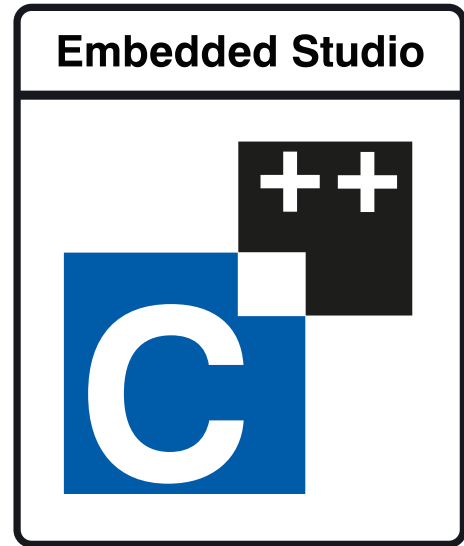
Set the project option **Linker** to **SEGGER**.

Set the project option **Linker Script File** to `$(StudioDir)/samples/SEGGER_RISCV_Flash.icf`.

Set the project option **Supply Memory Segments To Linker** to **Yes**.

Set the project option **Exclude From Build** on the `riscv crt0.s` file in your project.

Add the startup file `$(StudioDir)/samples/SEGGER_RISCV crt0.s` to your project.



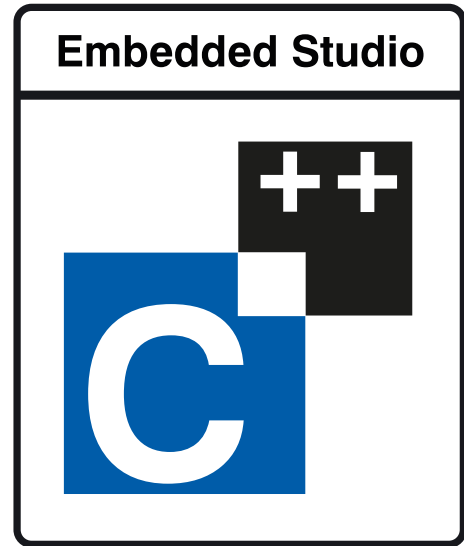
Using the SEGGER Runtime Library

You can create a new project that builds using the SEGGER Runtime Library by choosing the project template

A C executable for a RISC-V processor

from the New Project wizard. Alternatively you can modify an existing project as follows:

Set the project option **Run Time Library** to **SEGGER**.



C++ Library User Guide

SEGGER Embedded Studio for RISC-V provides a limited C++ library suitable for use in an embedded application.

Standard library

The following C++ standard header files are provided in `$(StudioDir)/include`:

File	Description
<cassert>	C++ wrapper on assert.h .
<cctype>	C++ wrapper on ctype.h .
<cerrno>	C++ wrapper on errno.h .
<cfloat>	C++ wrapper on float.h .
<ciso646>	C++ wrapper on iso646.h .
<climits>	C++ wrapper on limits.h .
<locale>	C++ wrapper on locale.h .
<cmath>	C++ wrapper on math.h .
<csetjmp>	C++ wrapper on setjmp.h .
<cstdarg>	C++ wrapper on stdarg.h .
<cstddef>	C++ wrapper on stddef.h .
<cstdint>	C++ wrapper on stdint.h .
<stdio>	C++ wrapper on stdio.h .
<stdlib>	C++ wrapper on stdlib.h .

<code><cstring></code>	C++ wrapper on string.h .
<code><ctime></code>	C++ wrapper on time.h .
<code><wchar></code>	C++ wrapper on wchar.h .
<code><cwctype></code>	C++ wrapper on wctype.h .
<code><exception></code>	Definitions for exceptions.
<new>	Types and definitions for placement new and delete.
<code><typeinfo></code>	Definitions for RTTI.

Standard template library

The C++ STL functionality of STLPort is provided as a separate library package use **Tools > Package Manager** to install this package.

Subset API reference

This section contains a subset reference to the SEGGER Embedded Studio for RISC-V C++ library.

<new> - memory allocation

The header file <new> defines functions for memory allocation.

Functions	
set_new_handler	Establish a function which is called when memory allocation fails.
Operators	
operator delete	Heap storage deallocators operator.
operator new	Heap storage allocators operator.

operator delete

Synopsis

```
void operator delete(void *ptr) throw();
```

```
void operator delete[](void *ptr) throw();
```

Description

operator delete deallocates space of an object.

operator delete will do nothing if **ptr** is null. If **ptr** is not null then it should have been returned from a call to **operator new**.

operator delete[] has the same behaviour as **operator delete** but is used for array deallocation.

Portability

Standard C++.

operator new

Synopsis

```
void *operator new(size_t size) throw();
```

```
void *operator new[](size_t size) throw();
```

Description

operator new allocates space for an object whose size is specified by **size** and whose value is indeterminate.

operator new returns a null pointer if the space for the object cannot be allocated from free memory; if space for the object can be allocated, **operator new** returns a pointer to the start of the allocated space.

operator new[] has the same behaviour as **operator new** but is used for array allocation.

Portability

The implementation is not standard. The standard C++ implementation should throw an exception if memory allocation fails.

set_new_handler

Synopsis

```
typedef void (*new_handler)();
```

```
new_handler set_new_handler(new_handler) throw();
```

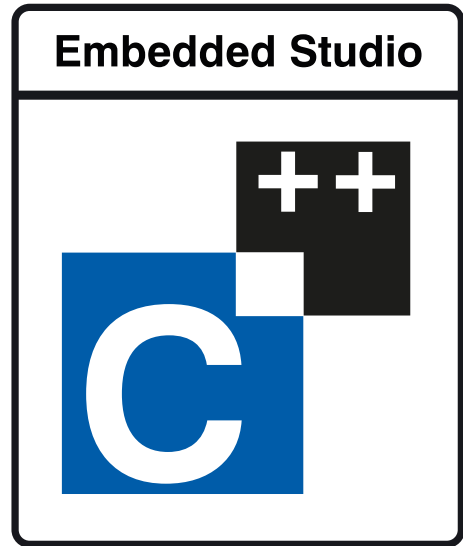
Description

set_new_handler establishes a **new_handler** function.

set_new_handler establishes a **new_handler** function that is called when **operator new** fails to allocate the requested memory. If the **new_handler** function returns then **operator new** will attempt to allocate the memory again. The **new_handler** function can throw an exception to implement standard C++ behaviour for memory allocation failure.

Portability

Standard C++.



Utilities Reference

Compiler driver

This section describes the switches accepted by the compiler driver, `cc`. The compiler driver is capable of controlling compilation by all supported language compilers and the final link by the linker. It can also construct libraries automatically.

In contrast to many compilation and assembly language development systems, with SEGGER Embedded Studio for RISC-V you don't invoke the assembler or compiler directly. Instead you'll normally use the compiler driver `cc` as it provides an easy way to get files compiled, assembled, and linked. This section will introduce you to using the compiler driver to convert your source files to object files, executables, or other formats.

We recommend that you use the compiler driver rather than use the assembler or compiler directly because there the driver can assemble multiple files using one command line and can invoke the linker for you too. There is no reason why you should not invoke the assembler or compiler directly yourself, but you'll find that typing in all the required options is quite tedious-and why do that when `cc` will provide them for you automatically?

File naming conventions

The compiler driver uses file extensions to distinguish the language the source file is written in. The compiler driver recognizes the extension `.c` as C source files, `.cpp`, `.cc` or `.cxx` as C++ source files, `.s` and `.asm` as assembly code files.

The compiler driver recognizes the extension `.o` as object files, `.a` as library files, `.ld` as linker script files and `.xml` as special-purpose XML files.

We strongly recommend that you adopt these extensions for your source files and object files because you'll find that using the tools is much easier if you do.

C language files

When the compiler driver finds a file with a `.c` extension, it runs the C compiler to convert it to object code.

C++ language files

When the compiler driver finds a file with a `.cpp` extension, it runs the C++ compiler to convert it to object code.

Assembly language files

When the compiler driver finds a file with a `.s` or `.asm` extension, it runs the C preprocessor and then the assembler to convert it to object code.

Object code files

When the compiler driver finds a file with a `.o` or `.a` extension, it passes it to the linker to include it in the final application.

Command-line options

This section describes the command-line options accepted by the SEGGER Embedded Studio for RISC-V compiler driver.

-allow-multiple-definition (Allow multiple symbol definition)

Syntax

`-allow-multiple-definition`

Description

Do not generate an error when linking multiple symbols of the same name.

-ansi (Warn about potential ANSI problems)

Syntax

-ansi

Description

Warn about potential problems that conflict with the relevant ANSI or ISO standard for the files that are compiled.

-ar (Archive output)

Syntax

-ar

Description

This switch instructs the compiler driver to archive all output files into a library. Using **-ar** implies **-c**.

Example

The following command compiles **file1.c**, **file2.asm**, and **file3.c** to object code and archives them into the library file **libfunc.a** together with the object file **file4.o**.

```
cc -ar file1.c file2.asm file3.c file4.o -o libfunc.a
```

-abi (RISC-V abi)

Syntax

`-abi=a`

`-abi=list`

Description

Specifies the RISC-V abi to generate code for and the library variants to link with.

Example

To force compilation for the single precision floating point subset you would use:

```
cc -abi=ilp32f
```

To list supported architectures:

```
cc -abi=list
```

-arch (RISC-V architecture)

Syntax

-arch=*a*

-arch=list

Description

Specifies the RISC-V architecture to generate code for and the library variants to link with.

Example

To force compilation for the base integer architecture you would use:

```
cc -arch=rv32i
```

To list supported architectures:

```
cc -arch=list
```

-builtins (Use Builtins)

Syntax

-builtins

Description

Use builtin compiler functions, for example memcpy. Default does not use builtin compiler functions.

-c (Compile to object code, do not link)

Syntax

-c

Description

All named files are compiled to object code modules, but are not linked. You can use the **-o** option to name the output if you just supply one input filename.

Example

The following command compiles **file1.c** and **file4.c** to produce the object files **file1.o** and **file4.o**.

```
cc -c file1.c file4.c
```

The following command compiles **file1.c** and produces the object file **obj/file1.o**.

```
cc -c file.c -o obj/file1.o
```

-clang (Use clang compiler/assembler)

Syntax

`-clang`

Description

Use the clang compiler and assembler. Default is to use the GNU compiler and assembler.

-codec (Set file codec)

Syntax

`-codec=c`

`-codec=list`

Description

Set the file codec to use for the source file.

Example

To set the codec for a utf-8 encoded file:

```
cc -codec=utf-8
```

To list supported codecs:

```
cc -codec=list
```

-common (Allocate globals in common)

Syntax

`-common`

Description

Allocate declarations of zero initialized variables. This enables variables that have been declared (perhaps multiple times) but not defined to be allocated. The default requires a single definition of each zero initialized variable.

-d (Define linker symbol)

Syntax

-dname=value

Description

You can define linker symbols using the **-d** option. The symbol definitions are passed to linker.

Example

The following defines the symbol, **STACK_SIZE** with a value of 512.

```
-dSTACK_SIZE=512
```

-depend (Generate dependency file)

Syntax

`-depend file`

Description

Create a dependency file in *file* (suitable for inclusion into a makefile) when compiling a source file.

```
cc -c main.c -depend main.d
```

-D (Define macro symbol)

Syntax

`-Dname`

`-Dname=value`

Description

You can define preprocessor macros using the `-D` option. The macro definitions are passed on to the respective language compiler which is responsible for interpreting the definitions and providing them to the programmer within the language.

The first form above defines the macro *name* but without an associated replacement value, and the second defines the same macro with the replacement value *value*.

Example

The following defines two macros, `SUPPORT_FLOAT` with a value of 1 and `LITTLE_ENDIAN` with no replacement value.

```
-DSUPPORT_FLOAT=1 -DLITTLE_ENDIAN
```

-emit-relocs (Emit relocations)

Syntax

`-emit-relocs`

Description

Keep relocations in the executable file

-e (Set entry point symbol)

Syntax

-ename

Description

Linker option to set the entry point symbol to be *name*. The debugger will start execution from this symbol.

-exceptions (Enable C++ Exception Support)

Syntax

`-exceptions`

Description

Enables C++ exceptions to be compiled.

-E (Preprocess)

Syntax

-E

Description

This option preprocesses the supplied file and outputs the result to the standard output.

Example

The following preprocesses the file **file.c** supplying the macros, **SUPPORT_FLOAT** with a value of 1 and **LITTLE_ENDIAN**.

```
-E -DSUPPORT_FLOAT=1 -DLITTLE_ENDIAN file.c
```

-fill (Fill gaps)

Syntax

`-fill=b`

Description

Specify the byte value *b* to fill gaps in the output file produced by the linker.

-framepointer (Enable generation of framepointer)

Syntax

-framepointer

Description

The `-framepointer` option instructs the compiler to store the stack frame pointer in a register.

-F (Set output format)

Syntax

`-Ffmt`

Description

The `-F` option instructs the compiler driver to generate an additional output file in the format *fmt*. The compiler driver supports the following formats:

- `-Fbin` Create a `.bin` file
- `-Fhex` Create a `.hex` file
- `-Fsrec` Create a `.srec` file

The compiler driver will always output a `.elf` file as specified with the `-o` option. The name of the additional output file is the same as the `.elf` file with the file extension changed.

For example

```
cc file.c -o file.elf -Fbin
```

will generate the files `file.elf` and `file.bin`.

-g (Generate debugging information)

Syntax

-g

-g1

-g2

-g3

Description

The **-g** option instructs the compiler and assembler to generate source level debugging information.

The **-g1** option instructs the compiler to generate backtrace and line number debugging information.

The **-g2** option instructs the compiler to generate backtrace, line number and variable display debugging information.

The **-g3** option instructs the compiler to generate backtrace, line number, variable display and macro display debugging information.

The default is to not generate any debugging information.

-help (Display help information)

Syntax

`-help`

Description

Displays a short summary of the options accepted by the compiler driver.

-instrument (Instrument functions)

Syntax

-instrument

Description

This option causes the compiler to insert instrumentation calls on function entry and exit

-I (Define user include directories)

Syntax

-Idirectory

Description

In order to find include files the compiler driver arranges for the compilers to search a number of standard directories. You can add directories to the search path using the `-I` switch which is passed on to each of the language processors.

You can specify more than one include directory by separating each directory component with either a comma or semicolon.

-I- (Exclude standard include directories)

Syntax

-I-

Description

Usually the compiler and assembler search for include files in the standard include directory created when the product is installed. If for some reason you wish to exclude these system locations from being searched when compiling a file, the -I- option will do this for you.

-J (Define system include directories)

Syntax

-Jdirectory

Description

The `-J` option adds *directory* to the end of the list of directories to search for source files included (using triangular brackets) by the `#include` preprocessor command.

You can specify more than one include directory by separating each directory component with either a comma or semicolon in the property

-kasm (Keep assembly code)

Syntax

-kasm

Description

The **-kasm** option instructs the compiler driver to keep intermediate assembly code files.

-kldscript (Keep linker script)

Syntax

`-kldscript`

Description

The `-kldscript` option instructs the compiler driver to keep generated linker script files.

-kpp (Keep preprocessor output)

Syntax

`-kpp`

Description

The `-kpp` option instructs the compiler driver to generate and keep intermediate preprocessor files.

-K (Keep linker symbol)

Syntax

`-Kname`

Description

The linker removes unused code and data from the output file. This process is called *deadstripping*. To prevent the linker from deadstripping unreferenced code and data you wish to keep, you must use the `-K` command line option to force inclusion of symbols.

Example

If you have a C function, `contextSwitch` that must be kept in the output file (and which the linker will normally remove), you can force its inclusion using:

```
-KcontextSwitch
```

-l- (Do not link standard libraries)

Syntax

-l-

Description

The **-l-** option instructs the compiler driver not to link standard libraries. If you use this option you must supply your own library functions or libraries.

-lto (Enable link time optimization)

Syntax

-lto

Description

The **-lto** option causes the compiler to generate intermediate code which is optimized before the link.

-L (Set library directory path)

Syntax

-Ldir

Description

Sets the library directory to *dir*. If *-L* is not specified on the command line, the default location to search for libraries is set to **\$(InstallDir)/lib**.

-memorymap (Memory map file)

Syntax

`-memorymap file`

Description

The `-memorymap` option supplies the memory map *file* which is used to define the memory segments referenced in the section placement file. See [Memory Map file format](#) for a description of the memory map file format.

Example

```
-memorymap MemoryMap.xml
```

-memorymapmacros (Memory map macros)

Syntax

`-memorymapmacros macros`

Description

The `-memorymapmacros` option supplies macro definitions that are applied to the memory map file.

Example

The macros `FLASH_START` and `FLASH_SIZE` are defined for the memory map using:

```
-memorymapmacros "FLASH_START=0x08000000;FLASH_SIZE=0x10000"
```

-M (Display linkage map)

Syntax

-M

Description

The **-M** option prints a linkage map named the same as the linker output file with the **.map** file extension.

-n (Dry run, no execution)

Syntax

`-n`

Description

When `-n` is specified, the compiler driver processes options as usual, but does not execute any subprocesses to compile, assemble, archive or link applications.

-nostderr (No stderr output)

Syntax

`-nostderr`

Description

When `-nostderr` is specified, any `stderr` output of subprocesses is redirected to `stdout`.

-O (Optimize output)

Syntax

-Ox

Description

Pass the optimization option **-Ox** to the compiler and select library variant. The following options are supported:

- O0** No optimization, use libraries built with **-O1**.
- O1** Level 1 optimization, use libraries built with **-O1**.
- O2** Level 2 optimization, use libraries built with **-O1**.
- O3** Level 3 optimization, use libraries built with **-O1**.
- Oz** Optimize for more size, use libraries built with **-Os**.
- Os** Optimize for size, use libraries built with **-Os**.

-o (Set output file name)

Syntax

`-o filename`

Description

The `-o` option instructs the compiler driver to write linker or archiver output to *filename*.

-patch (Run patch command)

Syntax

`-patch cmd`

Description

The `-patch` option instructs the compiler driver to run the `cmd` after the link but before the creation of the additional output file. The macro `$(TargetPath)` is expanded to the full path of the linked executable.

Example

This example will run the command `mypatch` replacing `$(TargetPath)` with `myoutput.elf`

```
-patch "mypatch $(TargetPath)" -o myoutput.elf -Fbin
```

The `mypatch` command can modify `myoutput.elf` before the creation of the `myouput.bin`.

-placement (Section placement file)

Syntax

-placement *file*

Description

The **-placement** option supplies the section placement *file* which is used to control the placement of program sections in the memory map segments. See [Section Placement file format](#) for a description of the section placement file format.

Example

```
-memorymap MemoryMap.xml -placement flash.xml
```

-placementmacros (Section placement macros)

Syntax

`-placementmacros macros`

Description

The `-placementmacros` option supplies macro definitions that are applied to the section placement file.

Example

The macros `FLASH_START` and `FLASH_SIZE` are defined for the section placement using:

```
-placementmacros "FLASH_START=0x08000000;FLASH_SIZE=0x10000"
```

-placementsegments (Section placement segments)

Syntax

-placementsegments *segments*

Description

The **-placementsegments** option supplies *segments* descriptions to the section placement file. You can use this rather than supplying a memory map file.

Example

A simple memory map with FLASH and SRAM can be supplied as follows:

```
-placementsegments "FLASH RX 0x0 0x10000;SRAM RWX 0x20000000 0x10000" -placement flash.xml
```

-printf (Select printf capability)

Syntax

`-printf=c`

Description

The `-printf` option selects the printf capability for the linked executable. The options are:

- `-printf=i[p][w]` integer is supported, optional width and precision and optional wchar
- `-printf=l[p][w]` long integer is supported, optional width and precision and optional wchar
- `-printf=ll[p][w]` long long integer is supported, optional width and precision and optional wchar
- `-printf=f[l][w]` float, width and precision supported, optional long long and optional wchar
- `-printf=d[l][w]` double, width and precision supported, optional long long and optional wchar

Example

The minimal sized printf

```
-printf=i
```

The maximal functionality printf

```
-printf=dllw
```

-rtti (Enable C++ RTTI Support)

Syntax

`-rtti`

Description

Enables C++ run-time type information to be compiled.

-R (Set section name)

Syntax

-R *name*

Description

These options name the default name of the sections generated by the compiler/assembler to be *name*. The options are:

- Rc** *name* change the default name of the code section
- Rd** *name* change the default name of the data section
- Rk** *name* change the default name of the const section
- Rz** *name* change the default name of the bss section

-scanf (Select scanf capability)

Syntax

`-scanf= c`

Description

The `-scanf` option selects the scanf capability for the linked executable. The options are:

- `-scanf=i[c]` integer is supported, optional `%[...]` and `%[^...]` character class
- `-scanf=l[c]` long integer is supported, optional `%[...]` and `%[^...]` character class
- `-scanf=ll[c]` long long integer is supported, optional `%[...]` and `%[^...]` character class
- `-scanf=d[ll][c]` floating point is supported, optional long long and `%[...]` and `%[^...]` character class

Example

The minimal sized scanf

```
-scanf=i
```

The maximal functionality scanf

```
-scanf=dllc
```


-segger (Use SEGGER assembler/compiler/linker)

Syntax

-clang

Description

Use the SEGGER assembler, compiler and linker. Default is to use the GNU assembler, compiler and linker.

-std (Select language standard)

Syntax

-std=s

-std=list

Description

The -std option sets the language standard to use.

Example

To set the language to c99 core you would use:

```
cc -std=c99
```

To list supported language standards:

```
cc -std=list
```

-strip (Strip symbols from executable)

Syntax

-stripsymbols

-stripdebug

Description

The **-stripsymbols** removes symbols from the linked executable.

The **-stripdebug** removes debugging information from the linked executable.

-symbols (Link symbols)

Syntax

`-symbols=s`

Description

The `-symbols` option supplies the symbols file `s` to the linker.

-T (Supply linker script)

Syntax

-Tfile

Description

The **-T** option supplies the *file* to the linker as a linker script.

-U (Undefine macro symbol)

Syntax

-U*name*

Description

The **-U** option undefines the preprocessor macro *name*.

-unwindtables (Generate unwind tables)

Syntax

-unwindtables

Description

The **-unwind** option instructs the compiler to generate unwind tables.

-v (Verbose execution)

Syntax

-v

Description

The **-v** switch displays command lines executed by the compiler driver.

-w (Suppress warnings)

Syntax

`-w`

Description

This option instructs the compiler, assembler, and linker not to issue any warnings.

-we (Treat warnings as errors)

Syntax

`-we`

Description

This option directs the compiler, assembler, and linker to treat all warnings as errors.

-W (Pass option to tool)

Syntax

`-Wtool option`

Description

The `-W` command-line option passes *option* directly to the specified *tool*. Supported tools are

- `Wa` pass option to assembler
- `Wc` pass option to compiler
- `Wl` pass option to linker

Example

The following example passes the (compiler specific) `-version` option to the compiler

```
cc -Wc-version
```

-x (Specify file types)

Syntax

`-x type`

Description

The `-x` option causes the compiler driver to treat subsequent files to be of the following file type

- `-xa` archives/libraries
- `-xasm` assembly code files
- `-xc` C code files
- `-xc++` C++ code files
- `-xo` object code files

Example

The following command line enables an assembly code file with the extension `.arm` to be assembled.

```
cc -xasm a.arm
```

Command-Line Project Builder

emBuild is a program used to build your software from the command line without using **SEGGER** Embedded Studio. You can, for example, use **emBuild** for nightly (automated) builds, production builds, and batch builds.

Building with a SEGGER Embedded Studio project file

You can specify a SEGGER Embedded Studio project file:

Syntax

emBuild [*options*] *project-file*

You must specify a configuration to build using **-config**. For instance:

```
emBuild -config "V5T Thumb LE Release" arm.emProject
```

The above example uses the configuration **V5T Thumb LE Release** to build all projects in the solution contained in **arm.emProject**.

To build a specific project that is in a solution, you can specify it using the **-project** option. For example:

```
emBuild -config "V5T Thumb LE Release" -project "libm" libc.emProject
```

This example will use the configuration **V5T Thumb LE Release** to build the project **libm** that is contained in **libc.emProject**.

If your project file imports other project files (using the <import> mechanism), when denoting projects you must specify the solution names as a comma-separated list in parentheses after the project name:

```
emBuild -config "V5T Thumb LE Release" -project "libc(C Library)" arm.emProject
```

libc(C Library) specifies the **libc** project in the **C Library** solution that has been imported by the project file **arm.emProject**.

