



CodeWarrior for ARMv7 Getting Started Guide



Contents

Chapter 1 Introduction.....	5
1.1 System requirements.....	5
1.2 Supported devices.....	6
Chapter 2 Configuring Target Hardware.....	7
2.1 Preparing LS1021AQDS board.....	7
2.2 Preparing LS1021ATWR board.....	9
2.3 Preparing LS1021AIOT board.....	11
Chapter 3 Installing CodeWarrior and Working with Projects.....	13
3.1 Installing and registering CodeWarrior.....	13
3.2 Creating and building bareboard project.....	14
3.3 Debugging bareboard project.....	21
Chapter 4 Installing Service Pack.....	25
4.1 Online mode.....	26
4.2 Offline mode.....	27



Chapter 1

Introduction

This document explains how to install the CodeWarrior Development Studio for QorIQ LS series - ARM V7 ISA. In addition, it describes how to prepare the boards and how to use CodeWarrior to create, build, and debug a simple project.

This chapter contains the following sections:

- [System requirements](#) on page 5
- [Supported devices](#) on page 6

1.1 System requirements

This section provides operating platform requirements for installing CodeWarrior software.

Table 1: System Requirements

Processor	Intel® Pentium® 4 processor, 2 GHz or faster, Intel Xeon™, Intel Core™, AMD Athlon™ 64, AMD Opteron™, or higher
Memory	2 GB RAM
Hardware	<ul style="list-style-type: none"> • CD-ROM drive for CD installation • Internet connectivity for web downloads and update access
Operating system	See Table 2. Supported operating systems on page 5
Disk space	At least 3 GB of free disk space

Table 2: Supported operating systems

Windows (32-bit)	Windows (64-bit)	Linux (64-bit)
Windows 7 Service Pack 1 (SP1)	Windows 7 SP1	Ubuntu 14.04 LTS
Windows 10	Windows 8.1 Update 1 (U1)	Ubuntu 15.04
	Windows 2012 Server	Fedora 22
	Windows 10	OpenSUSE 13.2
		RedHat Enterprise Linux 6.5
		RedHat Enterprise Linux / CentOS 7.1
		Mint 15
		Mint 17.2

1.2 Supported devices

This section describes the device families and targets that are supported by the CodeWarrior software.

Table 3: Supported target devices

Device Family	Description
LS102x family	
LS102MA	Supports generation of multi-core target projects for LS102MARDB.
LS1020A	Supports generation of multi-core target projects for LS1020AQDS and LS1020ATWR.
LS1021A	Supports generation of multi-core target projects for LS1021AIOT, LS1021AQDS, and LS1021ATWR.
LS1022A	Supports generation of multi-core target projects for LS1022AQDS and LS1022ATWR.
LS1024A	Supports generation of multi-core target projects for LS1024ARDB.

Chapter 2

Configuring Target Hardware

This chapter explains how to use the CodeWarrior IDE for configuring the boards supported by the CodeWarrior Development Studio for QorIQ LS series - ARM V7 ISA software.

This chapter contains the following sections:

- [Preparing LS1021AQDS board](#) on page 7
- [Preparing LS1021ATWR board](#) on page 9
- [Preparing LS1021AIOT board](#) on page 11

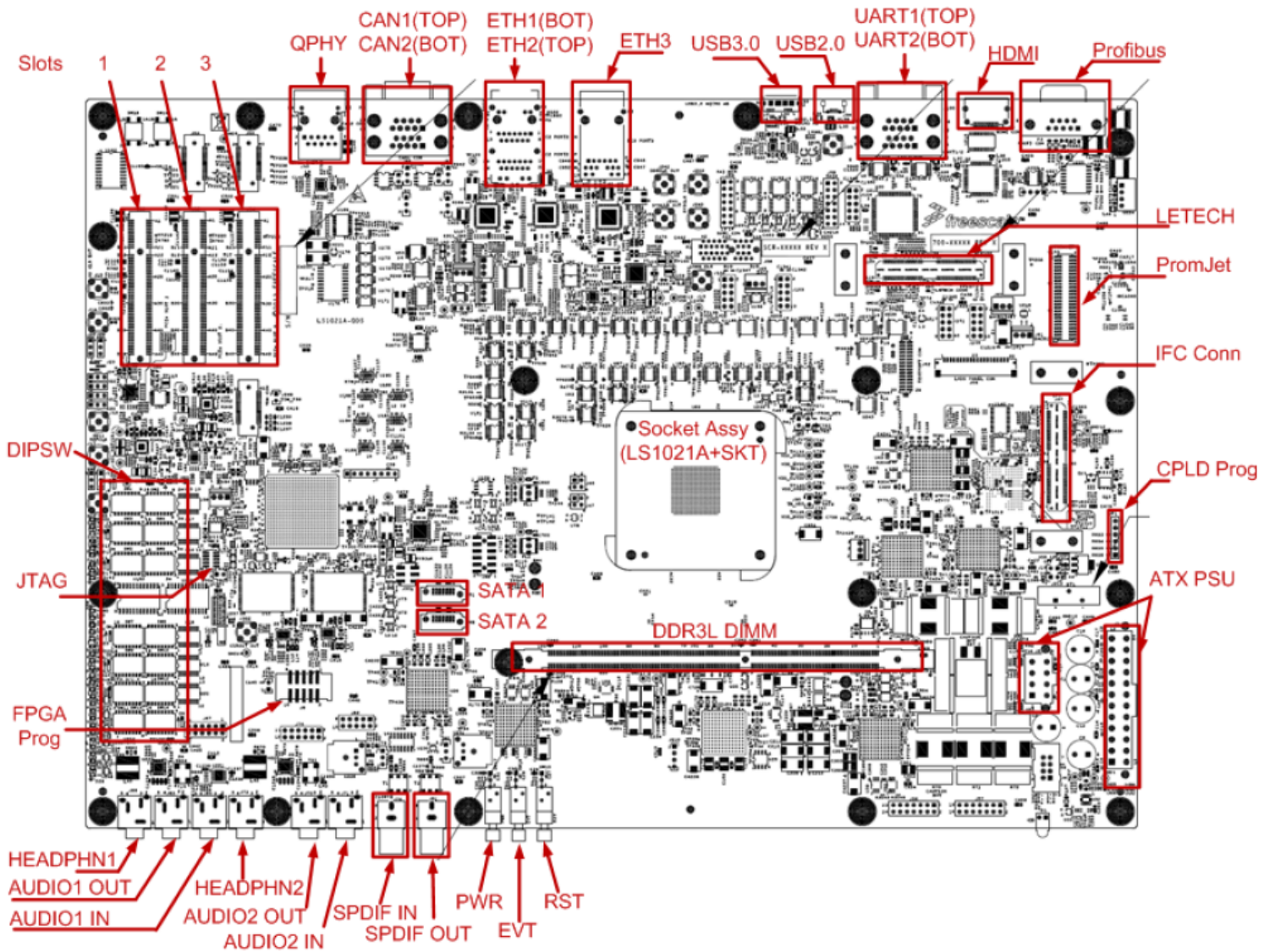
2.1 Preparing LS1021AQDS board

This section explains steps to configure the LS1021AQDS board.

Perform the following steps to configure an LS1021AQDS board:

1. Ensure that board is not connected to the power.
2. Ensure that the power to the chassis or the standalone power supply is OFF.

Figure 1: Connecting LS1021AQDS board



3. Check the default switch positions and jumper settings.
 - a. Attach ATX power cables to board.
 - Plug-in the main 24 pin ATX cable into J1.
 - Attach the 2x2 power connector into J2.
 - b. Attach UART cable to top port.
 - c. Ethernet cable (optional): if using Ethernet, attach Ethernet cable to ETSEC3 port.
 - d. JTAG/CWTAP (optional): if using JTAG, connect the cable from the CWTAP to J27.
 - e. Verify if the board is operational.

NOTE

For more details, see “Connection Setup” chapter from “LS1021QDS-DDR3 Setup Guide”.

4. Perform an initial board check and look for correct LED functioning: LED D33, POVDD, XVDD and SVDD are a steady green color; LED ALARM could flicker with a red color.
5. Power-on the board by pressing the POWER push button switch (SW17).
6. Check for completion of the PRESET (Power-on-Reset) sequence indicated by the LEDs. The LEDs on the board follow the below sequence:
 - a. LED OVDD and VDD display steady green light.
 - b. LED PASS display steady blue light.
 - c. LED POVDD is closed.
7. Push the POWER push button (SW17) to power off the board.

2.2 Preparing LS1021ATWR board

This section explains steps to configure the LS1021ATWR board.

