Connecting MCUs

Qt for MCU enables you to use subsets of QML and Qt Quick Controls to create user interfaces for devices that are powered by microcontroller units (MCU). It includes a new graphics rendering engine that has a low memory footprint and is optimized for MCUs and other resource-constrained devices.

You can connect MCU boards to a development host to build applications for them using the GNU Arm Embedded GCC compiler, libraries, and other GNU tools necessary for bare metal software development on devices based on the Arm Cortex-M processors. You can deploy the applications on MCUs to run and debug them using Qt Creator.

The toolchains are available for cross-compilation on Microsoft Windows, Linux, and macOS. However, the Qt for MCU SDK is currently only available for Windows and Linux.

For a list of Qt for MCU reference implementations, see the Qt for MCUs documentation.

Requirements

To use Qt Creator to develop QML applications for MCUs, you need the following:

- Qt for MCU SDK (only available for Windows and Linux)
- GNU ARM Embedded Toolchain

The hardware-specific requirements vary depending on the hardware platform you are developing for. For more information see:

- Getting Started on NXP
- Getting Started on STM
- Getting Started on Renesas

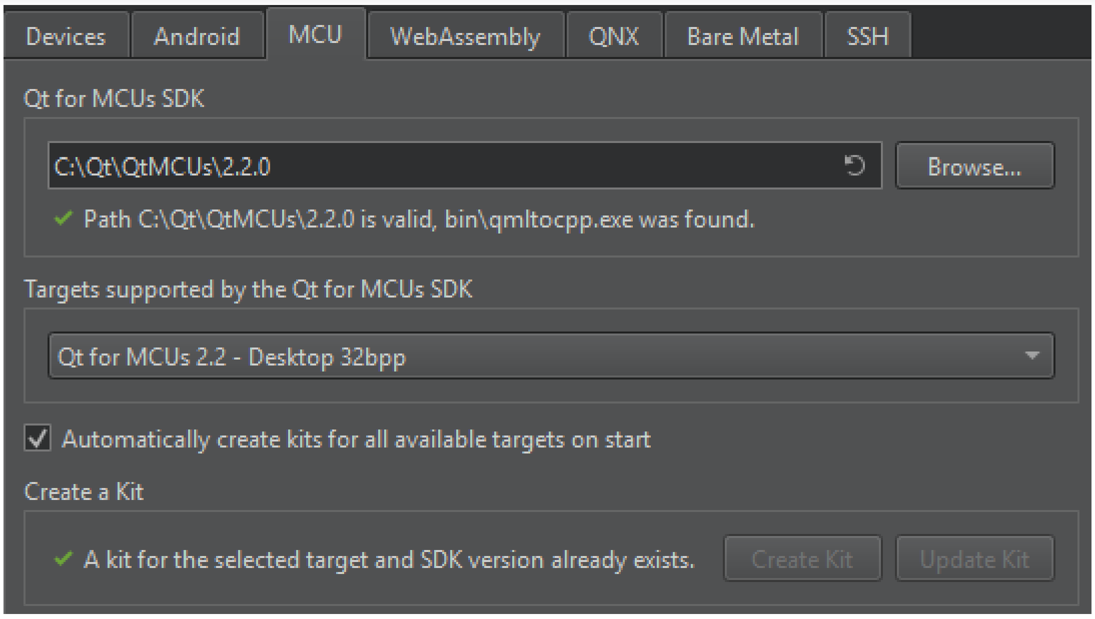
Setting Up the Development Environment

You must download and install the required software and create connections between Qt Creator and MCUs. The following subsections guide you through the setup process.

MCU Plugin

To be able to develop applications for MCUs, you need the MCU plugin. This plugin is enabled automatically by the Qt Installer when you install Qt for MCUs.

Specifying MCU Settings



Qt for MCUs SDK

C:\Qt\QtMCUs\2.2.0 Browse...

✓ Path C:\Qt\QtMCUs\2.2.0 is valid, bin\qmltocpp.exe was found.