To build a specific solution that has been imported from other project files, you can use the **-solution** option. This option takes the solution names as a comma-separated list. For example:

```
emBuild -config "ARM Debug" -solution "ARM Targets,EB55" arm.emProject
```

In this example, **ARM Targets,EB55** specifies the **EB55** solution imported by the **ARM Targets** solution, which was itself imported by the project file **arm.emProject**.

You can do a batch build using the **-batch** option:

```
emBuild -config "ARM Debug" -batch libc.emProject
```

This will build the projects in **libc.emProject** that are marked for batch build in the configuration **ARM Debug**.

By default, a *make-style* build will be done i.e., the dates of input files are checked against the dates of output files, and the build is avoided if the output is up to date. You can force a complete build by using the **-rebuild** option. Alternatively, to remove all output files, use the **-clean** option.

To see the commands being used in the build, use the **-echo** option. To also see why commands are being executed, use the **-verbose** option. You can see what commands will be executed, without executing them, by using the **-show** option.

Building without a SEGGER Embedded Studio project file

To use **emBuild** without a SEGGER Embedded Studio project, specify the name of an installed project template, the name of the project, and the files to build. For example:

```
emBuild -config -template LM3S_EXE -project myproject -file main.c
```

Or, instead of a template, you can specify a project type:

```
emBuild -config -type "Library" -project myproject -file main.c
```

You can specify project properties with the **-property** option:

```
emBuild -property Target=LM3S811
```


Command-line options

This section describes the command-line options accepted by emBuild.

-batch (Batch build)

Syntax

`-batch`

Description

Perform a batch build.

-config (Select build configuration)

Syntax

-config *name*

Description

Specify the configuration for a build. If the configuration *name* can't be found, emBuild will list the available configurations.

-clean (Remove output files)

Syntax

`-clean`

Description

Remove all output files resulting from the build process.

-D (Define macro)

Syntax

`-D macro=value`

Description

Define a SEGGER Embedded Studio for RISC-V macro value for the build process.

-echo (Show command lines)

Syntax

`-echo`

Description

Show the command lines as they are executed.

-file (Build a named file)

Syntax

-file *name*

Description

Build the file *name*. Use with **-template** or **-type**.

-packagesdir (Specify packages directory)

Syntax

-packagesdir *dir*

Description

Override the default value of the **\$(PackagesDir)** macro.

-project (Specify project to build)

Syntax

-project *name*

Description

Specify the name of the project to build. When used with a project file, if emBuild can't find the specified project, the names of available projects are listed.

-property (Set project property)

Syntax

`-property name=value`

Description

Specify the value of a project property use with **-template** or **-type**. If emBuild cannot find the specified property, a list of the properties is shown.

-rebuild (Always rebuild)

Syntax

-rebuild

Description

Always execute the build commands.

-show (Dry run, don't execute)

Syntax

`-show`

Description

Show the command lines that would be executed, but do not execute them.

-solution (Specify solution to build)

Syntax

-solution *name*

Description

Specify the name of the solution to build. If emBuild cannot find the given solution, the valid solution names are listed.

-studiodir (Specify SEGGER Embedded Studio directory)

Syntax

-studiodir *name*

Description

Override the default value of the **\$(StudioDir)** macro.

-template (Specify project template)

Syntax

-template *name*

Description

Specify the project template to use. If emBuild cannot find the specified template then a list of template names is shown.

-time (Time the build)

Syntax

-time

Description

Show the time taken for the build.

-threadnum (Specify number of build threads)

Syntax

-threadnum *n*

Description

Specify the number of build threads to use for the build. The default is zero which will use the number of processor cores on your machine.

-type (Specify project type)

Syntax

-type *name*

Description

Specify the project type to use. If emBuild cannot find the specified project type then a list of project type names is shown.

-verbose (Show build information)

Syntax

`-verbose`

Description

Show extra information relating to the build process.

Command-Line Simulator

emSim is a program that allows you to run SEGGER Embedded Studio's instruction set simulator from the command line.

The primary purpose of **emSim** is to enable command line tests to be run.

Syntax

emSim *file* [*options*] *args*

Command-line options

This section describes the command-line options accepted by emSim.

file (Elf executable file)

Description

This is the name of the elf file to run on the simulator. The file will be run until it makes a debug request to exit. The simulator will allocate memory regions based on the elf program sections.

Example

```
emSim app.elf
```

-segments (Specify memory segments)

Syntax

`-segments start;size;`

Description

Specify the memory segments to simulate.

Example

```
emSim app.elf -segments 0x08000000;0x10000;0x20000000;0x10000
```

args (User arguments)

Description

The arguments supplied to the elf file in the argc/argv parameters to the main function.

```
emSim app.elf hello world
```


Command-Line Scripting

emScript is a program that allows you to run SEGGER Embedded Studio's JavaScript (ECMAScript) interpreter from the command line.

The primary purpose of **emScript** is to facilitate the creation of platform-independent build scripts.

Syntax

emScript [*options*] *file*

Command-line options

This section describes the command-line options accepted by emScript.

-define (Define global variable)

Syntax

`-define variable=value`

Description

-help (Show usage)

Syntax

`-help`

Description

Display usage information and command line options.

-load (Load script file)

Syntax

`-load path`

Description

Loads the script file *path*.

-define (Verbose output)

Syntax

`-verbose`

Description

Produces verbose output.

emScript classes

emScript provides the following predefined classes:

[BinaryFile](#)

[CWSys](#)

[WScript](#)

Example uses

The following example demonstrates using **emScript** to increment a build number:

First, add a JavaScript file to your project called `incbuild.js` containing the following code:

```
function incbuild()
{
    var file = "buildnum.h"
    var text = "#define BUILDNUMBER "
    var s = CWSys.readStringFromFile(file);
    var n;
    if (s == undefined)
        n = 1;
    else
        n = eval(s.substring(text.length)) + 1;
    CWSys.writeStringToFile(file, text + n);
}

// Executed when script loaded.
incbuild();
```

Add a file called `getbuildnum.h` to your project containing the following code:

```
#ifndef GETBUILDNUM_H
#define GETBUILDNUM_H

unsigned getBuildNumber();

#endif
```

Add a file called `getbuildnum.c` to your project containing the following code:

```
#include "getbuildnum.h"
#include "buildnum.h"

unsigned getBuildNumber()
{
    return BUILDNUMBER;
}
```

Now, to combine these:

Set the **Build Options > Always Rebuild** project property of `getbuildnum.c` to **Yes**.

Set the **User Build Step Options > Pre-Compile Command** project property of `getbuildnum.c` to `"$(StudioDir)/bin/emScript" -load "$(ProjectDir)/incbuild.js"`.

Embed

Embed is a program that converts a binary file into a C/C++ array definition.

The primary purpose of the **Embed** tool is to provide a simple method of embedding files into an application. This may be useful if you want to include firmware images, bitmaps, etc. in your application without having to read them first from an external source.

Syntax

```
embed variable_name input_file output_file
```

variable_name is the name of the C/C++ array to be initialised with the binary data.

input_file is the path to the binary input file.

output_file is the path to the C/C++ source file to generate.

Example

To convert a binary file *image.bin* to a C/C++ file called *image.h*:

```
embed img image.bin image.h
```

This will generate the following output in *image.h*:

```
static const unsigned char img[] = {  
    0x5B, 0x95, 0xA4, 0x56, 0x16, 0x5F, 0x2D, 0x47,  
    0xC5, 0x04, 0xD4, 0x8D, 0x73, 0x40, 0x31, 0x66,  
    0x3E, 0x81, 0x90, 0x39, 0xA3, 0x8E, 0x22, 0x37,  
    0x3C, 0x63, 0xC8, 0x30, 0x90, 0x0C, 0x54, 0xA4,  
    0xA2, 0x74, 0xC2, 0x8C, 0x1D, 0x56, 0x57, 0x05,  
    0x45, 0xCE, 0x3B, 0x92, 0xAD, 0x0B, 0x2C, 0x39,  
    0x92, 0x59, 0xB9, 0x9D, 0x01, 0x30, 0x59, 0x9F,  
    0xC5, 0xEA, 0xCE, 0x35, 0xF6, 0x4B, 0x05, 0xBF  
};
```

Command-Line License Manager

The **emLicense** program can be used to install, remove and list licenses from the command line.

Usage	Description
<code>emLicense install <i>license-strings...</i></code>	Install licenses
<code>emLicense list</code>	List all installed licenses
<code>emLicense remove <i>license-ids...</i></code>	Remove licenses
Option	Description
<code>-verbose</code>	Produce verbose output

The **install** command can be used to install licenses:

```
$ emLicense install license-strings...
```

The **list** command can be used to list installed licenses:

```
$ emLicense list
Product: SEGGER Embedded Studio for RISC-V
Ethernet MAC Address Lock: 01-02-03-04-05-06 (OK)
Licensed to: Joe Bloggs
License ID: 00010203-04050607-08090A0B-0C0D0E0F
```

The **remove** command can be used to uninstall licenses:

```
$ emLicense remove 00010203-04050607-08090A0B-0C0D0E0F
```

Header file generator

The command line program **mkhdr** generates a C or C++ header file from a SEGGER Embedded Studio for RISC-V memory map file.

Using the header generator

For each register definition in the memory map file a corresponding **#define** is generated in the header file. The **#define** is named the same as the register name and is defined as a volatile pointer to the address.

The type of the pointer is derived from the size of the register. A four-byte register generates an unsigned long pointer. A two-byte register generates an unsigned short pointer. A one-byte register will generate an unsigned char pointer.

If a register definition in the memory map file has bitfields then preprocessor symbols are generated for each bitfield. Each bitfield will have two preprocessor symbols generated, one representing the mask and one defining the start bit position. The bitfield preprocessor symbol names are formed by prepending the register name to the bitfield name. The mask definition has **_MASK** appended to it and the start definition has **_BIT** appended to it.

For example consider the following definitions in the the file **memorymap.xml**.

```
<RegisterGroup start="0xFFFFF000" name="AIC">
  <Register start="+0x00" size="4" name="AIC_SMR0">
    <BitField size="3" name="PRIOR" start="0" />
    <BitField size="2" name="SRCTYPE" start="5" />
  </Register>
  ...
```

We can generate the header file associated with this file using:

```
mkhdr memorymap.xml memorymap.h
```

This generates the following definitions in the file **memorymap.h**.

```
#define AIC_SMR0 (*(volatile unsigned long *)0xFFFFF000)
#define AIC_SMR0_PRIOR_MASK 0x7
#define AIC_SMR0_PRIOR_BIT 0
#define AIC_SMR0_SRCTYPE_MASK 0x60
#define AIC_SMR0_SRCTYPE_BIT 5
```

These definitions can be used in the following way in a C/C++ program:

Reading a register

```
unsigned r = AIC_SMR0;
```

Writing a register

```
AIC_SMR0 = (priority << AIC_SMR0_PRIOR_BIT) | (srctype << AIC_SMR0_SRCTYPE_BIT);
```

Reading a bitfield

```
unsigned srctype = (AIC_SMR0 & AIC_SMR0_SRCTYPE_MASK) >> AIC_SMR0_SRCTYPE_BIT;
```

Writing a bitfield

```
AIC_SMR0 = (AIC_SMR0 & ~AIC_SMR0_SRCTYPE_MASK) | ((srctype & AIC_SMR0_SRCTYPE_MASK) << AIC_SMR0_SRCTYPE_BIT);
```

Command line options

This section describes the command line options accepted by the header file generator.

Syntax

mkhdr *inputfile outputfile targetname [option]*

inputfile is the name of the source SEGGER Embedded Studio for RISC-V memory map file. **outputfile** is the the name of the file to write.

-regbaseoffsets (Use offsets from peripheral base)

Syntax

-regbaseoffsets

Description

Instructs the header generator to include offsets of registers from the peripheral base.

-nobitfields (Inhibit bitfield macros)

Syntax

`-nobitfields`

Description

Instructs the header generator not to generate any definitions for bitfields.

Linker script file generator

The command line program **mkld** generates a GNU ld linker script from a SEGGER Embedded Studio for RISC-V memory map or section placement file.

Syntax

```
mkld -memory-map-file inputfile outputfile [options]
```

inputfile is the name of the SEGGER Embedded Studio for RISC-V memory map file to generate the ld script from. **outputfile** is the the name of the ld script file to write.

Command-line options

This section describes the command-line options accepted by *mkld*.

-check-segment-overflow

Syntax

`-check-segment-overflow`

Description

Add checks for memory segment overflow to the linker script.

-disable-missing-runin-error

Syntax

`-disable-missing-runin-error`

Description

Discard any sections with a missing run in section.

-memory-map-file

Syntax

-memory-map-file *filename*

Description

Generate a GNU ld linker script from the SEGGER Embedded Studio for RISC-V memory map file *filename*.

-memory-map-macros

Syntax

-memory-map-macros *macro=value*;*macro=value*]

Description

Define SEGGER Embedded Studio for RISC-V macros to use when reading a memory map file.

-no-check-unplaced-sections

Syntax

`-no-check-unplaced-sections`

Description

Removes checks for unplaced memory sections from the linker script.

-section-placement-file

Syntax

-section-placement-file *filename*

Description

Generate a GNU ld linker script from the SEGGER Embedded Studio for RISC-V section placement file *filename*. If this option is used, a memory map file should also be specified with the *-memory-map-file* option.

-section-placement-macros

Syntax

`-section-placement-macros macro=value;macro=value`

Description

Define SEGGER Embedded Studio for RISC-V macros to use when reading a section placement file.

-symbols

Syntax

`-symbols symbol=value;symbol=value`

Description

Add extra symbol definitions to the ld linker script.

Package generator

To create a package the program **mkpkg** can be used. The set of files to put into the package should be in the desired location in the `$(PackagesDir)` directory. The **mkpkg** command should be run with `$(PackagesDir)` as the working directory and all files to go into the package must be referred to using relative paths. A package must have a package description file that is placed in the `$(PackagesDir)/packages` directory. The package description file name must end with `_package.xml`. If a package is to create entries in the new project wizard then it must have a file name `project_templates.xml`.

For example, a package for the mythical FX150 processor would supply the following files:

A project template file called `targets/FX150/project_templates.xml`. The format of the project templates file is described in [Project Templates file format](#).

The `$(PackagesDir)`-relative files that define the functionality of the package.

A package description file called `packages/FX150_package.xml`. The format of the package description file is described in [Package Description file format](#).

The package file `FX150.emPackage` would be created using the following command line:

```
mkpkg -c packages/FX150.emPackage targets/FX150/project_templates.xml packages/
FX150_package.xml
```

You can exclude specific files or directories from being added to a package using the **-exclude** option:

```
mkpkg -c packages/FX150.emPackage targets/FX150 -exclude targets/FX150/excluded_file.txt -
exclude targets/FX150/excluded_directory packages/FX150_package.xml
```

You can list the contents of the package using the **-t** option:

```
mkpkg -t packages/FX150.emPackage
```

You can remove an entry from a package using the **-d** option:

```
mkpkg -d packages/FX150.emPackage -d fileName
```

You can add or replace a file into an existing package using the **-r** option:

```
mkpkg -r packages/FX150.emPackage -r fileName
```

You can extract files from an existing package using the **-x** option:

```
mkpkg -x packages/FX150.emPackage outputDirectory
```

You can automate the package creation process using a **Combining** project type.

Using the new project wizard create a combining project in the directory `$(PackagesDir)`.

Set the **Output File Path** property to be `$(PackagesDir)/packages/mypackage.emPackage`.

Set the **Combine command** property to `$(StudioDir)/bin/mkpkg -c $(CombiningOutputFilePath)`

`$(CombiningRelInputPaths)`.

Add the files you want to go into the package into the project using the Project Explorer.

Right-click the project node in the Project Explorer and choose **Build**.

When a package is installed, the files in the package are copied into the desired $\$(PackagesDir)$ -relative locations. When a file is copied into the $\$(PackagesDir)/packages$ directory and its filename ends with `_package.xml` the file $\$(PackagesDir)/packages/installed_packages.xml$ is updated with an entry:

```
<include filename="FX150_package.xml" />
```

During development of a package you can manually edit this file. The same applies to the file $\$(PackagesDir)/targets/project_templates.xml$ which will contain a reference to your `project_templates.xml` file.

Usage:

`mkpkg [options] packageFileName file1 file2`

Option	Description
<code>-c</code>	Create a new package.
<code>-compress level</code>	Change compression level (0 for none, 9 for maximum).
<code>-d</code>	Remove files from a package.
<code>-exclude path</code>	Exclude path when adding files to a package
<code>-f</code>	Output files to stdout.
<code>-r</code>	Replace files in a package.
<code>-readonly</code>	Force all files to have read only attribute.
<code>-t</code>	List the contents of a package.
<code>-v</code>	Be chatty.
<code>-V</code>	Show version information.
<code>-x</code>	Extract files from a package.

Package manager

The **pkg** program can be used to download, install, remove and search for packages from the command line.

Usage	Description
<code>pkg install <i>package_names...</i></code>	Download and install packages
<code>pkg install -manual <i>package_files...</i></code>	Manually install package files
<code>pkg list</code>	List all available packages
<code>pkg list -installed</code>	List installed packages
<code>pkg remove <i>package_names...</i></code>	Remove packages
<code>pkg remove -all</code>	Remove all packages
<code>pkg search <i>keywords...</i></code>	Search for packages
<code>pkg update</code>	Update list of available packages
<code>pkg upgrade</code>	Upgrade all installed packages
<code>pkg upgrade <i>package_names...</i></code>	Upgrade selected packages
Option	Description
<code>-rootuserdir <i>directory</i></code>	Set the root user data directory to <i>directory</i>
<code>-packagesdir <i>directory</i></code>	Set $\$(PackagesDir)$ to be <i>directory</i>
<code>-quiet</code>	Do not output any progress messages
<code>-verbose</code>	Produce verbose output
<code>-yes</code>	Answer yes to all questions without prompting

Before you can download, install or search for packages you must first update the local list of available packages:

```
$ pkg update
```

The **search** command can be used to search for a specific package:

```
$ pkg search STL
STLport (1.0) - STLport Library Package
```

The **install** command can be used to install a package:

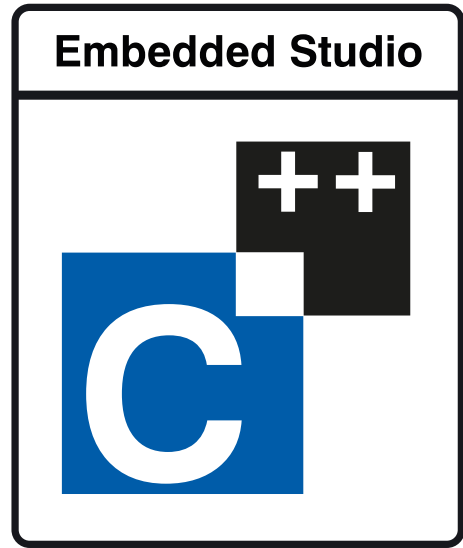
```
$ pkg install STLport
```

The **list** command can be used to list installed packages:

```
$ pkg list -installed
STLport (1.0) - STLport Library Package
```

The **remove** command can be used to uninstall a package:

```
$ pkg remove STLport
```



Appendices

File formats

This section describes the file formats SEGGER Embedded Studio for RISC-V uses:

Memory Map file format

Describes the memory map file format that defines memory regions and registers in a microcontroller.

Section Placement file format

Describes the section placement file format that maps program sections to memory areas in the target microcontroller.

Project file format

Describes the format of SEGGER Embedded Studio project files.

Project Templates file format

Describes the format of project template files used by the **New Project** wizard.

Property Groups file format

Describes the format of the property groups file you can use to define meta-properties.

Package Description file format

Describes the format of the package description files you use to create packages other users can install in SEGGER Embedded Studio.

External Tools file format

Describes the format of external tool configuration files you use to extend SEGGER Embedded Studio.

Debugger Type Interpretation file format

Describes the format of the debugger type interpretation file.

Memory Map file format

SEGGER Embedded Studio memory-map files are structured using XML syntax for its simple construction and parsing.

The first entry of the project file defines the XML document type used to validate the file format.

```
<!DOCTYPE Board_Memory_Definition_File>
```

The next entry is the `Root` element. There can only be one `Root` element in a memory map file:

```
<Root name="My Board">
```

A `Root` element has a `name` attribute every element in a memory map file has a `name` attribute. Names should be unique within a hierarchy level. Within a `Root` element, there are `MemorySegment` elements that represent regions within the memory map.

```
<Root name="My Board">
  <MemorySegment name="Flash" start="0x1000" size="0x200" access="ReadOnly">
```

`MemorySegment` elements have the following attributes:

start:The start address of the memory segment. A simple expression, usually a hexadecimal number with a 0x prefix.

size:The size of the memory segment. A simple expression, usually a hexadecimal number with a 0x prefix.

access:The permissible access types of the memory segment. One of `ReadOnly`, `Read/Write`, `WriteOnly`, or `None`.

address_symbol:A symbolic name for the start address of the memory segment.

size_symbol:A symbolic name for the size of the memory segment.

address_symbol:A symbolic name for the end address of the memory segment.

`RegisterGroup` elements are used to organize registers into groups. `Register` elements are used to define peripheral registers:

```
<Root name="My Board" >
  <MemorySegment name="System" start="0x2000" size="0x200" >
    <RegisterGroup name="Peripheral1" start="0x2100" size="0x10" >
      <Register name="Register1" start="+0x8" size="4" >
```

`RegisterGroup` elements have the same attributes as `MemorySegment` elements. `Register` elements have the following attributes:

name:Register names should be valid C/C++ identifier names, i.e., alphanumeric characters and underscores are allowed but names cannot start with a number.

start:The start address of the memory segment. Either a C-style hexadecimal number or, if given a + prefix, an offset from the enclosing element's start address.

size:The size of the register in bytes, either 1, 2, or 4.

access:The same as the `access` attribute of the `MemorySegment` element.

address_symbol:The same as the `address_symbol` attribute of the `MemorySegment` element.

A `Register` element can contain `BitField` elements that represent the bits in a peripheral register:

```
<Root name="My Board" >
  <MemorySegment name="System" start="0x2000" size="0x200" >
    <RegisterGroup name="Peripheral1" start="0x2100" size="0x10" >
      <Register name="Register1" start="+0x8" size="4" >
        <BitField name="Bits_0_to_3" start="0" size="4" />
      </Register>
    </RegisterGroup>
  </MemorySegment>
</Root>
```

`BitField` elements have the following attributes:

name:The same as the `name` attribute of the `RegisterGroup` element.

start:The starting bit position, 0-31.

size:The total number of bits, 1-32.

A `Bitfield` element can contain `Enum` elements:

```
<Root name="My Board" >
  <RegisterGroup name="Peripheral1" start="0x2100" size="0x10" >
    <Register name="Register1" start="+0x8" size="4" >
      <BitField name="Bits_0_to_3" start="0" size="4" />
        <Enum name="Enum3" start="3" />
        <Enum name="Enum5" start="5" />
      </BitField>
    </Register>
  </RegisterGroup>
</Root>
```

You can import CMSIS SVD files (see <http://www.onarm.com/>) into a memory map using the `ImportSVD` element:

```
<ImportSVD filename="$(TargetsDir)/targets/Manufacturer1/Processor1.svd.xml">
```

The `filename` attribute is an absolute filename which is macro-expanded using SEGGER Embedded Studio for RISC-V system macros.

When a memory map file is loaded either for the memory map viewer or to be used for linking or debugging, it is preprocessed using the (as yet undocumented) SEGGER Embedded Studio for RISC-V XML preprocessor.

Section Placement file format

SEGGER Embedded Studio section-placement files are structured using XML syntax to enable simple construction and parsing.

The first entry of the project file defines the XML document type used to validate the file format:

```
<!DOCTYPE Linker_Placement_File>
```

The next entry is the `Root` element. There can only be one `Root` element in a memory map file:

```
<Root name="Flash Placement" >
```

A `Root` element has a `name` attribute. Every element in a section-placement file has a `name` attribute. Each name should be unique within its hierarchy level. Within a `Root` element, there are `MemorySegment` elements. These correspond to memory regions defined in a memory map file that will be used in conjunction with the section-placement file when linking a program. For example:

```
<Root name="Flash Placement" >
  <MemorySegment name="FLASH" >
```

A `MemorySegment` contains `ProgramSection` elements that represent program sections created by the C/C++ compiler and assembler. The order of `ProgramSection` elements within a `MemorySegment` element represents the order in which the sections will be placed when linking a program. The first `ProgramSection` will be placed first and the last one will be placed last.

```
<Root name="My Board" >
  <MemorySegment name="FLASH" >
    <ProgramSection name=".text" >
```

`ProgramSection` elements have the following attributes:

address_symbol: A symbolic name for the start address of the section.

alignment: The required alignment of the program section; a decimal number specifying the byte alignment.

end_symbol: A symbolic name for the end address of the section.

load: If **Yes**, the section is loaded. If **No**, the section isn't loaded.

runin: This specifies the name of the section to copy this section to. Multiple sections can be specified separated by a semicolon, the first section that exists will be used.

size: The optional size of the program section in bytes, a hexadecimal number with a 0x prefix.

size_symbol: A symbolic name for the size of the section.

start: The optional start address of the program section, a hexadecimal number with a 0x prefix.

