# Yocto

## Qt Application Development

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**6 October 2014**

**v1.0**

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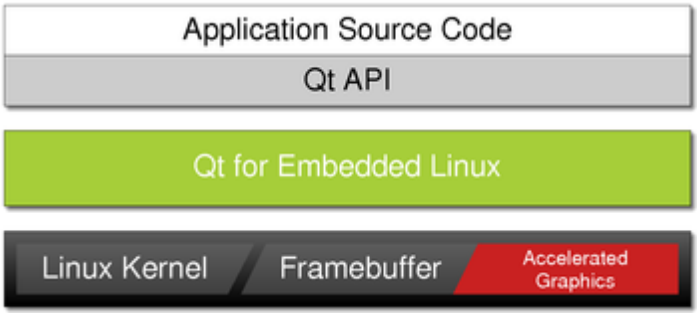
# 1.0 INTRODUCTION

## 1.1 Qt for Embedded Linux

Qt for Embedded Linux is a C++ framework for GUI and application development for embedded devices. It runs on a variety of processors, usually with Embedded Linux. Qt for Embedded Linux provides the standard Qt API for embedded devices with a lightweight window system.




Qt for Embedded Linux applications write directly to the framebuffer, eliminating the need for the X Window System and saving memory. The Linux framebuffer is enabled by default on all modern Linux distributions and provides an efficient way to develop GUI applications for embedded Linux devices.

## 1.2 Outline

The aim of this application note is to guide the user through the steps to set up a Qt application development environment for Yocto systems using Qt Designer.

The application note will guide the user through the setup of a Qt sample project, deployment of the build results to a Yocto system and required configurations necessary for application debugging.

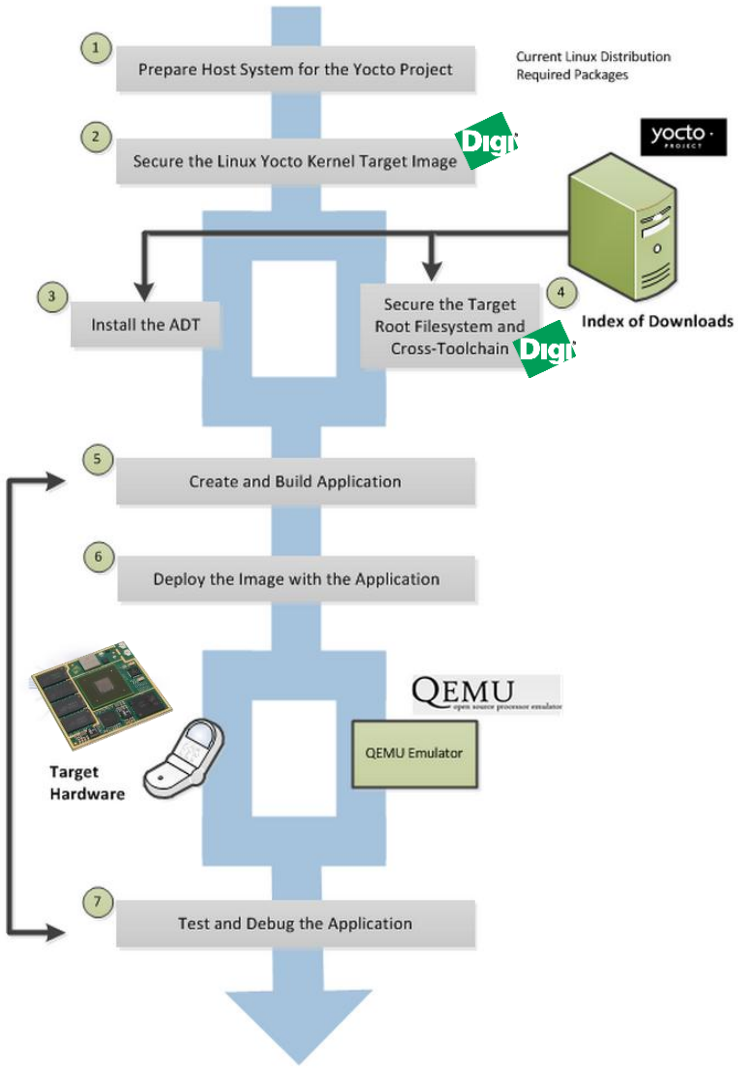



**Figure 1-1: Yocto Application Development Workflow Overview**

## 1.3 Assumptions

This application note has been written for use by technically competent personnel with a good understanding of the usage of a Linux desktop operating system and common Linux commands.

This application note applies to all Digi ARM embedded modules running Digi Embedded Yocto (DEY).

A DEY 1.6 installation on the development host and a Digi ConnectCore 6 SBC target hardware platform is assumed.

It's further assumed the Digi ConnectCore 6 SBC is running a previously compiled dey-image-graphical operating system image with the following extra image features included:

- EXTRA_IMAGE_FEATURES = "debug-tweaks tools-debug eclipse-debug dey-qt"

Follow the "Digi Embedded Yocto 1.6 First Steps Guide (SBC)", P/N: 90001423_A for detailed instructions about the installation of DEY and the building of the dey-image-graphical image.

## 1.4 Corrections

Requests for corrections or amendments to this application note are welcome and should be addressed to: embedded.presales@digi.com. Requests for new application notes can be sent to the same address.

## 1.5 Version

| | |
|---|---|
| Version Number: | 0.1 |
| Status: | DRAFT |

# 2.0 YOCTO QT TOOLCHAIN GENERATION AND INSTALLATION

## 2.1 Yocto Qt Toolchain Generation

To build a Qt enabled image the dey-qt extra image feature needs to be included in your project. Make sure the project configuration (conf/local.conf) is configured with the following extra image features:

- EXTRA_IMAGE_FEATURES = "debug-tweaks tools-debug eclipse-debug dey-qt"

Initialize the build environment for the ccimx6sbc platform and build the matching toolchain with the following commands:

- source /usr/local/dey-1.6/mkproject.sh -p ccimx6sbc
- bitbake meta-toolchain-qt

The resulting SDK file is located in your project folder in the tmp/deploy/sdk directory:

- dey-eglibc-i686-meta-toolchain-qt-cortexa9hf-vfp-neon-toolchain-qt-1.6.1.sh

## 2.2 Yocto Qt SDK Installation

Run the .sh file to install the toolchain in a directory of choice (this example assumes installation into /opt/dey-1.6/graphical/qt/ccimx6sbc):

- ./dey-eglibc-i686-meta-toolchain-qt-cortexa9hf-vfp-neon-toolchain-qt-1.6.1.sh

```
Enter target directory for SDK (default: /opt/poky/1.6):  /opt/dey-1.6/graphical/qt/ccimx6sbc/

You are about to install the SDK to
"/opt/dey-1.6/graphical/qt/ccimx6sbc/". Proceed[Y/n]?  Y

[sudo] password for <user>:  ****

Extracting SDK...done

Setting it up...done

SDK has been successfully set up and is ready to be used.
```

# 3.0 QT CREATOR INSTALLATION AND SETUP

## 3.1 Qt Creator Installation

Download the standalone Qt Creator IDE from the Qt Website: http://qt-project.org/downloads.

