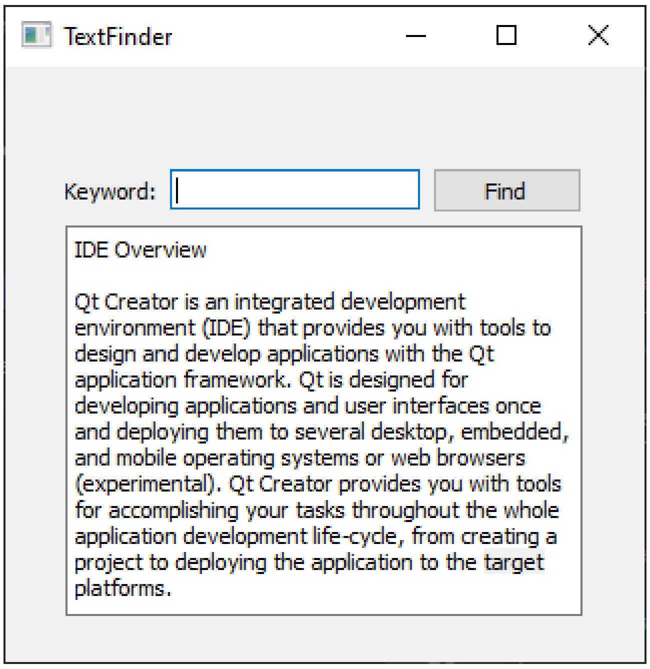
Creating a Qt Widget Based Application

This tutorial describes how to use Qt Creator to create a small Qt application, Text Finder. It is a simplified version of the Qt UI Tools Text Finder Example. The application user interface is constructed from Qt widgets by using Qt Designer. The application logic is written in C++ by using the code editor.

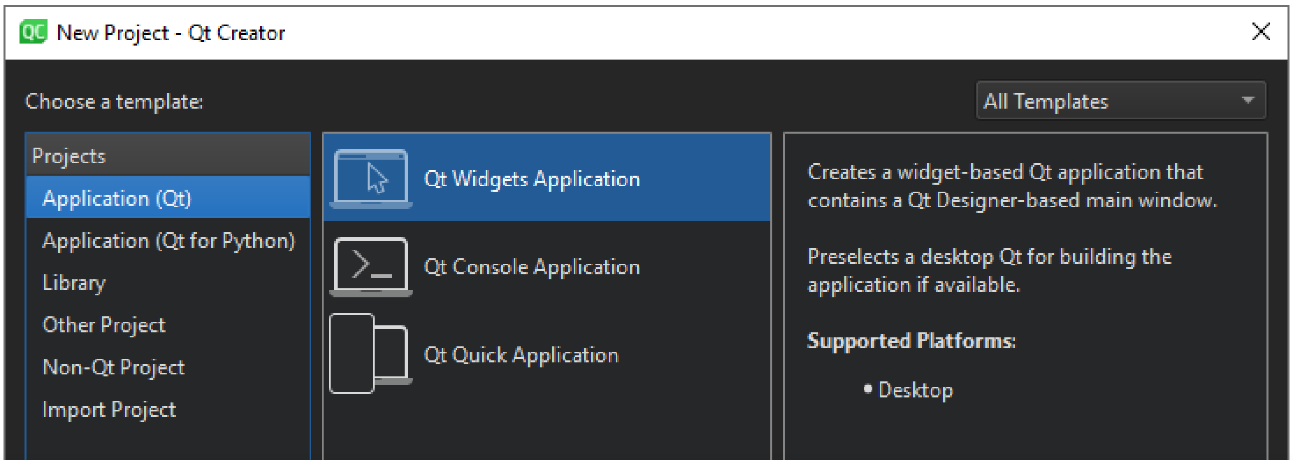


IDE Overview

Qt Creator is an integrated development environment (IDE) that provides you with tools to design and develop applications with the Qt application framework. Qt is designed for developing applications and user interfaces once and deploying them to several desktop, embedded, and mobile operating systems or web browsers (experimental). Qt Creator provides you with tools for accomplishing your tasks throughout the whole application development life-cycle, from creating a project to deploying the application to the target platforms.

Creating the Text Finder Project

1. Select **File** > **New Project** > **Application (Qt)** > **Qt Widgets Application** > **Choose**.



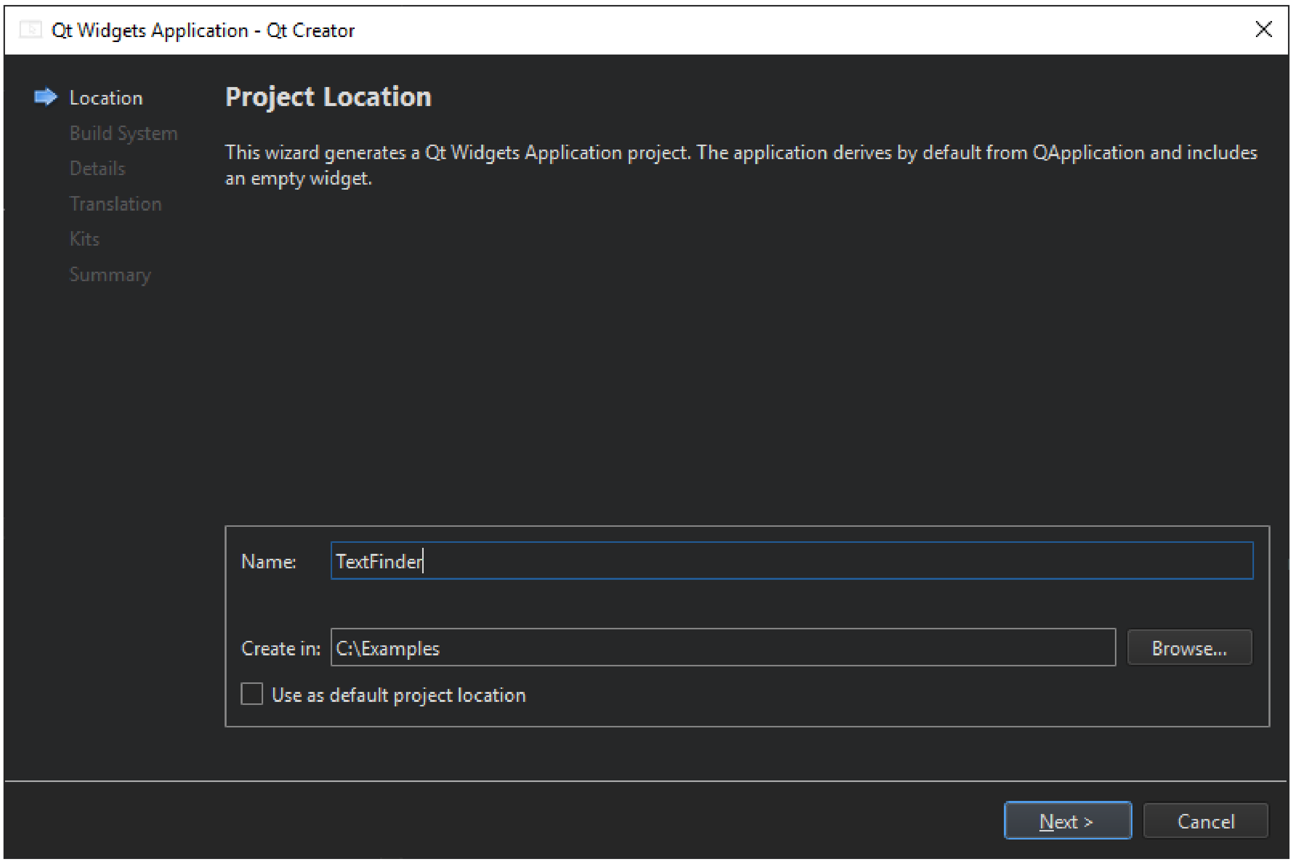
Creates a widget-based Qt application that contains a Qt Designer-based main window.

