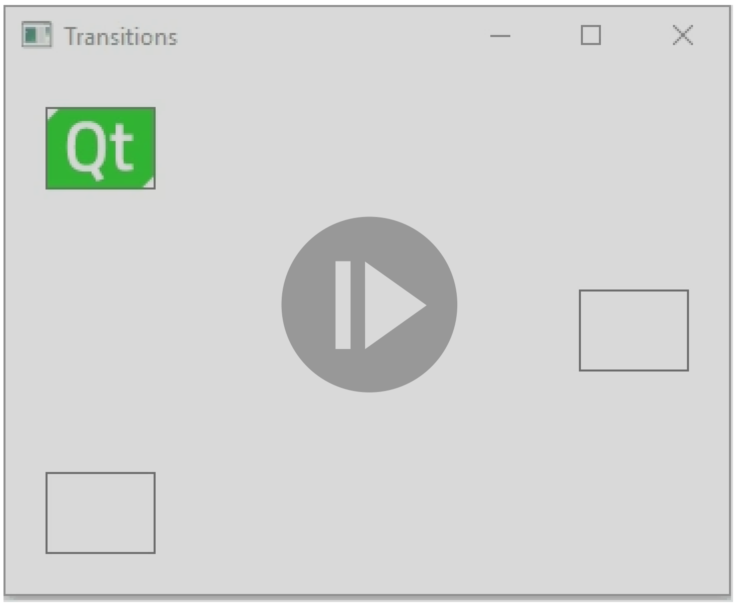
Creating a Qt Quick Application

This tutorial illustrates basic concepts of Qt Quick. For more information about the UI choices you have, see User Interfaces.

This tutorial describes how to use Qt Creator to implement states and transitions when using Qt 6 as the minimum Qt version and CMake as the build system.

We use the Edit mode to create an application that moves a Qt logo between three rectangles when you click them.



For more examples, see Qt Quick Examples and Tutorials.

You can develop Qt Quick applications also in Qt Design Studio. For more information, see Qt Design Studio Manual.

Creating the Project

1. Select **File** > **New Project** > **Application (Qt)** > **Qt Quick Application**.
2. Select **Choose** to open the **Project Location** dialog.
3. In the **Name** field, enter a name for the application. When naming your own projects, keep in mind that they cannot be easily renamed later.
4. In the **Create in** field, enter the path for the project files. You can move project folders later without problems.
5. Select **Next** (or **Continue** on macOS) to open the **Define Build System** dialog.
6. In the **Build system** field, select CMake as the build system to use for building and running the project.

Note: If you select qmake, the instructions for configuring the project won't apply.

7. Select **Next** to open the **Define Project Details** dialog.
8. In the **Minimum required Qt version** field, select Qt 6.2.
9. Select **Next** to open the **Translation File** dialog.
10. Select **Next** to use the default settings and to open the **Kit Selection** dialog.
11. Select Qt 6.2 or later kits for the platforms that you want to build the application for. To build applications for mobile devices, select kits also for Android and iOS.

    Note: Kits are listed if they have been specified in **Edit** > **Preferences** > **Kits** (on Windows and Linux) or in **Qt Creator** > **Preferences** > **Kits** (on macOS). For more information, see Adding Kits.

12. Select **Next** to open the **Project Management** dialog.
13. Review the project settings, and select **Finish** (or **Done** on macOS) to create the project.

For more information about the settings that you skipped and the other wizard templates available, see Creating Qt Quick Applications.

Qt Creator generates a component file, *main.qml*, and opens it in the **Edit** mode.

Deploying Applications

The main view of the application displays a Qt logo inside a rectangle in the top left corner of the view and two empty rectangles.

We use the *qt-logo.png* image in this tutorial, but you can also use any other image or a component, instead.

For the image to appear when you run the application, you must specify it as a resource in the RESOURCES section of *CMakeLists.txt* file that the wizard created for you:

```
qt_add_qml_module(apptransitions
    URI transitions
    VERSION 1.0
    QML_FILES main.qml Page.qml
    RESOURCES qt-logo.png
)
```

Creating Custom QML Types

Because the Window QML type requires states to be added into child components, we use the wizard to create a custom QML type called *Page* that we will refer to from *main.qml*.

To create a custom QML type:

1. Select **File** > **New File** > **Qt** > **QML File (Qt Quick 2)**.
2. Select **Choose** to open the **Location** dialog.
3. In the **File name** field, enter a name for the custom QML type. In this example, we call the type *Page*.
4. Select **Next** to open the **Project Management** dialog.
5. Select **Finish** to create *Page.qml*.

Qt Creator opens *Page.qml* in the **Edit** mode. It contains a root item of the type Item that we replace with a

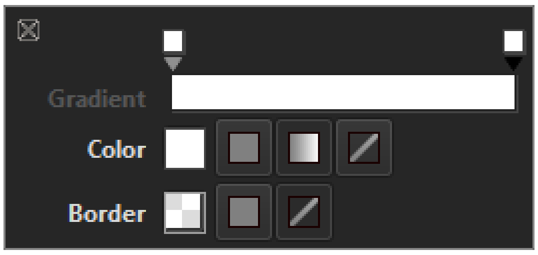
```
import QtQuick

Rectangle {
    id: page
    anchors.fill: parent
    color: "#ffffff"
```

Because we develop with Qt 6, where version numbers are not used with modules, we remove the version number from the import statement.

When you start typing the QML type name, Qt Creator suggests available types and properties to complete the code.

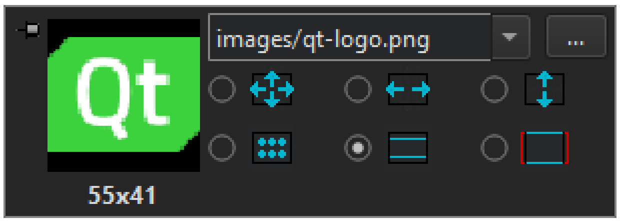
Select the light bulb icon next to the type name to open the Qt Quick Toolbar for rectangles. You can use it to specify rectangle properties, such as color, transparency, and gradients.



Next, we add an Image type with *qt-logo.png* as the source. We position the image in the top-left corner of the rectangle:

```
    Image {
        id: icon
        x: 20
        y: 20
        source: "qt-logo.png"
    }
```

You can use the Qt Quick Toolbar for images to specify image properties, such as source file and fill mode.



We now create the rectangles that the image will move between. Their size should match the image size and they should be transparent, so that the image is visible. We set the border color to light gray to make the rectangles visible:

```
    Rectangle {
        id: topLeftRect
        width: 55
        border.color: "#808080"
```

We anchor the rectangles to their parent to position them in its top-left and and bottom-left corners, as well as the vertical center of its right edge. The following code snippet anchors a rectangle to the top-left corner of its parent:

```
        anchors.left: parent.left
        anchors.top: parent.top
        anchors.leftMargin: 20
        anchors.topMargin: 20
```

We add a MouseArea type to make the rectangle clickable by users:

```
        MouseArea {
            id: mouseArea
            anchors.fill: parent
```

To check your code, you can compare it with the *Page.qml* example file.

Next, we will make the image move between the rectangles when users click them, by adding states and by connecting mouse clicks to state changes.

Connecting Mouse Clicks to State Changes

To make the image move between the rectangles when users click them, we add states to the Page component, where we change the values of the x and y properties of *icon* to match those of the middle right and top left rectangles. To make sure that the image is displayed within the rectangle when the view is scaled on different sizes of screens, we *bind* the values of the x and y properties of *icon* to those of the rectangles:

```
    ...
    states: [
        State {
            name: "State1"
        },
        State {
            name: "State2"

            PropertyChanges {
                target: icon
                x: middleRightRect.x
                y: middleRightRect.y
            }
        },
        State {
            name: "State3"

            PropertyChanges {
                target: icon
            }
        ]
```

Then, we connect the `onClicked` signals of the mouse areas to the state changes:

```
                Connections {
                    target: mouseArea
                    function onClicked()
                    {
                        page.state = "State1"
                    }
```

Because we develop with Qt 6, we must specify the connections as functions.

Adding Page to the Main View

We now open *main.qml* for editing and add an instance of the Page custom component to it:

```
import QtQuick

Window {
    width: 640
    height: 480
    visible: true
    title: qsTr("Transitions")

    Page {
        id: page
        anchors.fill: parent
    }
}
```

Press **Ctrl+R** to run the application, and click the rectangles to move the Qt logo from one rectangle to another.

Animating Transitions

We will now create transitions to apply animation to the image. For example, the image bounces back when it moves to *middleRightRect* and eases into *bottomLeftRect*.

We specify transitions for switching from each state to the other two states:

```
    transitions: [
        Transition {
            id: toState1
            ParallelAnimation {
                SequentialAnimation {
```

```
                PropertyAnimation {
                    target: icon
                    property: "y"
                    duration: 200
                }
            }

            SequentialAnimation {
                PauseAnimation {
                    duration: 0
                }

                PropertyAnimation {
                    target: icon
                    property: "x"
                    duration: 200
                }
            }
        }
        to: "State1"
        from: "State2,State3"
    },
```

We change the easing curve type for transitions to *State2* from linear to `Easing.OutBounce` to create the bounce effect:

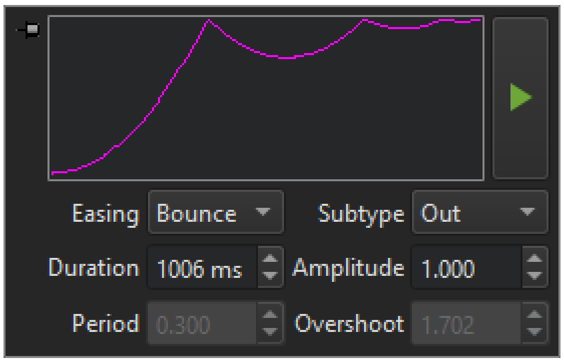
```
    Transition {
        id: toState2
        ParallelAnimation {
            SequentialAnimation {
                PauseAnimation {
                    duration: 0
                }

                PropertyAnimation {
                    target: icon
                    property: "y"
                    easing.type: Easing.OutBounce
                    duration: 1006
                }
            }

            SequentialAnimation {
                PauseAnimation {
                    duration: 0
                }

                PropertyAnimation {
                    target: icon
                    property: "x"
                    easing.type: Easing.OutBounce
                    duration: 1006
        to: "State2"
        from: "State1,State3"
    },
```

Note: You can use the Qt Quick Toolbar for animation to specify the easing curve type and animation duration.



Then, we change the easing curve type for transitions to *State2* from linear to `Easing.InOutQuad` to create the easing effect:

```
        Transition {
            id: toState3
            ParallelAnimation {
                SequentialAnimation {
                    PauseAnimation {
                        duration: 0
                    }

                    PropertyAnimation {
                        target: icon
                        property: "y"
                        easing.type: Easing.InOutQuad
                        duration: 2000
                    }
                }

                SequentialAnimation {
                    PauseAnimation {
                        duration: 0
                    }

                    PropertyAnimation {
                        target: icon
                        property: "x"
                        easing.type: Easing.InOutQuad
                        duration: 2000
                    }
                }
            }
            to: "State3"
```

```
    }
```

Press **Ctrl+R** to run the application, and click the rectangles to view the animated transitions.

Files:

- transitions/CMakeLists.txt
- transitions/Page.qml
- transitions/main.qml

Images:

- transitions/qt-logo.png

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