When a section placement file is used for linking it is preprocessed using the (as yet undocumented) SEGGER Embedded Studio for RISC-V XML preprocessor.

Project file format

SEGGER Embedded Studio project files are held in text files with the `.emProject` extension. Because you may want to edit project files, and perhaps generate them, they are structured using XML syntax to enable simple construction and parsing.

The first entry of the project file defines the XML document type used to validate the file format:

```
<!DOCTYPE CrossStudio_Project_File>
```

The next entry is the `solution` element; there can only be one `solution` element in a project file. This specifies the solution name displayed in the **Project Explorer** and has a `version` attribute that defines the file-format version of the project file. Solutions can contain projects, projects can contain folders and files, and folders can contain folders and files. This hierarchy is reflected in the XML nesting for example:

```
<solution version="1" Name="solutionname">
  <project Name="projectname">
    <file Name="filename" />
    <folder Name="foldername">
      <file Name="filename2" />
    </folder>
  </project>
</solution>
```

Note that each entry has a `Name` attribute. Names of `project` elements must be unique to the solution, and names of `folder` elements must be unique to the project, but names of files do not need to be unique.

Each `file` element must have a `file_name` attribute that is unique to the project. Ideally, the `file_name` is a file path relative to the project (or solution directory), but you can also specify a full file path, if you want to. File paths are case-sensitive and use `/` as the directory separator. They may contain macro instantiations, so file paths cannot contain the `"$"` character. For example

```
<file file_name="$(StudioDir)/source/crt0.s" Name="crt0.s" />
```

will be expanded using the value of `$(StudioDir)` when the file is referenced from SEGGER Embedded Studio.

Project properties are held in configuration elements with the `Name` attribute of the configuration element corresponding to the configuration name, e.g., "Debug". At a given project level (i.e., solution, project, folder), there can only be one named configuration element. i.e., all properties defined for a configuration are in single configuration element.

```
<project Name="projectname">
  <configuration project_type="Library" Name="Common" />
  <configuration Name="Release" build_debug_information="No" />
</project>
```

You can use the `import` element to link projects:

```
<import file_name="target/libc.emProject" />
```

Project Templates file format

The SEGGER Embedded Studio **New Project** dialog works from a file called `project_templates.xml` in the `targets` subdirectory of the SEGGER Embedded Studio installation directory. Because you may want to add your own new project types, they are structured using XML syntax to enable simple construction and parsing.

The first entry of the project file defines the XML document type used to validate the file format:

```
<!DOCTYPE Project_Templates_File>
```

The next entry is the `projects` element, which is used to group a set of new project entries into an XML hierarchy.

```
<projects>
  <project>
</projects>
```

Each entry has a `project` element that contains the class of the project (attribute `caption`), the name of the project (attribute `name`), its type (attribute `type`) and a description (attribute `description`). For example:

```
<project caption="ARM Evaluator7T" name="Executable"
  description="An executable for an ARM Evaluator7T." type="Executable"/>
```

The project type can be one of these:

- Executable*: a fully linked executable.
- Library*: a static library.
- Object file*: an object file.
- Staging*: a staging project.
- Combining*: a combining project.
- Externally Built Executable*: an externally built executable.

The configurations to be created for the project are defined using the `configuration` element, which must have a `name` attribute:

```
<configuration name="ARM RAM Release"/>
```

The property values to be created for the project are defined using the `property` element. If you have a defined value, you can specify this using the `value` attribute and, optionally, set the property in a defined configuration, such as:

```
<property name="target_reset_script" configuration="RAM"
  value="Evaluator7T_ResetWithRamAtZero()" />
```

Alternatively, you can include a property that will be shown to the user, prompting them to supply a value as part of the new-project process.

```
<property name="linker_output_format"/>
```

The folders to be created are defined using the `folder` element. The `folder` element must have a `name` attribute and can also have a `filter` attribute. For example:

```
<folder name="Source Files" filter="c;cpp;cxx;cc;h;s;asm;inc" />
```

The files to be in the project are specified using the `file` element. You can use build-system macros (see [Project macros](#)) to specify files located in the SEGGER Embedded Studio installation directory. Files will be copied to the project directory or just left as references, depending on the value of the `source` attribute:

```
<file name="main.c" source="$(StudioDir)/samples/Shared/main.c" />  
<file name="$(StudioDir)/source/thumb_crt0.s" />
```

You can define the set of configurations that can be referred to in the top-level `configurations` element:

```
<configurations>  
  <configuration>  
</configurations>
```

This contains the set of all configurations that can be created when a project is created. Each configuration is defined using a `configuration` element, which can define the property values for that configuration. For example:

```
<configuration name="Debug">  
  <property name="build_debug_information" value="Yes">
```

Property Groups file format

The SEGGER Embedded Studio project system provides a means to create new properties that change a number of project property settings and can also set C pre-processor definitions when selected. Such properties are called *property groups* and are defined in a property-groups file. The property-group file to use for a project is defined by the **Property Groups File** property. These files usually define target-specific properties and are structured using XML syntax to enable simple construction and parsing.

The first entry of the property groups file defines the XML document type, which is used to validate the file format:

```
<!DOCTYPE CrossStudio_Group_Values>
```

The next entry is the `propertyGroups` element, which is used to group a set of property groups entries into an XML hierarchy:

```
<propertyGroups>
  <groupdots
    <groupdots
  </propertyGroups>
```

Each group has the name of the group (attribute `name`), the name of the options category (attribute `group`), short (attribute `short`) and long (attribute `long`) help descriptions, and a default value (attribute `default`). For example:

```
<group short="Target Processor" group="Build Options" short="Target Processor"
  long="Select a set of target options" name="Target" default="STR912FW44" />
```

Each group has a number of `groupEntry` elements that define the enumerations of the group.

```
<group\>
  <groupEntry>
  <groupEntry>
</group>
```

Each `groupEntry` has the name of the entry (attribute `name`), e.g.:

```
<groupEntry name="STR910FW32" >
```

A `groupEntry` has the property values and C pre-processor definitions that are set when the `groupEntry` is selected; they are specified with `property` and `cdefine` elements. For example:

```
<groupEntry>
  <property>
  <cdefine>
  <property>
</groupEntry>
```

A `property` element has the property's name (attribute `name`), its value (attribute `value`), and an optional configuration (attribute `configuration`):

```
<property name="linker_memory_map_file"  
  value="$(StudioDir)/targets/ST_STR91x/ST_STR910FM32_MemoryMap.xml" />
```

A `cdefine` element has the C preprocessor name (attribute `name`) and its value (attribute `value`):

```
<cdefine value="STR910FM32" name="TARGET_PROCESSOR" />
```

Package Description file format

Package-description files are XML files used by SEGGER Embedded Studio to describe a support package, its contents, and any dependencies it has on other packages.

Each package file must contain one `package` element that describes the package. Optionally, the `package` element can contain a collection of `file`, `history`, and `documentation` elements to be used by SEGGER Embedded Studio for documentation purposes.

The filename of the package-description file should match that of the package and end in `"_package.xml"`.

Below is an example of two package-description files. The first is for a base chip-support package for the LPC2000; the second is for a board-support package dependent on the first:

Philips_LPC2000_package.xml

```
<!DOCTYPE CrossStudio_Package_Description_File>
<package cpu_manufacturer="Philips" cpu_family="LPC2000" version="1.1" ses_versions="8:1-"
author="SEGGER" >
  <file file_name="$(TargetsDir)/Philips_LPC210X/arm_target_Philips_LPC210X.htm"
title="LPC2000 Support Package Documentation" />
  <file file_name="$(TargetsDir)/Philips_LPC210X/Loader.emProject" title="LPC2000 Loader
Application Solution" />
  <group title="System Files">
    <file file_name="$(TargetsDir)/Philips_LPC210X/Philips_LPC210X_Startup.s" title="LPC2000
Startup Code" />
    <file file_name="$(TargetsDir)/Philips_LPC210X/Philips_LPC210X_Target.js" title="LPC2000
Target Script" />
  </group>
  <history>
    <version name="1.1" >
      <description>Corrected LPC21xx header files and memory maps to include GPIO ports 2
and 3.</description>
      <description>Modified loader memory map so that .libmem sections will be placed
correctly.</description>
    </version>
    <version name="1.0" >
      <description>Initial Release.</description>
    </version>
  </history>
  <documentation>
    <section name="Supported Targets">
      <p>This CPU support package supports the following LPC2000 targets:
      <ul>
        <li>LPC2103</li>
        <li>LPC2104</li>
        <li>LPC2105</li>
        <li>LPC2106</li>
        <li>LPC2131</li>
        <li>LPC2132</li>
        <li>LPC2134</li>
        <li>LPC2136</li>
        <li>LPC2138</li>
      </ul>
      </p>
    </section>
  </documentation>
```

```
</package>
```

CrossFire_LPC2138_package.xml

```
<!DOCTYPE CrossStudio_Package_Description_File>
<package cpu_manufacturer="Philips" cpu_family="LPC2000" cpu_name="LPC2138"
  board_manufacturer="Rowley Associates" board_name="CrossFire LPC2138"
  dependencies="Philips_LPC2000" version="1.0">
  <file file_name="$(SamplesDir)/CrossFire_LPC2138/CrossFire_LPC2138.emProject"
  title="CrossFire LPC2138 Samples Solution" />
  <file file_name="$(SamplesDir)/CrossFire_LPC2138/ctl/ctl.emProject" title="CrossFire
  LPC2138 CTL Samples Solution" />
</package>
```

Package elements

The package element describes the support package, its contents, and any dependencies it has on other packages. Valid attributes for this element are:

Attribute	Description
author	The author of the package.
board_manufacturer	The manufacturer of the board supported by the package <i>(if omitted, CPU manufacturer will be used)</i> .
board_name	The name of the specific board supported by the package <i>(only required for board-support packages)</i> .
company_name	The name of the company to group the package under in the package dialogs. <i>(if omitted, the Board/CPU manufacturer will be used)</i> .
cpu_family	The family name of the CPU supported by the package <i>(optional)</i> .
cpu_manufacturer	The manufacturer of the CPU supported by the package.
cpu_name	The name of the specific CPU supported by the package <i>(may be omitted if the CPU family is specified)</i> .
ses_versions	A string describing which version of SEGGER Embedded Studio supports the package <i>(optional)</i> . The format of the string is <i>target_id_number:version_range_string</i> .
description	A description of the package <i>(optional)</i> .
dependencies	A semicolon-separated list of packages the package requires to be installed in order to work.
installation_directory	The directory in which the package should be installed <i>(optional - if undefined, defaults to "\$(PackagesDir)')</i> .
title	A short description of the package <i>(optional)</i> .

<code>version</code>	The package version number.
----------------------	-----------------------------

File elements

The `file` element is used by SEGGER Embedded Studio for documentation purposes by adding links to files of interest within the package such as example project files and documentation.

Attribute	Description
<code>file_name</code>	The file path of the file.
<code>title</code>	A description of the file.

Optionally, `file` elements can be grouped into categories using the `group` element.

Group elements

The `group` element is used for categorizing files described by `file` elements into a particular group.

Attribute	Description
<code>title</code>	Title of the group.

History elements

The `history` element is used to hold a description of the package's version history.

The `history` element should contain a collection of `version` elements.

Version element

The `version` element is used to hold the description of a particular version of the package.

Attribute	Description
<code>name</code>	The name of the version being described.

The `version` element should contain a collection of `description` elements.

Description elements

Each `description` element contains text that describes a feature of the package version.

Documentation elements

The `documentation` element is used to provide arbitrary documentation for the package.

The `documentation` element should contain a collection of one or more `section` elements.

Section elements

The `section` element contains package documentation in XHTML format.

Attribute	Description
<code>name</code>	The title of the documentation section.

`target_id_number`

The following table lists the possible target ID numbers:

Target	ID
ARM	8
RISC-V	20

`version_range_string`

The `version_range_string` can be any of the following:

version_number:The package will only work on *version_number*.

version_number -:The package will work on *version_number* or any future version.

-*version_number*:The package will work on *version_number* or any earlier version.

low_version_number-high_version_number:The package will work on *low_version_number*, *high_version_number* or any version in between.

External Tools file format

SEGGER Embedded Studio external-tool configuration files are structured using XML syntax for its simple construction and parsing.

Tool configuration files

The SEGGER Embedded Studio application will read the tool configuration file when it starts up. By default, SEGGER Embedded Studio will read the file `$(StudioUserDir)/tools.xml`.

Structure

All tools are wrapped in a **tools** element:

```
<tools>
</tools>
```

Inside the **tools** element are **item** elements that define each tool:

```
<tools>
  <item name="logical name">
    </item>
</tools>
```

The **item** element requires an **name** attribute, which is an internal name for the tool, and has an optional *wait* element. When SEGGER Embedded Studio invokes the tool on a file or project, it uses the *wait* element to determine whether it should wait for the external tool to complete before continuing. If the *wait* attribute is not provided or is set to *yes*, SEGGER Embedded Studio will wait for external tool to complete.

The way that the tool is presented in SEGGER Embedded Studio is configured by elements inside the **menu** element.

menu

The **menu** element defines the wording used inside menus. You can place a shortcut to the menu using an ampersand, which must be escaped using **&** in XML, before the shortcut letter. For instance:

```
<menu>&amp;PC-lint (Unit Check)</menu>
```

text

The optional **text** element defines the wording used in contexts other than menus, for instance when the tool appears as a tool button with a label. If **text** is not provided, the tool's textual appearance outside the menu is taken from the **menu** element (and is presented without an shortcut underline). For instance:

```
<text>PC-lint (Unit Check)</text>
```

tip

The optional **tip** element defines the status tip, shown on the status line, when moving over the tool inside SEGGER Embedded Studio:

```
<tip>Run a PC-lint unit checkout on the selected file or folder</tip>
```

key

The optional **key** element defines the accelerator key, or key chord, to use to invoke the tool using the keyboard. You can construct the key sequence using modifiers **Ctrl**, **Shift**, and **Alt**, and can specify more than one key in a sequence (note: Windows and Linux only; OS X does not provide key chords). For instance:

```
<key>Ctrl+L, Ctrl+I</key>
```

message

The optional **message** element defines the text shown in the tool log in SEGGER Embedded Studio when running the tool. For example:

```
<message>Linting</message>
```

match

The optional **match** element defines which documents the tool will operator on. The match is performed using the file extension of the document. If the file extension of the document matches one of the wildcards provided, the tool will run on that document. If there is no **match** element, the tool will run on all documents. For instance:

```
<match>*.c;*.cpp</match>
```

output

The optional **output** element defines the name of the output file created by the tool. If this element is specified the the output file will be opened in the editor when the tool has finished execution. The macros **\$(InputPath)** and **\$(InputBaseName)** can be used to name the output file. For instance:

```
<output>$(InputBaseName).txt</output>
```

commands

The **commands** element defines the command line to run to invoke the tool. The command line is expanded using macros applicable to the file derived from the current build configuration and the project settings. Most importantly, the standard **\$(InputPath)** macro expands to a full pathname for the target file.

Additional macros constructed by SEGGER Embedded Studio are:

\$(DEFINES) is the set of **-D** options applicable to the current file, derived from the current configuration and project settings.

\$(INCLUDES) is the set of **-I** options applicable to the current file, derived from the current configuration and project settings.

For instance:

```
<commands>
  &quot;$(LINTDIR)/lint-nt&quot; -i$(LINTDIR)/lnt &quot;$(LINTDIR)/lnt/co-gcc.lnt&quot;
  $(DEFINES) $(INCLUDES) -D__GNUC__ -u -b +macros -w2 -e537 +fie +ffn -width(0,4) -hF1
  &quot;-format=%f:%l:%C:s%t:s%m&quot; &quot;$(InputPath)&quot;
</commands>
```

In this example we intend **\$(LINTDIR)** to point to the directory where PC-lint is installed and for **\$(LINTDIR)** to be defined as a SEGGER Embedded Studio global macro. You can set global macros using **Tools > Options > Building > Global Macros**.

Note that additional **"** entities are placed around pathnames in the **commands** section this is to ensure that paths that contain spaces are correctly interpreted when the command is executed by SEGGER Embedded Studio.

Debugger Type Interpretation file format

SEGGER Embedded Studio debugger type interpretation files are used by the debugger to provide list and string displays of C++ template container types. The files are structured using XML syntax for its simple construction and parsing.

Consider the following C++ template type

```
template <class _Type> class VeryBasicArray
{
private:
    size_t m_Count;
    _Type *m_pData;
public:
    VeryBasicArray(size_t count)
        : m_Count(count)
        , m_pData(new _Type[count])
    {
    }
}

VeryBasicArray<int> basicArray(5);
```

To display a variable of this type as a list the type interpretation file contains the following entry

```
<List Name="VeryBasicArray<int>*;"
      Head="((($T)*)HEAD).m_pData"
      Data="*(($T0)*)CURRENT"
      Length="((($T)*)HEAD).m_Count"
      Next="CURRENT+sizeof($T0)"/>
```

The **Name** attribute is used to match the template type name note that the **<** and **>** xml entities are used to match the template argument.

When an entry has been matched the head of the list is located by evaluating the debugger expression in the **Head** attribute. The debugger expressions can contain macros that refer to the matched template type and will use the symbols **HEAD** and **CURRENT**.

The macro **\$(T)** refers to the instantiated template type, for the above example **\$(T)=VeryBasicArray<int>**.

The template arguments are referred to using macros **\$(T0)**, for the above example **\$(T0)=int**.

The symbol **HEAD** is the address of the variable being displayed, for the above example if the variable **basicArray** is allocated at address **0x20004000** then the **Head** expression

```
((VeryBasicArray<int>*)0x20004000).m_pData
```

will be evaluated by the debugger, note that the **.** operator and the **->** operator are equivalent in debugger expressions.

To display an element the debugger will evaluate the **Data** expression. This expression contains the symbol **CURRENT** which is the address of the element to display, for the above example the first element is at the address **basicArray.m_pData** which is allocated at address **0x20008000** then the **Data** expression

```
(*(int*)0x20008000)
```

will be evaluated by the debugger.

To increment the **CURRENT** symbol the **Next** expression

```
0x20008000+sizeof(int)
```

will be evaluated by the debugger.

Before the **CURRENT** symbol is incremented the debugger needs to check if it is at the end of list. This can be done either as a **Condition** expression or as a **Length** expression

```
((VeryBasicArray<int>*)0x20004000).m_Count
```

The **String** display is simpler than the **List** display since the characters are contiguous and optionally null terminated. The **Data** and **Length** expressions are supported, for example

```
<String Name="string"  
  Data="*(($(T) *)HEAD)._M_start_of_storage._M_data"  
  Length="(($(T) *)HEAD)._M_finish-(($(T) *)HEAD)._M_start_of_storage._M_data"/>
```

is used to display STLPort std::string types.

Building Environment Options

Build

Property	Description
Automatically Build Before Debug Environment/Build/Build Before DebugBoolean	Enables auto-building of a project before downloading if it is out of date.
Confirm Automatically Build Before Debug Environment/Build/Show Build Before DebugBoolean	Enables the display of the auto-building popup.
Confirm Debugger Stop Environment/Build/Confirm Debugger StopBoolean	Present a warning when you start to build that requires the debugger to stop.
Display ETA Environment/Build/Display ETABoolean	Selects whether to attempt to compute and display the ETA on building.
Display Progress Bar Environment/Build/Display Progress BarBoolean	Selects whether to display progress bar on building.
Echo Build Command Lines Environment/Build/Show Command LinesBoolean	Selects whether build command lines are written to the build log.
Echo Raw Error/Warning Output Environment/Build/Show Unparsed Error OutputBoolean	Selects whether the unprocessed error and warning output from tools is displayed in the build log.
Find Error After Building Environment/Build/Find Error After BuildBoolean	Moves the cursor to the first diagnostic after a build completes with errors.
Global Macros Environment/Macros/Global MacrosStringList	Build macros that are shared across all solutions and projects e.g. paths to library files.
Keep Going On Error Environment/Build/Keep Going On ErrorBoolean	Build doesn't stop on error.
Save Project File Before Building Environment/Build/Save Project File On BuildBoolean	Selects whether to save the project file prior to build.
Show Build Information Environment/Build/Show Build InformationBoolean	Show build information.

Build Acceleration

Property	Description
Disable Unity Build Environment/Build/Disable Unity BuildBoolean	Ignore Unity Build project properties and always build individual project components.
Parallel Building Threads Environment/Build/Building ThreadsIntegerRange	The number of threads to launch when building.

Compatibility

Property	Description
Default Assembler Variant ARM/Build/Assembler Variant DefaultEnumeration	Specifies the default assembler variant to use.
Default Compiler Variant ARM/Build/Compiler Variant DefaultEnumeration	Specifies the default compiler variant to use.
Default Use Compiler Driver ARM/Build/Use Compiler DriverEnumeration	Specifies the default for the Use Compiler Driver project property.

Window

Property	Description
Show Build Log On Build Environment/Show Transcript On BuildBoolean	Show the build log when a build starts.

Debugging Environment Options

Breakpoint

Property	Description
Disassembly Breakpoints Environment/Debugger/Disassembly BreakpointsBoolean	What to do with disassembly breakpoints on debug stop/start.
Focus On Breakpoint Environment/Debugger/Focus On BreakpointBoolean	Focus IDE when breakpoint is hit.

Display

Property	Description
Close Disassembly On Mode Switch Environment/Debugger/Close Disassembly On Mode SwitchBoolean	Close Disassembly On Mode Switch.
Data Tips Display a Maximum Of Environment/Debugger/Maximum Array Elements DisplayedIntegerRange	Selects the maximum number of array elements displayed in a data tip.
Default Display Mode Environment/Debugger/Default Variable Display ModeEnumeration	Selects the format that data values are shown in.
Display Floating Point Number In Environment/Debugger/Floating Point Format DisplayCustom	The printf format directive used to display floating point numbers.
Maximum Backtrace Calls Environment/Debugger/Maximum Backtrace CallsIntegerRange	Selects the maximum number of calls when backtracing.
Prompt To Display If More Than Environment/Debugger/Array Elements Prompt SizeIntegerRange	The array size to display with prompt.
Show Data Tips In Text Editor Environment/Debugger/Show Data TipsBoolean	Show Data Tips In Text Editor.
Show Folds In Disassembly Environment/Debugger/Disassembly Show FoldsBoolean	Show Folds In Disassembly.
Show Labels In Disassembly Environment/Debugger/Disassembly Show LabelsBoolean	Show Labels In Disassembly.

Show Source In Disassembly Environment/Debugger/Disassembly Show SourceBoolean	Show Source In Disassembly.
Show char * as null terminated string Environment/Debugger/Display Char Ptr As StringBoolean	Show char * as null terminated string.
Source Path Environment/Debugger/Source PathStringList	Global search path to find source files.
Use objdump For File Disassembly ElfDwarf/Environment/Use Objdump For DisassemblyBoolean	Specifies whether to use objdump to disassemble files rather than the built-in disassembler.

Extended Data Tips

Property	Description
ASCII Environment/Debugger/Extended Tooltip Display Mode/ASCIIBoolean	Display ASCII extended data tips.
Binary Environment/Debugger/Extended Tooltip Display Mode/BinaryBoolean	Display Binary extended data tips.
Decimal Environment/Debugger/Extended Tooltip Display Mode/DecimalBoolean	Display Decimal extended data tips.
Hexadecimal Environment/Debugger/Extended Tooltip Display Mode/HexadecimalBoolean	Display Hexadecimal extended data tips.
Octal Environment/Debugger/Extended Tooltip Display Mode/OctalBoolean	Display Octal extended data tips.
Unsigned Decimal Environment/Debugger/Extended Tooltip Display Mode/Unsigned DecimalBoolean	Display Unsigned Decimal extended data tips.

Ozone

Property	Description
Ozone Executable ARM/Debugger/Ozone ExecutableFileName	The path to the Ozone executable.

Target

Property	Description
Switch Project To Text Editor Environment/Debugger/Switch ProjectBoolean	Switch Project To Text Editor.

Window

Property	Description
Clear Debug Terminal On Run Environment/Clear Debug Terminal On RunBoolean	Clear the debug terminal automatically when a program is run.
Hide Output Window On Successful Load Debugging/Hide Transcript On Successful LoadBoolean	Hide the Output window when a load completes without error.
Show Target Log On Load Debugging/Show Transcript On LoadBoolean	Show the target log when a load starts.