Preselects a desktop Qt for building the application if available.

Supported Platforms:

- Desktop

The **Introduction and Project Location** dialog opens.



Project Location

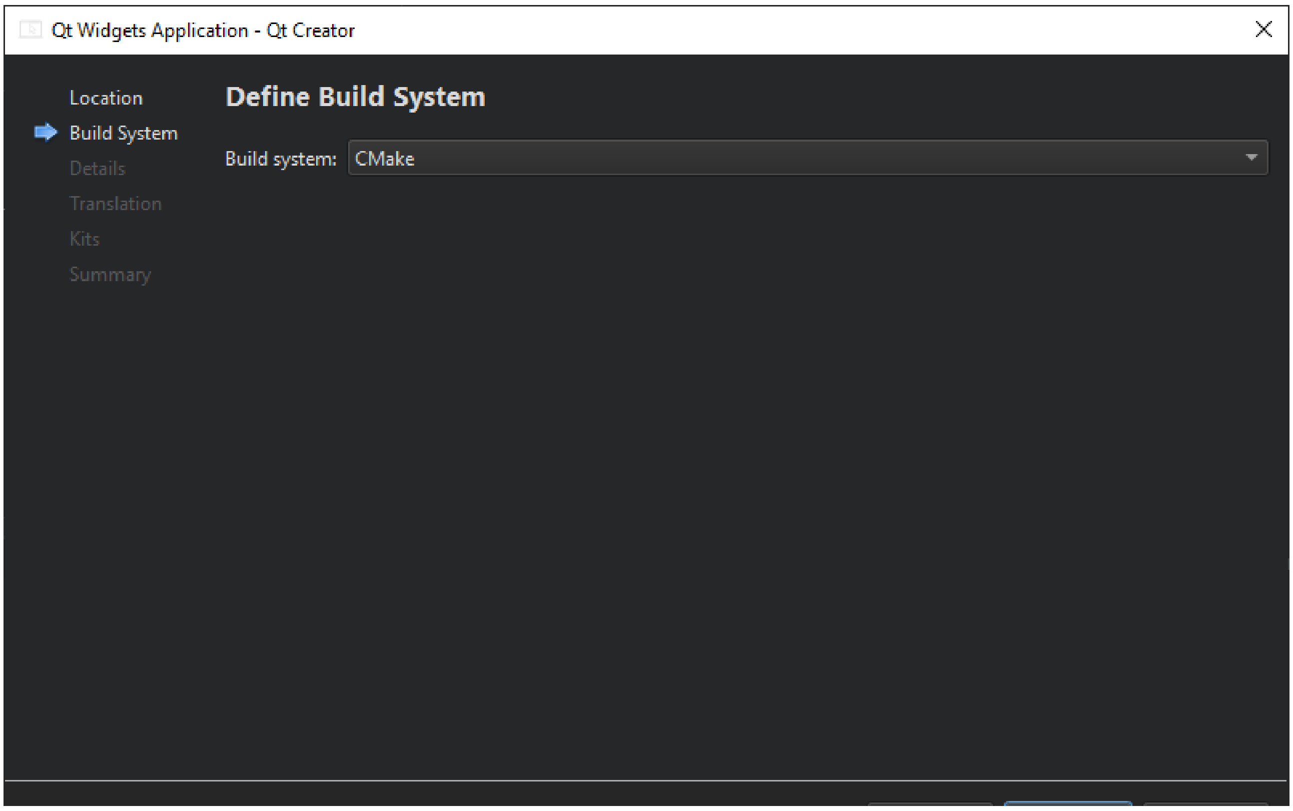
This wizard generates a Qt Widgets Application project. The application derives by default from QApplication and includes an empty widget.

Name: TextFinder

Create in: C:\Examples

☐ Use as default project location

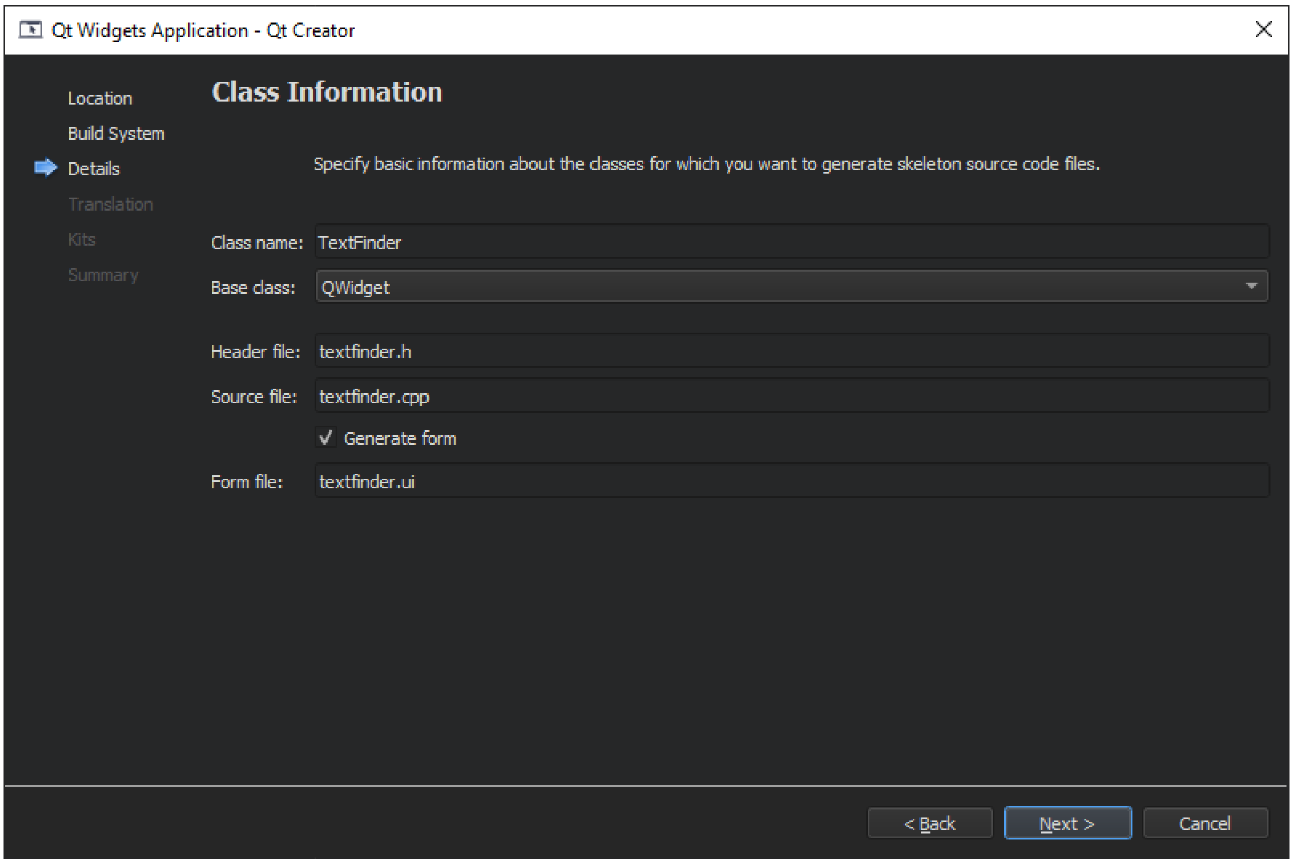
2. In the **Name** field, type **TextFinder**.
3. In the **Create in** field, enter the path for the project files. For example, `C:\Qt\examples`.
4. Select **Next** (on Windows and Linux) or **Continue** (on macOS) to open the **Define Build System** dialog.



