



Community Experience Distilled

Application Development with Qt Creator

A fast-paced guide for building cross-platform applications using
Qt and Qt Quick

Ray Rischpater

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Application Development with Qt Creator

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Ray Rischpater is an engineer and author with over 20 years' experience writing about and developing for computing platforms.

During this time, he has participated in the development of Internet technologies and custom applications for Java ME, Qualcomm BREW, Apple iPhone, Google Android, Palm OS, Newton, and Magic Cap, as well as several proprietary platforms. Presently, he's employed as a senior engineer at Microsoft in Mountain View, working on mapping and data visualization.

When not writing for or about mobile platforms, he enjoys hiking and photography with his family and friends in and around the San Lorenzo Valley in central California. When he's able, he also provides a public service through amateur radio as the licensed Amateur Extra station KF6GPE.

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- *Microsoft Mapping: Geospatial Development with Bing Maps and C#* (with Carmen Au, Apress, 2013)
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Preface

Whether you're just getting started with programming, or you've settled on Qt as the GUI toolkit for your project, Qt Creator is a great choice for an Integrated Development Environment (IDE)! In this book, we work to help you make the most of Qt Creator, showing you almost every facet of using Qt Creator, from its configuration through compiling and debugging applications, along with numerous tips and tricks. Along the way, you gain valuable experience not just with Qt Creator as an IDE, but with Qt and Qt Quick as well. After reading this book, you'll be able to:

- Edit, compile, debug, and run C++ applications using Qt Creator, opening a path to build state-of-the-art console and GUI applications with Qt and the Standard Template Library (STL)
- Edit, compile, debug, and run Qt Quick applications using Qt Creator, giving you access to one of the most advanced declarative GUI authoring environments anywhere
- Design GUI applications using Qt Designer to build either traditional widget-based or Qt Quick applications
- Analyze the memory and runtime performance of your Qt applications, and make improvements, and fix defects
- Provide localized versions of your application, so that you can deploy it all over the world in different languages
- Use Qt Quick and Qt Widgets to write mobile applications for platforms such as Google Android

What this book covers

This book is divided into seven chapters, which you should plan on reading in order, especially if you're new to Qt Creator and Qt programming in general. These chapters are:

[Chapter 1](#), *Getting Started with Qt Creator*, explains how to download and install Qt Creator, as well as edit simple applications to test your installation.

[Chapter 2](#), *Building Applications with Qt Creator*, explains how to compile, run, and debug your application using Qt Creator. You will learn how Qt Creator integrates with both the GNU debugger and the Microsoft console debugger to provide breakpoints, memory inspection, and other debugging help.

[Chapter 3](#), *Designing Your Application with Qt Designer*, explains how to use the drag-and-drop GUI designer that is part of Qt Creator, to build both Qt widget-based and Qt Quick applications.

[Chapter 4](#), *Localizing Your Application with Qt Linguist*, explains how to manage resource strings for different locales, letting you build your application with different languages in different locales.

[Chapter 5](#), *Performance Optimization with Qt Creator*, explains how to use Qt Creator to examine your Qt Quick application's runtime performance, as well as how to perform memory profiling of your application with Valgrind, an open source diagnostic tool.

[Chapter 6](#), *Developing Mobile Applications with Qt Creator*, gives a look at the exciting arena of mobile software development, and shows how you can use what you've learned in this book about Qt and Qt Creator to write applications for platforms such as Google Android.

[Chapter 7](#), *Qt Tips and Tricks*, covers tricks for using Qt and Qt Creator that will help you use the Qt framework and the Qt Creator IDE efficiently.

What you need for this book

Qt and Qt Creator are cross-platform tools. Whether you're using a Windows machine, a Macintosh using Mac OS X, or a workstation running Linux, you probably have what you need. You should have a reasonable amount of disk space (around 10 gigabytes is plenty) to install the whole Qt Creator IDE and Qt libraries, and as with any software development environment, the more RAM you have, the better (although I've run Qt Creator on netbooks running Ubuntu with a gigabyte of RAM and survived!).

You should have a basic understanding of computer programming, and should be prepared to write code in C++. Basic knowledge of JavaScript is helpful if you're interested in programming with Qt Quick, but you can pick that up along the way with little difficulty.

Who this book is for

I wrote this book for those who have little or no experience with Qt and Qt Creator, who may be using it for the first time as part of a college class, an open source project, or who just want to experiment with the platform and IDE.