Targets supported by the Qt for MCUs SDK

Qt for MCUs 2.2 - Desktop 32bpp

[✓] Automatically create kits for all available targets on start

Create a Kit

✓ A kit for the selected target and SDK version already exists. Create Kit Update Kit

1. In the **Qt for MCUs SDK** field, specify the path to the directory where you installed Qt for MCUs SDK.
2. In the **Targets supported by the Qt for MCUs SDK** field, select your MCU board.
3. In the **Requirements** section, ensure that the platform-specific requirements are met. This varies depending on the target chosen:
   - For STM32 targets:
     - The **GNU ARM Embedded Toolchain** or **IAR ARM Compiler** path.
     - The **STM32CubeProgrammer** install path.
     - The **MCU SDK** for the chosen target.
     - The **FreeRTOS Sources** for the chosen target.
   - For NXP targets:
     - The **GNU ARM Embedded Toolchain** or **IAR ARM Compiler** path.
     - The **MCUXpresso IDE** install path.
     - The **MCU SDK** for the chosen target.
     - The **FreeRTOS Sources** for the chosen target.
   - For Renesas targets:
     - The **Green Hills Compiler** path.
     - The **Renesas Graphics Library** path.
4. Select the **Automatically create kits for all available targets on start** option to create kits automatically the next time Qt Creator is started.

   Note: You could also use **Create Kit** to manually create kits for the chosen target.

5. Select **Apply** to save the settings.

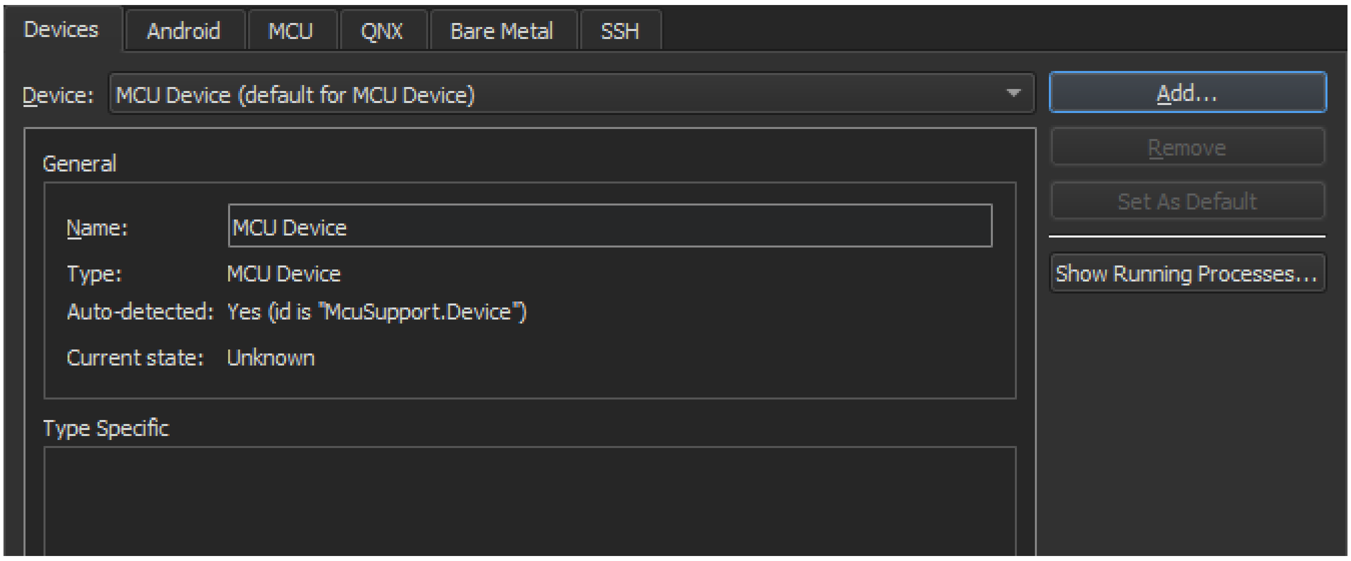
Note: When updating to other versions of the Qt for MCUs SDK, Qt Creator will ask you if you want to replace the existing kits, or create new ones alongside. This can also be done manually, for each individual target, via

Qt DOCUMENTATION

Adding MCU Devices

Note: This optional step is not necessary if you have already set up the MCU SDK as outlined in Specifying MCU Settings.