Perform the following steps to configure an LS1021ATWR board:

1. Ensure that board is not connected to the power.
2. Ensure that the power to the chassis or the standalone power supply is OFF.

Figure 2: Connecting LS1021ATWR board

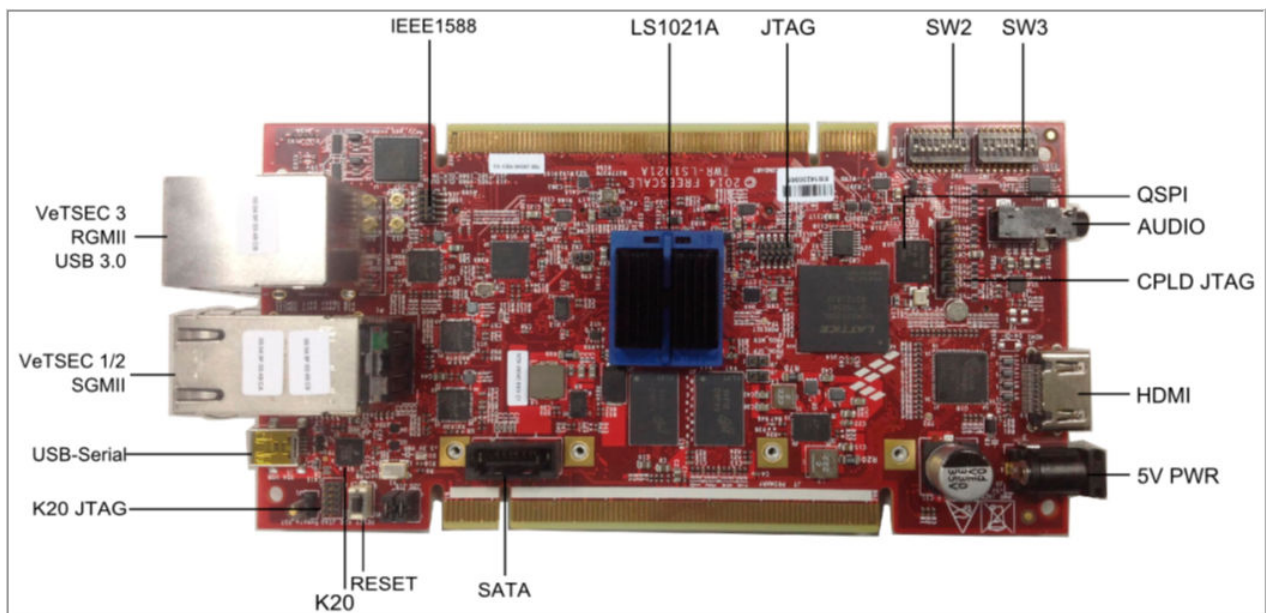
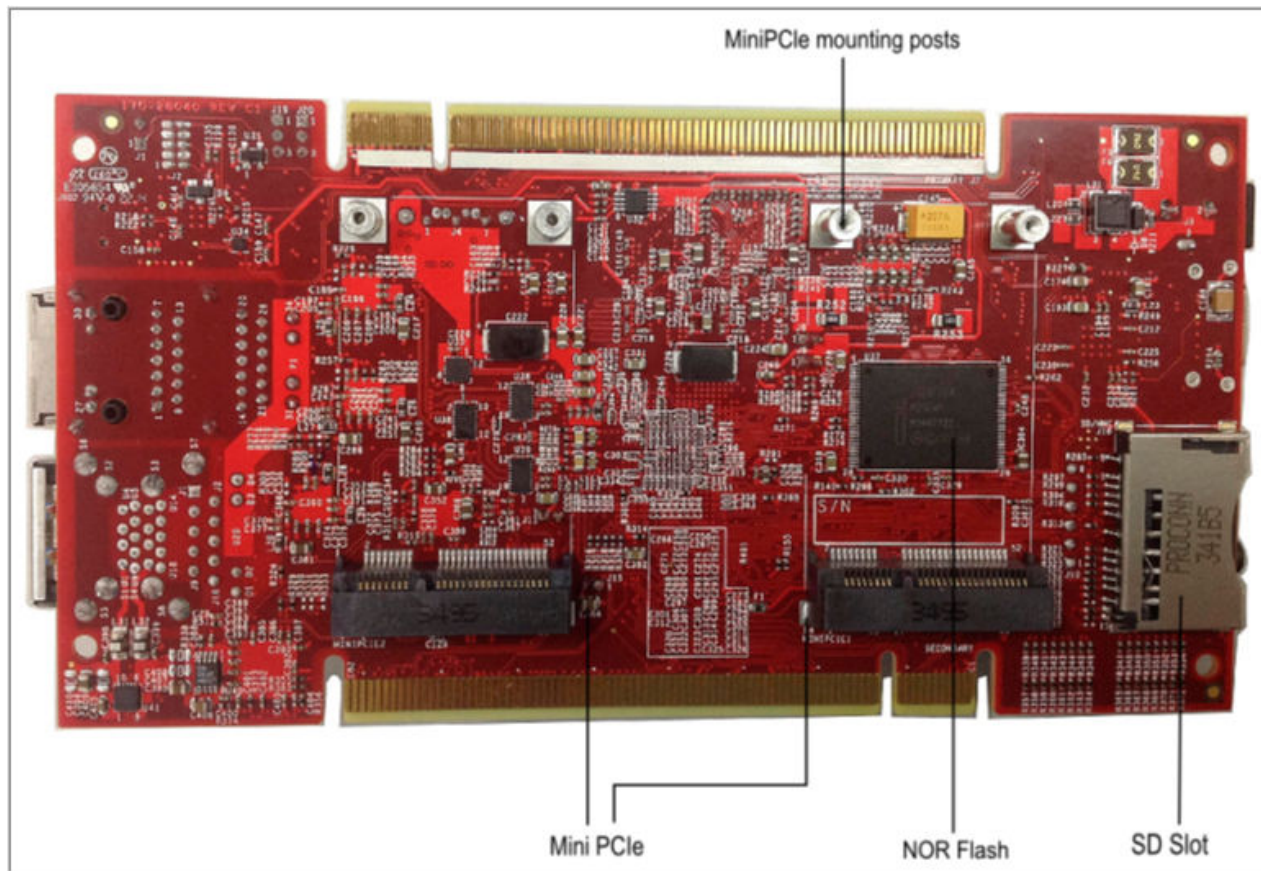


Figure 3: Connecting LS1021ATWR board



3. Check the default switch positions.
 - a. Attach the mini USB cable to USB-serial connector, J5. This will provide serial connectivity and CMSIS-DAP connection (optional).

NOTE

You need to install the USB driver on the host PC before using the serial terminal. You can download this driver from: <https://mbed.org/handbook/Windows-serial-configuration>

- b. Ethernet cable (optional): if using Ethernet, attach Ethernet cable to eTSEC3 port.
 - c. JTAG/CWTAP (optional): if using JTAG, connect the cable from the CWTAP to J12.
4. Power up the board through the barrel connector, J3. The board should be powered with a 5 V at 5 A supply.
5. Perform an initial board check and look for correct LED functioning:
 - a. LED D1 turns ON.
 - b. LED D2 turns ON.
 - c. LED D5 turns ON and then OFF.
6. Remove the power supply from the J3 connector to power off the board.