I especially want to encourage you to read this book if you're a student using Qt Creator in your university class on C++ programming! You should focus on the first two chapters, and as much of the rest as you need for your course.

Conventions

In this book, you will find a number of styles of text that distinguish between different kinds of information. Here are some examples of these styles, and an explanation of their meaning.

Code words in text, database table names, folder names, filenames, file extensions, pathnames, dummy URLs, user input, and Twitter handles are shown as follows: "For the name, enter `HelloWorldConsole`, and choose a path that makes sense for you (or accept the default)."

A block of code is set as follows:

```
#include <QCoreApplication>
#include <iostream>
using namespace std;
int main(int argc, char *argv[])
{
    QCoreApplication a(argc, argv);
    cout << "Hello world!";
    return a.exec();
}
```

When we wish to draw your attention to a particular part of a code block, the relevant lines or items are set in bold:

```
import QtQuick 2.0
Rectangle {
    width: 360
    height: 360
    Text {
        text: qsTr("Hello World")
        anchors.centerIn: parent
    }
    MouseArea {
        anchors.fill: parent
        onClicked: {
            Qt.quit();
        }
    }
}
```

New terms and **important words** are shown in bold. Words that you see on the screen, in menus or dialog boxes for example, appear in the text like this: "Where it says **Type Here**, right-click and choose **Remove menu bar**."

Note

Warnings or important notes appear in a box like this.

Tip

Tips and tricks appear like this.

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Errata

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Chapter 1. Getting Started with Qt Creator

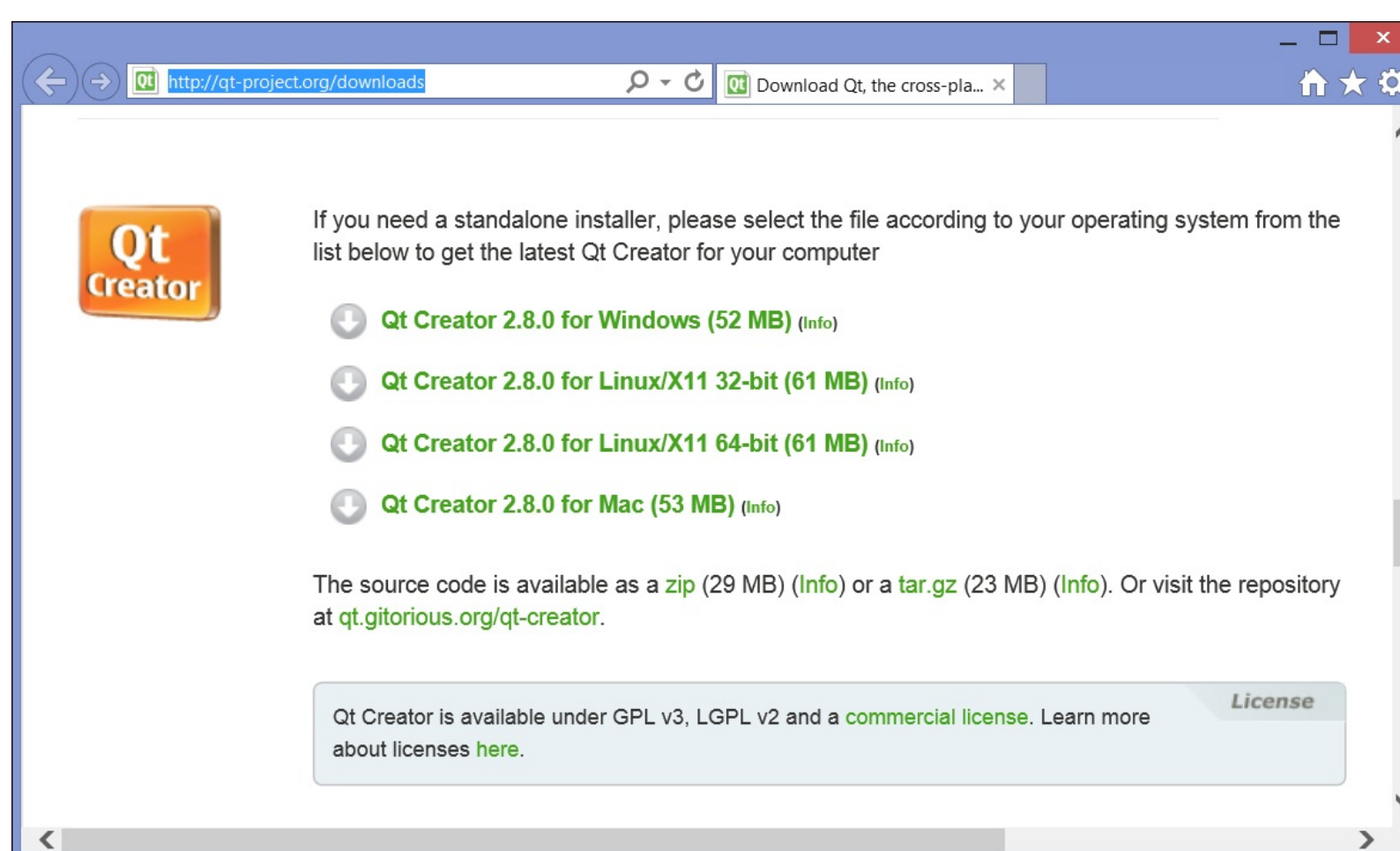
Qt Creator is the integrated software development environment that supports both traditional C++ application development, as well as development using the Qt project's libraries (collectively called "Qt", pronounced "cute"). In this chapter, we will see everything we need to get started with Qt Creator:

- Where to download Qt Creator for Linux, Mac OS X, or Windows
- How to ensure that your basic configuration is running
- A quick look at a simple Qt GUI application, as well as a Qt Quick application

Downloading Qt Creator

Qt, the cross-platform toolkit behind Qt Creator, has had a long and illustrious history. Presently, a project of Digia, it has its own URL at qt-project.org and has both commercial and noncommercial licenses available.

To get started with the noncommercial version for free, head over to <http://bit.ly/13G4Jfr> to see something similar to the following screenshot:



Downloading Qt Creator

Tip

One of the most popular platforms for application development with Qt is Linux. On many Linux variants—notably Ubuntu, my personal favorite—you can get Qt Creator using the package manager. On my Ubuntu box, Qt Creator is just a `sudo apt-get install qtcreator` command away. You'll get a version of Qt matched with your flavor of Linux, although it might not be the latest and greatest build from Digia.

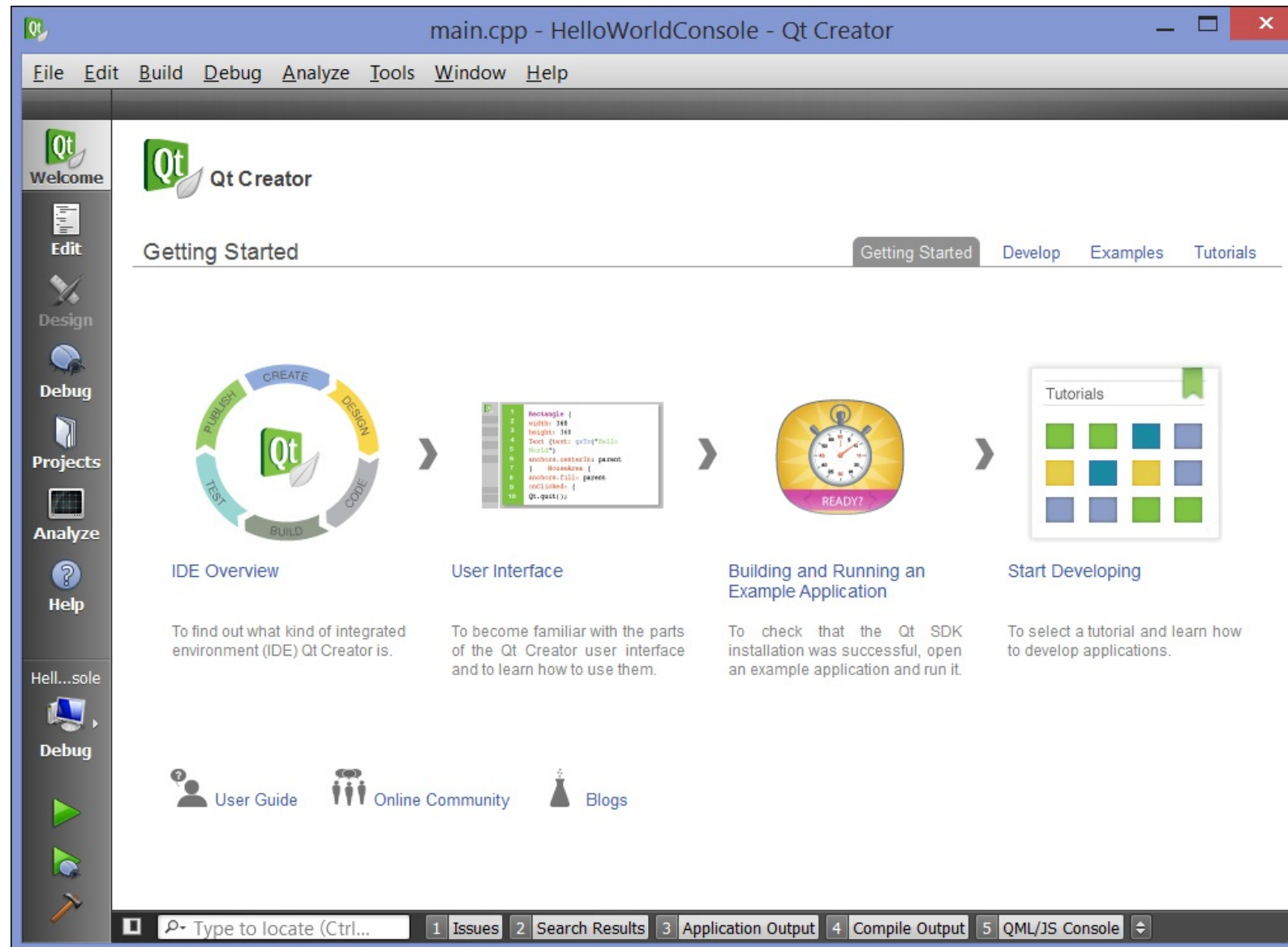
We can also download bits and pieces of Qt, such as just the runtime libraries, or build Qt Creator from source. This typically requires that you already have a compiler and basic development tools installed, and a basic understanding of `qmake` and Qt's build configuration management system.