Qt Creator automatically adds a default MCU device when you select **Apply** in the **MCU** tab after configuring the MCU tool chain.



Device: MCU Device (default for MCU Device)

Name: MCU Device

Type: MCU Device

Auto-detected: Yes (id is "McuSupport.Device")

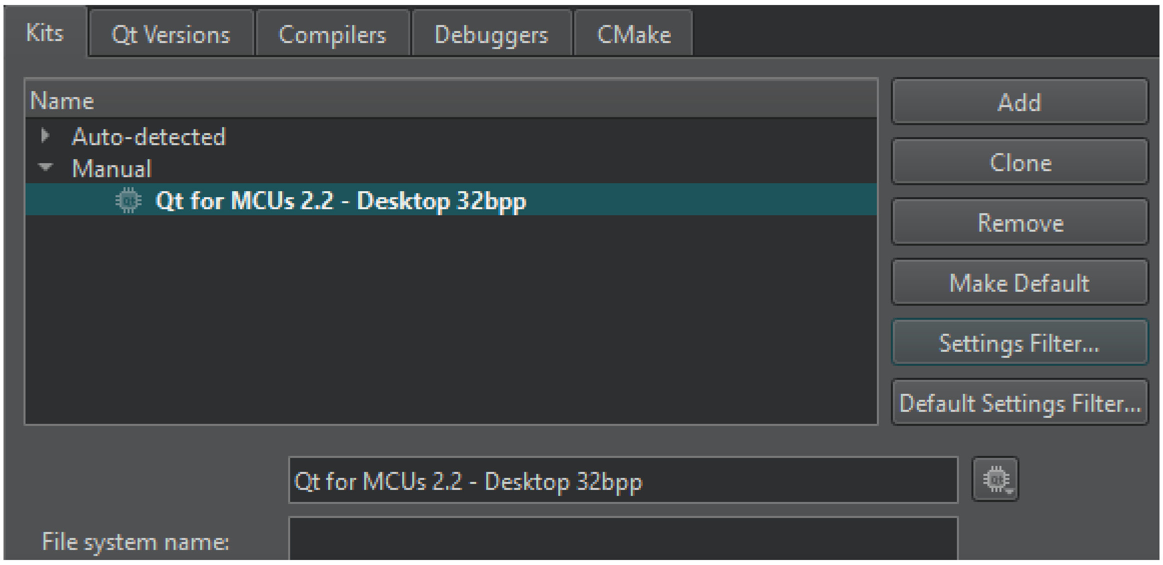
Current state: Unknown

To add MCU devices, select **Edit** > **Preferences** > **Devices** > **Add** > **MCU Device** > **Start Wizard**:

1. In the **Name** field, give the device a name.
2. In the **Type** field, select the board type.
3. Select **Apply** to add the device.