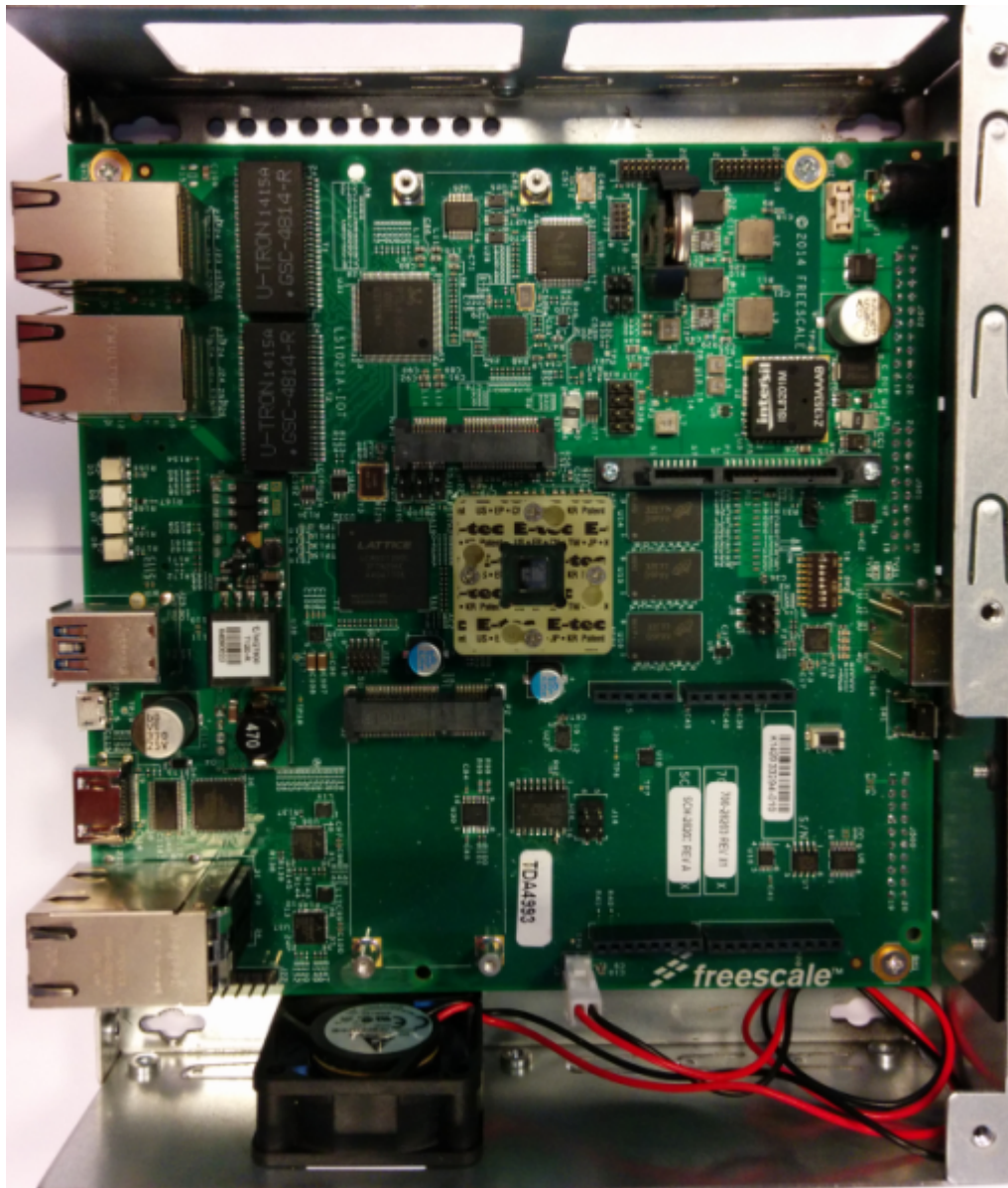
2.3 Preparing LS1021AIOT board

This section explains steps to configure the LS1021AIOT board.

Perform the following steps to configure an LS1021AIOT board:

1. Ensure that board is not connected to the power.
2. Ensure that the power to the chassis or the standalone power supply is OFF.

Figure 4: Connecting LS1021A IOT board



3. Check the default switch positions.
 - a. If you want to enable CMSIS-DAP you must change SW2[8] = 1. Make sure that your CW TAP device is not plugged in. Attach the micro USB cable to USB-serial connector, J26. This will provide serial connectivity and CMSIS-DAP connection (optional).

NOTE

You can find more information about how to install CMSIS-DAP (Linux/Windows) in `readme_cmsisdap.txt`, which is located in `[CWInstallDir]/Common/CCS/drivers/usb`.

- b. To boot from SD card, you have to change SW2[0] = 0.
 - c. Ethernet cable (optional): If using Ethernet, attach Ethernet cable to eTSEC3 port. ETHx where x is from 0 to 5.
 - d. JTAG/CW TAP (optional): If using JTAG, connect the cable from the CW TAP to J21.
4. Power-up the board through barrel connector, J3. The barrel should be supplied by a 12V at 5A supply.
 5. Perform an initial board check and look for correct LED functioning: LED D1 turns ON; LED D2 turns ON; LED D5 turns ON then OFF.
 6. D7 and D8 are ON. D5 is ON if CMSISDAP (micro-usb) cable is connected. Remove the supply connector from J3, to power off the board.

Chapter 3

Installing CodeWarrior and Working with Projects

This chapter explains how to install CodeWarrior tools to create and work with projects.

NOTE

The scope of this chapter is limited to the use of the CodeWarrior IDE to write and debug applications for the target platform.

This chapter contains the following sections:

- [Installing and registering CodeWarrior](#) on page 13
- [Creating and building bareboard project](#) on page 14
- [Debugging bareboard project](#) on page 21

3.1 Installing and registering CodeWarrior

This section provides the steps required to install and register the CodeWarrior software.

Microsoft® Windows OS installation

Administrator rights are required to install CodeWarrior on Microsoft Windows 7 operating system. The default CodeWarrior installation folder is C:\Freescale. Your project workspace needs to be set up in any folder that you can fully access.

To install CodeWarrior for ARMv7 on a Windows machine, perform these steps:

1. Insert the **CodeWarrior Development Studio** installation CD into the CD-ROM drive.

The CodeWarrior installation menu appears.

NOTE

If autorun is disabled on your computer, click **Start > Run** and enter `cd_drive:\Launch.exe` where `cd_drive` is the drive letter assigned to the CD-ROM drive.

2. Run the installer.

The install wizard appears.

3. Follow the wizard's on-screen instructions to install the CodeWarrior.

When installation completes, the **InstallShield Wizard Completed** page appears.

4. Click **Finish**.

The wizard closes. A browser starts and displays the Documentation page. This page contains tabs that group the CodeWarrior documentation into categories.

You have successfully installed CodeWarrior Development Studio for QorIQ LS series - ARM V7 ISA, Version 10.0.x.

Linux OS installation

Eclipse needs read/write access to the installation folder. Make sure the eclipse installation folder has the appropriate permissions for all users. Make sure your project workspace has read and write permissions. If the CodeWarrior software does not restart automatically after a successful CodeWarrior update operation, run `./eclipse -clean` to launch the CodeWarrior software.

To install CodeWarrior for ARMv7 on a Linux machine, perform these steps:

1. Insert the **CodeWarrior Development Studio** installation CD into the Linux host computer's CD-ROM drive.
2. On the host computer, open a new terminal window.
 A shell session starts.
3. Mount the CD-ROM media on the Linux file system.
4. Change the working directory to the CD-ROM mount directory.

NOTE

See `README.txt` file in the mount directory. This file contains installation instructions of different Linux distributions.

5. Issue the command `xhost +`.
6. Issue the command `./setuplinux.sh`.
 The install wizard starts and displays its welcome page.
7. Follow the wizard's on-screen instructions to install the CodeWarrior software.
 When the software installation completes, the wizard displays its installation summary page.
8. Click **Finish**.
 The wizard closes and a shortcut for Linux-hosted CodeWarrior is created on the desktop. The shortcut is not created if CodeWarrior was installed as a root user.

NOTE

CodeWarrior service packs are installed with the **Eclipse Updater**. To start the Eclipse Updater, choose **Help > Install New Software** from the CodeWarrior IDE menu bar.

Licensing

Both Windows and Linux installers generate an Evaluation license for the Architect edition that is valid for 15 days. The license is generated regardless of other product versions that may have been installed on the same host. The certificate generated is valid only on the machine where the product has been installed. During the installation, the user is informed that the evaluation key is node-locked and number of days the key is valid. Node-locking element is by default Ethernet ID. In case no Ethernet ID is found, the disk ID is used.

To obtain a suitable license, see the [CodeWarrior Development Studio for QorIQ LS series for ARM v7 ISA](#) product summary page.

3.2 Creating and building bareboard project

This section explains how to create and build CodeWarrior projects on Windows and Linux environments.

The steps are as follows:

1. Launch the CodeWarrior IDE:
 - On Windows:**
 - a. Choose **Start > All Programs > Freescale CodeWarrior > CW4NET [CWVersion] > CodeWarrior for ARMv7**.
 - On Linux:**
 - a. Open a new terminal window and change the working directory to: `[CWInstallDir]/eclipse/`, where `[CWInstallDir]` is the path to your CodeWarrior installation.
 - b. Issue the command `./cwide`.

The **Workspace Launcher** dialog appears.

2. If you wish to change the location of your project's workspace, clear **Use default location** checkbox and click **Browse** to select the new path.