Some downloads include the C++ compiler and linker you need for your development; others don't. For example, on Windows there's a variant that includes the MinGW tool chain, so you have everything you need to build applications. However, you can also download Qt Creator for Windows that uses the Microsoft Visual Studio compilers, so, if you prefer using Visual Studio for your compilation and Qt Creator as your IDE, that's also an option. On Mac OS X, you'll need to have Xcode and the command-line development tools installed first; you can download Xcode from the Mac OS X App Store, and then use Xcode to download the command-line development tools.

Once the installer is downloaded, run it in the usual way. It'll launch an installation wizard for your platform, and typically the installation takes about three or four minutes. You'll want to have plenty of disk space. Qt Creator doesn't consume that much disk space, but software development typically does; figure at least 500 megabytes for the tools and libraries, and budget a few gigabytes free on your main drive for your source code, intermediate object files, debug symbols, and of course, your compiled application. (This is especially important to plan for if you're running Qt Creator on a virtual machine; make sure that the virtual hard drive for your virtual machine image has plenty of disk space.) You should also ensure that your development box has plenty of RAM; the more, the better. Qt Creator runs happily in 2 GB of RAM, but the compiler and linker used by Qt Creator can run a lot faster if it has more RAM available.

Finding your way around Qt Creator

The following screenshot shows what you see the first time you launch Qt Creator. Let's take a closer look at each portion of the screen:



The landing page of Qt Creator

The main window, which currently shows the icons for **IDE Overview**, **User Interface**, **Building and Running an Example Application**, and **Start Developing**, is your workspace. Under normal conditions, this will be where you'll see the source code for your application. Along the left-hand side are a series of icons that let you select various views into your application. They are:

- The **Welcome** view shows basic information about Qt Creator
- The **Edit** view lets you edit the files that make up your application
- The **Design** view lets you use the Qt Designer to design the user interface for your application
- The **Debug** view lets you debug your application while it's running, including doing things like viewing memory and variables, setting breakpoints, and stepping through your

application

- The **Projects** view lets you adjust the build and link settings for your project
- The **Analyze** view lets you profile your application's runtime performance
- The **Help** view provides documentation about Qt Creator and the Qt Framework

Below the **Help** view button in the previous screenshot you can see the active project; when I took this screenshot, I had already created our first application. Let's do that now.

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