IDE Environment Options

Browser

Property	Description
Text Size Environment/Browser/Text SizeEnumeration	Sets the text size of the integrated HTML and help browser.
Underline Hyperlinks In Browser Environment/Browser/Underline Web LinksBoolean	Enables underlining of hypertext links in the integrated HTML and help browser.

File Extension

Property	Description
ELF Archive File Extensions ElfDwarf/Environment/Archive File ExtensionsStringList	The file extensions used for ELF archive files.
ELF Executable File Extensions ElfDwarf/Environment/Executable File ExtensionsStringList	The file extensions used for ELF executable files.
ELF Object File Extensions ElfDwarf/Environment/Object File ExtensionsStringList	The file extensions used for ELF object files.
Show ELF Header ElfDwarf/Environment/Show ELF HeaderBoolean	Display ELF Headers when executable and object files are displayed in text editor.

File Search

Property	Description
Collapse Search Results Find In Files/Collapse ResultsBoolean	Whether to initially collapse search results.
Files To Exclude Find In Files/Exclude File TypesStringList	The wildcard used to exclude files in Find In Files searches.
Files To Search Find In Files/File TypeStringList	The wildcard used to match files in Find In Files searches.
Find History Find In Files/Find HistoryStringList	The list of strings recently used in searches.

Flat Search Result Output Find In Files/Flat OutputBoolean	Whether to display file search results as a flat list.
Folder History Find In Files/Folder HistoryStringList	The set of folders recently used in file searches.
Match Case Find In Files/Match CaseBoolean	Whether the case of letters must match exactly when searching.
Match Whole Word Find In Files/Match Whole WordBoolean	Whether the whole word must match when searching.
Replace History Find In Files/Replace HistoryStringList	The list of strings recently used in searches.
Search Dependencies Find In Files/Search DependenciesBoolean	Controls searching of dependent files."
Search In Find In Files/ContextEnumeration	Where to look to find files.
Use Regular Expressions Find In Files/Use RegExpBoolean	Whether to use a regular expression or plain text search.

Find And Replace

Property	Description
Greedy Regular Expressions Find/Greedy RegExpBoolean	Enables greedy matching when using regular expressions.

Internet

Property	Description
Automatically Check For Packages Environment/Internet/Check PackagesBoolean	Specifies whether to enable downloading of the list of available packages.
Automatically Check For Updates Environment/Internet/Check UpdatesBoolean	Specifies whether to check for software updates.
Check For Latest News Environment/Internet/RSS UpdateBoolean	Specifies whether to update the latest news window.
Enable Connection Debugging Environment/Internet/Enable DebuggingBoolean	Controls debugging traces of internet connections and downloads.
External Web Browser Environment/External Web BrowserFileName	The path to the external web browser to use when accessing non-local files.
HTTP Caching Environment/Internet/HTTP CachingBoolean	Specifies if caching should be permitted when carrying out HTTP requests.

HTTP Proxy Host <code>Environment/Internet/HTTP Proxy ServerString</code>	Specifies the IP address or hostname of the HTTP proxy server. If empty, no HTTP proxy server will be used.
HTTP Proxy Port <code>Environment/Internet/HTTP Proxy PortIntegerRange</code>	Specifies the HTTP proxy server's port number.
Maximum Download History Items <code>Environment/Internet/Max Download History ItemsIntegerRange</code>	The maximum amount of download history kept in the downloads window.
Use Content Delivery Network <code>Environment/Package/Use Content Delivery NetworkBoolean</code>	Specifies whether to use content delivery network to deliver packages."

Launcher

Property	Description
Confirm Check Solution Target <code>Environment/Launcher/Confirm Check Solution TargetBoolean</code>	Specifies whether the SEGGER Embedded Studio launcher should present a warning if the solution being launched targets a device it does not support.
Launch Latest Installations Only <code>Environment/Launcher Use Latest Installations OnlyBoolean</code>	Specifies whether the SEGGER Embedded Studio launcher should only consider the latest installations when deciding which one to use.
Launcher Enabled <code>Environment/Launcher EnabledBoolean</code>	Specifies whether the SEGGER Embedded Studio launcher should be used when the operating system or an external application requests a file to be opened.

Licensing

Property	Description
Check J-Link For Licenses <code>Environment/Check J-Link LicensesBoolean</code>	Specifies whether to check J-Link's for licenses.

Package Manager

Property	Description
Check Solution Package Dependencies <code>Environment/Package/Check Solution Package DependenciesBoolean</code>	Specifies whether to check package dependencies when a solution is loaded.

Package Directory Environment/Package/Destination DirectoryString	Specifies the directory packages are installed to.
Show Check For Packages Dialog Environment/Package/Show Check For Packages DialogBoolean	Specifies whether the package manager should prompt for a package list refresh.
Show Logos Environment/Package/Show LogosEnumeration	Specifies whether the package manager should display company logos.
Verify Package Downloads Environment/Package/Verify DownloadsBoolean	Specifies whether to carry out an MD5 sum check on downloaded package files.

Print

Property	Description
Bottom Margin Environment/Printing/Bottom MarginIntegerRange	The page's bottom margin in millimetres.
Left Margin Environment/Printing/Left MarginIntegerRange	The page's left margin in millimetres.
Page Orientation Environment/Printing/OrientationEnumeration	The page's orientation.
Page Size Environment/Printing/Page SizeEnumeration	The page's size.
Right Margin Environment/Printing/Right MarginIntegerRange	The page's right margin in millimetres.
Top Margin Environment/Printing/Top MarginIntegerRange	The page's top margin in millimetres.

Startup

Property	Description
Allow Multiple SEGGER Embedded Studios Environment/Permit Multiple Studio InstancesBoolean	Allow more than one SEGGER Embedded Studio to run at the same time.
Load Last Project On Startup Environment/Load Last Project On StartupBoolean	Specifies whether to load the last project the next time SEGGER Embedded Studio runs.

New Project Directory Environment/General/Solution DirectoryString	The directory where projects are created.
Show Support Expired Dialog Environment/Support Reminder NagBoolean	Specifies whether to show the support expired dialog.
Splash Screen Environment/Splash ScreenEnumeration	How to display the splash screen on startup.

Status Bar

Property	Description
(Visible) Environment/Status BarBoolean	Show or hide the status bar.
Show Build Status Pane Environment/General/Status Bar/Show Build StatusBoolean	Show or hide the Build pane in the status bar.
Show Caret Position Pane Environment/General/Status Bar/Show Caret PosBoolean	Show or hide the Caret Position pane in the status bar.
Show Insert/Overwrite Status Pane Environment/General/Status Bar/Show Insert ModeBoolean	Show or hide the Insert/Overwrite pane in the status bar.
Show Read-Only Status Pane Environment/General/Status Bar/Show Read OnlyBoolean	Show or hide the Read Only pane in the status bar.
Show Size Grip Environment/General/Status Bar/Show Size GripBoolean	Show or hide the status bar size grip.
Show Target Pane Environment/General/Status Bar/Show TargetBoolean	Show or hide the Target pane in the status bar.
Show Time Pane Environment/General/Status Bar/Show TimeBoolean	Show or hide the Time pane in the status bar.

Title Bar

Property	Description
Show Full Solution Path Environment/General/Title Bar/Show Full Solution PathBoolean	Show the full solution path in title bar.

User Interface

Property	Description
Application Main Font Environment/Application Main FontFont	The font to use for the user interface as a whole.
Application Monospace Font Environment/Application Monospace FontFixedPitchFont	The fixed-size font to use for the user interface as a whole.
Error Display Timeout Environment/Error Display TimeoutIntegerRange	The minimum time, in seconds, that errors are shown for in the status bar.
Errors Are Displayed Environment/Error Display ModeEnumeration	How errors are reported in SEGGER Embedded Studio.
File Size Display Units Environment/Size Display UnitEnumeration	How to display sizes of items in the user interface. SI defines 1kB=1000 bytes, IEC defines 1kiB=1024 bytes, Alternate SI defines 1kB=1024 bytes.
Number File Names in Menus Environment/Number MenusBoolean	Number the first nine file names in menus for quick keyboard access.
Qt Style Sheet Environment/Qt Style SheetFileName	The Qt style sheet to use in order to customize the user interface (experimental).
Show Large Icons In Toolbars Environment/General/Large IconsEnumeration	Show large or small icons on toolbars.
Show Ribbon Environment/General/Ribbon/ShowBoolean	Show or hide the ribbon.
Show Window Selector On Ctrl+Tab Environment/Show SelectorBoolean	Present the Window Selector on Next Window and Previous Window commands activated from the keyboard.
Theme Environment/Studio ThemeEnumeration	The user interface style and color theme to use.
Window Menu Contains At Most Environment/Max Window Menu ItemsIntegerRange	The maximum number of windows appearing in the Windows menu.

Programming Language Environment Options

Assembly Language

Property	Description
Column Guide Columns Text Editor/Indent/Assembly Language/ Column GuidesString	The columns that guides are drawn for.
Indent Closing Brace Text Editor/Indent/Assembly Language/ Close BraceBoolean	Indent the closing brace of compound statements.
Indent Context Text Editor/Indent/Assembly Language/ Context LinesIntegerRange	The number of lines to use for context when indenting.
Indent Mode Text Editor/Indent/Assembly Language/ Indent ModeEnumeration	How to indent when a new line is inserted.
Indent Opening Brace Text Editor/Indent/Assembly Language/Open BraceBoolean	Indent the opening brace of compound statements.
Indent Size Text Editor/Indent/Assembly Language/ SizeIntegerRange	The number of columns to indent a code block.
Tab Size Text Editor/Indent/Assembly Language/Tab SizeIntegerRange	The number of columns between tabstops.
Use Tabs Text Editor/Indent/Assembly Language/Use TabsBoolean	Insert tabs when indenting.
User-Defined Keywords Text Editor/Indent/Assembly Language/ KeywordsStringList	Additional identifiers to highlight as keywords.

C and C++

Property	Description
Column Guide Columns Text Editor/Indent/C and C++/Column GuidesString	The columns that guides are drawn for.

Indent Closing Brace Text Editor/Indent/C and C++/Close BraceBoolean	Indent the closing brace of compound statements.
Indent Context Text Editor/Indent/C and C++/Context LinesIntegerRange	The number of lines to use for context when indenting.
Indent Mode Text Editor/Indent/C and C++/Indent ModeEnumeration	How to indent when a new line is inserted.
Indent Opening Brace Text Editor/Indent/C and C++/Open BraceBoolean	Indent the opening brace of compound statements.
Indent Size Text Editor/Indent/C and C++/ SizeIntegerRange	The number of columns to indent a code block.
Tab Size Text Editor/Indent/C and C++/Tab SizeIntegerRange	The number of columns between tabstops.
Use Tabs Text Editor/Indent/C and C++/Use TabsBoolean	Insert tabs when indenting.
User-Defined Keywords Text Editor/Indent/C and C++/ KeywordsStringList	Additional identifiers to highlight as keywords.

Default

Property	Description
Column Guide Columns Text Editor/Indent/Default/Column GuidesString	The columns that guides are drawn for.
Indent Closing Brace Text Editor/Indent/Default/Close BraceBoolean	Indent the closing brace of compound statements.
Indent Context Text Editor/Indent/Default/Context LinesIntegerRange	The number of lines to use for context when indenting.
Indent Mode Text Editor/Indent/Default/Indent ModeEnumeration	How to indent when a new line is inserted.

Indent Opening Brace Text Editor/Indent/Default/Open BraceBoolean	Indent the opening brace of compound statements.
Indent Size Text Editor/Indent/Default/SizeIntegerRange	The number of columns to indent a code block.
Tab Size Text Editor/Indent/Default/Tab SizeIntegerRange	The number of columns between tabstops.
Use Tabs Text Editor/Indent/Default/Use TabsBoolean	Insert tabs when indenting.
User-Defined Keywords Text Editor/Indent/Default/KeywordsStringList	Additional identifiers to highlight as keywords.

Java

Property	Description
Column Guide Columns Text Editor/Indent/Java/Column GuidesString	The columns that guides are drawn for.
Indent Closing Brace Text Editor/Indent/Java/Close BraceBoolean	Indent the closing brace of compound statements.
Indent Context Text Editor/Indent/Java/Context LinesIntegerRange	The number of lines to use for context when indenting.
Indent Mode Text Editor/Indent/Java/Indent ModeEnumeration	How to indent when a new line is inserted.
Indent Opening Brace Text Editor/Indent/Java/Open BraceBoolean	Indent the opening brace of compound statements.
Indent Size Text Editor/Indent/Java/SizeIntegerRange	The number of columns to indent a code block.
Tab Size Text Editor/Indent/Java/Tab SizeIntegerRange	The number of columns between tabstops.
Use Tabs Text Editor/Indent/Java/Use TabsBoolean	Insert tabs when indenting.
User-Defined Keywords Text Editor/Indent/Java/KeywordsStringList	Additional identifiers to highlight as keywords.

Source Control Environment Options

External Tools

Property	Description
Diff Command Line Environment/Source Code Control/ DiffCommandStringList	The diff command line.
Merge Command Line Environment/Source Code Control/ MergeCommandStringList	The merge command line.

Preference

Property	Description
Add Immediately Environment/Source Code Control/Immediate AddBoolean	Bypasses the confirmation dialog and immediately adds items to source control.
Commit Immediately Environment/Source Code Control/Immediate CommitBoolean	Bypasses the confirmation dialog and immediately commits items.
Get Immediately Environment/Source Code Control/Immediate GetBoolean	Bypasses the confirmation dialog and immediately gets items from source control.
Lock Immediately Environment/Source Code Control/Immediate LockBoolean	Bypasses the confirmation dialog and immediately locks items.
Remove Immediately Environment/Source Code Control/Immediate RemoveBoolean	Bypasses the confirmation dialog and immediately removes items from source control.
Resolved Immediately Environment/Source Code Control/Immediate ResolvedBoolean	Bypasses the confirmation dialog and immediately mark items resolved.
Revert Immediately Environment/Source Code Control/Immediate RevertBoolean	Bypasses the confirmation dialog and immediately revert items.
Unlock Immediately Environment/Source Code Control/Immediate UnlockBoolean	Bypasses the confirmation dialog and immediately unlocks items.

Update Immediately Environment/Source Code Control/Immediate UpdateBoolean	Bypasses the confirmation dialog and immediately updates items.
---	---

Text Editor Environment Options

Auto Recovery

Property	Description
Auto Recovery Backup Time Text Editor/Auto Recovery Backup TimeIntegerRange	The time in minutes between saving of auto recovery backups files or 0 to disable generation of backup files.
Auto Recovery Keep Time Text Editor/Auto Recovery Keep TimeIntegerRange	The time in days to keep unrecovered backup files or 0 to disable deletion of unrecovered backup files.

Cursor Fence

Property	Description
Bottom Margin Text Editor/Margins/BottomIntegerRange	The number of lines in the bottom margin.
Keep Cursor Within Fence Text Editor/Margins/EnabledBoolean	Enable margins to fence and scroll around the cursor.
Left Margin Text Editor/Margins/LeftIntegerRange	The number of characters in the left margin.
Right Margin Text Editor/Margins/RightIntegerRange	The number of characters in the right margin.
Top Margin Text Editor/Margins/TopIntegerRange	The number of lines in the right margin.

Editing

Property	Description
Allow Drag and Drop Editing Text Editor/Drag Drop EditingBoolean	Enables dragging and dropping of selections in the text editor.
Bold Popup Diagnostic Messages Text Editor/Bold Popup DiagnosticsBoolean	Displays popup diagnostic messages in bold for easier reading.
Column-mode Tab Text Editor/Column Mode TabBoolean	Tab key moves to the next textual column using the line above.
Confirm Modified File Reload Text Editor/Confirm Modified File ReloadBoolean	Display a confirmation prompt before reloading a file that has been modified on disk.

Copy Action When Nothing Selected Text Editor/Copy ActionEnumeration	What Copy copies when nothing is selected.
Cut Action When Nothing Selected Text Editor/Cut ActionEnumeration	What Cut cuts when nothing is selected.
Cut Single Blank Line Text Editor/Cut Blank LinesBoolean	Selects whether to place text on the clipboard when a single blank line is cut. When set to Yes, cutting a single blank line will put the blank line on the clipboard. When set to No, cutting a single blank line deletes the line and does not place it on the clipboard.
Diagnostic Cycle Mode Text Editor/Diagnostic Cycle ModeEnumeration	Iterates through diagnostics either from most severe to least severe or in reported order.
Edit Read-Only Files Text Editor/Edit Read OnlyBoolean	Allow editing of read-only files.
Enable Virtual Space Text Editor/Enable Virtual SpaceBoolean	Permit the cursor to move into locations that do not currently contain text.
Numeric Keypad Editing Text Editor/Numeric Keypad EnabledBoolean	Selects whether the numeric keypad plus and minus buttons copy and cut text.
Tab Key Indents Preprocessor Directives Text Editor/Tab Key Indents Preprocessor DirectivesBoolean	Enables or disables the indentation of C preprocessor directives when using tab key indentation on a selection.
Undo And Redo Behavior Text Editor/Undo ModeEnumeration	How Undo and Redo group your typing when it is undone and redone.

Find And Replace

Property	Description
Case Sensitive Matching Text Editor/Find/Match CaseBoolean	Enables or disables the case sensitivity of letters when searching.
Find History Text Editor/Find/HistoryStringList	The list of strings recently used in searches.
Regular Expression Matching Text Editor/Find/Use RegExpBoolean	Enables regular expression matching rather than plain text matching.
Replace History Text Editor/Replace/HistoryStringList	The list of strings recently used in replaces.
Whole Word Matching Text Editor/Find/Match Whole WordBoolean	Enables or disables whole word matching when searching.

Formatting

Property	Description
----------	-------------

Access Modifier Offset Text Editor/Formatting/ AccessModifierOffsetInteger	The extra indent or outdent of access modifiers, e.g. public:.
Additional Formatting Styles Text Editor/Additional Formatting StylesStringList	Additional styles to pass to clang-format.
Align After Open Bracket Text Editor/Formatting/ AlignAfterOpenBracketBoolean	If enabled, horizontally aligns arguments after an open bracket.
Align Consecutive Assignments Text Editor/Formatting/ AlignConsecutiveAssignmentsBoolean	If enabled, aligns consecutive assignments.
Align Consecutive Declarations Text Editor/Formatting/ AlignConsecutiveDeclarationsBoolean	If enabled, aligns consecutive declarations.
Align Escaped Newlines Left Text Editor/Formatting/ AlignEscapedNewlinesLeftBoolean	If enabled, aligns escaped newlines as far left as possible otherwise puts them into the right-most column.
Align Operands Text Editor/Formatting/ AlignOperandsBoolean	If enabled, horizontally align operands of binary and ternary expressions.
Align Trailing Comments Text Editor/Formatting/ AlignTrailingCommentsBoolean	If enabled, aligns trailing comments.
Allow All Parameters Of Declaration On Next Line Text Editor/Formatting/ AllowAllParametersOfDeclarationOnNextLineBoolean	Allow putting all parameters of a function declaration onto the next line even if Bin-pack Parameters is disabled.
Allow Short 'if' Statements On A Single Line Text Editor/Formatting/ AllowShortIfStatementsOnASingleLineBoolean	If enabled, short 'if' statements are put on a single line.
Allow Short Blocks On A Single Line Text Editor/Formatting/ AllowShortBlocksOnASingleLineBoolean	If enabled, allows contracting simple braced statements to a single line.
Allow Short Case Labels On A Single Line Text Editor/Formatting/ AllowShortCaseLabelsOnASingleLineBoolean	If enabled, short case labels will be contracted to a single line.
Allow Short Functions On A Single Line Text Editor/Formatting/ AllowShortFunctionsOnASingleLineEnumeration	Optionally compress small functions to a single line.
Allow Short Loop Statements On A Single Line Text Editor/Formatting/ AllowShortLoopsOnASingleLineBoolean	If enabled, short loop statements are put on a single line.

Always Break After Return Type Text Editor/Formatting/ AlwaysBreakAfterReturnTypeEnumeration	The function declaration return type breaking style to use.
Always Break Before Multiline Strings Text Editor/Formatting/ AlwaysBreakBeforeMultilineStringsBoolean	If enabled, always break before multiline strings.
Always Break Template Declarations Text Editor/Formatting/ AlwaysBreakTemplateDeclarationsBoolean	If enabled, always break after the 'template<...>' of a template declaration.
Bin-Pack Arguments Text Editor/Formatting/ BinPackArgumentsBoolean	If disabled, a function call's arguments will either be all on the same line or will have one line each.
Bin-Pack Parameters Text Editor/Formatting/ BinPackParametersBoolean	If disabled, a function call's or function definition's parameters will either all be on the same line or will have one line each.
Break Before Binary Operators Text Editor/Formatting/ BreakBeforeBinaryOperatorsBoolean	The way to wrap binary operators.
Break Before Braces Text Editor/Formatting/ BreakBeforeBracesEnumeration	The brace breaking style to use.
Break Before Inheritance Comma Text Editor/Formatting/ BreakBeforeInheritanceCommaBoolean	If enabled, the class inheritance expression will break before : and , if there is multiple inheritance.
Break Before Ternary Operators Text Editor/Formatting/ BreakBeforeTernaryOperatorsBoolean	If enabled, ternary operators will be placed after line breaks.
Break Constructor Initializers Before Comma Text Editor/Formatting/ BreakConstructorInitializersBeforeCommaBool	If enabled, always break constructor initializers before commas and align the commas with the colon.
Break String Literals Text Editor/Formatting/ BreakStringLiteralsBoolean	Allow breaking string literals when formatting.
C++11 Braced List Style Text Editor/Formatting/ CplusplusBracedListStyleBoolean	If enabled, format braced lists as best suited for C++11 braced lists.
Column Limit Text Editor/Formatting/ColumnLimitInteger	The column limit which limits the width of formatted lines.
Comment Pragmas Text Editor/Formatting/CommentPragmasString	A regular expression that describes comments with special meaning, which should not be split into lines or otherwise changed.

Compact Namespaces Text Editor/Formatting/ CompactNamespacesBoolean	If enabled, consecutive namespace declarations will be on the same line. If disabled, each namespace is declared on a new line.
Constructor Initializer All On One Line Or One Per Line Text Editor/Formatting/ ConstructorInitializerAllOnOneLineOrOnePer	If enabled and the constructor initializers don't fit on a line, put each initializer on its own line.
Constructor Initializer Indent Width Text Editor/Formatting/ ConstructorInitializerIndentWidthInteger	The number of characters to use for indentation of constructor initializer lists.
Continuation Indent Width Text Editor/Formatting/ ContinuationIndentWidthInteger	Indent width for line continuations.
Derive Pointer Alignment Text Editor/Formatting/ DerivePointerAlignmentBoolean	If enabled, analyze the formatted file for the most common alignment of address of and dereference. PointerAlignment is then used only as fallback.
Empty Lines At End Of File Text Editor/Extra Formatting/ LinesAtEOFIntegerRange	The number of lines to add at the end of the file.
Fix Namespace Comments Text Editor/Formatting/ FixNamespaceCommentsBoolean	If enabled, add missing namespace end comments and fix invalid existing ones.
For-Each Macros Text Editor/Formatting/ ForEachMacrosStringList	A list of macros that should be interpreted as foreach loops rather than function calls.
Formatting Indent Width Text Editor/Formatting/IndentWidthInteger	The number of columns the code formatter uses for indentation. Note that this is not the indent width used by the text editor, that value is specified in the 'Languages' environment option group.
Formatting Style Text Editor/FormattingStyleEnumeration	Select a set of formatting options based on a named standard.
Formatting Tab Width Text Editor/Formatting/TabWidthIntegerRange	The number of columns the code formatter uses for tab stops. Note that this is not the tab width used by the text editor, that value is specified in the 'Languages' environment option group.
Include Is Main Regex Text Editor/Formatting/ IncludeIsMainRegexString	Specify a regular expression of suffixes that are allowed in the file-to-main-include mapping.
Indent Case Labels Text Editor/Formatting/ IndentCaseLabelsBoolean	If enabled, indent case labels one level from the switch statement.
Indent Wrapped Function Names Text Editor/Formatting/ IndentWrappedFunctionNamesBoolean	If enabled, Indent if a function definition or declaration is wrapped after the type.

Keep Empty Lines At The Start Of Blocks Text Editor/Formatting/ KeepEmptyLinesAtTheStartOfBlocksBoolean	If enabled, empty lines at the start of blocks are kept.
Macro Block Begin Text Editor/Formatting/ MacroBlockBeginString	A regular expression matching macros that start a block.
Macro Block End Text Editor/Formatting/MacroBlockEndString	A regular expression matching macros that end a block.
Maximum Empty Lines To Keep Text Editor/Formatting/ MaxEmptyLinesToKeepInteger	The maximum number of consecutive empty lines to keep.
Namespace Indentation Text Editor/Formatting/ NamespaceIndentationEnumeration	The indentation used for namespaces.
Penalty Break Assignment Text Editor/Formatting/ PenaltyBreakAssignmentIntegerRange	The penalty for breaking around an assignment operator.
Penalty Break Before First Call Parameter Text Editor/Formatting/ PenaltyBreakBeforeFirstCallParameterIntegerR	The penalty for breaking a function call after 'call('.
Penalty Break Before First Less-Less Text Editor/Formatting/ PenaltyBreakFirstLessLessIntegerRange	The penalty for breaking before the first less-less.
Penalty Break Comment Text Editor/Formatting/ PenaltyBreakCommentIntegerRange	The penalty for each line break introduced inside a comment.
Penalty Break String Text Editor/Formatting/ PenaltyBreakStringIntegerRange	The penalty for each line break introduced inside a string literal.
Penalty Excess Character Text Editor/Formatting/ PenaltyExcessCharacterIntegerRange	The penalty for each character outside of the column limit.
Penalty Return Type On Its Own Line Text Editor/Formatting/ PenaltyReturnTypeOnItsOwnLineIntegerRange	Penalty for putting the return type of a function onto its own line.
Pointer Alignment Text Editor/Formatting/ PointerAlignmentEnumeration	Pointer and reference alignment style.
Reflow Comments Text Editor/Formatting/ ReflowCommentsBoolean	If enabled, clang-format will attempt to re-flow comments.
Sort Includes Text Editor/Formatting/SortIncludesBoolean	If enabled, sort #includes.

Sort Using Declarations Text Editor/Formatting/ SortUsingDeclarationsBoolean	If enabled, sort using declarations.
Space After C Style Cast Text Editor/Formatting/ SpaceAfterCStyleCastBoolean	If enabled, a space may be inserted after C style casts.
Space After Template Keyword Text Editor/Formatting/ SpaceAfterTemplateKeywordBoolean	If enabled, a space will be inserted after the ?template? keyword.
Space Before Assignment Operators Text Editor/Formatting/ SpaceBeforeAssignmentOperatorsBoolean	If disabled spaces will be removed before assignment operators.
Space Before Parentheses Text Editor/Formatting/ SpaceBeforeParensEnumeration	Defines in which cases to put a space before opening parentheses.
Space In Empty Parentheses Text Editor/Formatting/ SpaceInEmptyParenthesesBoolean	If enabled, spaces may be inserted into '()'. The number of spaces before trailing line comments.
Spaces Before Trailing Comments Text Editor/Formatting/ SpacesBeforeTrailingCommentsIntegerRange	
Spaces In Angles Text Editor/Formatting/ SpacesInAnglesBoolean	If enabled, spaces will be inserted around the angle brackets in template argument lists.
Spaces In C-style Cast Parentheses Text Editor/Formatting/ SpacesInCStyleCastParenthesesBoolean	If enabled, spaces may be inserted into C style casts.
Spaces In Container Literals Text Editor/Formatting/ SpacesInContainerLiteralsBoolean	If enabled, spaces are inserted inside container literals.
Spaces In Parentheses Text Editor/Formatting/ SpacesInParenthesesBoolean	If true, spaces will be inserted after '(' and before ')'. If true, spaces will be inserted after '[' and before ']'.
Spaces In Square Brackets Text Editor/Formatting/ SpacesInSquareBracketsBoolean	
Standard Text Editor/Formatting/StandardEnumeration	Format compatible with this standard
Tab Style Text Editor/Formatting/UseTabEnumeration	The way to use hard tab characters in the resulting file.

Use .clang-format File Text Editor/Use .clang-format FileBoolean	Load code formatting style configuration from a .clang-format file located in one of the parent directories of the source file rather than use the formatting options.
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International

Property	Description
Auto-Detect UTF-8 Text Editor/Auto-Detect UTF-8Boolean	Auto-detect UTF-8 encoding without signature.
Default Text File Encoding Text Editor/Default CodecEnumeration	The encoding to use if not overridden by a project property or file is not in a known format.

Mouse

Property	Description
Alt+Left Click Action Environment/Project Explorer/Alt+Left Click ActionEnumeration	The action the editor performs on Alt+Left Click.
Alt+Middle Click Action Environment/Project Explorer/Alt+Middle Click ActionEnumeration	The action the editor performs on Alt+Middle Click.
Alt+Right Click Action Environment/Project Explorer/Alt+Right Click ActionEnumeration	The action the editor performs on Alt+Right Click.
Copy On Mouse Select Text Editor/Copy On Mouse SelectBoolean	Automatically copy text to clipboard when marking a selection with the mouse.
Ctrl+Left Click Action Environment/Project Explorer/Ctrl+Left Click ActionEnumeration	The action the editor performs on Ctrl+Left Click.
Ctrl+Middle Click Action Environment/Project Explorer/Ctrl+Middle Click ActionEnumeration	The action the editor performs on Ctrl+Middle Click.
Ctrl+Right Click Action Environment/Project Explorer/Ctrl+Right Click ActionEnumeration	The action the editor performs on Ctrl+Right Click.
Middle Click Action Environment/Project Explorer/Middle Click ActionEnumeration	The action the editor performs on Middle Click.

Mouse Wheel Adjusts Font Size Text Editor/Mouse Wheel Adjusts Font Size Boolean	Enable or disable resizing of font by mouse wheel when CTRL key pressed.
Shift+Middle Click Action Environment/Project Explorer/Shift+Middle Click Action Enumeration	The action the editor performs on Shift+Middle Click.
Shift+Right Click Action Environment/Project Explorer/Shift+Right Click Action Enumeration	The action the editor performs on Shift+Right Click.

Programmer Assistance

Property	Description
ATTENTION Tag List Text Editor/ATTENTION Tags StringList	Set the tags to display as ATTENTION comments.
Ask For Index Text Editor/Ask For Index Boolean	Ask to index the project if goto symbol fails in current editor context.
Auto-Comment Text Text Editor/Auto Comment Boolean	Enable or disable automatically swapping commenting on source lines by typing '/' with an active selection.
Auto-Surround Text Text Editor/Auto Surround Boolean	Enable or disable automatically surrounding selected text when typing triangular brackets, quotation marks, parentheses, brackets, or braces.
Check Spelling Text Editor/Spell Checking Boolean	Enable spell checking in comments.
Code Completion Replaces Existing Word Text Editor/Completion Replaces Existing Word Boolean	Replace existing word with completion suggestion if cursor is located on one.
Code Completion Suggestion Selection Key Text Editor/Suggestion Selection Key Enumeration	The key used to select a code completion suggestion.
Display Code Completion Suggestions While Typing Text Editor/Suggest Completion While Typing Boolean	Enable code completion as you type without needing to use the show suggestions key (Ctrl+J).
Enable Popup Diagnostics Text Editor/Enable Popup Diagnostics Boolean	Enables on-screen diagnostics in the text editor.
FIXME Tag List Text Editor/FIXME Tags StringList	Set the tags to display as FIXME comments.
Inactive Code Opacity Text Editor/Inactive Code Opacity IntegerRange	Specifies the opacity of code that has been conditionally excluded by the preprocessor.

Include Preprocessor Definitions in Suggestions Text Editor/Preprocessor Definition SuggestionsBoolean	Include or exclude preprocessor definitions in code completion suggestions.
Include Templates in Suggestions Text Editor/Template SuggestionsBoolean	Include or exclude templates in code completion suggestions.
Lint Tag List Text Editor/LINT TagsStringList	Set the tags to display as Lint directives.
Show Inactive Code Text Editor/Show Inactive CodeBoolean	Show code that has been conditionally excluded by the preprocessor.
Show Symbol Declaration Tooltips Text Editor/Show TooltipBoolean	Show tooltips when hovering over symbols.
Template Characters To Match Text Editor/Template Suggestions CharactersIntegerRange	The number of characters to match before suggesting a template.

Save

Property	Description
Backup File History Depth Text Editor/Backup File DepthIntegerRange	The number of backup files to keep when saving an existing file.
Default Line Endings Text Editor/Default Line EndingsEnumeration	The line ending format to use for a new file or a file where the existing line ending format cannot be determined.
Delete Trailing Space On Save Text Editor/Delete Trailing Space On SaveBoolean	Deletes trailing whitespace from each line when a file is saved.
Tab Cleanup On Save Text Editor/Cleanup Tabs On SaveEnumeration	Cleans up tabs when a file is saved.

Visual Appearance

Property	Description
Font Text Editor/FontFixedPitchFont	The font to use for text editors.
Font Rendering Text Editor/Font RenderingEnumeration	The font rendering scheme to use in text editors.
Font Smoothing Threshold Text Editor/Antialias ThresholdIntegerRange	The minimum size for font smoothing; font sizes smaller than this will have antialiasing turned off.
Hide Cursor When Typing Text Editor/Hide Cursor When TypingBoolean	Hide or show the I-beam cursor when you start to type.

Highlight All Selected Text Text Editor/Highlight All Selected TextBoolean	Enable or disable visually highlighting all text that matches the current selection.
Highlight Cursor Line Text Editor/Highlight Cursor LineBoolean	Enable or disable visually highlighting the cursor line.
Horizontal Scroll Bar Text Editor/HScroll BarEnumeration	Show or hide the horizontal scroll bar.
Insert Caret Style Text Editor/Insert Caret StyleEnumeration	How the caret is displayed with the editor in insert mode.
Line Numbers Text Editor/Line Number ModeEnumeration	How often line numbers are displayed in the margin.
Mate Match Off Screen Text Editor/Mate Match Off ScreenBoolean	Specifies whether braces, brackets, and parentheses are matched when off screen.
Mate Matching Mode Text Editor/Mate Matching ModeEnumeration	Controls when braces, brackets, and parentheses are matched.
Minimum Scroll Width Text Editor/Minimum Scroll WidthIntegerRange	Specifies the minimum width of the scrolling region in characters.
Overwrite Caret Style Text Editor/Overwrite Caret StyleEnumeration	How the caret is displayed with the editor in overwrite mode.
Selection Opacity Text Editor/Selection OpacityIntegerRange	Specifies the opacity of text selection.
Show Bookmarks In Vertical Scroll Bar Text Editor/Show Bookmarks In Vertical Scroll BarBoolean	Annotate the vertical scroll bar with bookmark positions.
Show Breakpoints In Vertical Scroll Bar Text Editor/Show Breakpoints In Vertical Scroll BarBoolean	Annotate the vertical scroll bar with breakpoint positions.
Show Caret Position In Vertical Scroll Bar Text Editor/Show Caret In Vertical Scroll BarBoolean	Annotate the vertical scroll bar with the caret's position within the document.
Show Diagnostic Icons In Gutter Text Editor/Diagnostic IconsBoolean	Enables display of diagnostic icons in the icon gutter.
Show Errors In Vertical Scroll Bar Text Editor/Show Errors In Vertical Scroll BarBoolean	Annotate the vertical scroll bar with error positions.
Show Fold Gutter Text Editor/Fold GutterBoolean	Show or hide the left-hand gutter containing folding controls.
Show Icon Gutter Text Editor/Icon GutterBoolean	Show or hide the left-hand gutter containing breakpoint, bookmark, and optional diagnostic icons.

Show Mini Toolbar Text Editor/Mini ToolbarBoolean	Show the mini toolbar when selecting text with the mouse.
Show Toolbar Text Editor/ShowWidgetStripBoolean	Show or hide the Editor toolbar in the dock window.
Show Warnings In Vertical Scroll Bar Text Editor/Show Warnings In Vertical Scroll BarBoolean	Annotate the vertical scroll bar with warning positions.
Use I-beam Cursor Text Editor/Ibeam cursorBoolean	Show an I-beam or arrow cursor in the text editor.
Vertical Scroll Bar Text Editor/VScroll BarEnumeration	Show or hide the vertical scroll bar.
View Whitespace Text Editor/View WhitespaceBoolean	Make whitespace characters visible in the text editor.

Windows Environment Options

Autos

Property	Description
Show Member Functions Environment/AutosWindow/Show Member FunctionsBoolean	Controls whether C++ class member functions are displayed.
Show Variable Address Column Environment/AutosWindow/Show Address ColumnBoolean	Controls whether the variable address column is displayed.
Show Variable Size Column Environment/AutosWindow/Show Size ColumnBoolean	Controls whether the variable size column is displayed.
Show Variable Type Column Environment/AutosWindow/Show Type ColumnBoolean	Controls whether the variable type column is displayed.

Call Stack

Property	Description
Execution Frame at Top Environment/Call Stack/Most Recent At TopBoolean	Controls whether the most recent call is at the top or the bottom of the list.
Show Call Address Environment/Call Stack/Show Call AddressBoolean	Enables the display of the call address in the call stack.
Show Call Source Location Environment/Call Stack/Show Call LocationBoolean	Enables the display of the call source location in the call stack.
Show Frame Size Environment/Call Stack/Show Stack UsageBoolean	Enables the display of the amount of stack used by the call.
Show Frame Size In Bytes Environment/Call Stack/Show Stack Usage In BytesBoolean	Display the stack usage in bytes rather than words.
Show Parameter Names Environment/Call Stack/Show Parameter NamesBoolean	Enables the display of parameter names in the call stack.

Show Parameter Types Environment/Call Stack/Show Parameter TypesBoolean	Enables the display of parameter types in the call stack.
Show Parameter Values Environment/Call Stack/Show Parameter ValuesBoolean	Enables the display of parameter values in the call stack.
Show Stack Pointer Environment/Call Stack/Show Stack PointerBoolean	Enables the display of the stack pointer in the call stack.
Show Stack Usage Environment/Call Stack/Show Cumulative Stack UsageBoolean	Enables the display of the amount of stack used.
Show Stack Usage In Bytes Environment/Call Stack/Show Cumulative Stack Usage In BytesBoolean	Display the stack usage in bytes rather than words.

Clipboard Ring

Property	Description
Maximum Items Held In Ring Environment/Clipboard Ring/Max EntriesIntegerRange	The maximum number of items held on the clipboard ring before they are recycled.
Preserve Contents Between Runs Environment/Clipboard Ring/SaveBoolean	Save the clipboard ring across SEGGER Embedded Studio runs.

Debug Terminal

Property	Description
Backscroll Buffer Lines Debug Terminal/Backscroll Buffer LinesIntegerRange	The number of lines you can see when you scroll backward in the debug terminal window.
Use Window System Colors Debug Terminal/Use Window System ColorsBoolean	Substitute window system colors for ANSI black background and white foreground in debug terminal.

Globals

Property	Description
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Show Member Functions Environment/GlobalsWindow/Show Member FunctionsBoolean	Controls whether C++ class member functions are displayed.
Show Variable Address Column Environment/GlobalsWindow/Show Address ColumnBoolean	Controls whether the variable address column is displayed.
Show Variable Size Column Environment/GlobalsWindow/Show Size ColumnBoolean	Controls whether the variable size column is displayed.
Show Variable Type Column Environment/GlobalsWindow/Show Type ColumnBoolean	Controls whether the variable type column is displayed.

Locals

Property	Description
Show Member Functions Environment/LocalsWindow/Show Member FunctionsBoolean	Controls whether C++ class member functions are displayed.
Show Variable Address Column Environment/LocalsWindow/Show Address ColumnBoolean	Controls whether the variable address column is displayed.
Show Variable Size Column Environment/LocalsWindow/Show Size ColumnBoolean	Controls whether the variable size column is displayed.
Show Variable Type Column Environment/LocalsWindow/Show Type ColumnBoolean	Controls whether the variable type column is displayed.

Memory

Property	Description
Confirm Large Download Environment/Memory Window/Confirm SizeBoolean	Present a warning if you attempt to download a large amount of memory in the memory window.
Group Auto Columns Environment/Memory Window/Group Auto ColumnsBoolean	Selects whether columns are grouped in automatic column mode.
Locate Sets Entry Width Environment/Memory Window/Locate Sets Entry WidthBoolean	Set the memory window entry width if possible when locating.

Locate Sets Size Environment/Memory Window/Locate Sets SizeBoolean	Set the memory window size when locating.
Scroll Wheel Modifies Start Address Environment/Memory Window/Scroll Wheel Modifies Start AddressBoolean	Selects whether the mouse scroll wheel can change the memory window start address.

Outline

Property	Description
Group #define Directives Windows/Outline/Group DefinesBoolean	Group consecutive #define and #undef preprocessor directives.
Group #include Directives Windows/Outline/Group IncludesBoolean	Group consecutive #include preprocessor directives.
Group Top-Level Declarations Windows/Outline/Group Top Level ItemsBoolean	Group consecutive top-level variable and type declarations.

Project Explorer

Property	Description
Add Filename Replace Macros Environment/Project Explorer/Filename Replace MacrosStringList	Macros (system and global) used to replace the start of a filename on project file addition.
Check Solution Target Environment/Project Explorer/Check Solution TargetBoolean	Specifies whether to check target is correct when loading a solution.
Color Project Nodes Environment/Project Explorer/Color NodesBoolean	Show the project nodes colored for identification in the Project Explorer.
Confirm Configuration Folder Delete Project Explorer/Confirm Configuration Folder DeleteBoolean	Display a confirmation prompt before deleting a configuration folder cotaining properties.
Confirm File Replacement Warning Project Explorer/Confirm File Replacement WarningBoolean	Display a confirmation prompt before replacing project files for import and creation
Confirm Forget Modified Options Project Explorer/Confirm Reject Property ChangesBoolean	Display a confirmation prompt before forgetting option modifications.

Context Menu Edit Options At Top Environment/Project Explorer/Context Menu Properties PositionBoolean	Controls where Edit Options are displayed by the Project Explorer's context menu.
Context Menu Uses Common Folder Environment/Project Explorer/Context Menu Common FolderBoolean	Controls how common options are displayed by the Project Explorer's context menu.
External Editor Environment/Project Explorer/External EditorFileName	The file name of the application to use as the external text editor. The external editor is started by holding down the Shift key when opening files from the project explorer.
Highlight Dynamic Items Environment/Project Explorer/Show Dynamic OverlayBoolean	Show an overlay on an item if it is populated from a dynamic folder.
Highlight External Items Environment/Project Explorer/Show Non-Local OverlayBoolean	Show an overlay on an item if it is not held within the project directory.
Output Files Folder Environment/Project Explorer/Show Output FilesBoolean	Show the build output files in an Output Files folder in the project explorer.
Read-Only Data In Code Environment/Project Explorer/Statistics Read-Only Data HandlingBoolean	Configures whether read-only data contributes to the Code or Data statistic.
Show Dependencies Environment/Project Explorer/Dependencies DisplayEnumeration	Controls how the dependencies are displayed.
Show Favorite Properties Environment/Project Explorer/Context Menu Show FavoritesBoolean	Controls if favorite properties are displayed by the Project Explorer's context menu.
Show File Count on Folder Environment/Project Explorer/Count FilesBoolean	Show the number of files contained in a folder as a badge in the Project Explorer.
Show Modified Options on Folder/File Environment/Project Explorer/Show Modified PropertiesBoolean	Show if a folder or file has modified options as a badge in the Project Explorer.
Show Options Environment/Project Explorer/Properties DisplayEnumeration	Controls how the options are displayed.
Show Project Count on Solution Environment/Project Explorer/Count ProjectsBoolean	Show the number of projects contained in a solution as a badge in the Project Explorer.
Show Source Control Annotation Environment/Project Explorer/Show Source Control AnnotationBoolean	Annotate items in the project explorer with their source control status.

Show Statistics Rounded Environment/Project Explorer/Statistics FormatBoolean	Show exact or rounded sizes in the project explorer.
Source Control Status Column Environment/Project Explorer/Show Source Control ColumnBoolean	Show the source control status column in the project explorer.
Starred Files Names Environment/Project Explorer/Starred File NamesStringList	The list of wildcard-matched file names that are highlighted with stars, to bring attention to themselves, in the Project Explorer.
Statistics Column Environment/Project Explorer/Statistics DisplayBoolean	Show the code and data size columns in the Project Explorer.
Synchronize Explorer With Editor Environment/Project Explorer/Sync EditorBoolean	Synchronizes the Project Explorer with the document being edited.
Use Common Options Folder Environment/Project Explorer/Common Properties DisplayBoolean	Controls how common options are displayed.

Source Navigator

Property	Description
Show Definitions Only Windows/Source Navigator/Show Definitions OnlyBoolean	Show definitions only. When set to Yes only symbols that are defined will be included in the source navigator display. When set to No declarations of symbols will also be included in the source navigator display.

Symbol Browser

Property	Description
Code Field Environment/Symbol Browser/Display CodeBoolean	Selects whether the Code field is displayed.
Const Field Environment/Symbol Browser/Display ConstBoolean	Selects whether the Const field is displayed.
Data Field Environment/Symbol Browser/Display DataBoolean	Selects whether the Data field is displayed.

Frame Size Field Environment/Symbol Browser/Display Frame SizeBoolean	Selects whether the Frame Size field is displayed.
Range Field Environment/Symbol Browser/Display RangeBoolean	Selects whether the Range field is displayed.
Section Field Environment/Symbol Browser/Display SectionBoolean	Selects whether the Section field is displayed.
Size Field Environment/Symbol Browser/Display SizeBoolean	Selects whether the Size field is displayed.
Sort Criteria Environment/Symbol Browser/GroupingEnumeration	Selects how to sort or group the symbols displayed.
Type Field Environment/Symbol Browser/Display TypeBoolean	Selects whether the Type field is displayed.
Value Field Environment/Symbol Browser/Display ValueBoolean	Selects whether the Value field is displayed.

Terminal Emulator

Property	Description
Backscroll Buffer Lines Terminal Emulator/Backscroll Buffer LinesIntegerRange	The number of lines you can see when you scroll backward in the terminal emulator window.
Baud Rate Terminal Emulator/Communications/Baud RateEnumeration	Baud rate used when transmitting and receiving data.
Data Bits Terminal Emulator/Communications/Data BitsEnumeration	Number of data bits to use when transmitting and receiving data.
Flow Control Terminal Emulator/Communications/Flow ControlEnumeration	The flow control method to use.
Line Feed On Carriage Return Terminal Emulator/Line Feed On Carriage ReturnBoolean	Append a line feed character when a carriage return character is received.
Local Echo Terminal Emulator/Local EchoBoolean	Displays every character typed before sending to the remote computer.

Maximum Input Block Size Terminal Emulator/Maximum Input Block SizeIntegerRange	The maximum number of bytes to read at a time.
Parity Terminal Emulator/Communications/ParityEnumeration	Parity used when transmitting and receiving data.
Port Terminal Emulator/Communications/PortCOMPort	The communications port to use, e.g. /dev/ttyS0, /dev/ttyS1, etc.
Port Used By Target Interface Terminal Emulator/Communications/Port Used By Target InterfaceBoolean	The COM port will be disconnected when the target interface is connected and reconnected when the target interface is disconnected.
Set DTR Terminal Emulator/Communications/DTRBoolean	Set the DTR signal.
Stop Bits Terminal Emulator/Communications/Stop BitsEnumeration	Number of stop bits to use when transmitting data.

Watch 1

Property	Description
Show Member Functions Environment/Watch1Window/Show Member FunctionsBoolean	Controls whether C++ class member functions are displayed.
Show Variable Address Column Environment/Watch1Window/Show Address ColumnBoolean	Controls whether the variable address column is displayed.
Show Variable Size Column Environment/Watch1Window/Show Size ColumnBoolean	Controls whether the variable size column is displayed.
Show Variable Type Column Environment/Watch1Window/Show Type ColumnBoolean	Controls whether the variable type column is displayed.

Watch 2

Property	Description
Show Member Functions Environment/Watch2Window/Show Member FunctionsBoolean	Controls whether C++ class member functions are displayed.

Show Variable Address Column Environment/Watch2Window/Show Address ColumnBoolean	Controls whether the variable address column is displayed.
Show Variable Size Column Environment/Watch2Window/Show Size ColumnBoolean	Controls whether the variable size column is displayed.
Show Variable Type Column Environment/Watch2Window/Show Type ColumnBoolean	Controls whether the variable type column is displayed.

Watch 3

Property	Description
Show Member Functions Environment/Watch3Window/Show Member FunctionsBoolean	Controls whether C++ class member functions are displayed.
Show Variable Address Column Environment/Watch3Window/Show Address ColumnBoolean	Controls whether the variable address column is displayed.
Show Variable Size Column Environment/Watch3Window/Show Size ColumnBoolean	Controls whether the variable size column is displayed.
Show Variable Type Column Environment/Watch3Window/Show Type ColumnBoolean	Controls whether the variable type column is displayed.

Watch 4

Property	Description
Show Member Functions Environment/Watch4Window/Show Member FunctionsBoolean	Controls whether C++ class member functions are displayed.
Show Variable Address Column Environment/Watch4Window/Show Address ColumnBoolean	Controls whether the variable address column is displayed.
Show Variable Size Column Environment/Watch4Window/Show Size ColumnBoolean	Controls whether the variable size column is displayed.
Show Variable Type Column Environment/Watch4Window/Show Type ColumnBoolean	Controls whether the variable type column is displayed.

Windows

Property	Description
Buffer Grouping Environment/Windows/GroupingEnumeration	How the files are grouped or listed in the Windows window.
Show File Path as Tooltip Environment/Windows/Show Filename TooltipsBoolean	Show the full file name as a tooltip when hovering over files in the Windows window.
Show Line Count and File Size Environment/Windows/Show SizesBoolean	Show the number of lines and size of each file in the windows list.

Code Options

Assembler

Property	Description
Additional Assembler Options asm_additional_optionsStringList	Enables additional options to be supplied to the assembler. This property will have macro expansion applied to it.
Additional Assembler Options From File asm_additional_options_from_fileProjFileName	Enables additional options to be supplied to the assembler from a file. This property will have macro expansion applied to it.
Assembler arm_assembler_variantEnumeration	Specifies which assembler to use.
Backup Additional Assembler Options asm_additional_options_backupString	Value of additional assembler options prior to generic options processing.
Generate Assembler Listing File asm_generate_listing_fileBoolean	An assembler listing file is generated which can be found in the Output Files folder
Run Preprocessor arm_preprocess_assembly_codeBoolean	The assembly code file is preprocessed before assembly

Build

Property	Description
Always Rebuild build_always_rebuildBoolean	Specifies whether or not to always rebuild the project/folder/file.
Batch Build Configurations batch_build_configurationsStringList	The set of configurations to batch build.
Build Options Generic File Name build_generic_options_file_nameProjFileName	The file name containing the generic options.
Build Quietly build_quietlyBoolean	Suppress the display of startup banners and information messages.
Dependency File Name build_dependency_file_nameFileName	The file name to contain the dependencies.
Enable Unused Symbol Removal build_remove_unused_symbolsBoolean	Enable the removal of unused symbols from the executable.
Exclude From Build build_exclude_from_buildBoolean	Specifies whether or not to exclude the project/folder/file from the build.
GCC Prefix gcc_prefixString	The string that is prepended to the gcc toolname e.g arm-none-eabi-. The macro \$(GCCPrefix) is set to this value for external build command lines.

<p>Include Debug Information build_debug_informationBoolean</p>	Specifies whether symbolic debug information is generated.
<p>Intermediate Directory build_intermediate_directoryDirPath</p>	Specifies a relative path to the intermediate file directory. This property will have macro expansion applied to it. The macro \$(IntDir) is set to this value.
<p>Object File Name build_object_file_nameFileName</p>	Specifies a name to override the default object file name.
<p>Output Directory build_output_directoryDirPath</p>	Specifies a relative path to the output file directory. This property will have macro expansion applied to it. The macro \$(OutDir) is set to this value. The macro \$(RootRelativeOutDir) is set relative to the Root Output Directory if specified.
<p>Project Can Build In Parallel project_can_build_in_parallelEnumeration</p>	Specifies that dependent projects can be built in parallel. Default is No for Staging and Combining project types, Yes for all other project types.
<p>Project Dependencies project_dependenciesStringList</p>	Specifies the projects the current project depends upon.
<p>Project Directory project_directoryString</p>	Path of the project directory relative to the directory containing the project file. The macro \$(ProjectDir) is set to the absolute path of this property.
<p>Project Macros macrosStringList</p>	Specifies macro values which are expanded in project properties and for file names in Common configuration only. Each macro is defined as name=value and are separated by ;.
<p>Project Type project_typeEnumeration</p>	Specifies the type of project to build. The options are Executable, Library, Object file, Staging, Combining, Externally Built Executable, Externally Built Library, Externally Built Object file .
<p>Property Groups File property_groups_file_pathProjFileName</p>	The file containing the property groups for this project. This is applicable to Executable and Externally Built Executable project types only.
<p>Root Output Directory build_root_output_directoryDirPath</p>	Allows a common root output directory to be specified that can be referenced using the \$(RootOutDir) macro.
<p>Suppress Warnings build_suppress_warningsBoolean</p>	Don't report warnings.
<p>Toolchain Directory build_toolchain_directoryDirPath</p>	Specify the root of the toolchain directory. This property will have macro expansion applied to it. The macro \$(ToolChainDir) is set to this value.
<p>Treat Warnings as Errors build_treat_warnings_as_errorsBoolean</p>	Treat all warnings as errors.

Code Analyzer

Property	Description
Analyze After Compile <code>analyze_after_compile</code> Boolean	Run the static code analyzer after compile
Clang Tidy Checks C <code>clang_tidy_checks_c</code> StringList	Checks to supply to clang-tidy for C source files.
Clang Tidy Checks C++ <code>clang_tidy_checks_cpp</code> StringList	Checks to supply to clang-tidy for C++ source files.

Code Generation

Property	Description
Debugging Level <code>gcc_debugging_level</code> Enumeration	Specifies the level of debugging information to generate. The options are: <ul style="list-style-type: none"> None - no debugging information Level 1 - backtrace and line number debugging information Level 2 - Level 1 and variable display debugging information Level 3 - Level 2 and macro display debugging information
Disable Function Inlining <code>gcc_disable_function_inlining</code> Boolean	Disable auto inlining of functions when optimization enables this.
Dwarf Version <code>gcc_dwarf_version</code> Enumeration	Specifies the version of Dwarf debugging information to generate.
Emit Assembler CFI <code>gcc_emit_assembler_cfi</code> Boolean	Emit DWARF 2 unwind info using GAS <code>.cfi_*</code> directives rather than a compiler generated <code>.eh_frame</code> section.
Enable Coroutines <code>gcc_enable_coroutines</code> Boolean	Enable compiler coroutine support.
Enable Exception Support <code>cpp_enable_exceptions</code> Boolean	Specifies whether exception support is enabled for C++ programs.
Enable Linker Relaxation <code>rv_relax</code> Boolean	If enabled the linker may be able to optimize the instructions used to access symbols.
Enable RTTI Support <code>cpp_enable_rtti</code> Boolean	Specifies whether RTTI support is enabled for C++ programs.
Enable Save Restore <code>rv_save_restore</code> Enumeration	If enabled use smaller but slower prolog and epilog code.
Enable Use Of <code>__cxa_atexit</code> <code>gcc_use_cxa_at_exit</code> Boolean	Enable compiler usage of <code>__cxa_atexit</code> .

Enumeration Size gcc_short_enumEnumeration	Select between minimal container sized enumerations and int sized enumerations.
GNU Tools Prefix rv_toolchain_prefixString	The GNU tools prefix e.g andes-
Generate Dwarf Debug Types gcc_dwarf_generate_debug_typesBoolean	Generate Dwarf .debug_types section.
Generate Dwarf Pubnames gcc_dwarf_generate_pubnamesBoolean	Generate Dwarf .debug_pubnames and .debug_pubtypes sections.
Instrument Functions arm_instrument_functionsBoolean	Specifies whether instrumentation calls are generated for function entry and exit.
Keep Link Time Optimization Intermediate Files link_keep_lto_filesBoolean	Specifies whether to keep the link time optimization resolution and object files.
Link Time Optimization link_time_optimizationBoolean	Specifies whether the project should be built for optimization at link time.
Link Time Optimization Additional Options lto_additional_optionsStringList	Enables additional options to be supplied to the link time optimization process
Machine Outliner [clang+segger-cc] clang_machine_outlinerEnumeration	Select machine outliner mode. An optimization that reduces code size by identifying identical code sequences across functions and replaces them with a call to a function which contains the identical code sequence.
Math Erno arm_math_errnoBoolean	Set errno after calling math functions that are executed with a single instruction, e.g., sqrt.
No COMMON gcc_no_commonBoolean	Don't put globals in the common section
Omit Frame Pointer gcc_omit_frame_pointerBoolean	Specifies whether a frame pointer register is omitted if not required.
Optimization Level gcc_optimization_levelEnumeration	Specifies the optimization level to use. The options are: None - don't specify an optimization level Level 0 - no optimization, fastest compilation and best debug experience. Level 1 - optimize minimally. Level 2 for speed Level 2 balanced Level 2 for size Level 3 for more speed - optimize even more, will take longer to compile and may produce much larger code.

<p>RISC-V ABI rv_abiEnumeration</p>	<p>Specifies the floating point instruction set to generate code for. The options are:</p> <ul style="list-style-type: none"> ilp32 - software floating point ilp32d - hardware double precision floating point ilp32e - embedded abi ilp32f - hardware single precision floating point lp64 - software floating point lp64d - hardware double precision floating point lp64f - hardware single precision floating point None - do not supply an abi command line option
<p>RISC-V ISA rv_architectureEnumeration</p>	<p>Specifies the instruction set to generate code for. The options are:</p> <ul style="list-style-type: none"> rv32e - RV32E with no extensions rv32ec - RV32E with C extension rv32em - RV32E with M extension rv32emc - RV32E with M and C extensions rv32ema - RV32E with M and A extensions rv32emac - RV32E with M, A and C extensions rv32i - RV32I with no extensions rv32ic - RV32I with C extension rv32im - RV32I with M extension rv32imc - RV32I with M and C extensions rv32imf - RV32I with M and F extensions rv32imfc - RV32I with M, F and C extensions rv32ima - RV32I with M and A extensions rv32imac - RV32I with M, A and C extensions rv32imaf - RV32I with M, A and F extensions rv32imafc - RV32I with M, A, F and C extensions rv32g - RV32I with M, A, F and D extensions rv32gc - RV32I with M, A, F, D and C extensions rv64i - RV64I with no extensions rv64ic - RV64I with C extension rv64im - RV64I with M extension rv64imc - RV64I with M and C extensions rv64imf - RV64I with M, and F and C extensions rv64imfc - RV64I with M, F and C extensions rv64ima - RV64I with M and A extensions rv64imac - RV64I with M, A and C extensions rv64imaf - RV64I with M, A and F extensions rv64imafc - RV64I with M, A, F and C extensions rv64g - RV64I with M, A, F and D extensions rv64gc - RV64I with M, A, F, D and C extensions None - do not supply an architecture command line option
<p>RISC-V ISA Extension rv_arch_extString</p>	<p>Additional extensions to supply to the GNU tools</p>

RISC-V Memory Code Model <code>rv_mcmodelEnumeration</code>	Specifies the 64-bit code model to generate code for. The options are: medlow - memory map has address ranges of -2Gb to +2Gb medany - memory map has address ranges of +2Gb None - do not supply an mcmodel command line option
Relocation Model [clang+segger-cc] <code>clang_relocation_modelEnumeration</code>	Select relocation model.
Stack Usage [clang+segger-cc] <code>generate_stack_usageBoolean</code>	Generate stack size section
Unwind Tables <code>arm_unwind_tablesBoolean</code>	Generate unwind tables for C code.
Use Builtins <code>arm_use_builtinsBoolean</code>	Use built-in library functions e.g. scanf.
Wide Character Size <code>gcc_wchar_sizeEnumeration</code>	Select between standard 32-bit or shorter 16-bit size for wide characters and <code>wchar_t</code> .

Combining

Property	Description
Combine Command <code>combine_commandCommandLine</code>	The command to execute. This property will have macro expansion applied to it with the macro <code>\$(CombiningOutputFilePath)</code> set to the output filepath of the combine command and the macro <code>\$(CombiningRelInputPaths)</code> is set to the (project relative) names of all of the files in the project.
Combine Command Working Directory <code>combine_command_wdString</code>	The working directory in which the combine command is run. This property will have macro expansion applied to it.
Output File Path <code>combine_output_filepathString</code>	The output file path the stage command will create. This property will have macro expansion applied to it.
Set To Read-only <code>combine_set_readonlyEnumeration</code>	Set the output file to read only or read/write.

Compiler

Property	Description
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Additional C Compiler Only Options c_only_additional_optionsStringList	Enables additional options to be supplied to the C compiler only. This property will have macro expansion applied to it.
Additional C Compiler Only Options From File c_only_additional_options_from_fileProjFileName	Enables additional options to be supplied to the C compiler only from a file. This property will have macro expansion applied to it.
Additional C++ Compiler Only Options cpp_only_additional_optionsStringList	Enables additional options to be supplied to the C++ compiler only. This property will have macro expansion applied to it.
Additional C++ Compiler Only Options From File cpp_only_additional_options_from_fileProjFileName	Enables additional options to be supplied to the C++ compiler only from a file. This property will have macro expansion applied to it.
Additional C/C++ Assembler Options c_asm_additional_optionsStringList	Enables additional options to be supplied to the assembler when used by the C/C++ compiler. This property will have macro expansion applied to it.
Additional C/C++ Compiler Options c_additional_optionsStringList	Enables additional options to be supplied to the C/C++ compiler. This property will have macro expansion applied to it.
Additional C/C++ Compiler Options From File c_additional_options_from_fileProjFileName	Enables additional options to be supplied to the C/C++ compiler from a file. This property will have macro expansion applied to it.
Backup Additional C Compiler Only Options c_only_additional_options_backupString	Value of additional C compiler options prior to generic options processing
Backup Additional C++ Compiler Only Options cpp_only_additional_options_backupString	Value of additional C++ compiler options prior to generic options processing
Backup Additional Compiler Options c_additional_options_backupString	Value of additional compiler options prior to generic options processing
C Language Standard gcc_c_language_standardEnumeration	Specifies the language standard to use when compiling C files. The options are: None - don't specify a language standard c89/gnu89 c90/gnu90 c99/gnu99 c11/gnu11 c17/gnu17
C++ Language Standard gcc_cpp_language_standardEnumeration	Specifies the language standard to use when compiling C files. The options are: None - don't specify a language standard c++98/gnu++98 c++11/gnu++11 c++14/gnu++14 c++20/gnu++20 c++17/gnu++17

Color Diagnostics compiler_color_diagnosticsBoolean	Specifies whether to enable color diagnostic output.
Compile C Files As C++ c_files_are_cppBoolean	Compile files that have the .c extension with the C++ compiler.
Compiler arm_compiler_variantEnumeration	Specifies which compiler to use.
Enable All Warnings gcc_enable_all_warningsBoolean	Enables all the warnings about constructions that some users consider questionable, and that are easy to avoid (or modify to prevent the warning), even in conjunction with macros.
Enable All Warnings C Compiler Only Command Line Options gcc_c_only_all_warnings_command_line_optio	The command line options supplied to the C compiler when Enable All Warnings is enabled.
Enable All Warnings C++ Compiler Only Command Line Options gcc_cpp_only_all_warnings_command_line_opt	The command line options supplied to the C++ compiler when Enable All Warnings is enabled.
Enable All Warnings Command Line Options gcc_all_warnings_command_line_optionsStringL	The command line options supplied to the compiler when Enable All Warnings is enabled.
Enforce ANSI Checking c_enforce_ansi_checkingBoolean	Perform additional checks for ensure strict conformance to the selected ISO (ANSI) C or C++ standard.
Enforce ANSI Checking C Command Line Options gcc_c_only_enforce_ansi_checking_command_l	The command line options supplied to the C compiler when Enforce ANSI Checking is enabled.
Enforce ANSI Checking C++ Command Line Options gcc_cpp_only_enforce_ansi_checking_command	The command line options supplied to the C++ compiler when Enforce ANSI Checking is enabled.
Enforce ANSI Checking Command Line Options gcc_enforce_ansi_checking_command_line_opt	The command line options supplied to the compiler when Enforce ANSI Checking is enabled.
GNU Version [clang+segger-cc] clang_gnu_versionEnumeration	Specifies value of __GNU__ and related macros
Keep Assembly Source arm_keep_assemblyBoolean	Specifies whether assembly code generated by the compiler is kept.
Keep Preprocessor Output arm_keep_preprocessor_outputBoolean	Specifies whether preprocessor output generated by the compiler is kept.
Show Caret compiler_diagnostics_show_caretBoolean	Specifies whether caret is displayed in compiler diagnostics.
Supply Absolute File Path arm_supply_absolute_file_pathBoolean	Specifies whether absolute file paths are supplied to the compiler.
Use Compiler Driver use_compiler_driverBoolean	The build will issue cc commands.

External Build

Property	Description
Archive Command external_archive_commandCommandLine	<p>The command line to archive object files. This property will have macro expansion applied to it with the additional macros:</p> <p>\$(TargetPath) contains the full file name of the Library File Name property</p> <p>\$(RelTargePath) contains the project directory relative file name of the Object File Name property.</p> <p>\$(Objects) a space seperated list of files to archive, generated from the source files of the project OR.</p> <p>\$(ObjectsFilePath) contains the full file name of the file containing the list of files to archive</p> <p>\$(RelObjectsFilePath) contains the project directory relative file name of the file containing the list of files to link</p>
Assemble Command external_assemble_commandCommandLine	<p>The command line to assemble an assembly source file. This property will have macro expansion applied to it with the additional macros:</p> <p>\$(TargetPath) contains the full file name of the Object File Name property.</p> <p>\$(RelTargePath) contains the project directory relative file name of the Object File Name property.</p> <p>\$(AsmOptions) contains a space seperated list of options as set in the Additional Assembler Options property.</p> <p>\$(DependencyPath) contains the filename of the .d file that is required to be output by the compilation for dependency support.</p> <p>\$(RelDependencyPath) contains the relative filename of the .d file that is required to be output by the compilation for dependency support.</p> <p>\$(Defines) contains a space seperated list of preprocessor definitions as set in the Preprocessor Definitions property.</p> <p>\$(Undefines) contains a space seperated list of preprocessor undefinitions as set in the Preprocessor Definitions property.</p> <p>\$(Includes) contains a space seperated list of user include directories as set in the User Include Directories property.</p>
Build Command external_build_commandCommandLine	<p>The command line to build the executable e.g. make. This property will have macro expansion applied to it.</p>

C Compile Command

`external_c_compile_commandCommandLine`

The command line to compile a C source file. This property will have macro expansion applied to it with the additional macros:

\$(TargetPath) contains the full file name of the **Object File Name** property.

\$(RelTargetPath) contains the project directory relative file name of the **Object File Name** property.

\$(COptions) contains a space separated list of options as set in the **C Additional C/C++ Compiler Options** property.

\$(COnlyOptions) contains a space separated list of options as set in the **C Additional C Compiler Only Options** property.

\$(DependencyPath) contains the filename of the .d file that is required to be output by the compilation for dependency support.

\$(RelDependencyPath) contains the relative filename of the .d file that is required to be output by the compilation for dependency support.

\$(Defines) contains a space separated list of preprocessor definitions as set in the **Preprocessor Definitions** property.

\$(Undefines) contains a space separated list of preprocessor undefinitions as set in the **Preprocessor Definitions** property.

\$(Includes) contains a space separated list of user include directories as set in the **User Include Directories** property.

C++ Compile Command

external_cpp_compile_commandCommandLine

The command line to compile a C++ source file. This property will have macro expansion applied to it with the additional macros:

\$(TargetPath) contains the full file name of the **Object File Name** property.

\$(RelTargetPath) contains the project directory relative file name of the **Object File Name** property.

\$(COptions) contains a space separated list of options as set in the **C Additional C/C++ Compiler Options** property.

\$(CppOnlyOptions) contains a space separated list of options as set in the **C Additional C++ Compiler Only Options** property.

\$(DependencyPath) contains the filename of the .d file that is required to be output by the compilation for dependency support.

\$(RelDependencyPath) contains the relative filename of the .d file that is required to be output by the compilation for dependency support.

\$(Defines) contains a space separated list of preprocessor definitions as set in the **Preprocessor Definitions** property

\$(Undefines) contains a space separated list of preprocessor undefinitions as set in the **Preprocessor Definitions** property.

\$(Includes) contains a space separated list of user include directories as set in the **User Include Directories** property.

<p>C++ Link Command external_cpp_link_commandCommandLine</p>	<p>The command line to link an executable. This property will have macro expansion applied to it with the additional macros:</p> <ul style="list-style-type: none"> \$(TargetPath) contains the full file name of the Executable File Name property. \$(RelTargetPath) contains the project directory relative file name of the Executable File Name property. \$(LinkOptions) contains a space separated list of options as set in the Additional Linker Options property. \$(Objects) a space separated list of files to link, generated from the source files of the project and the outputs of any dependent projects OR. \$(ObjectsFilePath) contains the full file name of the file containing the list of files to link \$(RelObjectsFilePath) contains the project directory relative file name of the file containing the list of files to link \$(LinkerScriptPath) contains the full file name of the Linker Script File property. \$(RelLinkerScriptPath) contains the project directory relative file name of the Linker Script File property. \$(MapPath) contains the full file name of the required map file. \$(RelMapPath) contains the project directory relative file name of the required map file.
<p>Clean Command external_clean_commandCommandLine</p>	<p>The command line to clean the executable e.g. make clean. This property will have macro expansion applied to it.</p>

<p>Link Command external_link_commandCommandLine</p>	<p>The command line to link an executable. This property will have macro expansion applied to it with the additional macros:</p> <ul style="list-style-type: none"> \$(TargetPath) contains the full file name of the Executable File Name property. \$(RelTargetPath) contains the project directory relative file name of the Executable File Name property. \$(LinkOptions) contains a space separated list of options as set in the Additional Linker Options property. \$(Objects) a space separated list of files to link, generated from the source files of the project and the outputs of any dependent projects OR. \$(ObjectsFilePath) contains the full file name of the file containing the list of files to link \$(RelObjectsFilePath) contains the project directory relative file name of the file containing the list of files to link \$(LinkerScriptPath) contains the full file name of the Linker Script File property. \$(RelLinkerScriptPath) contains the project directory relative file name of the Linker Script File property. \$(MapPath) contains the full file name of the required map file. \$(RelMapPath) contains the project directory relative file name of the required map file.
<p>Objects File external_objects_file_nameCommandLine</p>	<p>The name of the file containing the list of files to archive or link, generated from the source files of the project. This property will have macro expansion applied to it. The macro \$(ObjectsFilePath) is set to this value.</p>

File

Property	Description
<p>File Encoding file_codecEnumeration</p>	<p>Specifies the encoding to use when reading and writing the file.</p>

File Name <code>file_nameString</code>	The name of the file. This property will have global macro expansion applied to it. The following macros are set based on the value: <code>\$(InputDir)</code> relative directory of file, <code>\$(InputName)</code> file name without directory or extension, <code>\$(InputFileName)</code> file name, <code>\$(InputExt)</code> file name extension, <code>\$(InputPath)</code> absolute path to the file name, <code>\$(RelInputPath)</code> relative path from project directory to the file name.
File Open Action <code>file_open_withEnumeration</code>	Specifies how to open the file when it is double clicked.
File Type <code>file_typeEnumeration</code>	The type of file. Default setting uses the file extension to determine file type.
Flag <code>file_flagEnumeration</code>	Flag which you can use to draw attention to important files in your project.

Folder

Property	Description
Dynamic Folder Directory <code>pathDirPath</code>	Dynamic folder directory specification - ; seperated directory names that will have global macro expansion applied to them.
Dynamic Folder Exclude <code>excludeStringList</code>	Dynamic folder exclude specification - ; seperated wildcards.
Dynamic Folder Filter <code>filterString</code>	Dynamic folder filter specification - ; seperated wildcards.
Dynamic Folder Recurse <code>recurseBoolean</code>	Dynamic folder recurse into subdirectories.
Unity Build Exclude Filter <code>unity_build_exclude_filterString</code>	The filter specification to exclude from the unity build - ; seperated wildcards.
Unity Build File Name <code>unity_build_file_nameFileName</code>	The file name created that #includes all files in the folder for the unity build.

General

Property	Description
Environment Variables <code>environment_variablesStringList</code>	Environment variables to set on solution load.
Inherited Configurations <code>inherited_configurationsStringList</code>	The list of configurations that are inherited by this configuration.