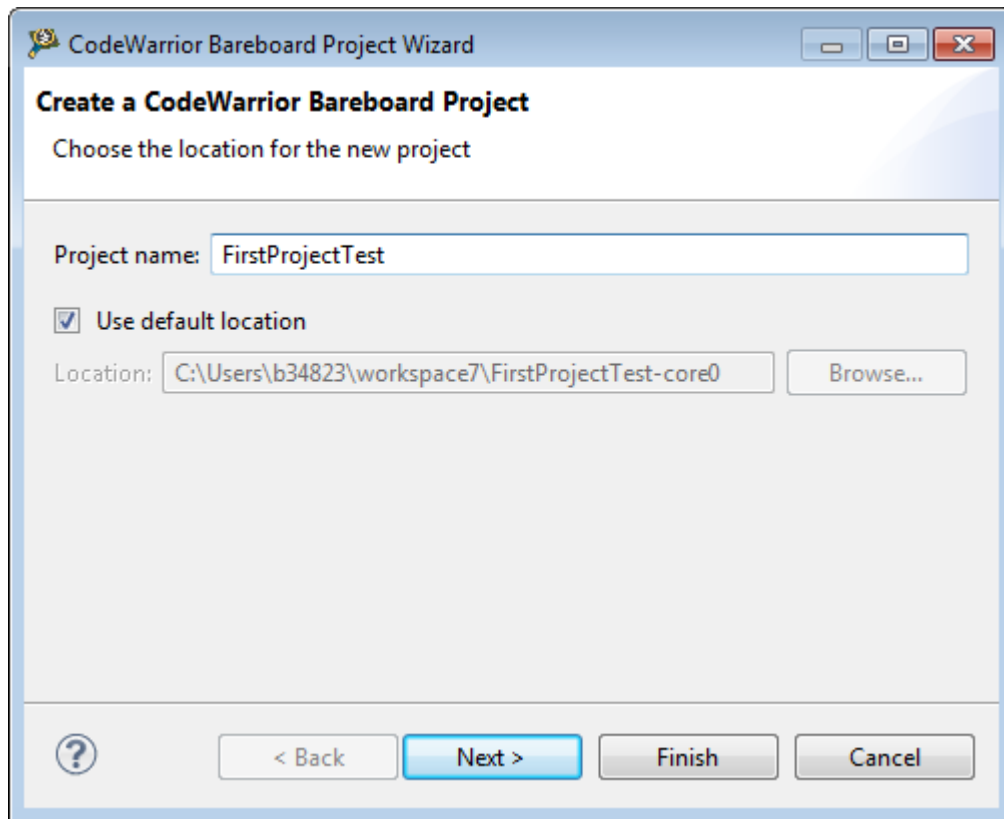
The **Select Workspace Directory** dialog appears.

3. Select the required folder. Alternatively, to create a new workspace directory:
 - On Windows, click **Make New Folder**.
 - On Linux, click **Create Folder**.
4. Click **OK**.

The **Select Workspace Directory** dialog closes.

5. Click **OK** to store the project at the specified location.
6. Create a new project:
 - a. Choose **File > New > CodeWarrior Bareboard Project Wizard** from the CodeWarrior IDE menu bar.

Figure 5: Create sample project



- b. In **Project name** text box, type **FirstProjectTest**.

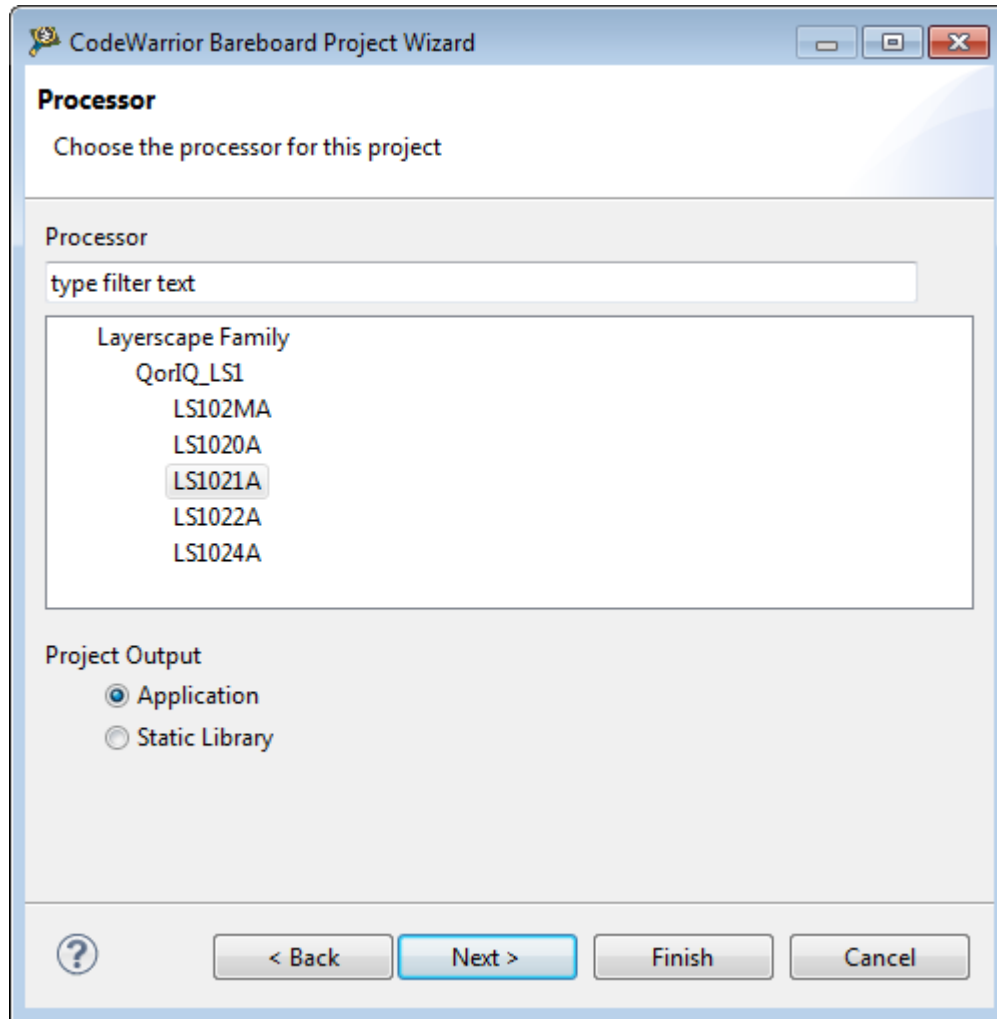
NOTE

The **Location** text box shows the default workspace location. To change this location, clear the **Use default location** checkbox and click **Browse** to select a new location.

- c. Click **Next**.

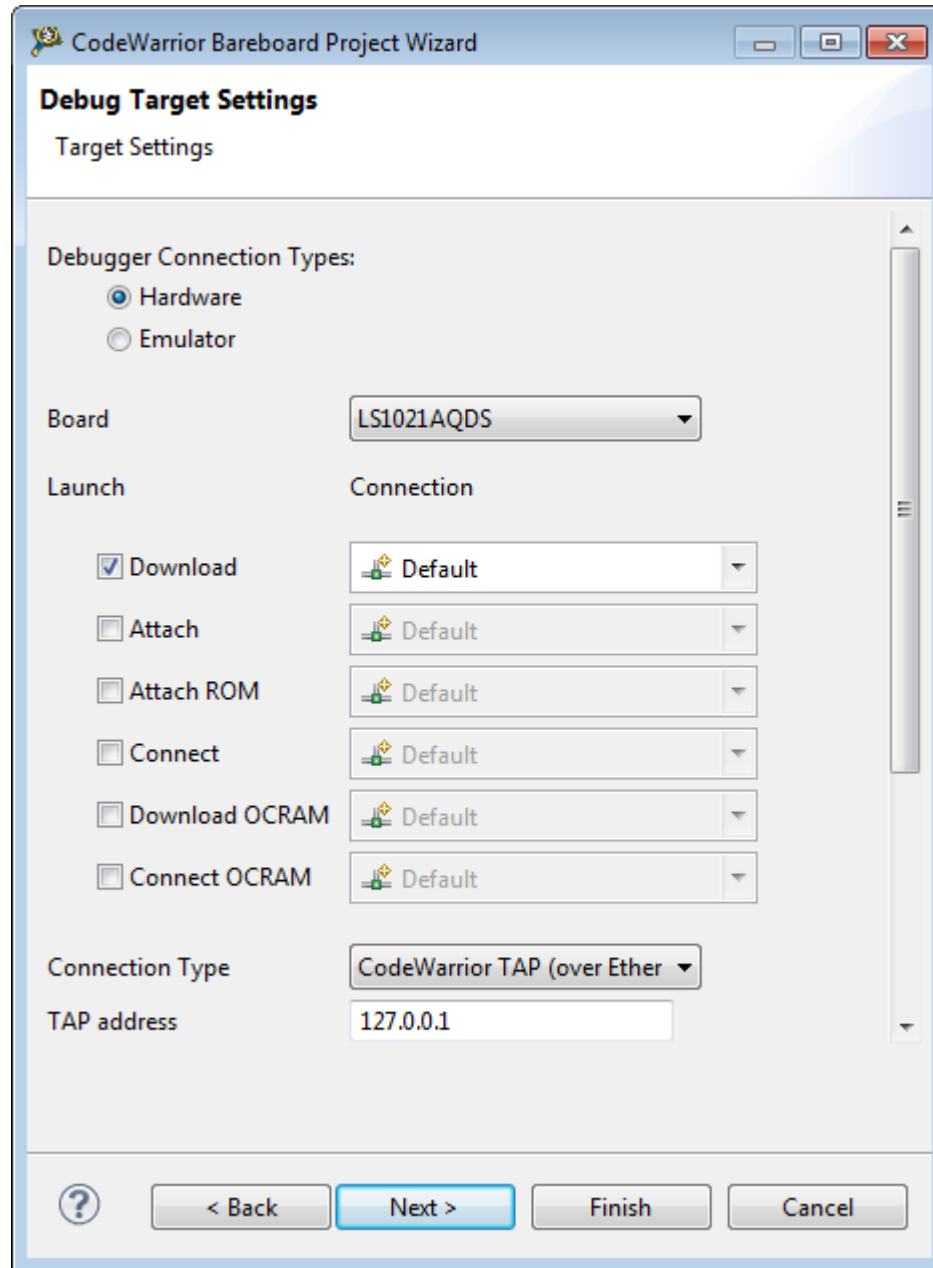
The **Processor** page appears, as shown in the figure below.