Define Build System

Build system: CMake

5. In the **Build system** field, select CMake as the build system to use for building the project.
6. Select **Next** or **Continue** to open the **Class Information** dialog.



Qt Widgets Application - Qt Creator

Class Information

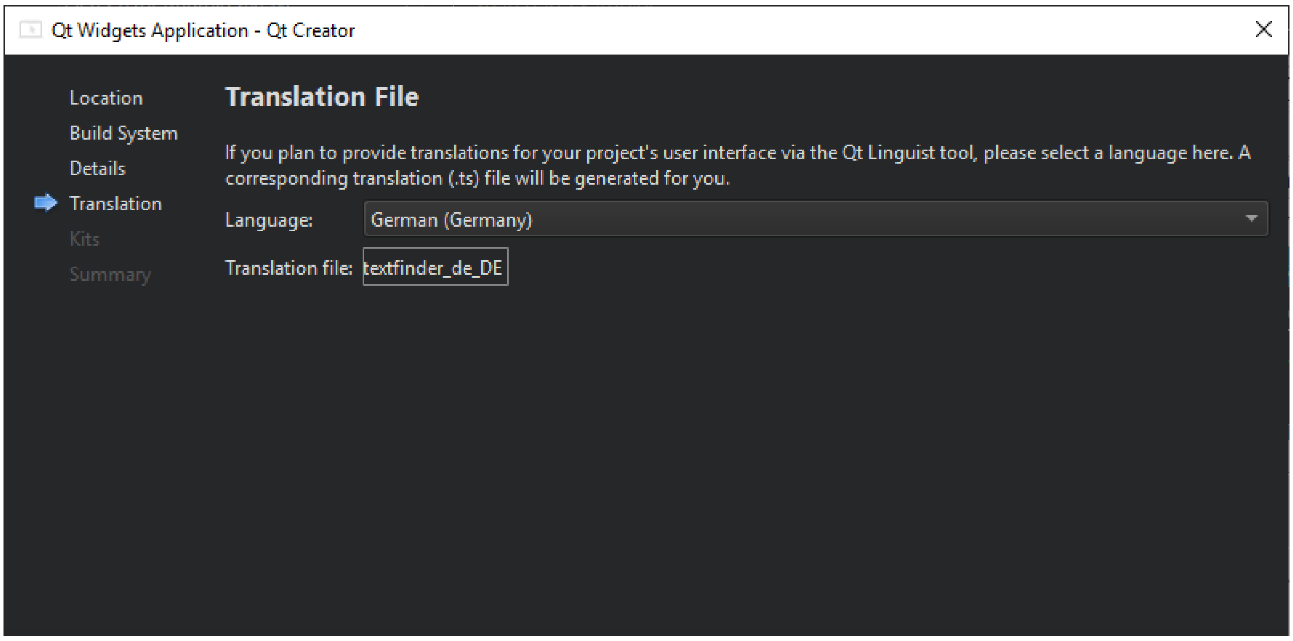
Specify basic information about the classes for which you want to generate skeleton source code files.

Class name: TextFinder
Base class: QWidget
Header file: textfinder.h
Source file: textfinder.cpp
✓ Generate form
Form file: textfinder.ui

7. In the **Class name** field, type **TextFinder** as the class name.
8. In the **Base class** list, select QWidget as the base class type.

Note: The **Header file**, **Source file** and **Form file** fields are automatically updated to match the name of the class.

9. Select **Next** or **Continue** to open the **Translation File** dialog.



Qt Widgets Application - Qt Creator

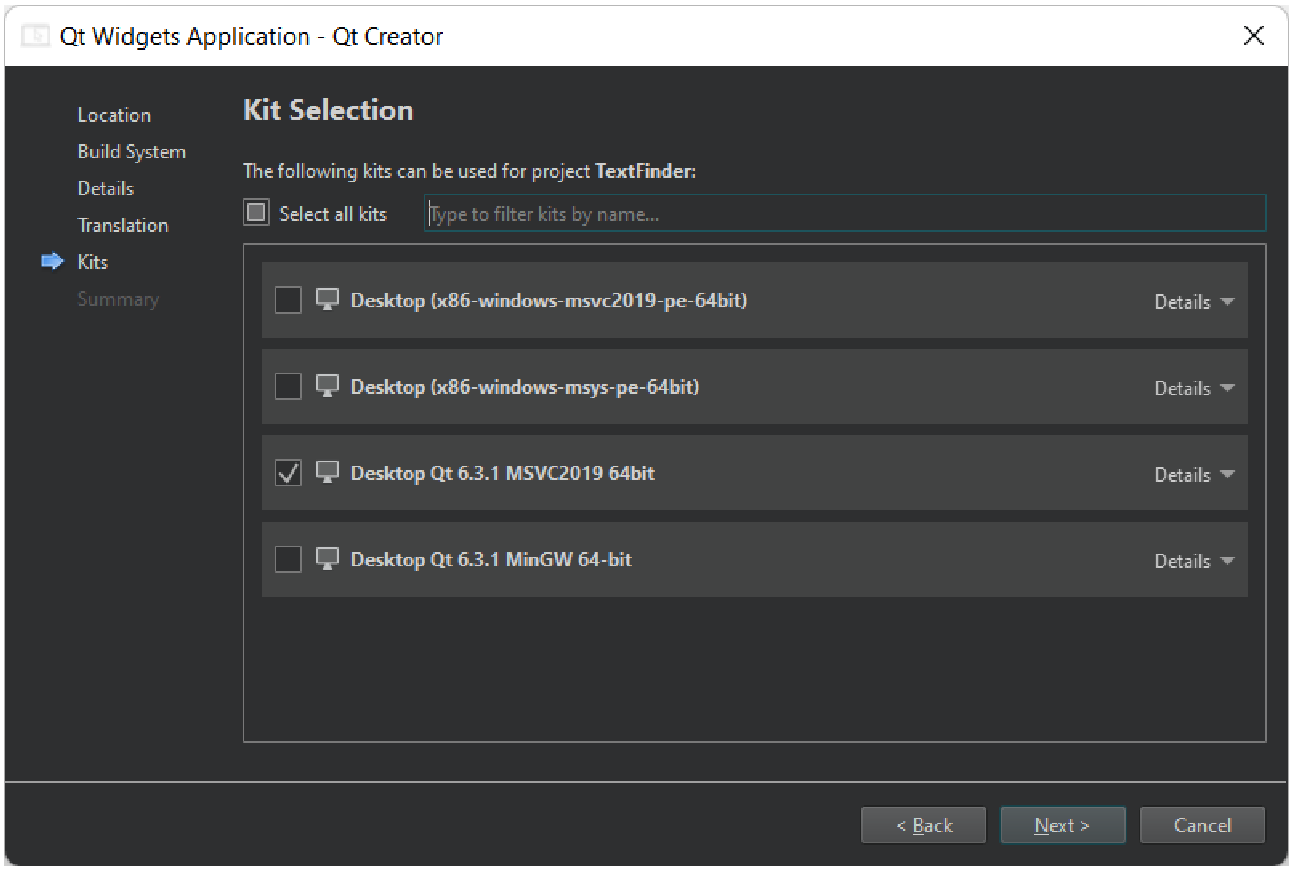
Translation File

If you plan to provide translations for your project's user interface via the Qt Linguist tool, please select a language here. A corresponding translation (.ts) file will be generated for you.

Language: German (Germany)
Translation file: textfinder_de_DE

< Back
Next >
Cancel

10. In the **Language** field, you can select a language that you plan to translate the application to. This sets up localization support for the application. You can add other languages later by editing the project file.
11. Select **Next** or **Continue** to open the **Kit Selection** dialog.


Qt Widgets Application - Qt Creator

Location
Build System
Details
Translation
Kits
Summary

Kit Selection

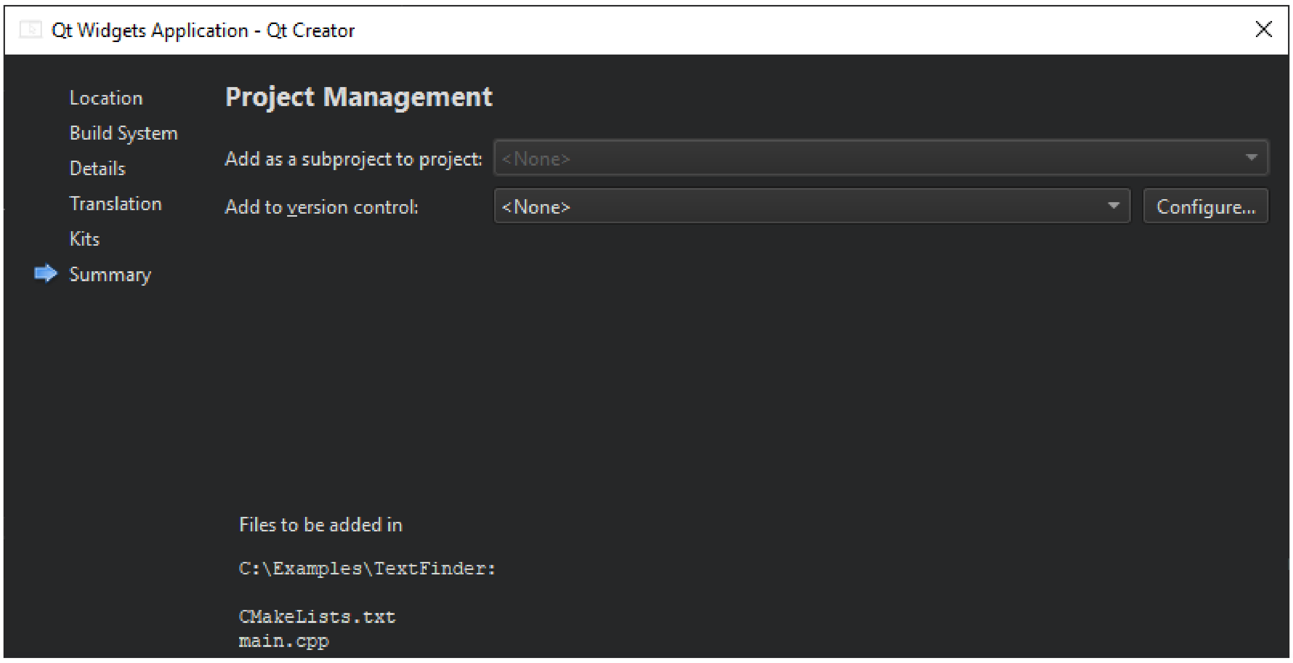
The following kits can be used for project **TextFinder**:

Select all kits | Type to filter kits by name...

- [ ] Desktop (x86-windows-msvc2019-pe-64bit) Details
- [ ] Desktop (x86-windows-msys-pe-64bit) Details
- [✓] Desktop Qt 6.3.1 MSVC2019 64bit Details
- [ ] Desktop Qt 6.3.1 MinGW 64-bit Details

< Back | Next > | Cancel

12. Select build and run kits for your project.
13. Select **Next** or **Continue** to open the **Project Management** dialog.


Qt Widgets Application - Qt Creator

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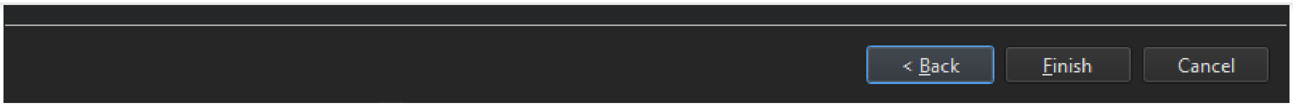
Project Management

Add as a subproject to project: <None>
Add to version control: <None> Configure...

Files to be added in

```
C:\Examples\TextFinder:

CMakeLists.txt
main.cpp
```

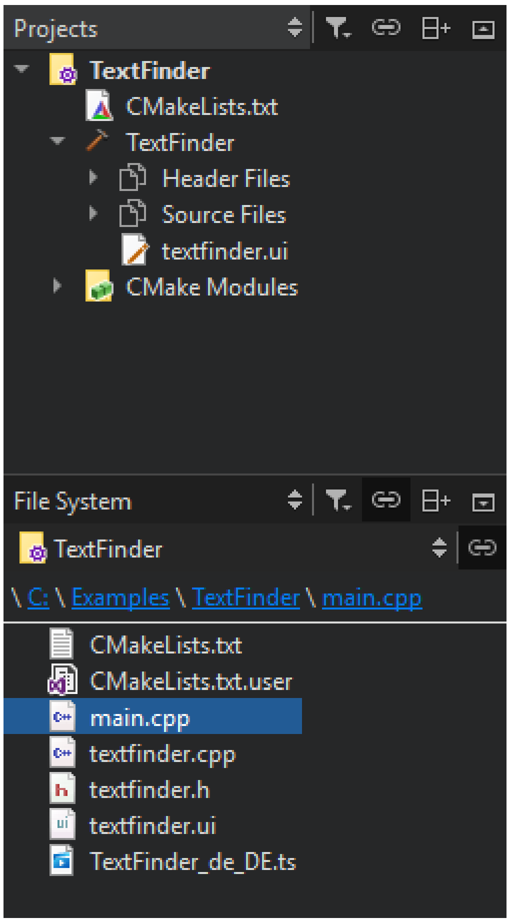


14. Review the project settings, and select **Finish** (on Windows and Linux) or **Done** (on macOS) to create the project.