Library

Property	Description
Exclude Default Library Helper Functions <code>link_use_multi_threaded_libraries</code> Boolean	Specifies whether to exclude default library helper functions.
Include Standard Libraries <code>link_include_standard_libraries</code> Boolean	Specifies whether the standard libraries should be linked into your application.
Library File Name <code>build_output_file_name</code> FileName	Specifies a name to override the default library file name.
Library I/O <code>LIBRARY_IO_TYPE</code> Enumeration	<p>Specifies how the library does I/O. Options are:</p> <ul style="list-style-type: none"> RTT: Use SEGGER Real-Time Transfer for I/O operations without halting the system. Recommended for maximum speed. SEMIHOST (host-formatted): Halt CPU for I/O operation. Recommended for minimum size. SEMIHOST (buffered): Format output and write to RAM buffer. Halt CPU for I/O operation. SEMIHOST (unbuffered): Format output and write immediately. Halt CPU for I/O operation. STD: Use user-supplied I/O Mechanism. None: Do not implement I/O. <p>For more information read: https://wiki.segger.com/Embedded_Studio_Library_IO</p>
Library Optimization <code>rv_library_optimization</code> Enumeration	Specifies whether to link with libraries optimized for speed or size.
Standard Libraries Directory <code>link_standard_libraries_directory</code> String	Specifies where to find the standard libraries

Linker

Property	Description
Additional Input Files <code>linker_additional_files</code> StringList	Enables additional object and library files to be supplied to the linker.
Additional Linker Options <code>linker_additional_options</code> StringList	Enables additional options to be supplied to the linker.
Additional Linker Options From File <code>linker_additional_options_from_file</code> ProjFileName	Enables additional options to be supplied to the linker from a file.
Additional Linker Script Generator Options <code>arm_additional_mkld_options</code> StringList	Enables additional options to be supplied to the linker script generator

Additional Output File Gap Fill Value arm_linker_additional_output_file_gap_fill	The value to fill gaps between sections in additional output file.
Additional Output Format linker_output_formatEnumeration	The format used when creating an additional linked output file. The options are: None do not create an additional output file. bin create a binary file. srec create a Motorola S-Record file. hex create an Intel Hex file.
Additional System Libraries linker_additional_system_librariesStringList	Enables additional system libraries to be supplied to the linker.
Align ro Section [segger-ld] link_align_roInteger	Specifies the linker alignment of the ro section
Align rw Section [segger-ld] link_align_rwInteger	Specifies the linker alignment of the rw section
Align rx Section [segger-ld] link_align_rxInteger	Specifies the linker alignment of the rx section
Align zi Section [segger-ld] link_align_ziInteger	Specifies the linker alignment of the zi section
Allow Multiple Symbol Definition arm_linker_allow_multiple_definitionBoolean	Do not report error if the same symbol is defined more than once in object files/libraries.
Backup Additional Linker Options link_additional_options_backupString	Value of additional linker options prior to generic options processing
Breakpad Symbols Directory linker_breakpad_symbols_directoryString	Specifies location of the breakpad symbols directory.
Check For Memory Segment Overflow arm_library_check_memory_segment_overflowBoolean	Specifies whether the linker should check whether program sections fit in their memory segments.
Deduplicate Code Sections [segger-ld] link_dedupe_codeBoolean	Specifies whether the linker finds readonly code sections that are identical and discard duplicates.
Deduplicate Data Sections [segger-ld] link_dedupe_dataBoolean	Specifies whether the linker finds readonly data sections that are identical and discard duplicates.
Default Fill Pattern arm_linker_script_generator_default_fill_p	Specifies the default pattern used to fill unspecified regions of memory in a generated linker script. This pattern maybe overridden by the <i>fill</i> attribute of a program section in the section placement file.
Emit Relocations arm_linker_emit_relocationsBoolean	Output relocation information into the executable.
Enable Call Springboarding [segger-ld] rv_spring_boardBoolean	If enabled the linker may be able to optimize the instructions used for function calls.
Enable Outline Optimization [segger-ld] rv_outlineBoolean	If enabled the linker may be able to reduce code size by extracting common code into subroutines.

Enable Tail Merging [segger-ld] rv_tail_mergeBoolean	If enabled the linker may be able to reduce code size by extracting common code immediately before function return.
Entry Point gcc_entry_pointString	Specifies the entry point of the program.
Generate Breakpad Symbols linker_generate_breakpad_symbolsBoolean	Specifies whether to generate breakpad symbols from the linked image.
Generate Log File [segger-ld] linker_log_fileBoolean	Specifies whether to generate a linkage log file.
Generate Map File linker_map_fileBoolean	Specifies whether to generate a linkage map file.
Generate Map File [segger-ld] link_map_fileEnumeration	Specifies whether to generate a linkage map file.
Indirect File Supported linker_use_indirect_filesBoolean	Linker can use @indirect file for input files.
Inline Small Functions [segger-ld] link_inlineBoolean	Specifies whether the linker inlines small functions at the call site rather than calling the function.
Keep Symbols linker_keep_symbolsStringList	Specifies the symbols that should be kept by the linker even if they are not reachable.
Link Dependent Projects link_dependent_projectsBoolean	Specifies whether to link the output of dependent library projects.
Linker arm_linker_variantEnumeration	Specifies which linker to use.
Linker Script File link_linker_script_fileProjFileName	The name of the manual linker script file.
Linker Search Path arm_linker_search_pathStringList	Specify the linker script search path.
Linker Symbol Definitions link_symbol_definitionsStringList	Specifies one or more linker symbol definitions.
Map File Format [segger-ld] link_map_file_formatEnumeration	Specifies map file format generated by the linker.
Memory Map File linker_memory_map_fileProjFileName	The name of the file containing the memory map description.
Memory Map Macros linker_memory_map_macrosStringList	Macro values to substitute in memory map nodes. Each macro is defined as name=value and are separated by ;
Memory Segments linker_section_placements_segmentsString	The start, access and size of named segments in the target, these are used when no memory map file is available.Each segment is specified by NAME RWX HEXSTART HEXSIZE for example FLASH RX 0x08000000 0x00010000

Merge Sections [segger-ld] link_merge_sectionsBoolean	Specifies whether the linker merges compatible sections.
Merge String Constants [segger-ld] link_merge_stringsBoolean	Specifies whether the linker merges duplicate string constants.
No Enum Size Warning arm_linker_no_enum_size_warningBoolean	Do not generate warnings when object files have different ARM EABI enum size attributes.
No Wide Char Size Warning arm_linker_no_wchar_size_warningBoolean	Do not generate warnings when object files have different ARM EABI wide character size attributes.
Pad ro Section [segger-ld] link_pad_roBoolean	Specifies whether the linker pads the ro section
Pad rw Section [segger-ld] link_pad_rwBoolean	Specifies whether the linker pads the rw section
Pad rx Section [segger-ld] link_pad_rxBoolean	Specifies whether the linker pads the rx section
Pad zi Section [segger-ld] link_pad_ziBoolean	Specifies whether the linker pads the zi section
Section Placement File linker_section_placement_fileProjFileName	The name of the file containing section placement description.
Section Placement Macros linker_section_placement_macrosStringList	Macro values to substitute in section placement nodes - MACRO1=value1;MACRO2=value2.
Start/End Group Required linker_requires_start_groupBoolean	Linker requires --start-group and --end-group for input files.
Strip Debug Information linker_strip_debug_informationBoolean	Specifies whether debug information should be stripped from the linked image.
Strip Symbols gcc_strip_symbolsBoolean	Specifies whether symbols should be stripped.
Supply Memory Segments To Linker [segger-ld] linker_supply_memory_segmentsBoolean	Specifies whether to supply memory segments on the linker command line.
Suppress Warning on Mismatch arm_linker_no_warn_on_mismatchBoolean	No warning on mismatched object files/libraries.
Symbols File arm_linker_symbols_filesFileName	Specify the name of a symbols file to link.
Thread Pointer Model [segger-ld] rv_thread_pointer_modelEnumeration	Controls how the thread pointer register is used.
Treat Linker Warnings as Errors arm_linker_treat_warnings_as_errorsBoolean	Treat linker warnings as errors.
Use Manual Linker Script link_use_linker_script_fileBoolean	Specifies whether to use a manual linker script.

Package

Property	Description
Package Dependencies package_dependenciesStringList	Specifies the packages the current project depends upon.

Preprocessor

Property	Description
Ignore Includes c_ignore_includesBoolean	Ignore the include directories properties.
Preprocessor Definitions c_preprocessor_definitionsStringList	Specifies one or more preprocessor definitions. This property will have macro expansion applied to it.
Preprocessor Undefinitions c_preprocessor_undefinitionsStringList	Specifies one or more preprocessor undefinitions. This property will have macro expansion applied to it.
System Include Directories c_system_include_directoriesStringList	Specifies the system include path. This property will have macro expansion applied to it.
Undefine All Preprocessor Definitions c_undefine_all_preprocessor_definitionsBool	Does not define any standard preprocessor definitions.
User Include Directories c_user_include_directoriesStringList	Specifies the user include path. This property will have macro expansion applied to it.

Printf/Scanf

Property	Description
Printf Floating Point Supported linker_printf_fp_enabledEnumeration	Are floating point numbers supported by the printf function group.
Printf Integer Support linker_printf_fmt_levelEnumeration	The largest integer type supported by the printf function group.
Printf Width/Precision Supported linker_printf_width_precision_supportedBool	Enables support for width and precision specification in the printf function group.
Scanf Classes Supported linker_scanf_character_group_matching_enab	Enables support for %[...] and %[^...] character class matching in the scanf functions.
Scanf Floating Point Supported linker_scanf_fp_enabledBoolean	Are floating point numbers supported by the scanf function group.
Scanf Integer Support linker_scanf_fmt_levelEnumeration	The largest integer type supported by the scanf function group.
Wide Characters Supported linker_printf_wchar_enabledBoolean	Are wide characters supported by the printf function group.

Project

Property	Description
Flag <code>project_flag</code> Enumeration	Flag which you can use to draw attention to important projects in your solution.

Runtime Memory Area

Property	Description
Heap Size <code>heap_size</code> IntegerRange	The size of the heap in bytes.
Stack Size <code>stack_size</code> IntegerRange	The size of the stack in bytes.

Section

Property	Description
Code Section Name <code>default_code_section</code> String	Specifies the default name to use for the program code section.
Constant Section Name <code>default_const_section</code> String	Specifies the default name to use for the read-only constant section.
Data Section Name <code>default_data_section</code> String	Specifies the default name to use for the initialized, writable data section.
ISR Section Name <code>default_isr_section</code> String	Specifies the default name to use for the ISR code.
Vector Section Name <code>default_vector_section</code> String	Specifies the default name to use for the interrupt vector section.
Zeroed Section Name <code>default_zeroed_section</code> String	Specifies the default name to use for the zero-initialized, writable data section.

Solution

Property	Description
Flag <code>solution_flag</code> Enumeration	Flag which you can use to draw attention to important projects in your solution.
Properties Filter <code>properties_filter</code> StringList	The names of project properties that can be displayed at the solution

Source Code

Property	Description
Additional Code Completion Compiler Options <code>code_completion_optionsStringList</code>	Additional source indexing and code completion compiler options.
Inhibit Source Indexing <code>project_inhibit_indexingBoolean</code>	Disable source indexing and code completion for files/folders/projects that would normally be indexed (C/C++ files in executable and library projects).
Source Code Control Directory <code>source_code_control_directoryDirPath</code>	Source code control directory root.

Staging

Property	Description
Output File Path <code>stage_output_filepathString</code>	The output file path the stage command will create. This property will have macro expansion applied to it.
Set To Read-only <code>stage_set_readonlyEnumeration</code>	Set the output file permissions to read only or read/write.
Stage Command <code>stage_commandCommandLine</code>	The command to execute. This property will have macro expansion applied to it with the additional \$(StageOutputFilePath) macro set to the output filepath of the stage command.
Stage Command Working Directory <code>stage_command_wdString</code>	The working directory in which the stage command is run. This property will have macro expansion applied to it.
Stage Project Command <code>stage_post_build_commandCommandLine</code>	The command to execute after staging commands have executed. This property will have macro expansion applied to it.
Stage Project Command Working Directory <code>stage_post_build_command_wdString</code>	The working directory where the post build command runs. This property will have macro expansion applied to it.

User Build Step

Property	Description
Link Patch Command <code>linker_patch_build_commandCommandLine</code>	A command to run after the link but prior to additional binary file generation. This property will have macro expansion applied to it with the additional \$(TargetPath) macro set to the output filepath of the linker command.

Link Patch Working Directory <code>linker_patch_build_command_wdDirPath</code>	The working directory where the link patch command is run. This property will have macro expansion applied to it.
Post-Archive Command <code>archive_post_build_commandCommandLine</code>	A command to run after the archive command has completed. This property will have macro expansion applied to it with the additional <code>\$(TargetPath)</code> macro set to the output filepath of the archive command.
Post-Archive Working Directory <code>archive_post_build_command_wdDirPath</code>	The working directory where the post-archive command is run. This property will have macro expansion applied to it.
Post-Build Command <code>post_build_commandCommandLine</code>	The command to execute after a project build. This property will have macro expansion applied to it.
Post-Build Command Control <code>post_build_command_controlEnumeration</code>	Controls when the post-build command is run, either Always Run or when Run When Build Has Occurred .
Post-Build Command Working Directory <code>post_build_command_wdString</code>	The working directory in which the post-build command is run. This property will have macro expansion applied to it.
Post-Compile Command <code>compile_post_build_commandCommandLine</code>	A command to run after the compile command has completed. This property will have macro expansion applied to it with the additional <code>\$(TargetPath)</code> macro set to the output filepath of the compiler command.
Post-Compile Working Directory <code>compile_post_build_command_wdDirPath</code>	The working directory where the post-compile command is run. This property will have macro expansion applied to it.
Post-Link Command <code>linker_post_build_commandCommandLine</code>	A command to run after the link command has completed. This property will have macro expansion applied to it with the additional <code>\$(TargetPath)</code> macro set to the output filepath of the linker command and <code>\$(PostLinkOutputFilePath)</code> set to the value of the output filepath of the post link command.
Post-Link Output File <code>linker_post_build_command_output_fileString</code>	The name of the file created by the post-link command. This property will have macro expansion applied to it.
Post-Link Working Directory <code>linker_post_build_command_wdDirPath</code>	The working directory where the post-link command is run. This property will have macro expansion applied to it.
Pre-Build Command <code>pre_build_commandCommandLine</code>	The command to execute before a project build. This property will have macro expansion applied to it.
Pre-Build Command Control <code>pre_build_command_controlEnumeration</code>	Controls when the pre-build command is run, either Always Run or when Run When Build Required .
Pre-Build Command Working Directory <code>pre_build_command_wdString</code>	The working directory in which the pre-build command is run. This property will have macro expansion applied to it.

Pre-Compile Command <code>compile_pre_build_command</code> <code>CommandLine</code>	A command to run before the compile command. This property will have macro expansion applied to it.
Pre-Compile Command Output File Path <code>compile_pre_build_command_output_file_name</code>	The pre-compile generated file name. This property will have macro expansion applied to it.
Pre-Compile Working Directory <code>compile_pre_build_command_wdDirPath</code>	The working directory where the pre-compile command is run. This property will have macro expansion applied to it.
Pre-Link Command <code>linker_pre_build_command</code> <code>CommandLine</code>	A command to run before the link command. This property will have macro expansion applied to it.
Pre-Link Working Directory <code>linker_pre_build_command_wdDirPath</code>	The working directory where the pre-link command is run. This property will have macro expansion applied to it.

Debug Options

Debugger

Property	Description
Command Arguments <code>debug_command_argumentsString</code>	The command arguments passed to the executable. This property will have macro expansion applied to it.
Debug Additional Projects <code>debug_dependent_projectsStringList</code>	The debugger will load (if not already loaded by Load Additional Projects) and debug the specified additional projects.
Debug Symbols File[0] <code>external_debug_symbols_file_nameProjFileName</code>	The name of the debug symbols file. This property will have macro expansion applied to it. If it is not defined then the main load file is used.
Debug Symbols File[1] <code>external_debug_symbols_file_name1ProjFileName</code>	The name of the debug symbols file. This property will have macro expansion applied to it. If it is not defined then the main load file is used.
Debug Symbols File[2] <code>external_debug_symbols_file_name2ProjFileName</code>	The name of the debug symbols file. This property will have macro expansion applied to it. If it is not defined then the main load file is used.
Debug Symbols File[3] <code>external_debug_symbols_file_name3ProjFileName</code>	The name of the debug symbols file. This property will have macro expansion applied to it. If it is not defined then the main load file is used.
Debug Symbols Load Address[0] <code>external_debug_symbols_load_addressString</code>	The (code) address to be added to the debug symbol (code) addresses.
Debug Symbols Load Address[1] <code>external_debug_symbols_load_address1String</code>	The (code) address to be added to the debug symbol (code) addresses.
Debug Symbols Load Address[2] <code>external_debug_symbols_load_address2String</code>	The (code) address to be added to the debug symbol (code) addresses.
Debug Symbols Load Address[3] <code>external_debug_symbols_load_address3String</code>	The (code) address to be added to the debug symbol (code) addresses.
Debug Terminal Log File <code>debug_terminal_log_fileUnknown</code>	A file to write the output from the debug terminal to.
Entry Point Symbol <code>debug_entry_point_symbolString</code>	Debugger will start execution at symbol if defined.
HTML Watch File <code>debug_html_watchProjFileName</code>	The file used by the debugger's HTML Watch window.
ISA Extensions Debug <code>rv_debug_extensionsEnumeration</code>	Specify ISA extensions supported by debugger.
Ignore .debug_aranges Section <code>debug_ignore_debug_arangesBoolean</code>	The debugger will not use the .debug_aranges section.

Ignore .debug_frame Section debug_ignore_debug_frameBoolean	The debugger will not use the .debug_frame section.
Load Additional Projects debug_load_additional_projectsStringList	The debugger will load the outputs of the specified additional projects.
Load Offset debug_load_file_offsetString	The offset to add to the load address of the load file. This offset is added to any absolute relocations of symbols (whose address is less than Load Offset Symbol Limit) if the load file contains relocation sections.
Memory Upload Page Size debug_memory_upload_page_sizeInteger	The aligned page size the debugger uses when uploading address ranges.
RTT Control Block Address debug_RTTCBString	The symbol or 0x prefixed address of the RTT control block.
RTT Enable debug_enable_RTTBoolean	If enabled the debugger will service RTT input/output in the debug terminal.
Register Definition File debug_register_definition_fileProjFileName	The name of the file containing register definitions.
Reserved Member Name reservedMember_nameString	The struct reserved member name. Struct members that contain the (case insensitive) string will not be displayed.
Restrict Memory Access debug_restrict_memory_accessBoolean	If enabled the debugger will only display variables located in the address ranges of the memory map or the sections in the elf file.
Run To debug_initial_breakpointString	The initial breakpoint to set
Run To Control debug_initial_breakpoint_set_optionEnumerat	Specify when the initial breakpoint should be set
Start Address external_start_addressString	The address to start the externally built executable running from.
Start From Entry Point Symbol debug_start_from_entry_point_symbolBoolean	If yes the debugger will start execution from the entry point symbol. If no the debugger will start execution from the core specific location.
Starting Stack Pointer Value debug_stack_pointer_startString	The symbol or 0x prefixed value to set the stack pointer on start debugging.
Startup Completion Point debug_startup_completion_pointString	Specifies the point in the program where startup is complete. Software breakpoints and debugIO will be enabled after this point has been reached.
Target Connection debug_target_connectionEnumeration	Specifies the target to connect to for debugging actions.
Target Device target_device_nameString	The name of the device to connect to.

Thread Maximum debug_threads_maxIntegerRange	The maximum number of threads to display.
Threads Script File debug_threads_scriptProjFileName	The threads script used by the debugger.
Type Interpretation File debug_type_fileFileName	Specifies the type interpretation file to use.
Working Directory debug_working_directoryDirPath	The working directory for a debug session. This property will have macro expansion applied to it.

GDB Server

Property	Description
Allow Memory Access During Execution gdb_server_allow_memory_access_during_exec	Specifies whether memory can be access while target is running. If set to <i>No</i> , target will be stopped each time memory is accessed.
Auto Start GDB Server gdb_server_autostart_serverBoolean	Specifies whether a GDB server should be started on connect.
Breakpoint Types gdb_breakpoint_typesEnumeration	Specifies the type of breakpoints to use.
Connect Timeout gdb_server_connect_timeoutInteger	The length of time in seconds to attempt to connect to server before failing.
GDB Server Command Line gdb_server_command_lineCommandLine	The command line to start the gdb server
Host gdb_server_hostnameString	The hostname of the GDB server to connect to.
Ignore Checksum Errors gdb_server_ignore_checksum_errorsBoolean	Specifies whether an incorrect GDB server checksum causes and error.
Log File gdb_server_log_fileUnknown	Specifies a file to output a log of GDB server transactions to.
Port gdb_server_portInteger	The port number to use to connect to the GDB server.
Read Timeout gdb_server_read_timeoutInteger	The length of time in seconds to attempt to read from server before failing.
Register Access gdb_server_register_accessEnumeration	Specifies how registers are accessed
Reset and Stop Command gdb_server_reset_commandString	The remote GDB server command to use to reset and stop the target.
Target XML File gdb_server_target_xml_fileFileName	If specified, points to a target.xml file to use in place of file returned by the GDB server.

Type gdb_server_typeEnumeration	Specifies the type of GDB server being connected to. J-Link, OpenOCD, ST-LINK and pyOCD gdb server implementations are currently supported.
Write Timeout gdb_server_write_timeoutInteger	The length of time in seconds to attempt to write to server before failing.

J-Link

Property	Description
Additional J-Link Options JLinkExecuteCommandString	Specify additional J-Link options to allow enabling or disabling advanced features and fine tuning. For more information see J-Link Command Strings
Enable Adaptive Clocking adaptiveEnumeration	Adaptive clocking is enabled.
Exclude Flash Cache Range JLinkExcludeFlashCacheRangeString	Address range to exclude from flash cache. This can be specified by either 'start_address-end_address' or 'address,size'. For example: 0x08000000,0x10000.
Host Connection ConnectionEnumeration	Defines how to connect the host to the J-Link: "USB": Connect to J-Link via USB "USB S/N": Connect to J-Link with specified serial number via USB e.g. USB 174300001 "IP S/N": Connect to J-Link with specified serial number via IP e.g. IP 174300001 "IP n.n.n.n port": Connect to J-Link with specified IP address and optional port number e.g. IP 192.168.20.20 19020
JTAG Instruction Register Size Before Target arm_linker_jtag_pad_post_irIntegerRange	Specifies the number of bits in the instruction register before the target (as seen from TDI), which is the number of bits to pad the JTAG instruction register with the BYPASS instruction after the target instruction.
JTAG Number Of Devices Before Target arm_linker_jtag_pad_post_drIntegerRange	Specifies the number of devices before the target (as seen from TDI), which is the number of bits to pad the JTAG data register.
Log File JLinkLogFileNameFileName	The file to output the J-Link log to.
Script File JLinkScriptFileNameFileName	The file path of the optional J-Link script file to use.
Show Log Messages In Output Window JLinkShowLogBoolean	Display the J-Link log messages to the output window.

Speed speedIntegerRange	The required JTAG clock frequency in kHz (0 to auto-detect best possible).
Supply Power supplyPowerBoolean	The J-Link supplies power to the target.
Target Has Cycle Counter riscv_has_cycle_counterBoolean	The target device implements the mcycle CSR.
Target Interface Type target_interface_typeEnumeration	Specifies the type of interface the target has. The options are: JTAG - Use JTAG interface SWD - Use SWD interface cJTAG - Use cJTAG interface

Loader

Property	Description
Additional Load File Address[0] debug_additional_load_file_addressString	The address to load the additional load file.
Additional Load File Address[1] debug_additional_load_file_address1String	The address to load the additional load file.
Additional Load File Address[2] debug_additional_load_file_address2String	The address to load the additional load file.
Additional Load File Address[3] debug_additional_load_file_address3String	The address to load the additional load file.
Additional Load File Type[0] debug_additional_load_file_typeEnumeration	The file type of the additional load file. The options are Detect, elf, bin, ihex, hex, tihex, src .
Additional Load File Type[1] debug_additional_load_file_type1Enumeration	The file type of the additional load file. The options are Detect, elf, bin, ihex, hex, tihex, src .
Additional Load File Type[2] debug_additional_load_file_type2Enumeration	The file type of the additional load file. The options are Detect, elf, bin, ihex, hex, tihex, src .
Additional Load File Type[3] debug_additional_load_file_type3Enumeration	The file type of the additional load file. The options are Detect, elf, bin, ihex, hex, tihex, src .
Additional Load File[0] debug_additional_load_fileProjFileName	Additional file to load on debug load. This property will have macro expansion applied to it.
Additional Load File[1] debug_additional_load_file1ProjFileName	Additional file to load on debug load. This property will have macro expansion applied to it.
Additional Load File[2] debug_additional_load_file2ProjFileName	Additional file to load on debug load. This property will have macro expansion applied to it.
Additional Load File[3] debug_additional_load_file3ProjFileName	Additional file to load on debug load. This property will have macro expansion applied to it.