Install Qt Creator by running the install file:

- ./qt-creator-opensource-linux-x86-3.2.1.run

Patch the qtcreator.sh start script to source the Yocto environment setup script at Qt Creator start-up, with the following patch code:

```
diff --git a/qtcreator.sh b/qtcreator.sh
index aca30f5b9ecf..114f69717877 100755
--- a/qtcreator.sh
+++ b/qtcreator.sh
@@ -1,3 +1,4 @@
+source /opt/dey-1.6/graphical/qt/ccimx6sbc/environment-setup-cortexa9hf-vfp-neon-dey-linux-gnueabi
 #! /bin/sh

 makeAbsolute() {
```

You can copy & paste the above patch code into a new file e.g. named “0001-Source-Yocto-environment-script-setup.patch” and apply the patch with the following command:

- patch qtcreator.sh < 0001-Source-Yocto-environment-script-setup.patch

Make sure the path given in the patch file matches the path to the dey environment setup script of your development system.

Start Qt Creator:

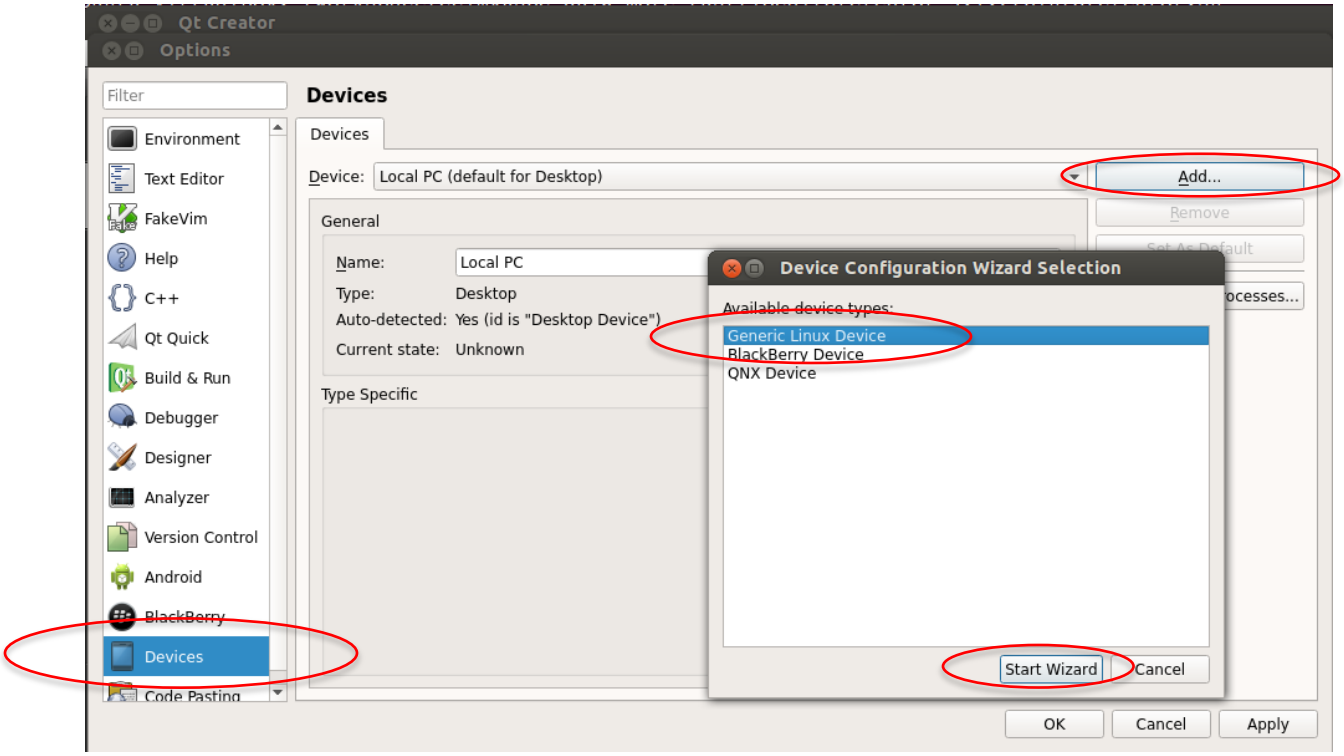
- /usr/local/qtcreator-3.2.1/bin/qtcreator.sh &

# 4.0 CONFIGURE TARGET CONNECTION AND TOOLCHAIN

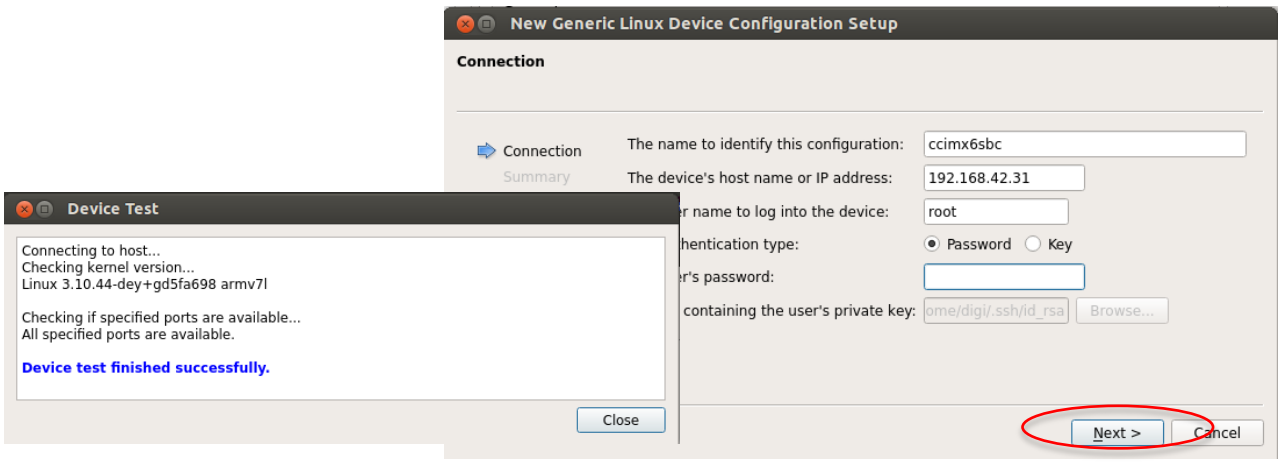
## 4.1 Create New Device Configuration

In Qt Creator menu go to the “Tools” -> “Options"

Select “Devices” and “Add” a new “Generic Linux Device”:




Configure the target connection with your targets IP address, login and password and run the optional “Device Test”:

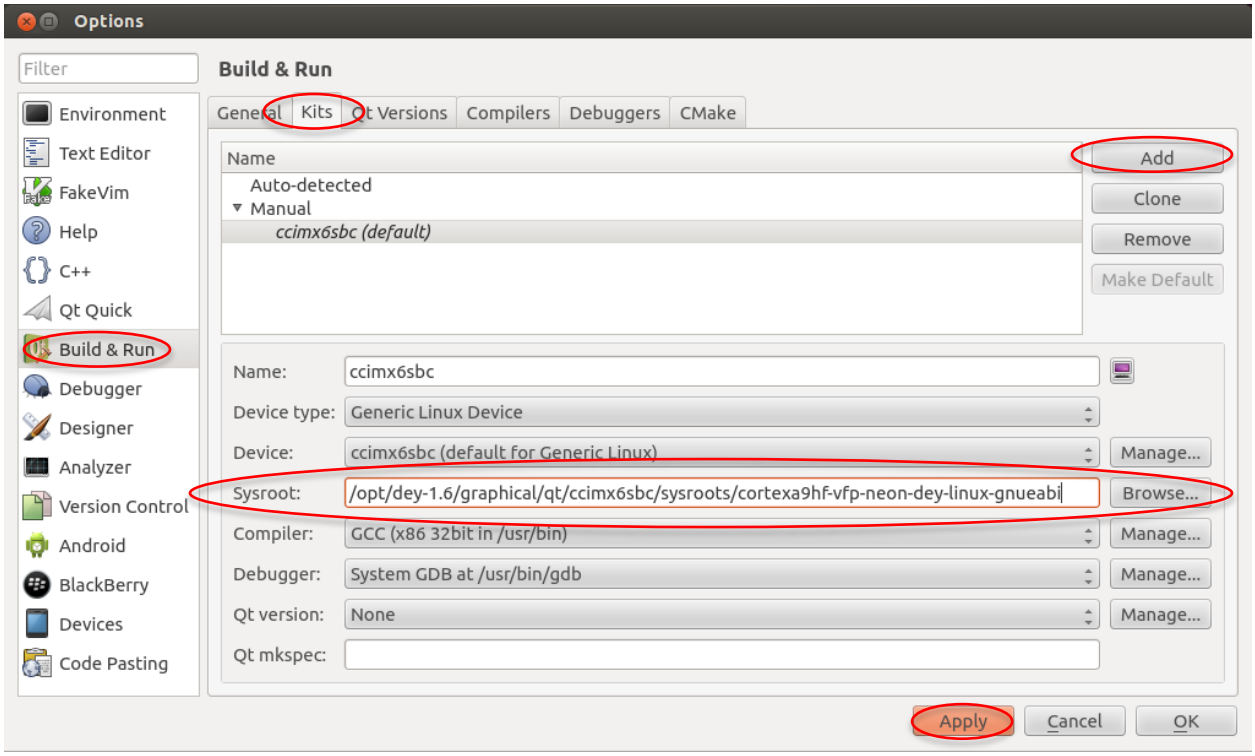


## 4.2 Setup New Build & Run Configuration

Select “Build & Run”, go to the “Kits” tab and “Add” a new kit.

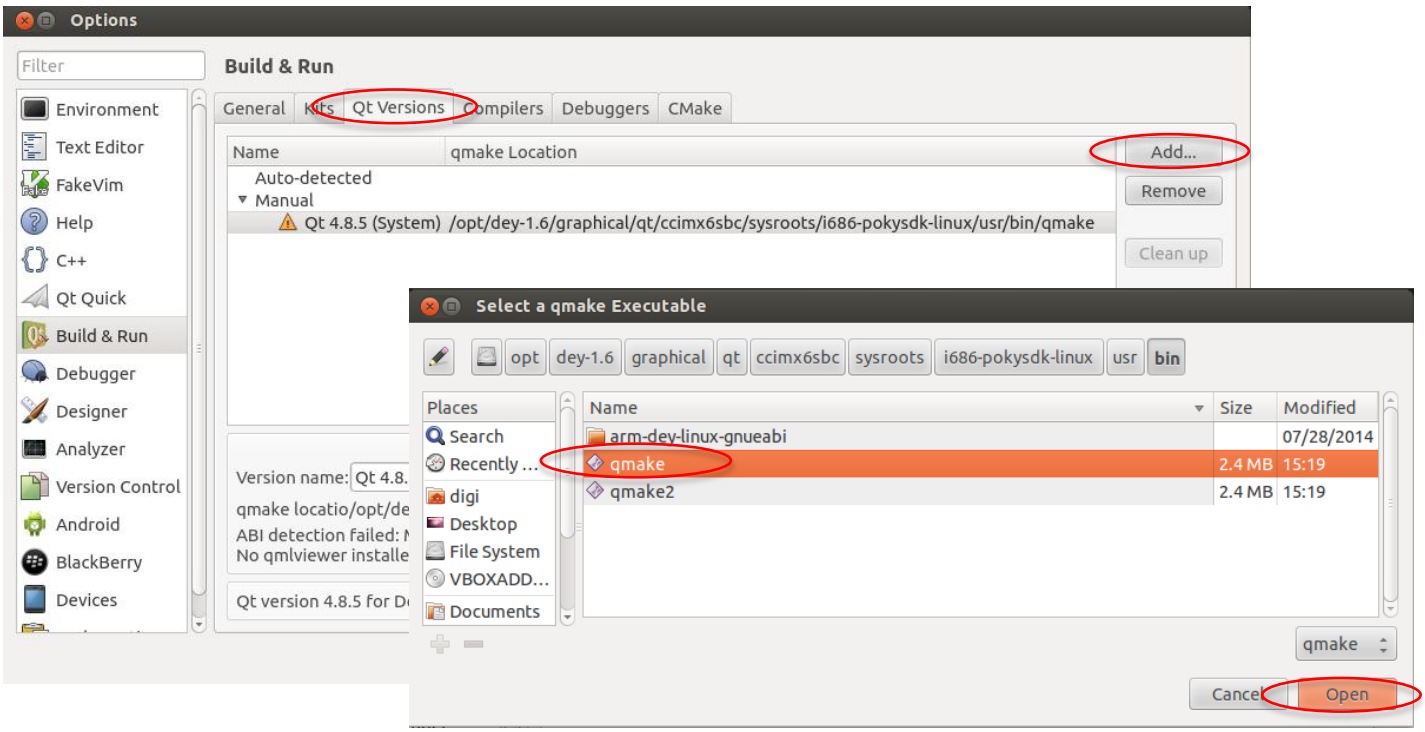
In the “Sysroot:” field, browse to the sysroot folder of your Qt toolchain installation directory and point to cortexa9hf-vfp-neon-dey-linux-gnueabi:

- /opt/dey-1.6/graphical/qt/ccimx6sbc/sysroots/cortexa9hf-vfp-neon-dey-linux-gnueabi