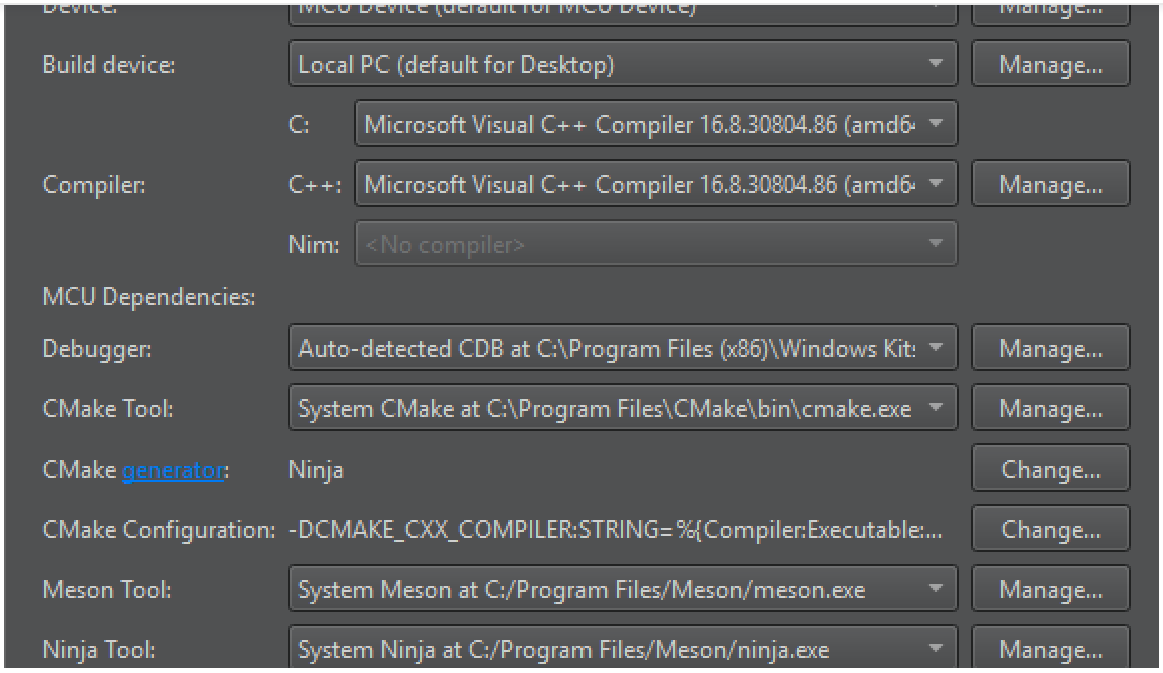
Managing MCU Kits

Qt Creator automatically adds kits for all the available targets, if the **Automatically create kits for all available targets on start** option is enabled under the **MCU** settings tab. You can also create kits for individual targets manually, as outlined in Specifying MCU Settings.



Qt for MCUs 2.2 - Desktop 32bpp

File system name:



Build device:	Local PC (default for Desktop)	Manage...
Compiler:	C: Microsoft Visual C++ Compiler 16.8.30804.86 (amd6	
	C++: Microsoft Visual C++ Compiler 16.8.30804.86 (amd6	Manage...
	Nim: <No compiler>	
MCU Dependencies:		
Debugger:	Auto-detected CDB at C:\Program Files (x86)\Windows Kit:	Manage...
CMake Tool:	System CMake at C:\Program Files\CMake\bin\cmake.exe	Manage...
CMake generator:	Ninja	Change...
CMake Configuration:	-DCMAKE_CXX_COMPILER:STRING=%{Compiler:Executable:...	Change...
Meson Tool:	System Meson at C:/Program Files/Meson/meson.exe	Manage...
Ninja Tool:	System Ninja at C:/Program Files/Meson/ninja.exe	Manage...

You can edit and/or remove individual kits in **Edit** > **Preferences** > **Kits**.

However, for adding new kits you should use the **Create Kit** button in the {Qt for MCUs} settings tab. This method adds the paths to the kit's toolkits and SDKs, and keeps them synchronized when selecting **Apply** or **OK**.

The **MCU dependencies** field displays paths to 3rd party software required for MCU development with the current kit.

Running Applications on MCUs

You can use a wizard to set up a project for developing an application that you can run on MCUs. The project uses a subset of QML and Qt Quick Controls that are supported by Qt for MCU. For more information about developing applications for MCUs, see the Qt for MCU documentation.

To create an application and run it on a MCU board:

1. Select **File** > **New Project** > **Application (Qt for MCU)** > **MCU Support Application** > **Choose**.
2. Follow the instructions of the wizard to create the project.
3. Select **Projects** > **Build & Run**, and then select the kit for building the application and running it on the MCU board specified in the kit.
4. Select **Run** to specify run settings. Usually, you can use the default settings.

Supported Qt for MCUs SDKs

Since version 7.0.0, Qt Creator supports version 2.0 and later of the Qt for MCUs SDK. For older versions, refer to the following table.

Qt Creator version	Qt for MCUs SDK version
7.0.0 or later	2.0 or later
6.0.x	1.3 or later, including 2.0 or later
4.12.4 up to 5.0.3	1.3 up to 1.9

Qt Creator version Qt for MCUs SDK version

4.11.x	1.0

< Connecting iOS Devices

Connecting QNX Devices >