Figure 6: Processor page



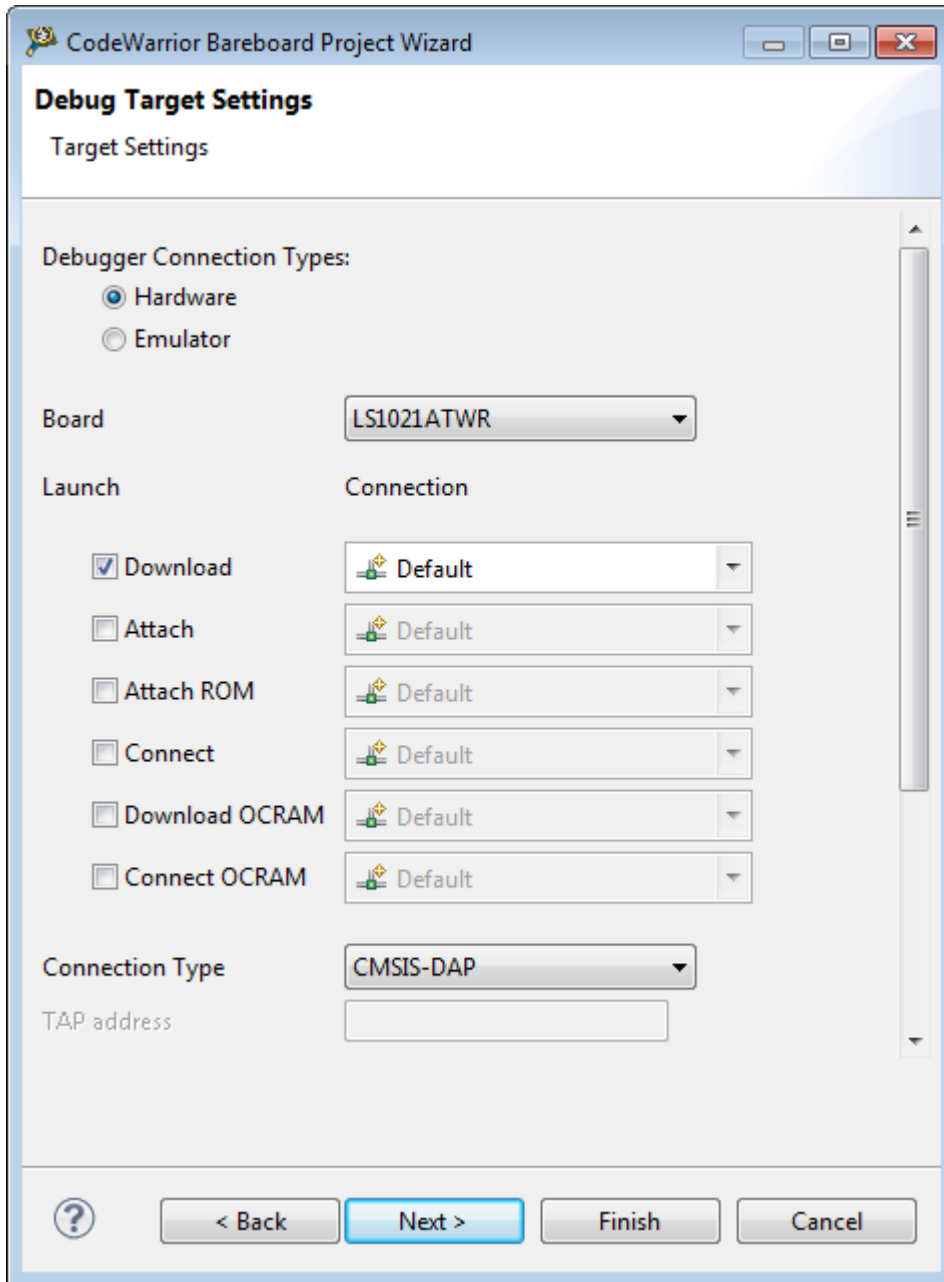
- d. Select a target processor (LS1021A), for the new project, from the **Processor** list.
- e. Select **Application** from the **Project Output** group to create an application with the `.elf` extension that includes information required to debug the project.
- f. Click **Next**.
 The **Debug Target Settings** page appears.
- g. Select a connection type (hardware or emulator) from the **Debugger Connection Types** group.
- h. Choose the board you are targeting from the **Board** menu. Based on your requirements, choose QDS or Tower board.
- i. Select the launch configurations and the corresponding connection to be included in your project, from the **Launch** group.

Figure 7: Debug target settings - QDS board



- j. On the **Debug Target Settings** page, choose a connection type from the **Connection Type** menu.
- k. Enter the IP address of the TAP device in the **TAP address** text box. This option is disabled and cannot be edited, if you choose USB TAP from the **Connection Type** menu. CodeWarrior TAP works with both types of board, QDS and Tower, but CMSIS-DAP is the default connection type for Tower board (as shown below).