> **Note:** The project opens in the **Edit** mode, and these instructions are hidden. To return to these instructions, open the **Help** mode.

The TextFinder project now contains the following files:

- main.cpp
- textfinder.h
- textfinder.cpp
- textfinder.ui
- CMakeLists.txt



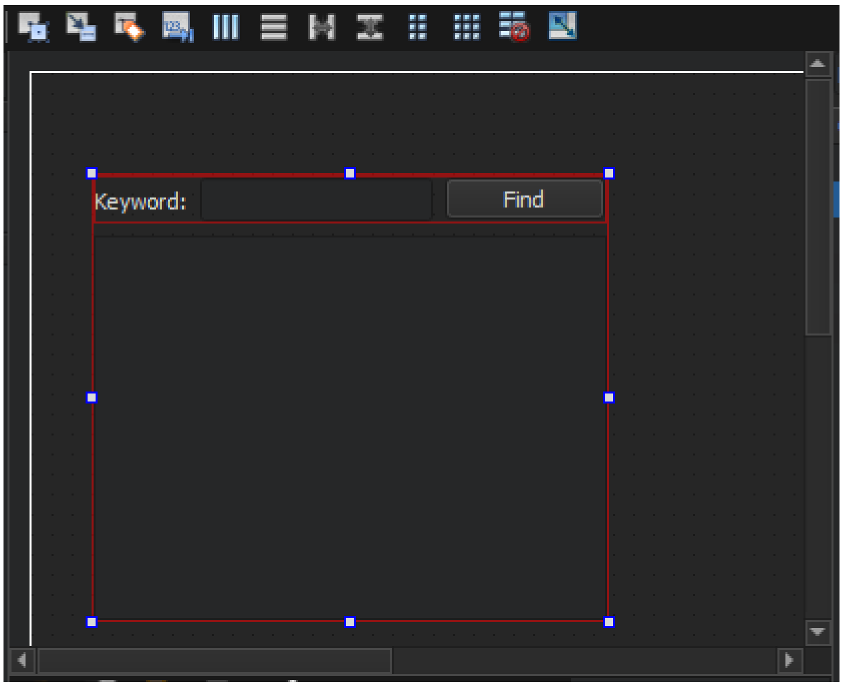
The .h and .cpp files come with the necessary boiler plate code.

If you selected CMake as the build system, Qt Creator created a CMakeLists.txt project file for you.

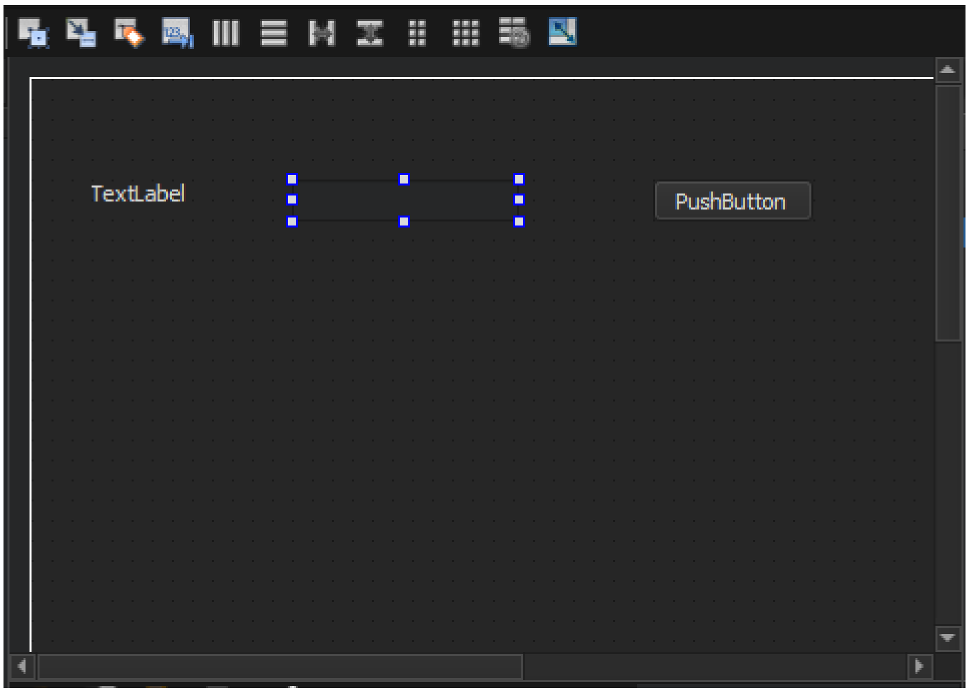
Filling in the Missing Pieces

Begin by designing the user interface and then move on to filling in the missing code. Finally, add the find

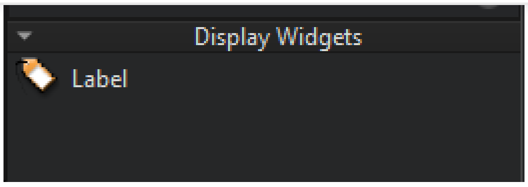
Designing the User Interface



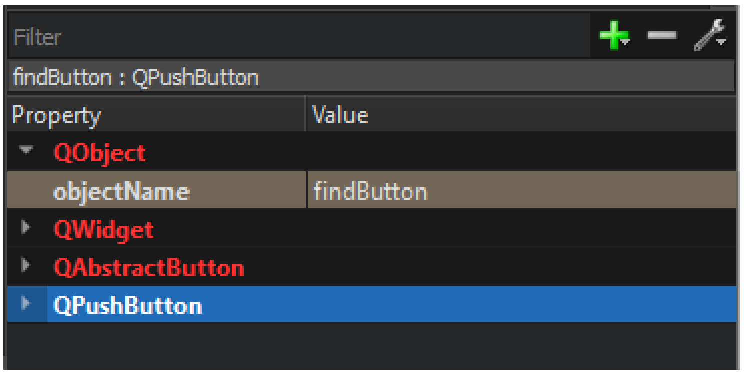
1. In the **Editor** mode, double-click the textfinder.ui file in the **Projects** view to launch the integrated Qt Designer.
2. Drag and drop the following widgets to the form:
   - **Label** (QLabel)
   - **Line Edit** (QLineEdit)
   - **Push Button** (QPushButton)



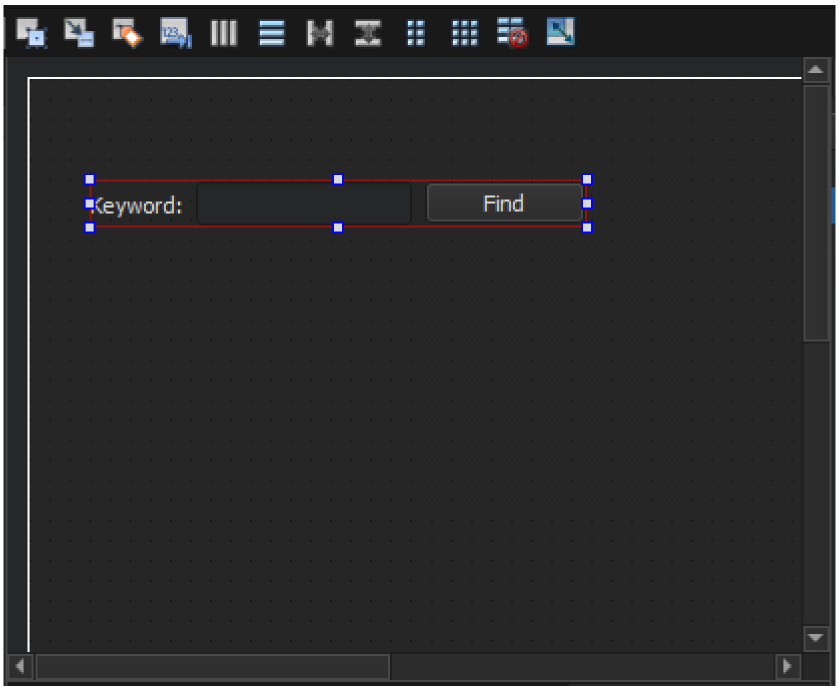
Note: To easily locate the widgets, use the search box at the top of the **Sidebar**. For example, to find the **Label** widget, start typing the word **label**.



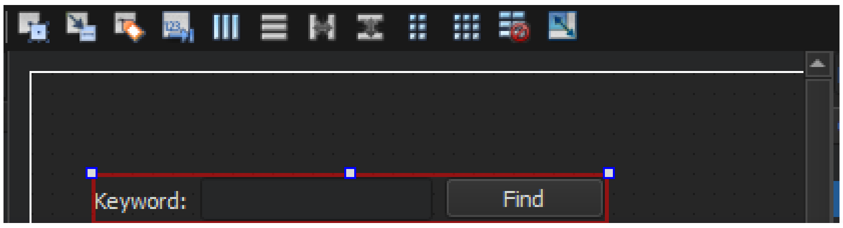
3. Double-click the **Label** widget and enter the text **Keyword**.
4. Double-click the **Push Button** widget and enter the text **Find**.
5. In the **Properties** view, change the **objectName** to **findButton**.



6. Press **Ctrl+A** (or **Cmd+A**) to select the widgets and select **Lay out Horizontally** (or press **Ctrl+H** on Linux or Windows or **Ctrl+Shift+H** on macOS) to apply a horizontal layout (QHBoxLayout).



7. Drag and drop a **Text Edit** widget (QTextEdit) to the form.
8. Select the screen area, and then select **Lay out Vertically** (or press **Ctrl+L**) to apply a vertical layout (QVBoxLayout).



Applying the horizontal and vertical layouts ensures that the application UI scales to different screen sizes.

9. To call a find function when users select the **Find** button, you use the Qt signals and slots mechanism. A signal is emitted when a particular event occurs and a slot is a function that is called in response to a particular signal. Qt widgets have predefined signals and slots that you can use directly from Qt Designer. To add a slot for the find function:
   - Right-click the **Find** button to open a context-menu.
   - Select **Go to Slot** > **clicked()**, and then select **OK**.

     A private slot, `on_findButton_clicked()`, is added to the header file, textfinder.h and a private function, `TextFinder::on_findButton_clicked()`, is added to the source file, textfinder.cpp.

10. Press **Ctrl+S** (or **Cmd+S**) to save your changes.

For more information about designing forms with Qt Designer, see the Qt Designer Manual.

Completing the Header File

The textfinder.h file already has the necessary #includes, a constructor, a destructor, and the `Ui` object. You need to add a private function, `loadTextFile()`, to read and display the contents of the input text file in the QTextEdit.

1. In the **Projects** view in the **Edit view**, double-click the `textfinder.h` file to open it for editing.
2. Add a private function to the `private` section, after the `Ui::TextFinder` pointer, as illustrated by the following code snippet:

```
private slots:
    void on_findButton_clicked();

private:
    Ui::TextFinder *ui;
    void loadTextFile();
```

Completing the Source File

Now that the header file is complete, move on to the source file, textfinder.cpp.

1. In the **Projects** view in the **Edit** view, double-click the textfinder.cpp file to open it for editing.
2. Add code to load a text file using QFile, read it with QTextStream, and then display it on `textEdit` with QTextEdit::setPlainText(). This is illustrated by the following code snippet:

DOCUMENTATION

```
        inputFile.open(QIODevice::ReadOnly);

        QTextStream in(&inputFile);
        QString line = in.readAll();
        inputFile.close();

        ui->textEdit->setPlainText(line);
        QTextCursor cursor = ui->textEdit->textCursor();
        cursor.movePosition(QTextCursor::Start, QTextCursor::MoveAnchor, 1);
    }
```

3. To use QFile and QTextStream, add the following #includes to textfinder.cpp:

```
#include "./ui_textfinder.h"
#include <QFile>
#include <QTextStream>
```

4. For the `on_findButton_clicked()` slot, add code to extract the search string and use the QTextEdit::find() function to look for the search string within the text file. This is illustrated by the following code snippet:

```
void TextFinder::on_findButton_clicked()
{
    QString searchString = ui->lineEdit->text();
    ui->textEdit->find(searchString, QTextDocument::FindWholeWords);
}
```

5. Once both of these functions are complete, add a line to call `loadTextFile()` in the constructor, as illustrated by the following code snippet:

```
TextFinder::TextFinder(QWidget *parent)
    : QWidget(parent)
    , ui(new Ui::TextFinder)
{
    ui->setupUi(this);
    loadTextFile();
}
```

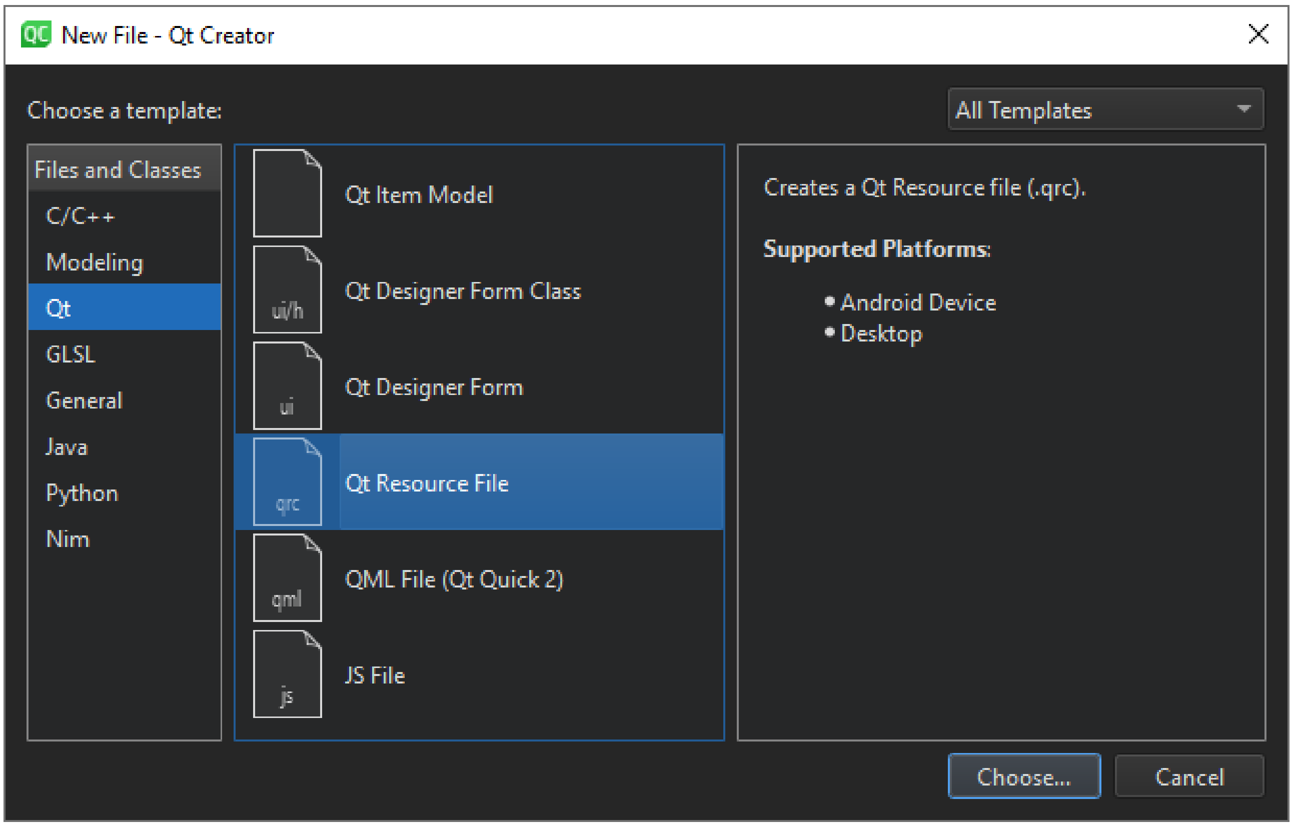
The `on_findButton_clicked()` slot is called automatically in the uic generated ui_textfinder.h file by this line of code:

```
QMetaObject::connectSlotsByName(TextFinder);
```

You need a resource file (.qrc) within which you embed the input text file. The input file can be any .txt file with a paragraph of text. Create a text file called input.txt and store it in the textfinder folder.

To add a resource file:

1. Select **File** > **New File** > **Qt** > **Qt Resource File** > **Choose**.

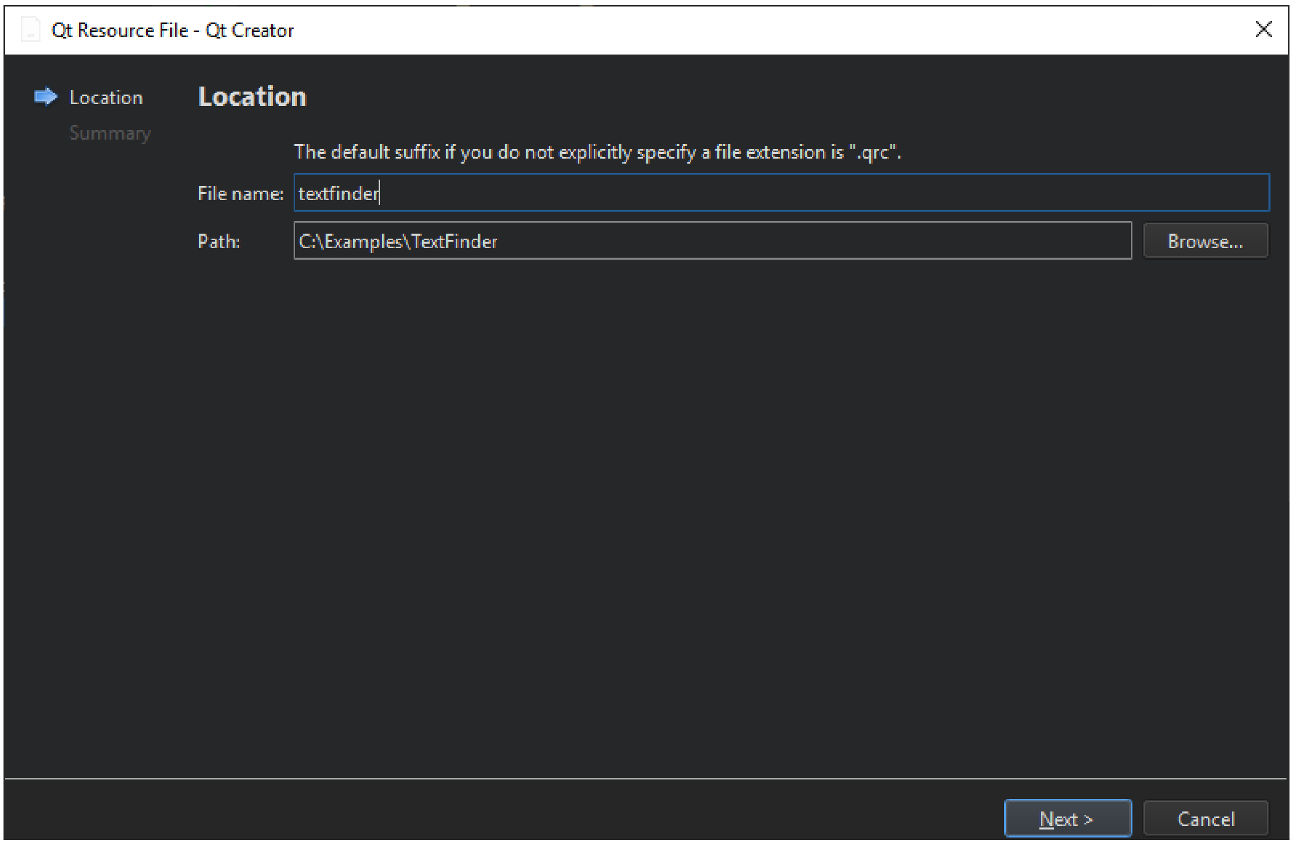


Creates a Qt Resource file (.qrc).

Supported Platforms:

- Android Device
- Desktop

The **Choose the Location** dialog opens.



Location

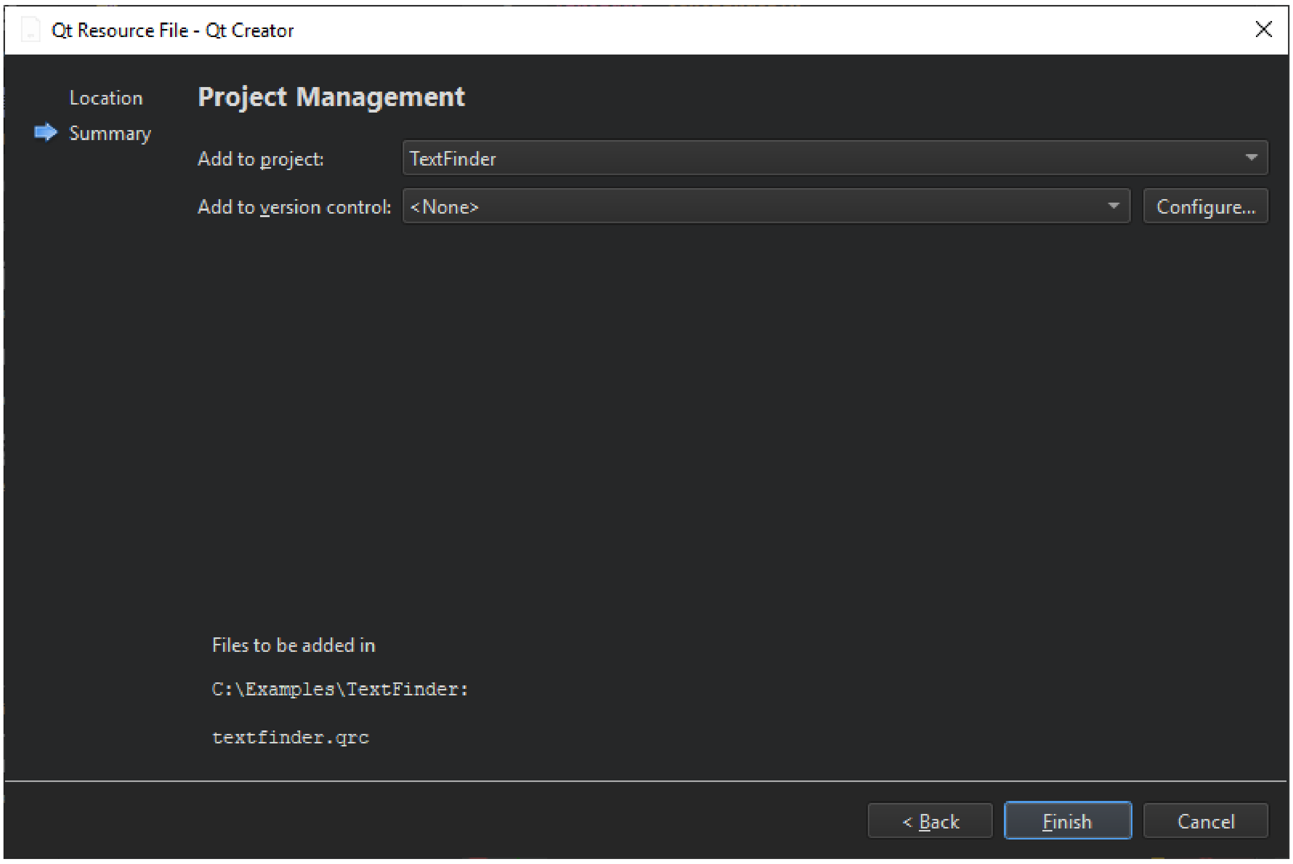
The default suffix if you do not explicitly specify a file extension is ".qrc".

File name: textfinder

Path: C:\Examples\TextFinder

3. In the **Path** field, enter the path to the project, and select **Next** or **Continue**.

   The **Project Management** dialog opens.



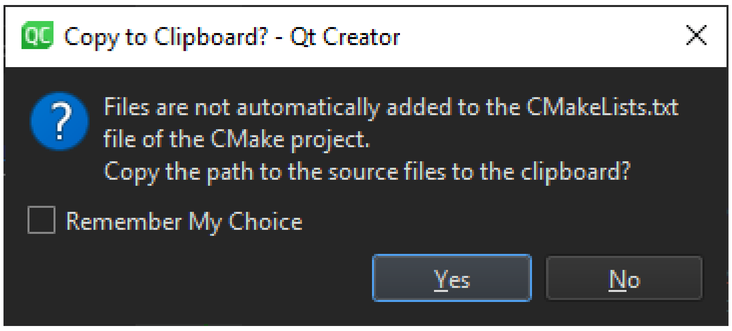
Add to project: TextFinder
Add to version control: <None>

Files to be added in

C:\Examples\TextFinder:

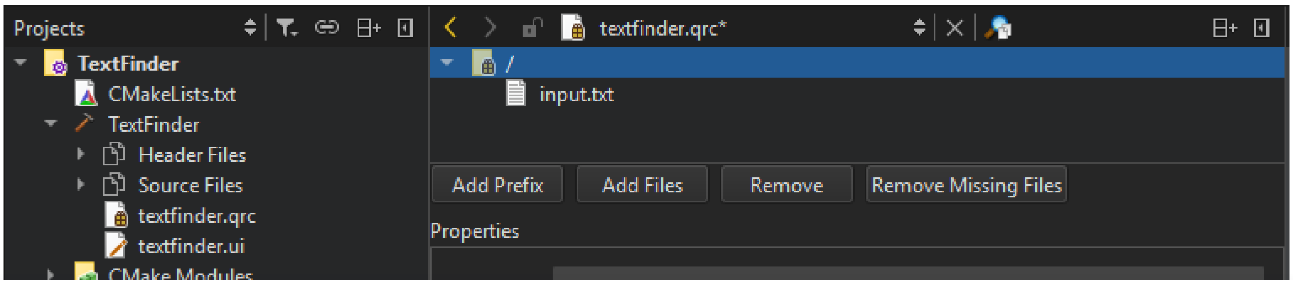
textfinder.qrc

4. In the **Add to project** field, select **TextFinder** and select **Finish** or **Done** to open the file in the code editor.
5. In the **Copy** to Clipboard dialog, select **Yes** to copy the path to the resource file to the clipboard for adding it to the CMakeLists.txt file.



Files are not automatically added to the CMakeLists.txt file of the CMake project.
Copy the path to the source files to the clipboard?

6. Select **Add** > **Add Prefix**.
7. In the **Prefix** field, replace the default prefix with a slash (/).
8. Select **Add** > **Add Files**, to locate and add input.txt.



Adding Resources to Project File

For the text file to appear when you run the application, you must specify the resource file as a source file in the *CMakeLists.txt* file that the wizard created for you:

```
set(PROJECT_SOURCES
        main.cpp
        textfinder.cpp
        textfinder.h
        textfinder.ui
        ${TS_FILES}
        textfinder.qrc
)
```

Compiling and Running Your Application

Now that you have all the necessary files, select the ▶ button to compile and run your Application.

‹ Creating a Qt Quick Application Creating a Mobile Application ›

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