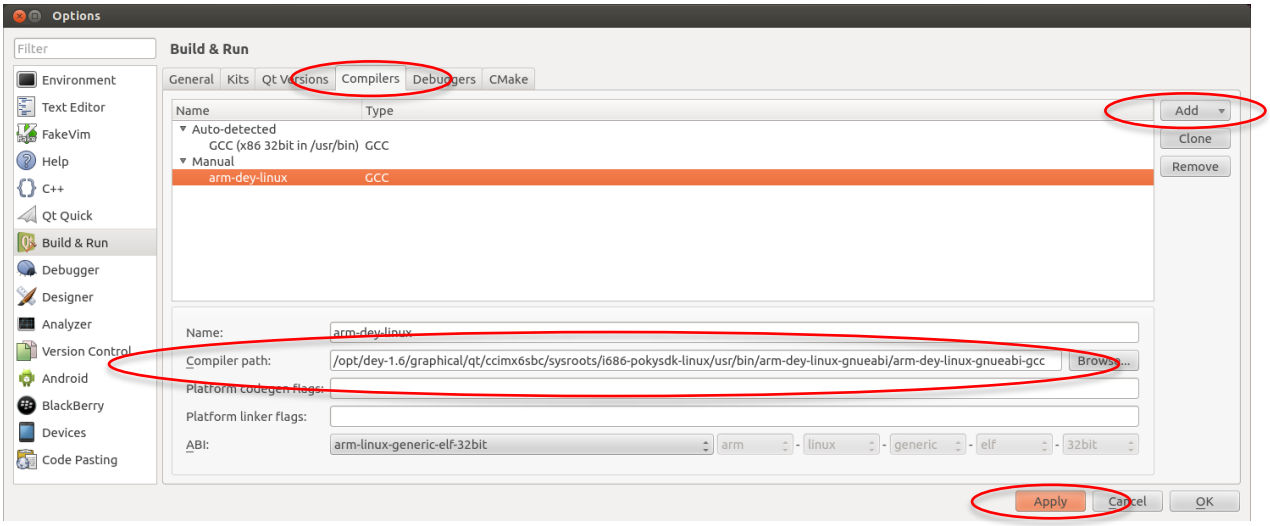
Move to the “Qt Version” tab and make sure your toolchain’s qmake is selected. If not Auto-detected, add it manually:

- /opt/dey-1.6/graphical/qt/ccimx6sbc/sysroots/i686-pokysdk-linux/usr/bin/qmake



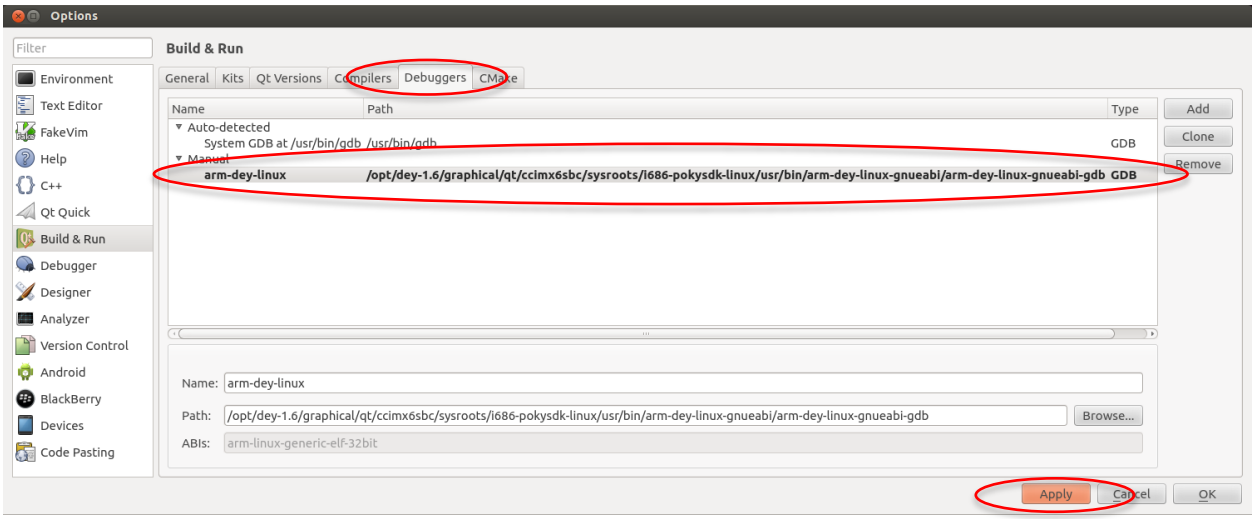

Move to the “Compilers” tab and “Add” you gcc compiler from your toolchain installation folder:

- /opt/dey-1.6/graphical/qt/ccimx6sbc/sysroots/i686-pokysdk-linux/usr/bin/arm-dey-linux-gnueabi/arm-dey-linux-gnueabi-gcc

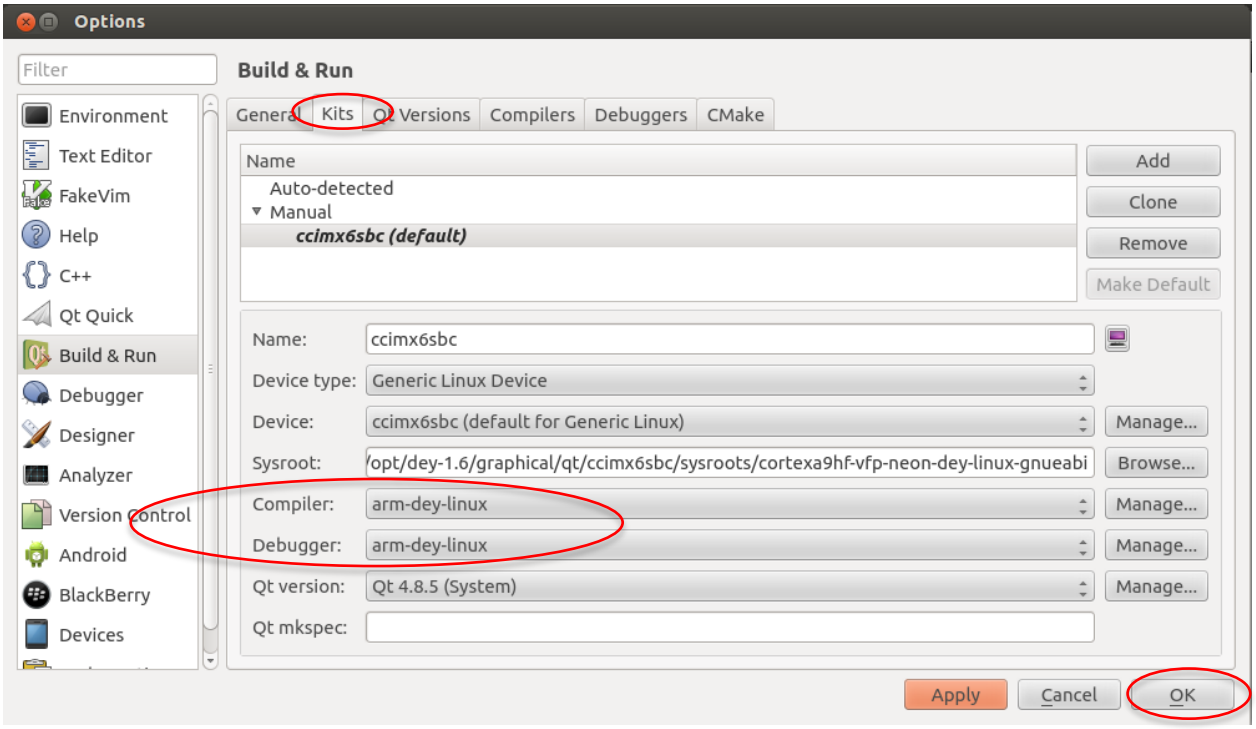


Move to the “Debuggers” tab and “Add” your gdb debugger from your toolchain installation folder:

- /opt/dey-1.6/graphical/qt/ccimx6sbc/sysroots/i686-pokysdk-linux/usr/bin/arm-dey-linux-gnueabi/arm-dey-linux-gnueabi-gdb



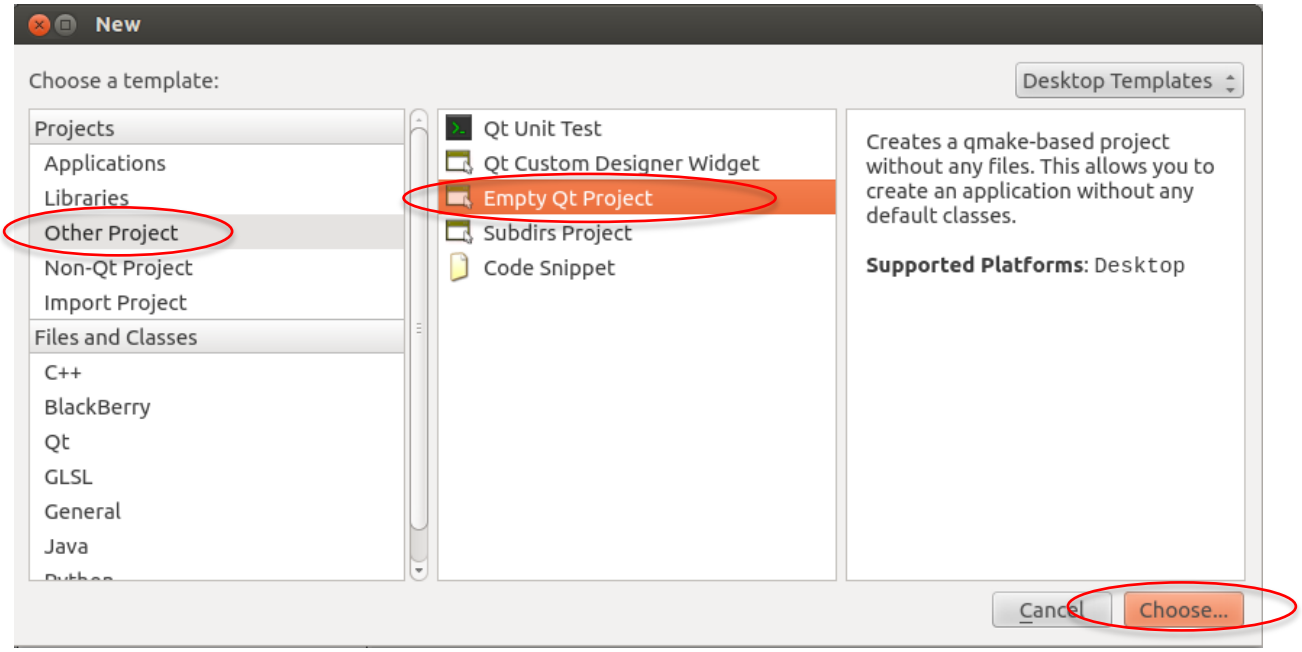

Go back to the “Kits” tab and chose the just configured arm-dey-linux “Compiler” and “Debugger”. Finalize your settings by pressing the “Ok” button:



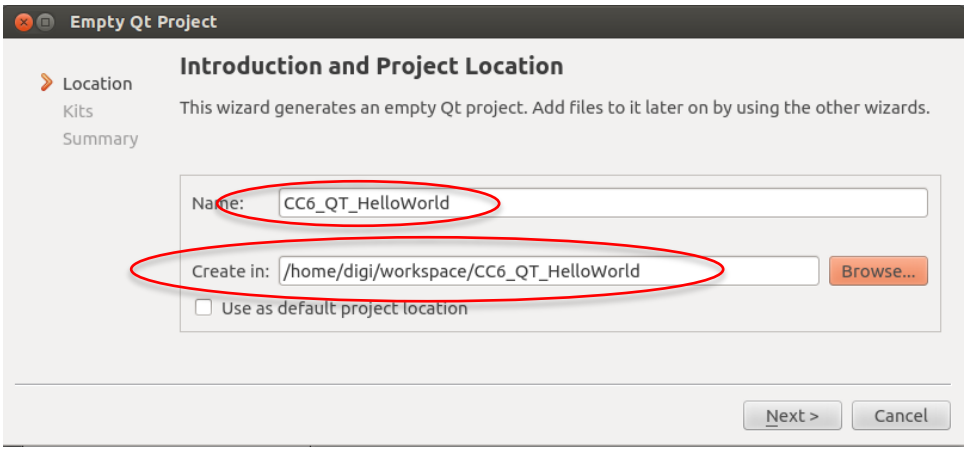
# 5.0 CREATE QT PROJECT AND APPLICATION

## 5.1 Create New Qt Project

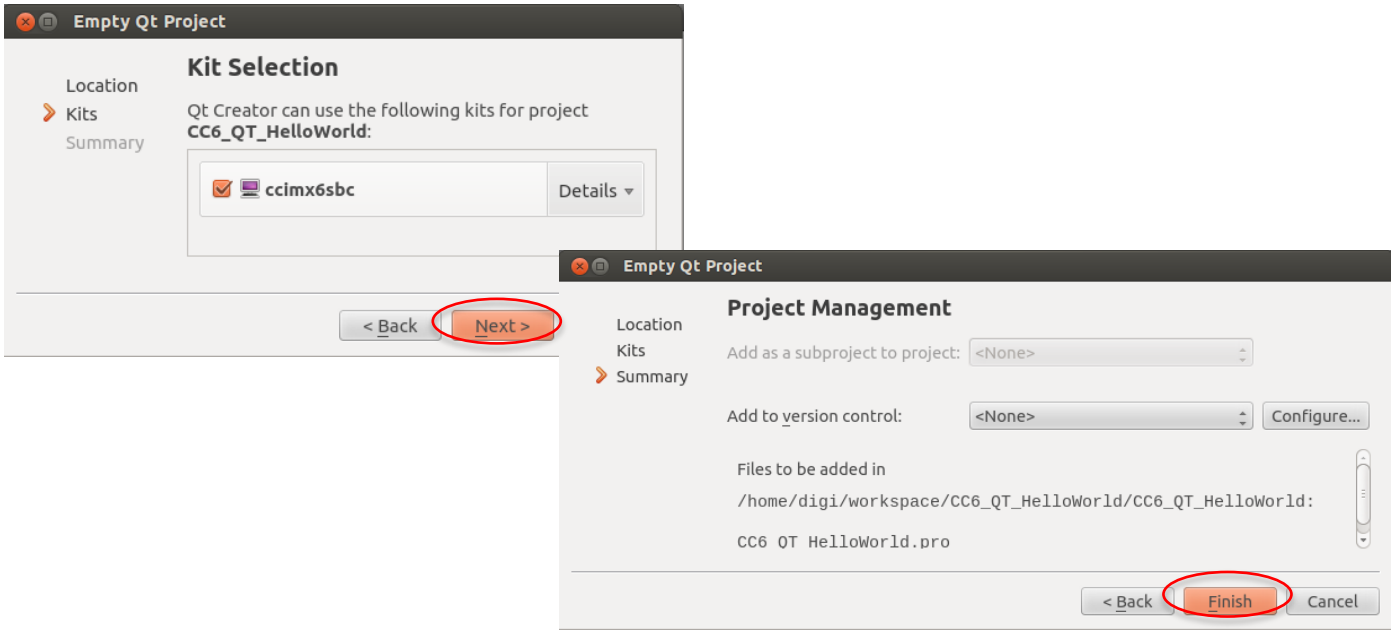
In Qt Creator menu go to the “File” -> “New File  or Project…" and “Choose” an “Empty Qt Project” from the “Other Project” category:




Enter a project “Name” and select the “Create in” folder within your workspace directory:

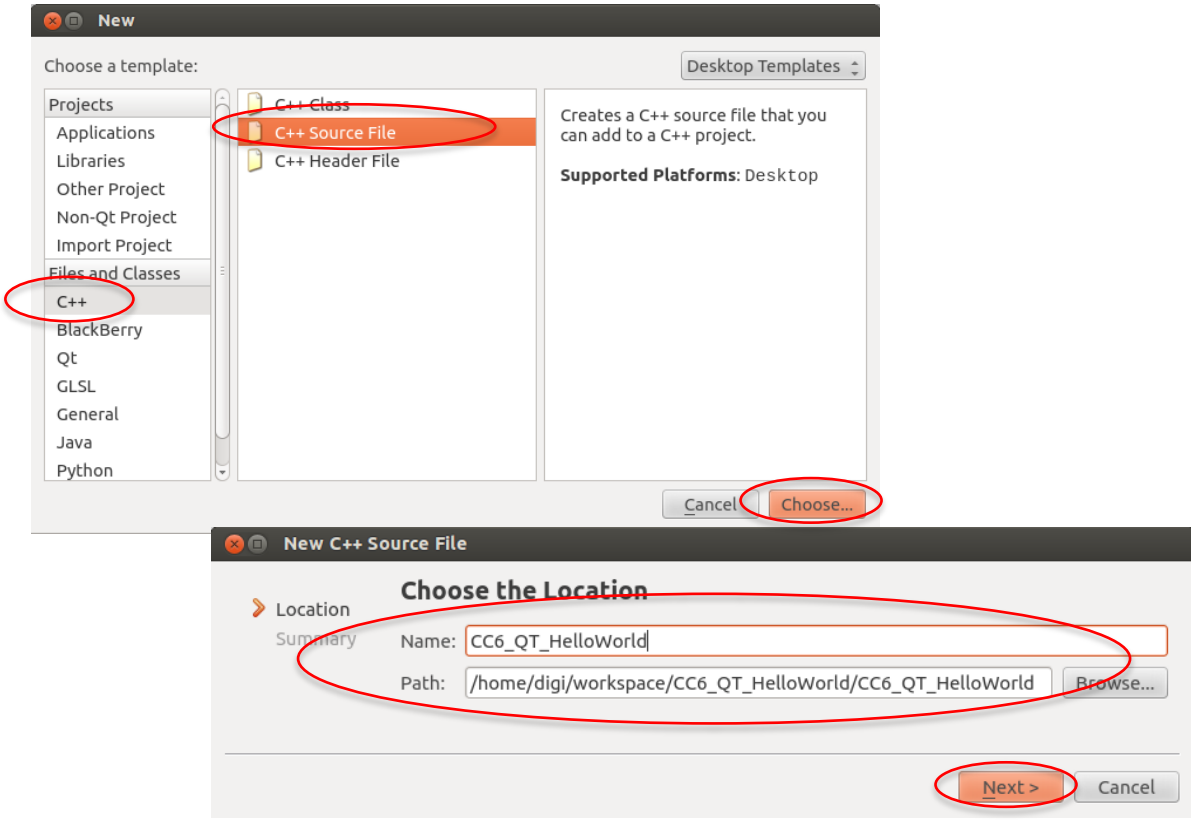


Select the just created “ccimx6sbc” kit and finish the project setup:

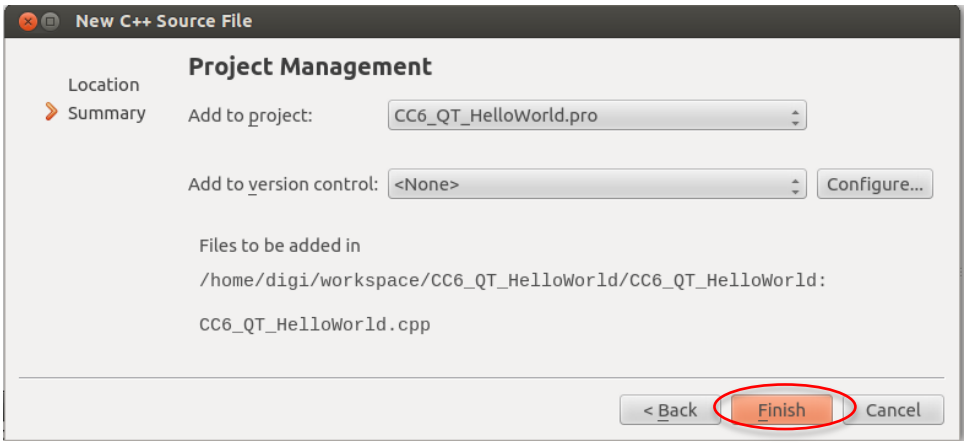



## 5.2 Add Your Application Source Code

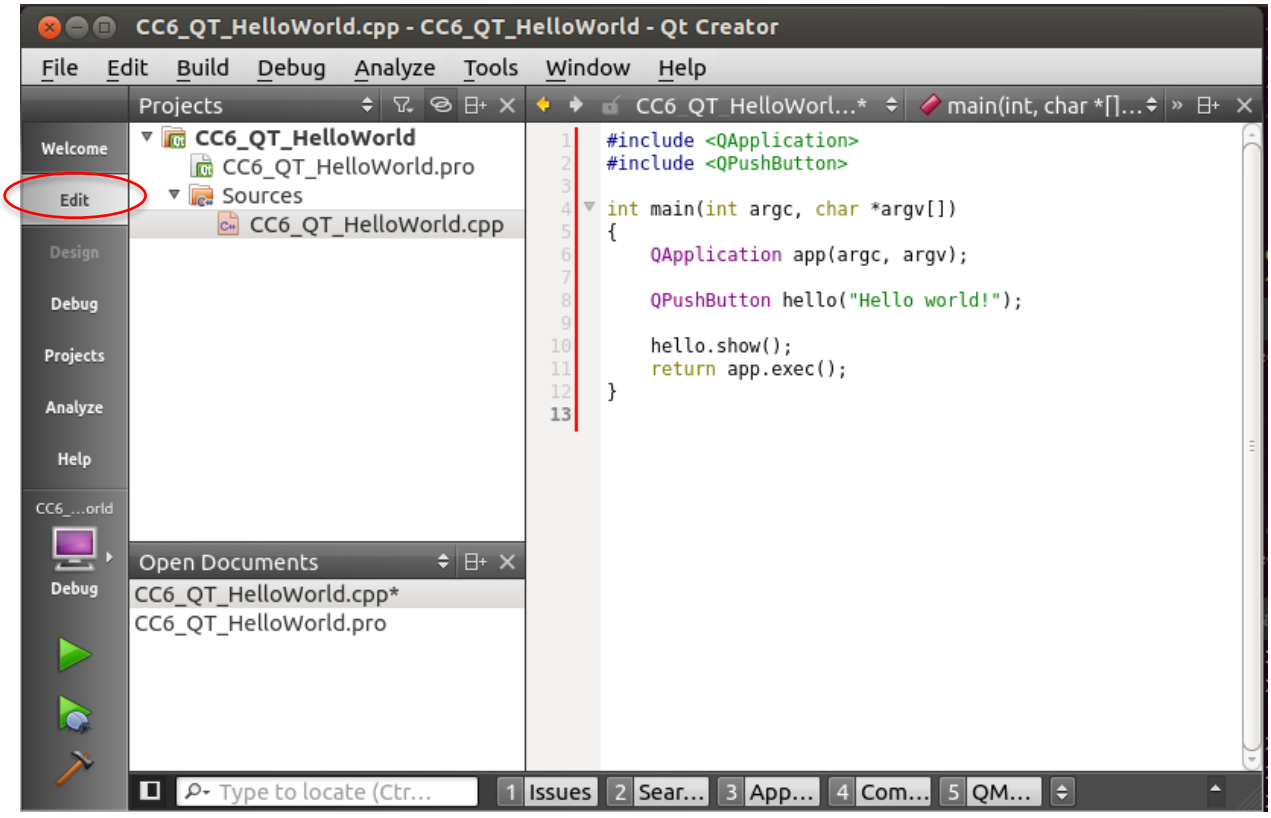
Go to the “File” -> “New File or Project…" to add your new application “C++ Source File”:



Complete the new project setup by pressing the “Finish” button on the “Project Management” dialog box:




Write your application source code into the newly added source code file (or copy and paste the hello world example code from above):



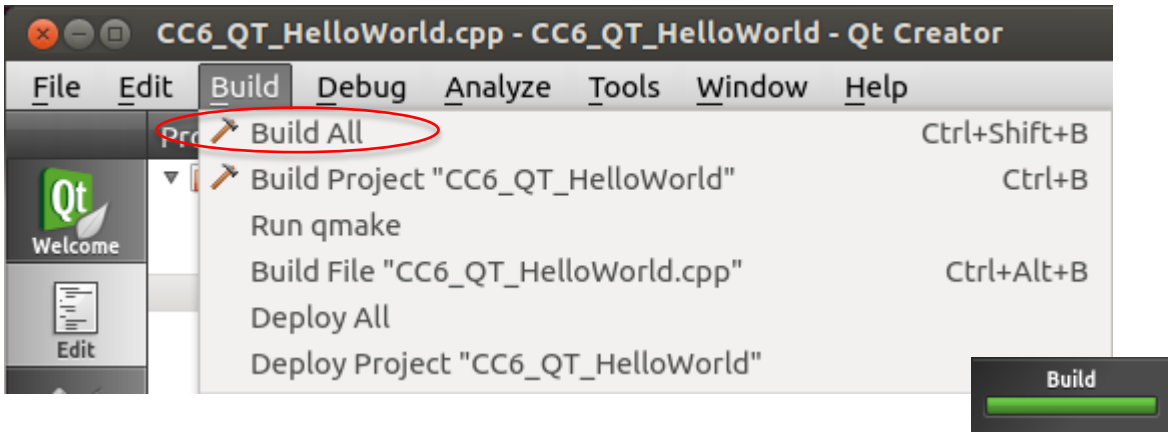
"Hello World" Qt example code:

```
#include <QApplication>
#include <QPushButton>
int main(int argc, char *argv[])
{
    QApplication app(argc, argv);
    QPushButton hello("Hello world!");
    hello.show();
    return app.exec();
}
```

# 6.0 BUILD YOUR PROJECT AND DEPLOY APPLICATION

## 6.1 Build Your Application

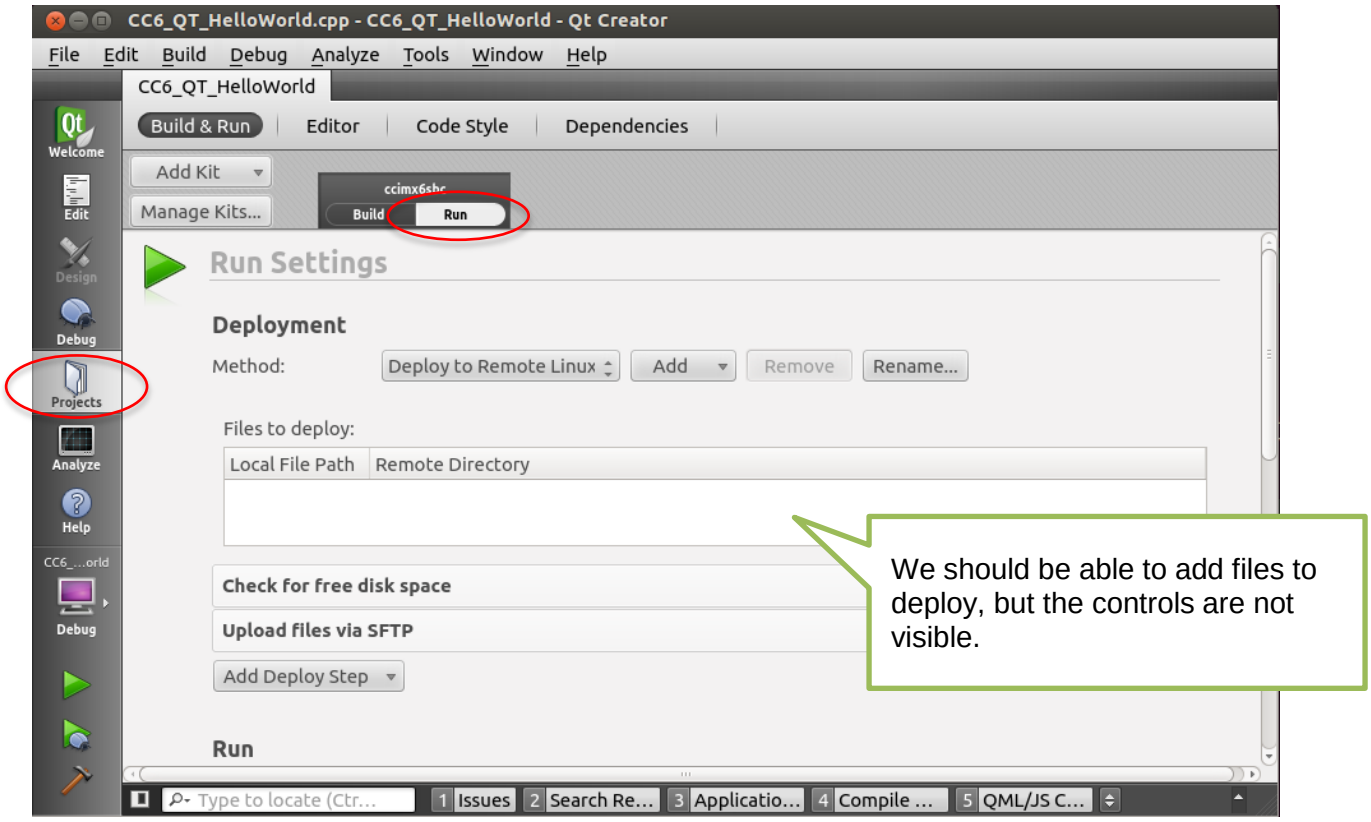
In Qt Creator menu go to the “Build” -> “Build All”:




The application source code will be guild using your Yocto Qt toolchain configuration.