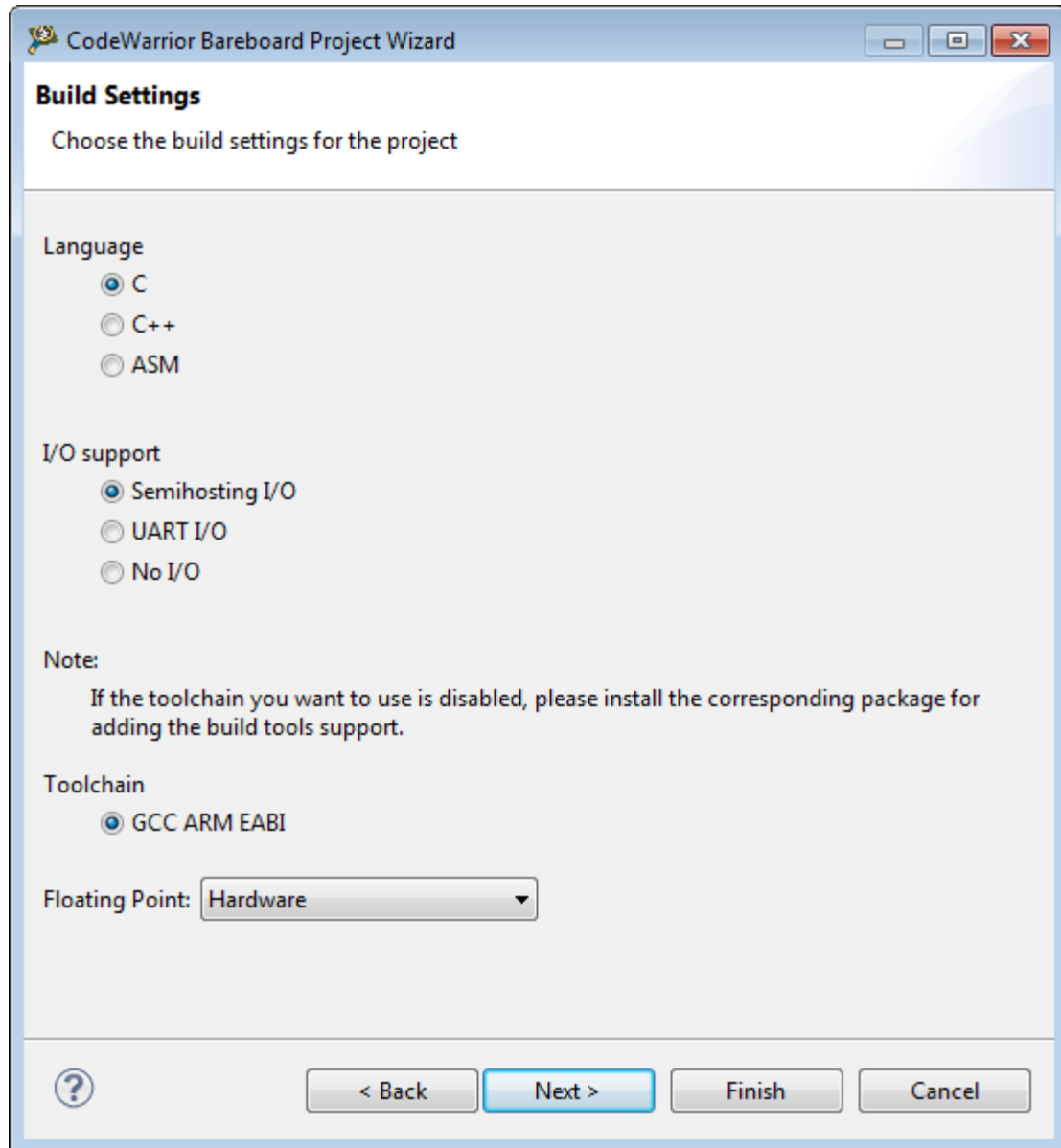
Figure 8: Debug target settings - Tower board



I. Click **Next**.

The **Build Settings** page appears.

Figure 9: Build settings



m. Select a programming language, from the **Language** group.

The language you select determines the libraries that are linked with your program and the contents of the `main` source file that the wizard generates.

n. Select **I/O Support**.

o. Select a toolchain from the **Toolchain** group.

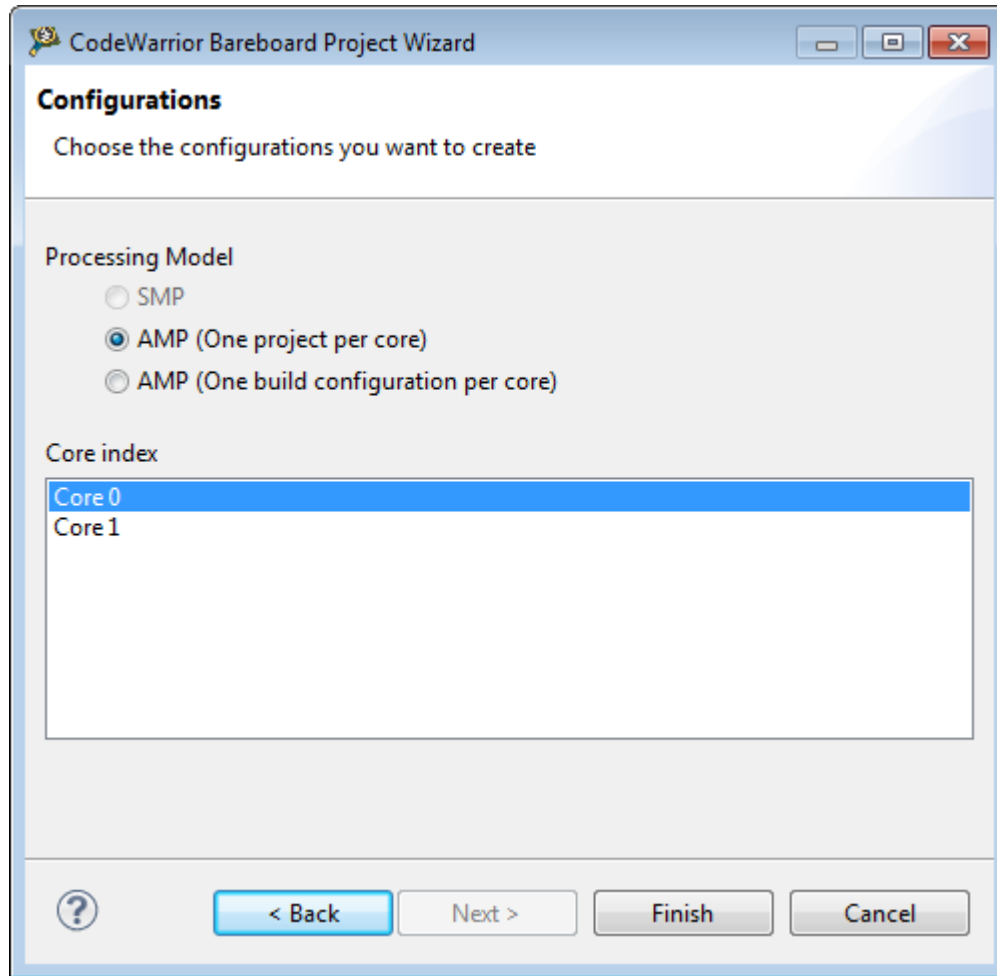
Selected toolchain sets up the default compiler, linker, and libraries used to build the new project. Each toolchain generates code targeted for a specific platform.

p. Choose an option from the **Floating Point** menu to prompt the compiler to handle the floating-point operations, by generating instructions for the chosen floating-point unit.

q. Click **Next**.

The **Configurations page** appears.

Figure 10: Configurations page



- r. Select a processing model option from the **Processing Model** group.

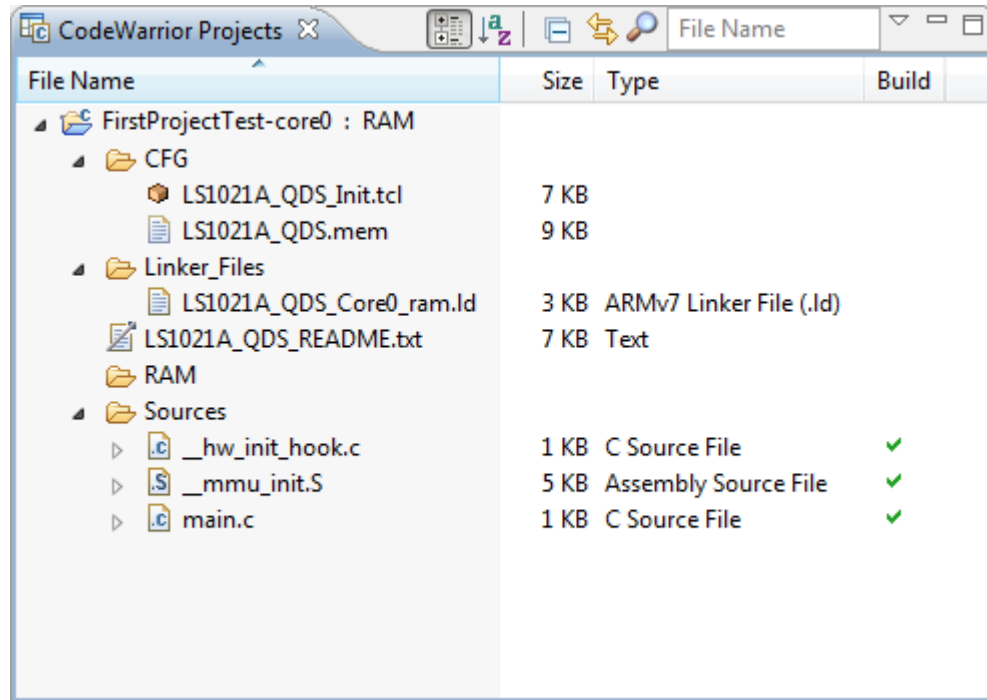
NOTE

The **SMP** option is disabled for this release.

- s. Select the processor core that executes the project, from the **Core index** list.
- t. Click **Finish**.

The new project appears in the **Project Explorer** view according to your specifications.

Figure 11: CodeWarrior projects view



7. Build the program.
 - a. Select the newly created project in the **Project Explorer** view.
 - b. Select **Project > Build Project** to build the project. Alternatively, right-click the project in the **Project Explorer** view and select **Build Project** from the context menu that appears.

The IDE compiles the project's source code files and links resulting object code into an ELF-format executable file.

3.3 Debugging bareboard project

This section explains how to change the debugger settings and how to debug a CodeWarrior bareboard application project.

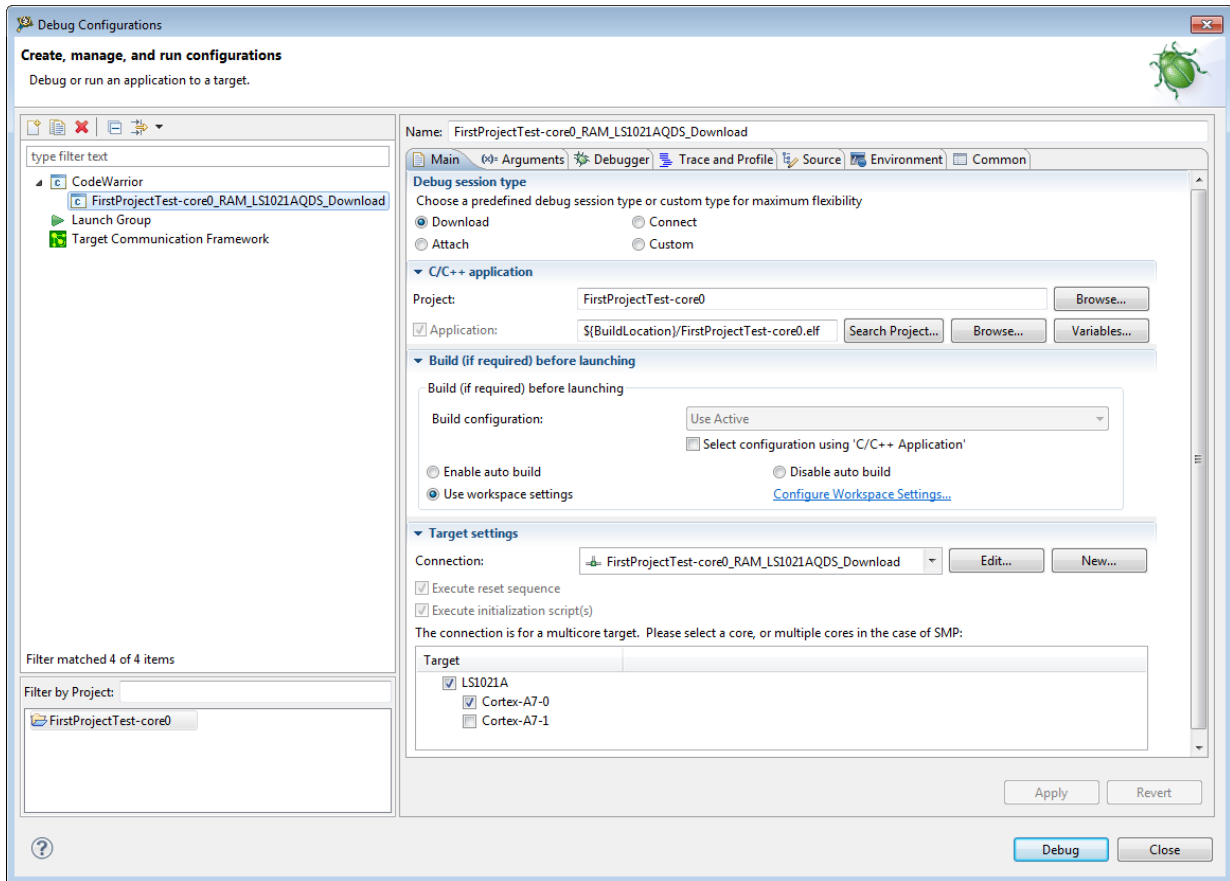
The **CodeWarrior Bareboard Project** wizard sets the debugger settings of the project's launch configurations to default values. You can change these default values based on your requirements.

To modify the debugger settings and start debugging a CodeWarrior project, perform these steps:

1. Launch the CodeWarrior IDE.
2. Debug the program.
 - a. From the CodeWarrior IDE menu bar, select **Run > Debug Configurations**.

The **Debug Configurations** dialog appears.

Figure 12: Debug configurations dialog

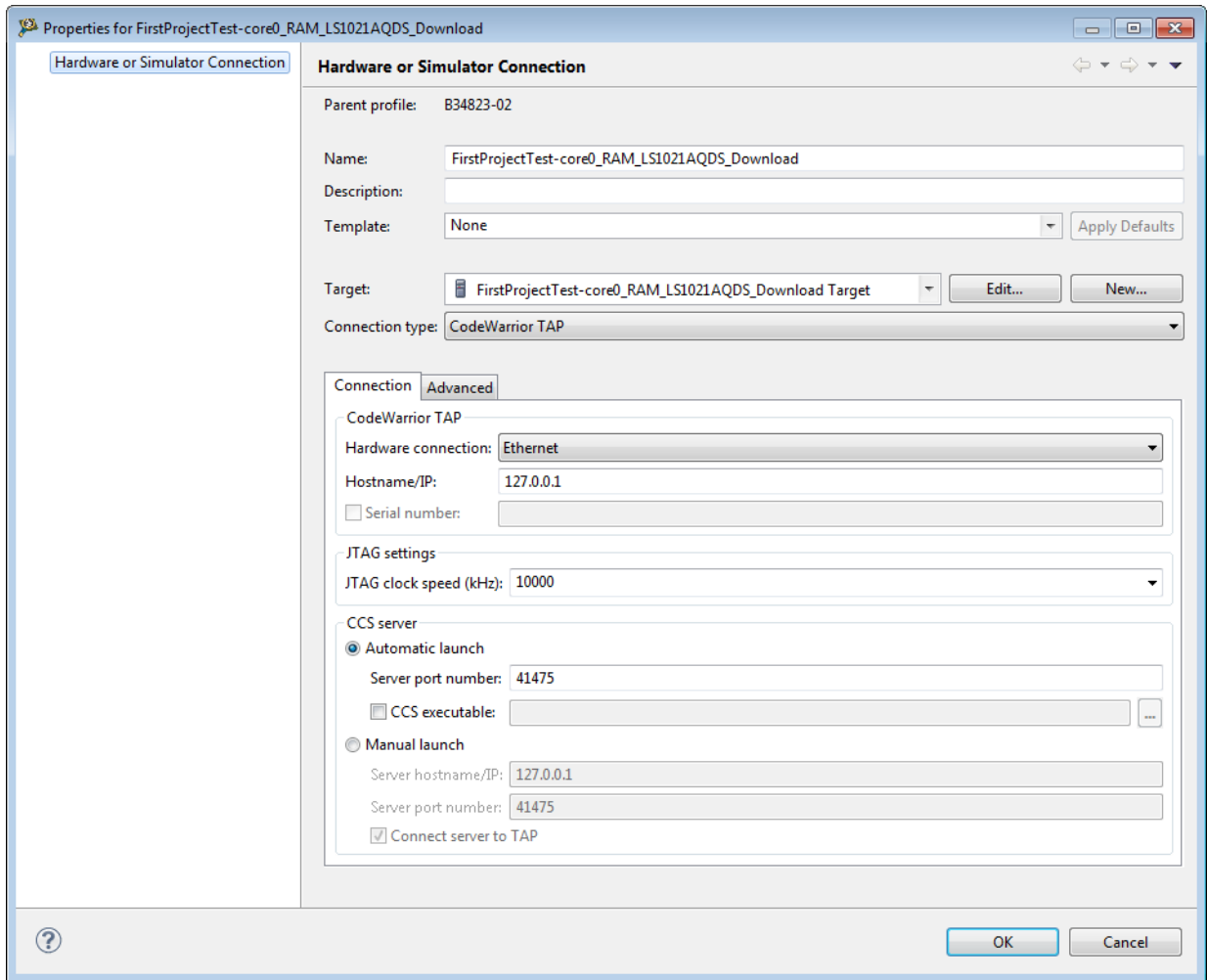


- b. On the **Main** page, choose a remote system from the **Connection** menu.
- c. Select a core, or multiple cores in case of SMP, from the **Target** list.
- d. Click **Edit**.

The **Properties for <Connection>** window appears.

- e. Choose a connection type from the **Connection type** menu. For Tower board, CMSIS-DAP is the default connection type.
- f. Configure the **CCS server** settings on the **<Connection>** tab.



Figure 13: Properties for <Connection> window



- g. Click **OK**.
The **Properties for<Connection>** window closes.
- h. Click **Apply**.
The IDE saves your settings.
- 3. Debug the program.
 - a. Click **Debug**.
 - b. The IDE switches to the **Debug** perspective. The debugger downloads your program to the target board and halts execution at the first statement of `main()`.

NOTE

To download multiple projects on each core, you can click the pull-down menu next to the debug icon. From this menu, pick the next core you wish to debug.

- c. Click a thread in the **Debug** view.
The program counter icon  (on the marker bar) points to the next statement to be executed.
- d. In the **Debug** view, click **Step Over** .

The debugger executes the current statement and halts at next statement.

4. Set breakpoint and execute program to breakpoint.


- a. In the editor area, scroll to a statement.
- b. Double-click the marker bar next to the statement.

A breakpoint indicator  appears next to the statement.

- c. In the **Debug** view, click **Resume** .


The debugger executes all statements up to, but not including the breakpoint statement.

5. Control the program:

- a. In the **Debug** view (top-left of perspective), click **Step Over** .

The debugger executes the current statement and halts at the next statement.

- b. In the **Debug** view, click **Resume** .

- c. In the **Debug** view, click **Terminate** .

The program terminates and the debug session ends.

6. Select **File > Exit**.

The CodeWarrior IDE window closes.

Chapter 4

Installing Service Pack

To update CodeWarrior with the latest version, you need to install service pack.

To install the service pack:

1. Choose **Help > Install New Software** from the CodeWarrior IDE menu bar. The **Install** dialog with the **Available Software** page appears.
2. Choose the software site or service pack archive you have added from the **Work with** menu.
3. Check the details of the service pack in the **Details** section.
4. Click **Next**. The **Install Details** page appears.
5. Click **Next**. The **Review Licenses** page appears.
6. Accept the terms of license agreement. Click **Finish**.

The installation of the service pack dependencies begins.

7. Click **OK**. The installation proceeds.

A message box appears asking for your permission to restart the CodeWarrior Development Studio.

NOTE

Ensure that you restart CodeWarrior for the service pack to be installed completely.

8. Click **Yes**. Without restarting the CodeWarrior software, new plug-ins will not be registered. The CodeWarrior software restarts and the **Workspace Launcher** dialog appears.

NOTE

For Linux, if the CodeWarrior software does not restart automatically after a successful update operation, run `/cwide` with `-clean` option.

9. Specify the workspace in the **Workspace Launcher** dialog and click **OK**.
10. Open the **New Project** wizard and browse to the **Hardware** page to verify the installation of the service pack for the specific release. The ARMv7 10.x service pack adds the new targets to this page.

Now, you should know how to install the service pack updater archive for your CodeWarrior software running on the Windows or Linux platform.

To install a service pack archive for your CodeWarrior tool, you need to perform these steps.

- Add the service pack archive to the available software list in CodeWarrior.
- Install the service pack. You can install it in two modes. They are online and offline modes.
 - [Online mode](#) on page 26
 - [Offline mode](#) on page 27

4.1 Online mode

If your computer is connected to Internet, you can install the service pack directly from the software site where the service pack is available.

NOTE

The Codewarrior IDE maintains a list of URLs, which is accessed for updates. Ensure that you select the right URL for the CodeWarrior tools. If you select an incorrect URL, the update process will not work. These instructions show you how to manipulate that list to ensure that you focus on the correct URL for the CodeWarrior tools update.

1. Open the CodeWarrior IDE.
2. Choose **Help > Install New Software** from the CodeWarrior IDE menu bar. The **Install** dialog appears.

NOTE

Do not use the **Check for Updates** option from the **Help** menu. The **Install New Software** option is more comprehensive as it locates new service packs that are considered new software and are not the usual product updates.

3. From the **Work with** menu, choose the URL where the service pack you wish to install is available.

NOTE

The **Work with** menu is populated by the **Available Software Sites** page of the **Preferences** window. Only the sites that are enabled in the **Preferences** window are listed. A quick solution is to enter the URL of the target site in the **Work with** field. The service packs for CodeWarrior for ARMv7 for Windows and Linux are available at the following links:

- http://freescale.com/lgfiles/updates/Eclipse/ARMv7_10_0_8/com.freescale.armv7.updatestite_win
- http://freescale.com/lgfiles/updates/Eclipse/ARMv7_10_0_8/com.freescale.armv7.updatestite_lin

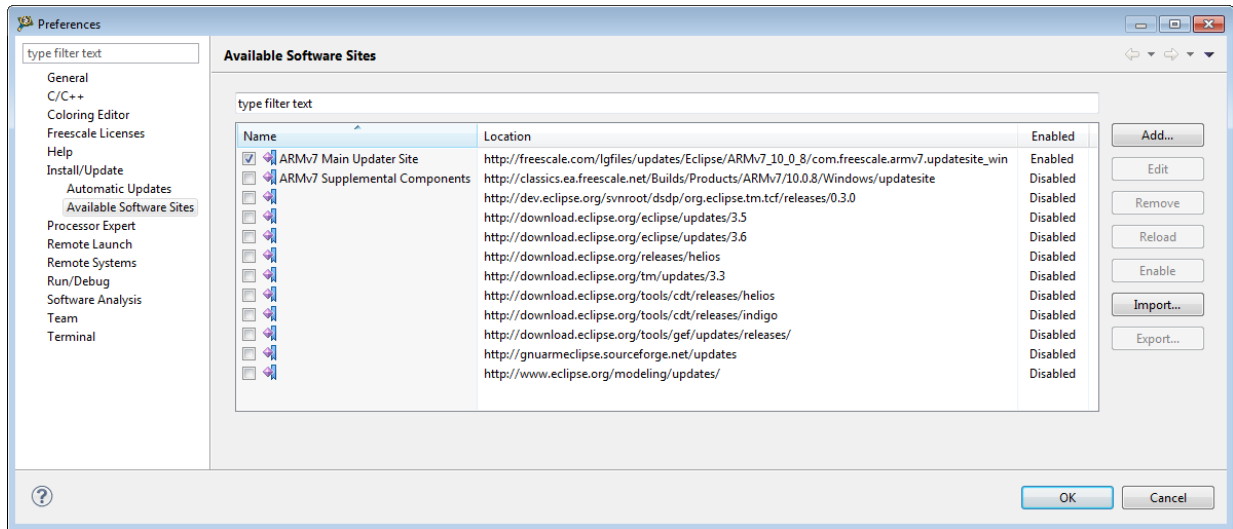
If the required software site is not available in the **Work with** menu, add the web site to the list of the available software sites using the **Available Software Sites** preferences window.

- a. Click the **Available Software Sites** link provided below the **Work with** drop-down list. The **Preferences** window appears with the available software sites.

NOTE

You can use the **Preferences** window to add, edit, remove, or disable the software sites.

Figure 14: Preferences window



- b. Click **Add**. The **Add Site** dialog appears.
- c. In the **Name** text box, specify the name of the software site you want to add, such as *FSL ARMv7 Eclipse Update Site*.
- d. In the **Location** text box, specify the web site address. Click **OK**.
- e. The list of the available software on the selected web site appears in the **Install** dialog.

NOTE

You can select the **Show only the latest versions of software available** and **Hide items that are already installed** checkboxes. This limits the items displayed and you can focus on selecting items based on your requirements. You can also select the **Group items by category** checkbox to classify and identify the nature of the update. It is a good practice to have the features in a service pack specified according to categories. This helps in a scenario where a service pack includes many features. If features are grouped by categories it allows you to install the category as per your requirements. If this checkbox is clear, all the features will be visible and will be automatically installed.

4.2 Offline mode

If your computer is not connected to Internet and you want to install the service pack either from an archive, USB drive, or DVD, then add the archive to the list of the available software sites.

1. Download a patch or update file.
2. Open the CodeWarrior IDE.
3. Select **Help > Install New Software** from the CodeWarrior IDE menu bar. The **Install** dialog appears.
4. Click **Add**. The **Add Site** dialog appears.
5. In the **Name** text box, specify a name for the service pack archive you want to add, such as *FSL ARMv7 Update Site*.
6. Click **Archive**. Browse to the location of the service pack archive you have downloaded.
7. Click **Open**. The **Location** text box in the **Add Site** dialog populates with the selected path.



Installing Service Pack
Offline mode

8. Click **OK**. The list of the available software in the selected service pack appears in the **Install** dialog.



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CW_ARMv7_Getting_Started_Guide
Rev. 10.0.8
01/2016