Check Load Sections Fit Target Description target_check_load_sections_fitBoolean	Specifies whether load sections in the program match the memory segments described in the memory map.
Load ELF Sections debug_load_sectionsEnumeration	The debugger will load ELF sections rather than ELF programs.
Load File external_build_file_nameProjFileName	The name of the main load file. This property will have macro expansion applied to it. If it is not defined then the output filepath of the linker command is used.
Load File Address external_load_addressString	The address to download the main load file to.
Load File Type external_load_file_typeEnumeration	The file type of the main load file. The options are Detect, elf, bin, ihex, hex, tihex, srec .
No Load Sections target_loader_no_load_sectionsStringList	Names of (loadable) sections not to load.

Simulator

Property	Description
Software Interrupt Register Address riscv_software_interrupt_addressIntegerHex	The address of the msip register
Stop On Jump . riscv_simulator_stop_on_jump_dotBoolean	Stop when the simulator executes a j . instruction.
Timer Comparator Register Address riscv_simulator_timer_comparator_addressInt	The address of the mtimecmp register
Timer Register Address riscv_simulator_timer_addressIntegerHex	The address of the mtime register

Target Script

Property	Description
Debug Begin Script target_debug_begin_scriptJavaScript	The script that is executed when the debugger begins a debug session.
Debug End Script target_debug_end_scriptJavaScript	The script that is executed when the debugger ends a debug session.
Load Begin Script target_load_begin_scriptJavaScript	The script that is executed when the debugger begins a load.
Load End Script target_load_end_scriptJavaScript	The script that is executed when the debugger ends a load.
Reset Script target_reset_scriptJavaScript	The script that is executed when the target is reset.

Target Script File`target_script_file`FileName

The target script file, the contents of this file are prepended to script project properties before they are executed.

System Macros

System Macro Values

Property	Description
<code>\$(Date)</code> <code>\$(Date)String</code>	Day Month Year e.g. 21 June 2011.
<code>\$(DateDay)</code> <code>\$(DateDay)String</code>	Day e.g. 21.
<code>\$(DateMonth)</code> <code>\$(DateMonth)String</code>	Month e.g. June.
<code>\$(DateYear)</code> <code>\$(DateYear)String</code>	Year e.g. 2011.
<code>\$(DesktopDir)</code> <code>\$(DesktopDir)String</code>	Path to users desktop directory.
<code>\$(DocumentsDir)</code> <code>\$(DocumentsDir)String</code>	Path to users documents directory.
<code>\$(EmbeddedStudioVersionNumber)</code> <code>\$(EmbeddedStudioVersionNumber)String</code>	The release version number.
<code>\$(HomeDir)</code> <code>\$(HomeDir)String</code>	Path to users home directory.
<code>\$(HostArch)</code> <code>\$(HostArch)String</code>	The CPU architecture that SEGGER Embedded Studio is running on e.g. x86.
<code>\$(HostDLL)</code> <code>\$(HostDLL)String</code>	The file extension for dynamic link libraries on the CPU that SEGGER Embedded Studio is running on e.g. .dll.
<code>\$(HostDLExt)</code> <code>\$(HostDLExt)String</code>	The file extension for dynamic link libraries used by the operating system that SEGGER Embedded Studio is running on e.g. .dll, .so, .dylib.
<code>\$(HostEXE)</code> <code>\$(HostEXE)String</code>	The file extension for executables on the CPU that SEGGER Embedded Studio is running on e.g. .exe.
<code>\$(HostOS)</code> <code>\$(HostOS)String</code>	The name of the operating system that SEGGER Embedded Studio is running on e.g. win.
<code>\$(JLinkDir)</code> <code>\$(JLinkDir)String</code>	Path to J-Link software.
<code>\$(Micro)</code> <code>\$(Micro)String</code>	The SEGGER Embedded Studio target e.g. ARM.
<code>\$(PackagesDir)</code> <code>\$(PackagesDir)String</code>	Path to the users packages directory.
<code>\$(Platform)</code> <code>\$(Platform)String</code>	The target platform.

<code>\$(ProductNameShort)</code> <code>\$(ProductNameShort)String</code>	The product name.
<code>\$(StudioArchiveFileExt)</code> <code>\$(StudioArchiveFileExt)String</code>	The filename extension of a studio archive file.
<code>\$(StudioBuildToolExeName)</code> <code>\$(StudioBuildToolExeName)String</code>	The filename of the build tool executable.
<code>\$(StudioBuildToolName)</code> <code>\$(StudioBuildToolName)String</code>	The name of the build tool executable.
<code>\$(StudioDir)</code> <code>\$(StudioDir)String</code>	The install directory of the product.
<code>\$(StudioExeName)</code> <code>\$(StudioExeName)String</code>	The filename of the studio executable.
<code>\$(StudioLicenseToolExeName)</code> <code>\$(StudioLicenseToolExeName)String</code>	The filename of the license tool executable.
<code>\$(StudioLicenseToolName)</code> <code>\$(StudioLicenseToolName)String</code>	The name of the license tool executable.
<code>\$(StudioMajorVersion)</code> <code>\$(StudioMajorVersion)String</code>	The major release version of software.
<code>\$(StudioMinorVersion)</code> <code>\$(StudioMinorVersion)String</code>	The minor release version of software.
<code>\$(StudioName)</code> <code>\$(StudioName)String</code>	The full name of studio.
<code>\$(StudioNameShort)</code> <code>\$(StudioNameShort)String</code>	The short name of studio.
<code>\$(StudioPackageFileExt)</code> <code>\$(StudioPackageFileExt)String</code>	The filename extension of a studio package file.
<code>\$(StudioProjectFileExt)</code> <code>\$(StudioProjectFileExt)String</code>	The filename extension of a studio project file.
<code>\$(StudioScriptToolExeName)</code> <code>\$(StudioScriptToolExeName)String</code>	The filename of the script tool executable.
<code>\$(StudioScriptToolName)</code> <code>\$(StudioScriptToolName)String</code>	The name of the script tool executable.
<code>\$(StudioSessionFileExt)</code> <code>\$(StudioSessionFileExt)String</code>	The filename extension of a studio session file.
<code>\$(StudioSimulatorExeName)</code> <code>\$(StudioSimulatorExeName)String</code>	The filename of the simulator executable.
<code>\$(StudioSimulatorName)</code> <code>\$(StudioSimulatorName)String</code>	The name of the simulator executable.
<code>\$(StudioUserDir)</code> <code>\$(StudioUserDir)String</code>	The directory containing the user data.

<code>\$(TargetID)</code> <code>\$(TargetID)String</code>	ID number representing the SEGGER Embedded Studio target.
<code>\$(Time)</code> <code>\$(Time)String</code>	Hour:Minutes:Seconds e.g. 15:34:03.
<code>\$(TimeHour)</code> <code>\$(TimeHour)String</code>	Hour e.g. 15.
<code>\$(TimeMinute)</code> <code>\$(TimeMinute)String</code>	Minute e.g. 34.
<code>\$(TimeSecond)</code> <code>\$(TimeSecond)String</code>	Seconds e.g. 03.
<code>\$(UnixTime)</code> <code>\$(UnixTime)String</code>	Seconds since 00:00, Jan 1 1970 UTC

Build Macros

(Build Macro Values)

Property	Description
<code>\$(ABI)</code> <code>\$(ABI)String</code>	The value of the RISC-V ABI Type project property.
<code>\$(AR)</code> <code>\$(AR)String</code>	The path to the binutils ar command.
<code>\$(AS)</code> <code>\$(AS)String</code>	The path to the binutils as command.
<code>\$(Arch)</code> <code>\$(Arch)String</code>	The value of the RISC-V ISA project property.
<code>\$(AsmOptions)</code> <code>\$(AsmOptions)String</code>	A space separated list of assembler options for the external assemble command.
<code>\$(CC1)</code> <code>\$(CC1)String</code>	The path to the gcc cc1 command.
<code>\$(CLANG)</code> <code>\$(CLANG)String</code>	The path to the clang command.
<code>\$(CLANGTIDY)</code> <code>\$(CLANGTIDY)String</code>	The path to the clang-tidy command.
<code>\$(COnlyOptions)</code> <code>\$(COnlyOptions)String</code>	A space separated list of compiler options for the external c compile command.
<code>\$(COptions)</code> <code>\$(COptions)String</code>	A space separated list of compiler options for the external c and c++ compile commands.
<code>\$(CombiningOutputFilePath)</code> <code>\$(CombiningOutputFilePath)String</code>	The full path of the output file of the combining command.
<code>\$(CombiningRelInputPaths)</code> <code>\$(CombiningRelInputPaths)String</code>	The relative inputs to the combining command.
<code>\$(Configuration)</code> <code>\$(Configuration)String</code>	The build configuration e.g. ARM Flash Debug.
<code>\$(Defines)</code> <code>\$(Defines)String</code>	The preprocessor defines property value for the external compile command.
<code>\$(DependencyPath)</code> <code>\$(DependencyPath)String</code>	The path of the dependency file for the external compile command.
<code>\$(EXE)</code> <code>\$(EXE)String</code>	The default file extension for an executable file including the dot e.g. .elf.
<code>\$(FolderName)</code> <code>\$(FolderName)String</code>	The folder name of the containing folder.

<code>\$(FolderPath)</code> <code>\$(FolderPath)String</code>	The folder path of the containing folders.
<code>\$(GCC)</code> <code>\$(GCC)String</code>	The path to the gcc command.
<code>\$(GCCPrefix)</code> <code>\$(GCCPrefix)String</code>	The macro-expanded value of the GCC Prefix project property.
<code>\$(GCCTarget)</code> <code>\$(GCCTarget)String</code>	The value of the GCC Target project property.
<code>\$(GPLUSPLUS)</code> <code>\$(GPLUSPLUS)String</code>	The path to the g++ command.
<code>\$(Includes)</code> <code>\$(Includes)String</code>	The user includes property value for the external compile command.
<code>\$(InputDir)</code> <code>\$(InputDir)String</code>	The absolute directory of the input file.
<code>\$(InputExt)</code> <code>\$(InputExt)String</code>	The extension of an input file not including the dot e.g cpp.
<code>\$(InputFileName)</code> <code>\$(InputFileName)String</code>	The name of an input file relative to the project directory.
<code>\$(InputName)</code> <code>\$(InputName)String</code>	The name of an input file relative to the project directory without the extension.
<code>\$(InputPath)</code> <code>\$(InputPath)String</code>	The absolute name of an input file including the extension.
<code>\$(IntDir)</code> <code>\$(IntDir)String</code>	The macro-expanded value of the Intermediate Directory project property.
<code>\$(LD)</code> <code>\$(LD)String</code>	The path to the binutils ld command.
<code>\$(LIB)</code> <code>\$(LIB)String</code>	The default file extension for a library file including the dot e.g. .lib.
<code>\$(LIBLTO)</code> <code>\$(LIBLTO)String</code>	The path to the LTO dll.
<code>\$(LTO1)</code> <code>\$(LTO1)String</code>	The path to the gcc lto1 command.
<code>\$(LibArch)</code> <code>\$(LibArch)String</code>	The library architecture.
<code>\$(LibExt)</code> <code>\$(LibExt)String</code>	The architecture and build specific library extension.
<code>\$(LinkOptions)</code> <code>\$(LinkOptions)String</code>	A space seperated list of compiler options for the external link command.
<code>\$(LinkerScriptPath)</code> <code>\$(LinkerScriptPath)String</code>	The full path of the linker script file for the link command.

<code>\$(MapPath)</code> <code>\$(MapPath)String</code>	The full path of the map file of the external link command.
<code>\$(MemorySegments)</code> <code>\$(MemorySegments)String</code>	The value of the Memory Segments property supplied to pre/post link command.
<code>\$(OBJ)</code> <code>\$(OBJ)String</code>	The default file extension for an object file including the dot e.g. <code>.o</code> .
<code>\$(OBJCOPY)</code> <code>\$(OBJCOPY)String</code>	The path to the binutils objcopy command.
<code>\$(Objects)</code> <code>\$(Objects)String</code>	A space separated list of files for the external archive or link command.
<code>\$(ObjectsFilePath)</code> <code>\$(ObjectsFilePath)String</code>	The full path containing the files for the external archive or link command.
<code>\$(OutDir)</code> <code>\$(OutDir)String</code>	The macro-expanded value of the Output Directory project property.
<code>\$(PackageExt)</code> <code>\$(PackageExt)String</code>	The file extension of a package file e.g. <code>emPackage</code> .
<code>\$(PostLinkOutputFilePath)</code> <code>\$(PostLinkOutputFilePath)String</code>	The full path of the output file of the post link command.
<code>\$(ProjectDir)</code> <code>\$(ProjectDir)String</code>	The absolute value of the Project Directory project property of the current project. If this isn't set then the directory containing the solution file.
<code>\$(ProjectName)</code> <code>\$(ProjectName)String</code>	The project name of the current project.
<code>\$(ProjectNodeName)</code> <code>\$(ProjectNodeName)String</code>	The name of the selected project node.
<code>\$(RANLIB)</code> <code>\$(RANLIB)String</code>	The path to the binutils ranlib command.
<code>\$(RelDependencyPath)</code> <code>\$(RelDependencyPath)String</code>	The relative path of the dependency file for the external compile command.
<code>\$(RelInputDir)</code> <code>\$(RelInputDir)String</code>	The relative path to the directory containing the input file from the project directory or dot if not relative.
<code>\$(RelInputPath)</code> <code>\$(RelInputPath)String</code>	The relative path to the input file from the project directory or the full path if not relative.
<code>\$(RelLinkerScriptPath)</code> <code>\$(RelLinkerScriptPath)String</code>	The relative path of the linker script file for the link command.
<code>\$(RelMapPath)</code> <code>\$(RelMapPath)String</code>	The relative path of the map file of the external link command.
<code>\$(RelObjectsFilePath)</code> <code>\$(RelObjectsFilePath)String</code>	The relative path containing the files for the external archive or link command.
<code>\$(RelTargetPath)</code> <code>\$(RelTargetPath)String</code>	The project directory relative path of the output file of the link or compile command.

<code>\$(RootOutDir)</code> <code>\$(RootOutDir)String</code>	The macro-expanded value of the Root Output Directory project property.
<code>\$(RootRelativeOutDir)</code> <code>\$(RootRelativeOutDir)String</code>	The relative path to get from the path specified by the Output Directory project property to the path specified by the Root Output Directory project property.
<code>\$(SASM)</code> <code>\$(SASM)String</code>	The path to the SEGGER assembler.
<code>\$(SCC)</code> <code>\$(SCC)String</code>	The path to the SEGGER compiler.
<code>\$(SLINK)</code> <code>\$(SLINK)String</code>	The path to the SEGGER linker.
<code>\$(STRIP)</code> <code>\$(STRIP)String</code>	The path to the binutils strip command.
<code>\$(SolutionDir)</code> <code>\$(SolutionDir)String</code>	The absolute path of the directory containing the solution file.
<code>\$(SolutionExt)</code> <code>\$(SolutionExt)String</code>	The extension of the solution file without the dot.
<code>\$(SolutionFileName)</code> <code>\$(SolutionFileName)String</code>	The filename of the solution file.
<code>\$(SolutionName)</code> <code>\$(SolutionName)String</code>	The basename of the solution file.
<code>\$(SolutionPath)</code> <code>\$(SolutionPath)String</code>	The absolute path of the solution file.
<code>\$(StageOutputFilePath)</code> <code>\$(StageOutputFilePath)String</code>	The full path of the output file of the stage command.
<code>\$(TargetPath)</code> <code>\$(TargetPath)String</code>	The full path of the output file of the link or compile command.
<code>\$(ToolChainDir)</code> <code>\$(ToolChainDir)String</code>	The macro-expanded value of the Tool Chain Directory project property.
<code>\$(Undefines)</code> <code>\$(Undefines)String</code>	The preprocessor undefines property value for the external compile command.

BinaryFile

The following table lists the BinaryFile object's member functions.

BinaryFile.crc32(offset, length) returns the CRC-32 checksum of an address range *length* bytes long, starting at *offset*. This function computes a CRC-32 checksum on a block of data using the standard CRC-32 polynomial (0x04C11DB7) with an initial value of 0xFFFFFFFF. Note that this implementation doesn't reflect the input or the output and the result is inverted.

BinaryFile.length() returns the length of the binary file in bytes.

BinaryFile.load(path) loads binary file from *path*.

BinaryFile.loadAppend(path) loads binary file from *path* and appends it to the binary image.

BinaryFile.peekBytes(offset, length) returns byte array containing *length* bytes peeked from *offset*.

BinaryFile.peekUint32(offset, littleEndian) returns a 32-bit word peeked from *offset*. The *littleEndian* argument specifies the endianness of the access, if true or undefined it will be little endian, otherwise it will be big endian.

BinaryFile.pokeBytes(offset, byteArray) poke byte array *byteArray* to *offset*.

BinaryFile.pokeUint32(offset, value, littleEndian) poke a *value* to 32-bit word located at *offset*. The *littleEndian* argument specifies the endianness of the access, if true or undefined it will be little endian, otherwise it will be big endian.

BinaryFile.resize(length, fill) resizes the binary image to *length* bytes. If the operation extends the size, the binary image will be padded with bytes of value *fill*.

BinaryFile.save(path) saves binary file to *path*.

BinaryFile.saveRange(path, offset, length) saves part of the binary file to *path*. The *offset* argument specifies the byte offset to start from. The *length* argument specifies the maximum number of bytes that should be saved.

CWSys

The following table lists the CWSys object's member functions.

CWSys.appendStringToFile(path, string) appends <i>string</i> to the end of the file <i>path</i> .
CWSys.copyFile(srcPath, destPath) copies file <i>srcPath</i> to <i>destPath</i> .
CWSys.crc32(array) returns the CRC-32 checksum of the byte array <i>array</i> . This function computes a CRC-32 checksum on a block of data using the standard CRC-32 polynomial (0x04C11DB7) with an initial value of 0xFFFFFFFF. Note that this implementation doesn't reflect the input or the output and the result is inverted.
CWSys.fileExists(path) returns true if file <i>path</i> exists.
CWSys.fileSize(path) return the number of bytes in file <i>path</i> .
CWSys.getRunStderr() returns the stderr output from the last <i>CWSys.run()</i> call.
CWSys.getRunStdout() returns the stdout output from the last <i>CWSys.run()</i> call.
CWSys.makeDirectory(path) create the directory <i>path</i> .
CWSys.packU32(array, offset, number, le) packs <i>number</i> into the <i>array</i> at <i>offset</i> .
CWSys.popup(text, caption) prompt the user with text and return true for yes and false for no.
CWSys.readByteArrayFromFile(path) returns the byte array contained in the file <i>path</i> .
CWSys.readStringFromFile(path) returns the string contained in the file <i>path</i> .
CWSys.removeDirectory(path) remove the directory <i>path</i> .
CWSys.removeFile(path) deletes file <i>path</i> .
CWSys.renameFile(oldPath, newPath) renames file <i>oldPath</i> to be <i>newPath</i> .
CWSys.run(cmd, wait) runs command line <i>cmd</i> optionally waits for it to complete if <i>wait</i> is true.
CWSys.unpackU32(array, offset, le) returns the number unpacked from the <i>array</i> at <i>offset</i> .
CWSys.writeByteArrayToFile(path, array) creates a file <i>path</i> containing the byte array <i>array</i> .
CWSys.writeStringToFile(path, string) creates a file <i>path</i> containing <i>string</i> .

Debug

The following table lists the Debug object's member functions.

Debug.evaluate(expression) evaluates debug *expression* and returns it as a JavaScript value.

Debug.getfunction(address) return function name containing *address*.

ElfFile

The following table lists the ElfFile object's member functions.

ElfFile.crc32(address, length, virtualNotPhysical, padding, programNotSection) returns the CRC-32 checksum of an address range *length* bytes long, located at *address*. If *virtualNotPhysical* is true or undefined, *address* is a virtual address otherwise it is a physical address. If *padding* is defined, it specifies the byte value used to fill gaps in the program. If *programNotSection* is true or undefined, data is read using program headers rather than section headers. This function computes a CRC-32 checksum on a block of data using the standard CRC-32 polynomial (0x04C11DB7) with an initial value of 0xFFFFFFFF. Note that this implementation doesn't reflect the input or the output and the result is inverted.

ElfFile.findProgram(address) returns an object with *start*, the *data* and the *size* to allocate of the Elf program that contains *address*.

ElfFile.getEntryPoint() returns the entry point in the ELF file.

ElfFile.getSection(name) returns an object with *start* and the *data* of the Elf section corresponding to the *name*.

ElfFile.isLittleEndian() returns true if the Elf file has numbers encoded as little endian.

ElfFile.load(path) loads Elf file from *path*.

ElfFile.peekBytes(address, length, virtualNotPhysical, padding, programNotSection) returns byte array containing *length* bytes peeked from *address*. If *virtualNotPhysical* is true or undefined, *address* is a virtual address otherwise it is a physical address. If *padding* is defined, it specifies the byte value used to fill gaps in the program. If *programNotSection* is true or undefined, data is read using program headers rather than section headers.

ElfFile.peekUint32(address, virtualNotPhysical) returns a 32-bit word peeked from *address*. If *virtualNotPhysical* is true or undefined, *address* is a virtual address otherwise it is a physical address.

ElfFile.pokeBytes(address, byteArray, virtualNotPhysical) poke byte array *byteArray* to *address*. If *virtualNotPhysical* is true or undefined, *address* is a virtual address otherwise it is a physical address.

ElfFile.pokeUint32(address, value, virtualNotPhysical) poke a *value* to 32-bit word located at *address*. If *virtualNotPhysical* is true or undefined, *address* is a virtual address otherwise it is a physical address.

ElfFile.save(path) saves Elf file to *path*.

ElfFile.symbolValue(symbol) returns the value of *symbol* in Elf file.

TargetInterface

The following table lists the TargetInterface object's member functions.

TargetInterface.crc32(address, length) reads a block of bytes from target memory starting at address for length bytes, generates a crc32 on the block of bytes and returns it.
TargetInterface.delay(ms) waits for ms milliseconds
TargetInterface.error(message) terminates execution of the script and outputs a target interface error message to the target log.
TargetInterface.expandMacro(string) returns the string with macros expanded.
TargetInterface.getProjectProperty(savename) returns the value of the savename project property.
TargetInterface.getTargetProperty(savename) returns the value of the savename target property.
TargetInterface.go() allows the target to run.
TargetInterface.isStopped() returns true if the target is stopped.
TargetInterface.message(message) outputs a target interface message to the target log.
TargetInterface.peekBinary(address, length, filename) reads a block of bytes from target memory starting at address for length bytes and writes them to filename.
TargetInterface.peekByte(address) reads a byte of target memory from address and returns it.
TargetInterface.peekBytes(address, length) reads a block of bytes from target memory starting at address for length bytes and returns the result as an array containing the bytes read.
TargetInterface.peekMultUInt16(address, length) reads length unsigned 16-bit integers from target memory starting at address and returns them as an array.
TargetInterface.peekMultUInt32(address, length) reads length unsigned 32-bit integers from target memory starting at address and returns them as an array.
TargetInterface.peekUInt16(address) reads a 16-bit unsigned integer from target memory from address and returns it.
TargetInterface.peekUInt32(address) reads a 32-bit unsigned integer from target memory from address and returns it.
TargetInterface.peekWord(address) reads a word as an unsigned integer from target memory from address and returns it.
TargetInterface.pokeBinary(address, filename) reads a block of bytes from filename and writes them to target memory starting at address.
TargetInterface.pokeByte(address, data) writes the byte data to address in target memory.
TargetInterface.pokeBytes(address, data) writes the array data containing 8-bit data to target memory at address.
TargetInterface.pokeMultUInt16(address, data) writes the array data containing 16-bit data to target memory at address.
TargetInterface.pokeMultUInt32(address, data) writes the array data containing 32-bit data to target memory at address.

TargetInterface.pokeUInt16(address, data) writes data as a 16-bit value to address in target memory.

TargetInterface.pokeUInt32(address, data) writes data as a 32-bit value to address in target memory.

TargetInterface.pokeWord(address, data) writes data as a word value to address in target memory.

TargetInterface.readBinary(filename) reads a block of bytes from filename and returns them in an array.

TargetInterface.reset() resets the target.

TargetInterface.resetAndStop() resets and stops the target.

TargetInterface.setTargetProperty(savename) set the value of the savename target property.

TargetInterface.stop() stops the target.

TargetInterface.writeBinary(array, filename) write the bytes in array to filename.

WScript

The following table lists the WScript object's member functions.

WScript.Echo(s) echos string *s* to the output terminal.

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