## 6.2 Deploy Application Binary to Target

In the left side tool bar in Qt Creator go to the “Projects” and select the “Run” configuration of your kit:



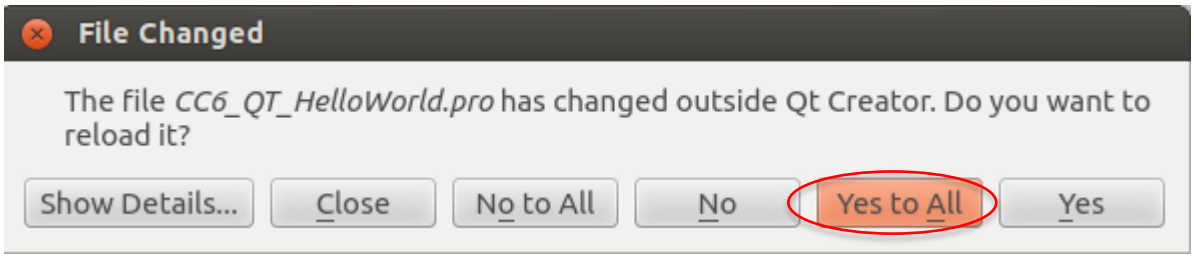

Manually add files to deploy in your .pro project configuration file located in your project directory:

- nano CC6_QT_HelloWorld/CC6_QT_HelloWorld.pro

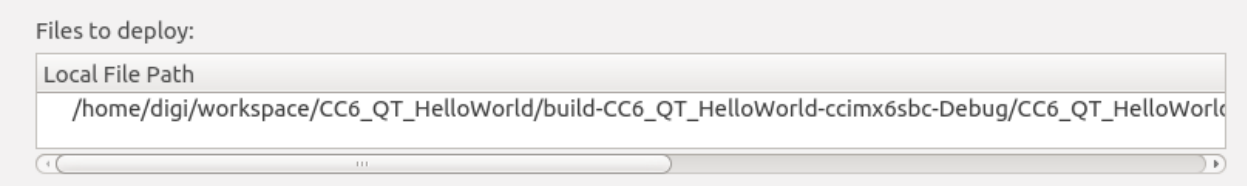
Add the following code to the .pro file and save it:

```
TARGET = CC6_QT_HelloWorld
target.files = CC6_QT_HelloWorld
target.path = /
INSTALLS += target
```

Qt Creator may notify you that the .pro file changed. Accept the changes by pressing the “Yes to All” button:



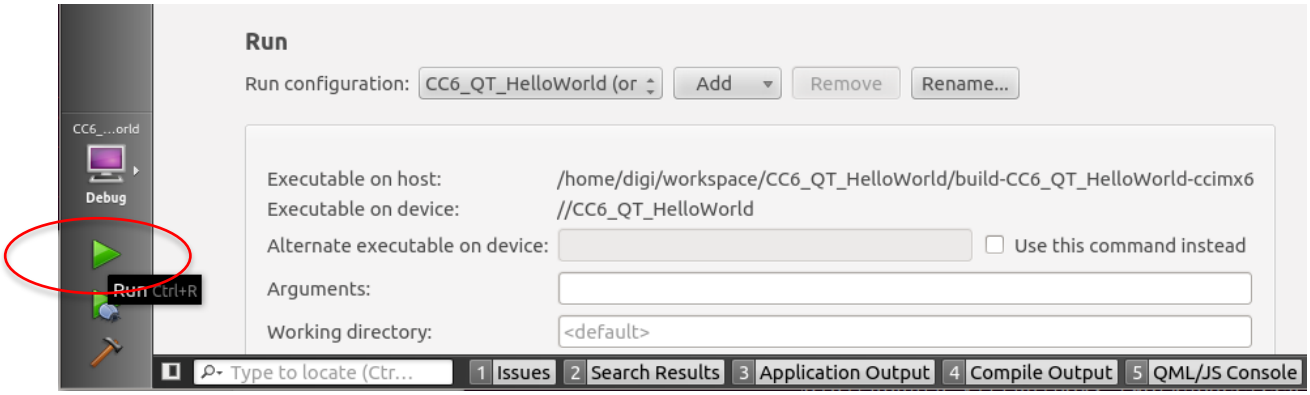

Your “Files to Deploy” list in Qt Creator should now get updated and show the added files:



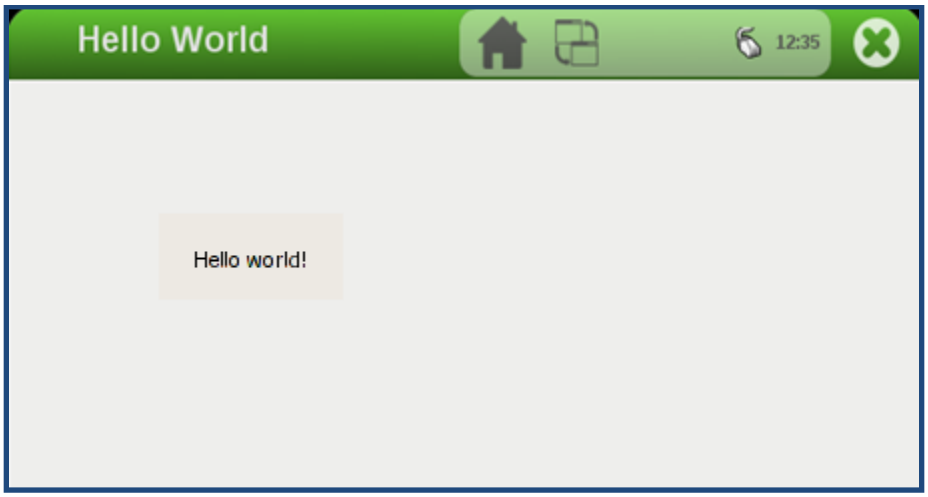
# 7.0 RUN AND DEBUG YOUR APPLICATION ON THE TARGET

## 7.1 Run Your Application

In the left side tool bar in Qt Creator press the green arrow “Run” button to execute the application on your target:




You should see the “Hello World” application come up on your target’s display:



## 7.2 Debug Your Application

Similar to running the application you can press the debug arrow on the left side tool bar in Qt creator to start debugging: