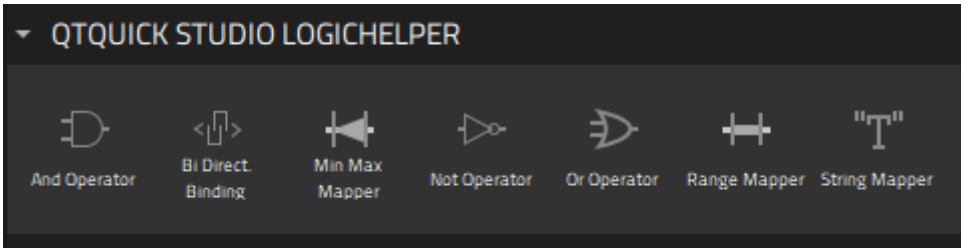
Logic Helpers

To have your UI perform certain operations, you might need to write JavaScript expressions for conditions or convert numbers to strings. To make this easier, Qt Design Studio provides a set of components called *logic helpers*.



Logic helpers are available for binding property values using the boolean AND, NOT, and OR operators, as well as for mapping numbers and numerical ranges. In addition, you can synchronize the property values of two components bi-directionally.

Logic helpers are invisible components that you can use in connection with controls, such as a Slider or Check Box. To use a logic helper, drag-and-drop it from **Components** > **Qt Quick Studio Logic Helper** to Navigator. If you cannot find the logic helpers in **Components**, you need to add the **Qt Quick Studio Logic Helper** module to your project, as described in Adding and Removing Modules.

The following sections describe the different types of logic helpers in more detail.

Boolean Helpers

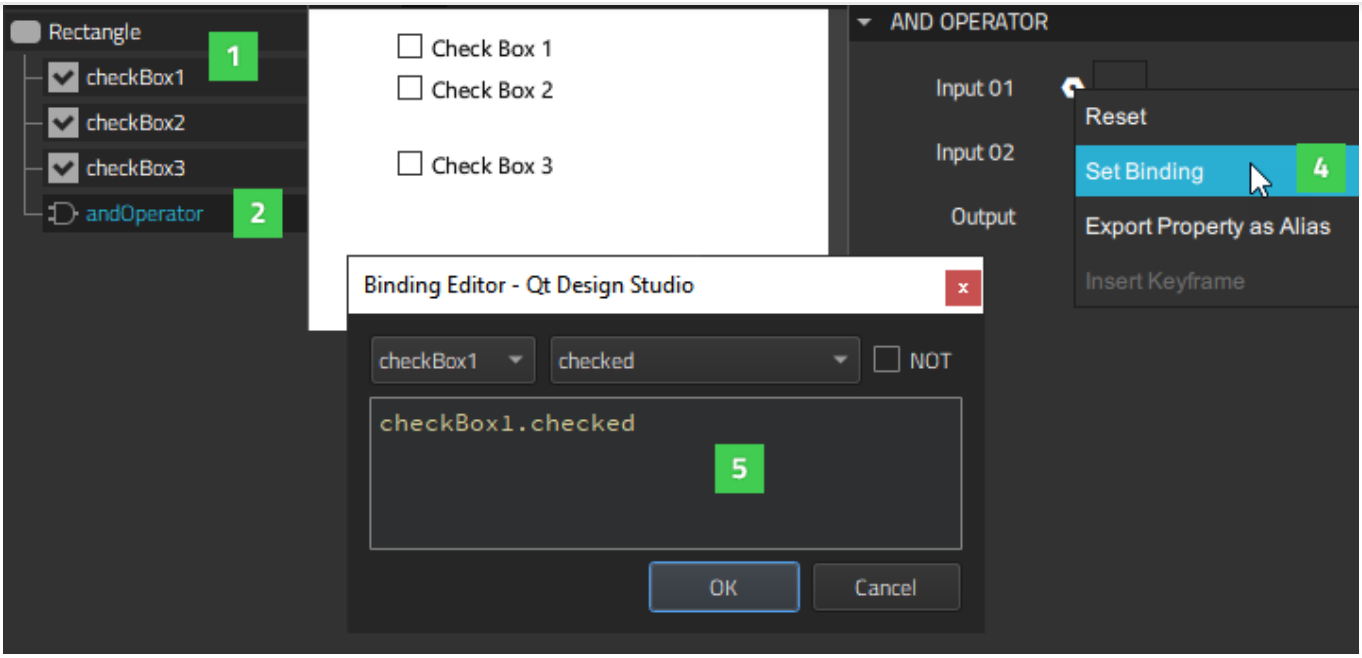
You can use logic helpers to bind property values using the boolean AND, OR, and NOT operators.

AND Operator

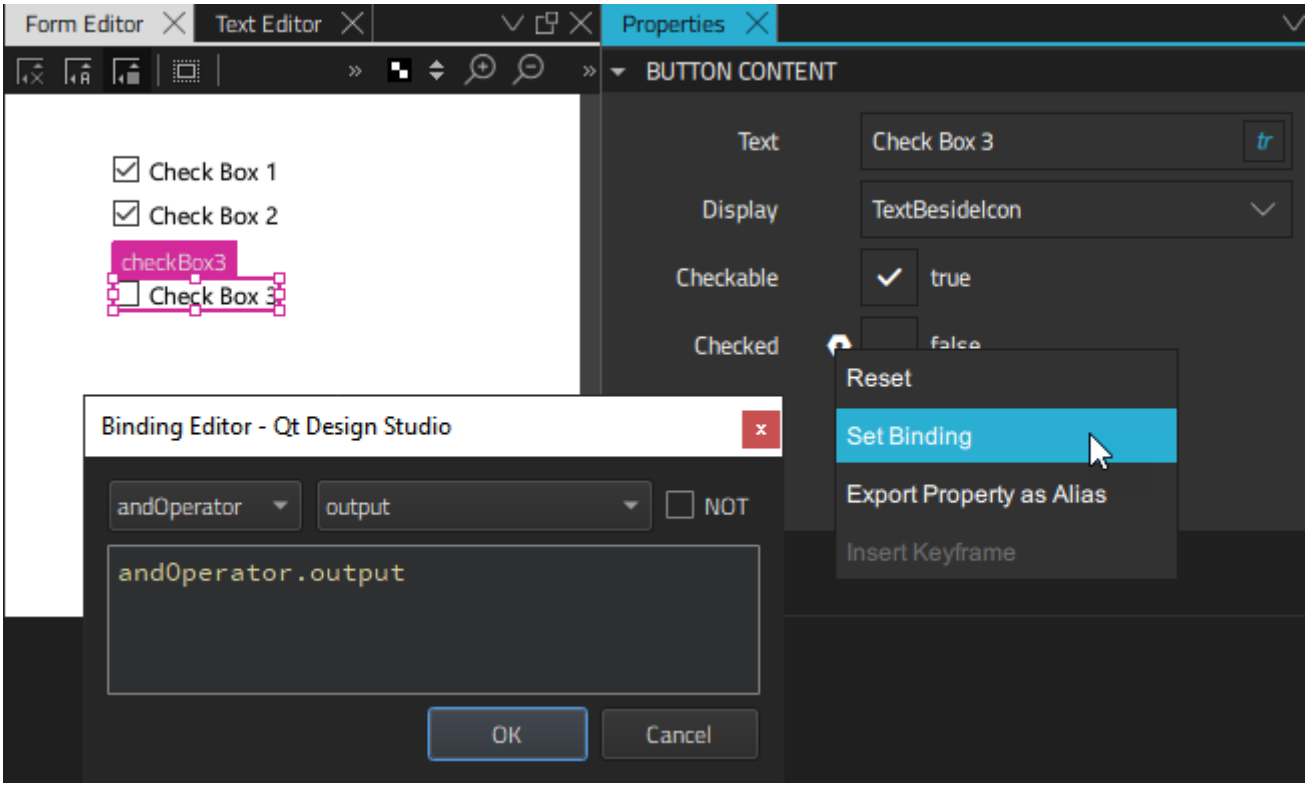
The **And Operator** component evaluates two boolean inputs. The output is evaluated as `true` if both inputs are `true`.

For example, we could use the checked state of two check boxes to determine the checked state of a third one. First, we drag-and-drop three instances of the **Check Box** components and one instance of the **And Operator** component to **Navigator** (1). Then, we select the **And Operator** component instance (2) and set its properties in Properties (3).

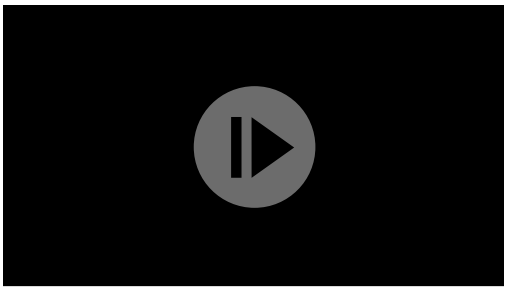
We select next to the **Input 01** field to display the **Actions** menu, and then **Set Binding** (4) to open the **Binding Editor** (5). There we bind the value of the `input01` property of the AND operator to the value of the `checked` property of the first check box. Then, we do the same in the **Input 02** field, where we bind the `input02` property to the `checked` property of the second check box.



Finally, we select the third check box and bind its **Checked** property to the **Output** property of the AND operator.



When we preview our UI, all the check boxes are initially unchecked. However, when we select the first and second check box, the third one also becomes checked.

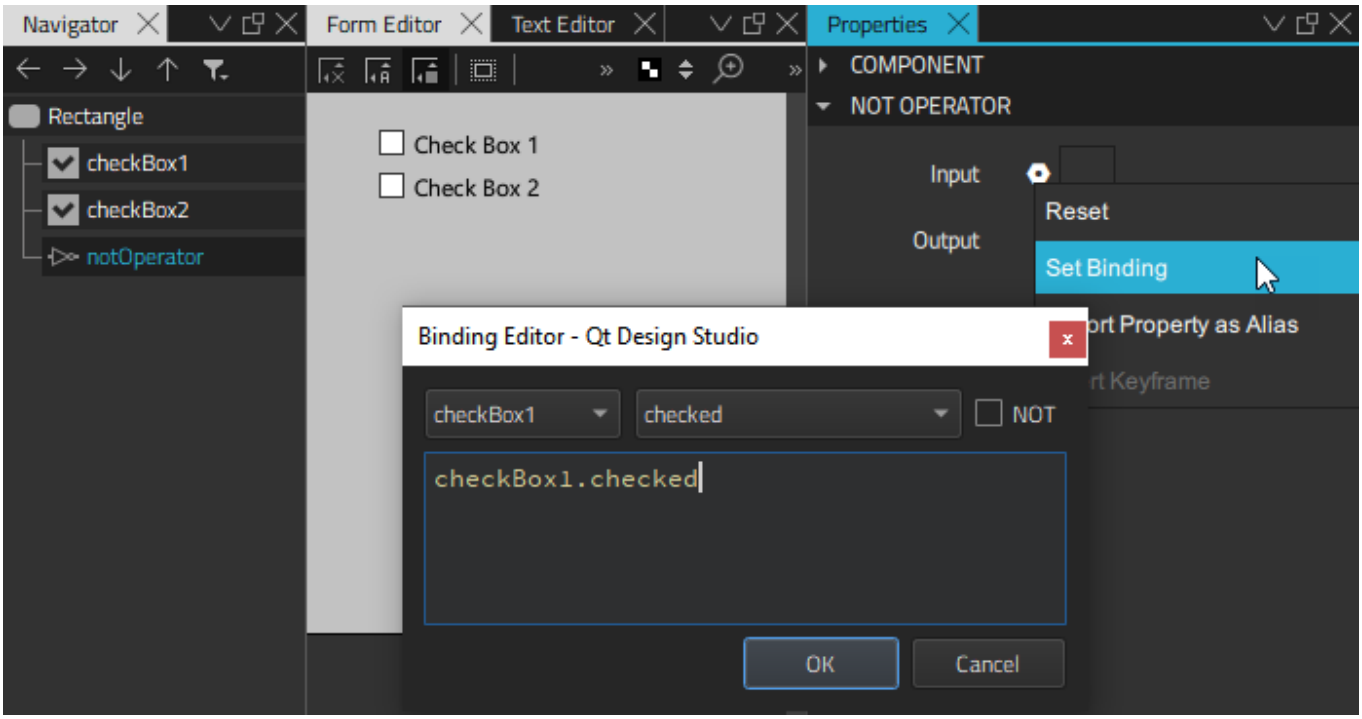


`true`.

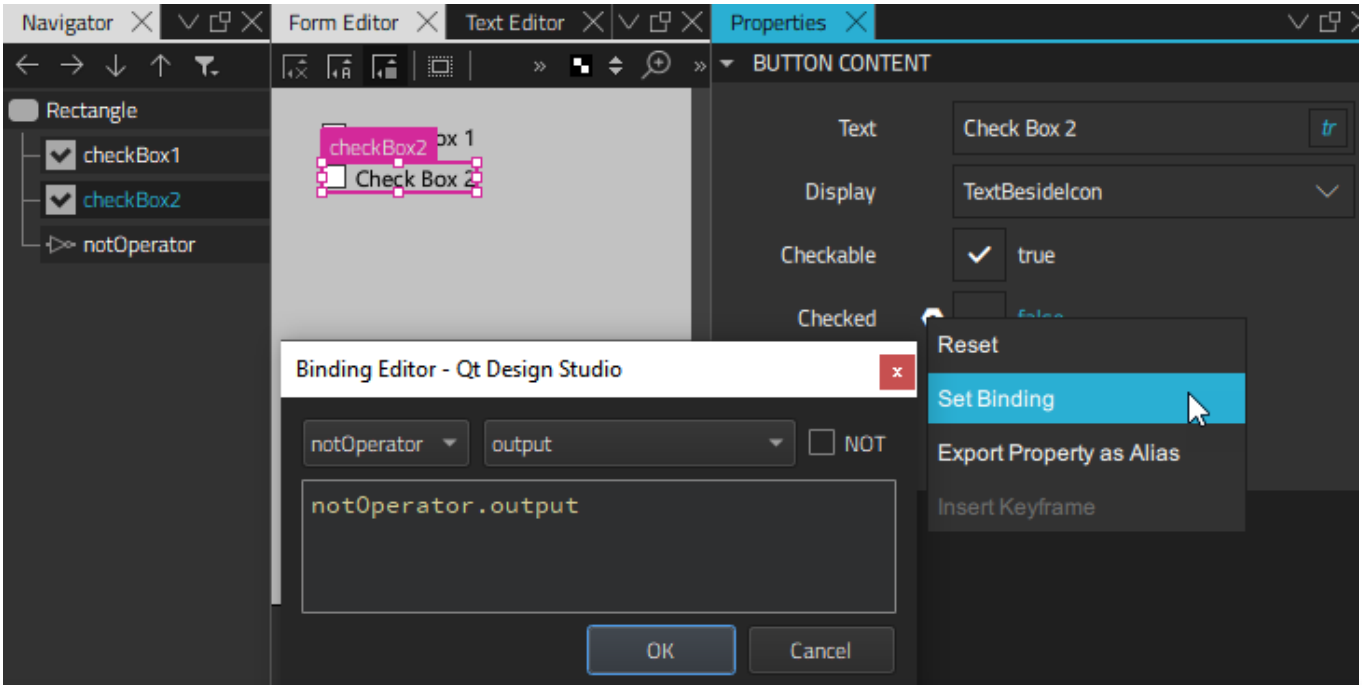
NOT Operator

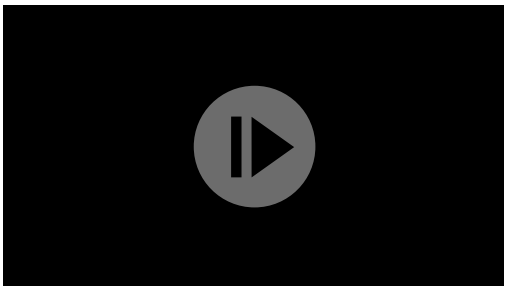
The **Not Operator** component is evaluated to `true` if the condition is not met.

For example, we could specify that if one check box is checked, another one cannot be checked. First, we drag-and-drop two instances of the **Check Box** component and one instance of the **Not Operator** component to **Navigator**. Then, we select the **Not Operator** component instance and set its properties in **Properties**. In the **Binding Editor**, we bind the value of the `input` property of the NOT operator to the value of the `checked` property of one check box instance.



We then select the other check box instance and bind the value of its **Checked** field to the value of of **Output** field of the **Not Operator** component.

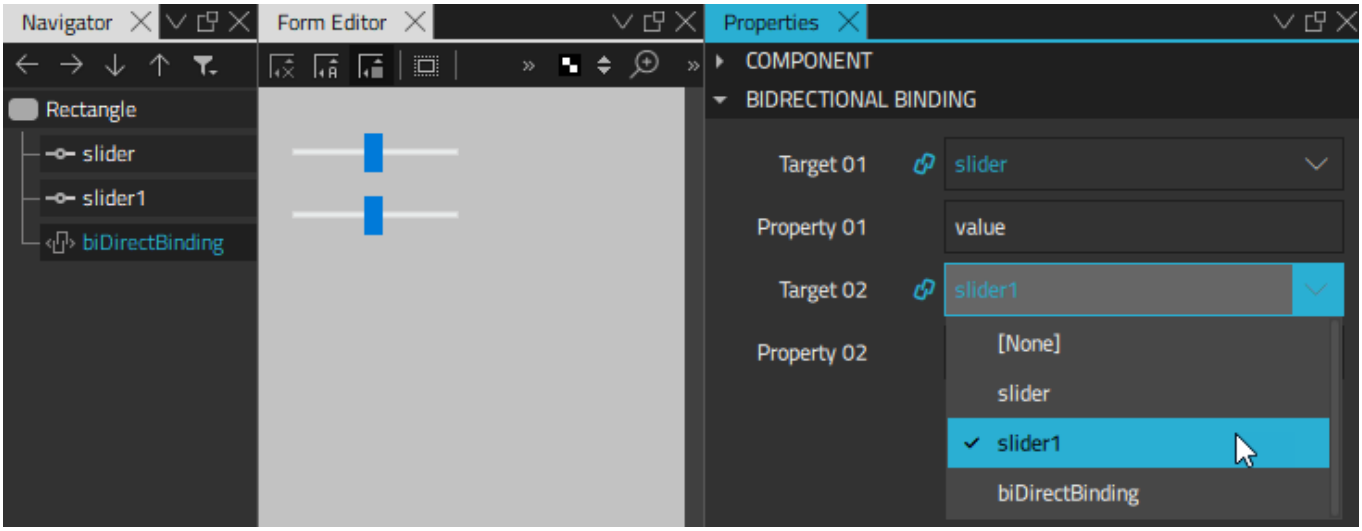




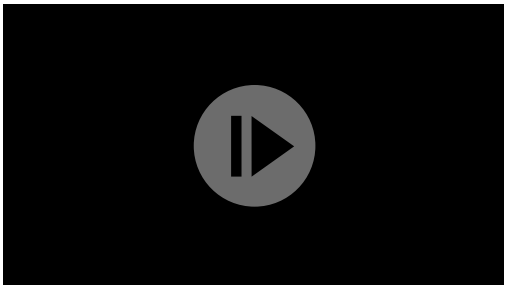
Bi-directional Binding

The **Bi Direct. Binding** component binds the values of two controls together, so that when one value is changed, the other one follows it. This component could be used to synchronize two sliders or a slider and checkbox. Typically, it is used to bind a backend value to a control, such as a slider.

For example, to synchronize the values of two sliders, we drag-and-drop two instances of the **Slider** component and one instance of the **Bi Direct. Binding** component to the same parent component in **Navigator**. Then, we select the bi-directional binding instance and set its properties in **Properties**.



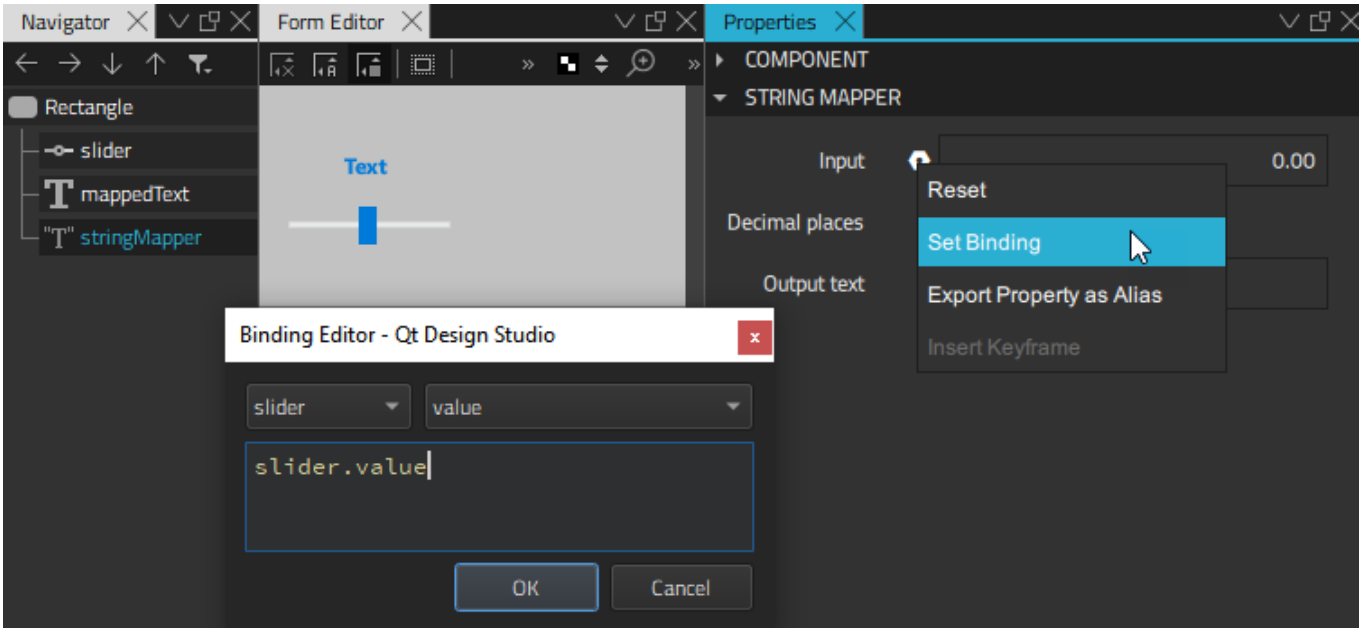
In the **Target 01** and **Target 02** fields, enter the IDs of the components that you want to bind together. In the **Property 01** and **Property 02** fields, enter the names of the properties to synchronize. In our example, we bind the `value` property of two slider components together, so that when we move one slider handle in the preview, the other one moves along with it.



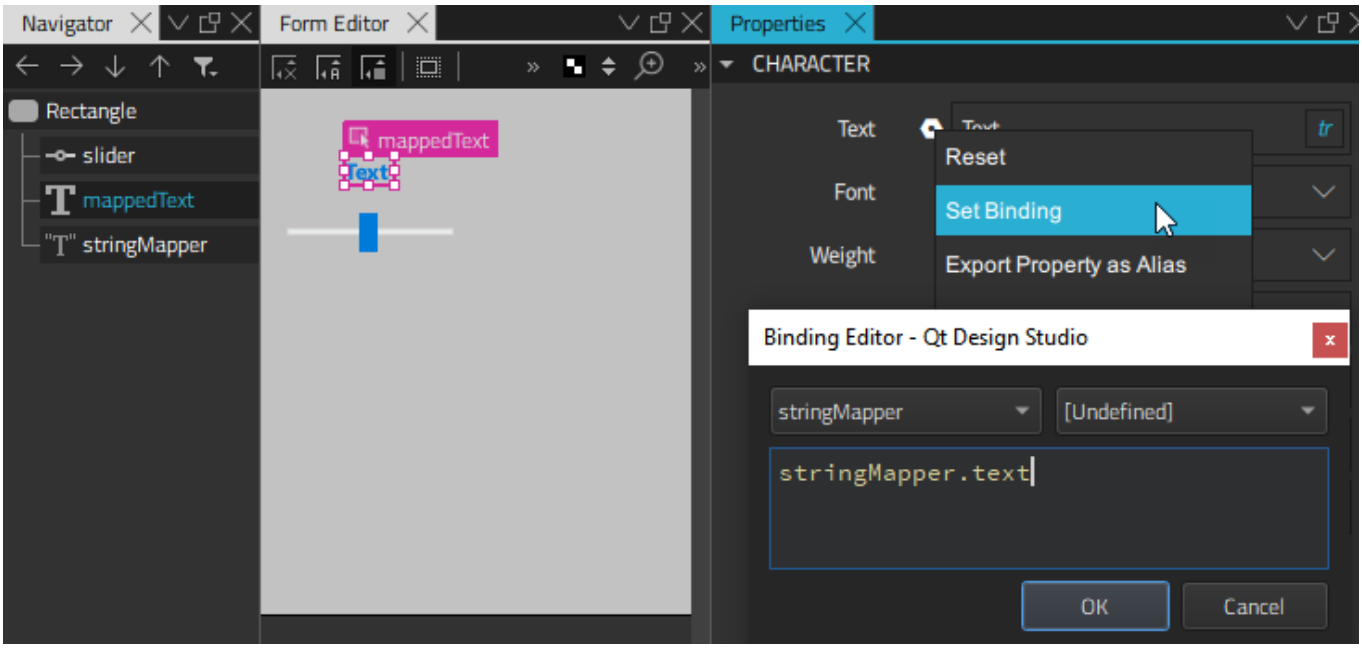
If you want to add a text field that displays the value of the slider, you can use a String Mapper component.

String Mapper

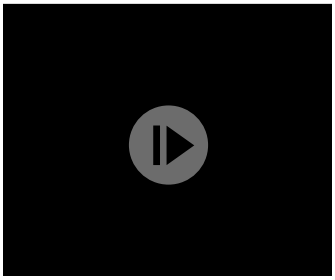
For example, to use a Text component to display the value of a slider, we drag-and-drop **Text**, **Slider**, and **String Mapper** components to the same parent component. Then, we select the **String Mapper** instance in **Navigator** to display its properties in **Properties**. There we bind the value of the **Input** field to the value of the `value` property of the **Slider** instance.



Next, we select the **Text** instance and bind the value of the **Text** field to the value of the **Output text** field (`text` property) of the **String Mapper** component.



When we move the slider handle in the preview, the value displayed in the text component changes accordingly.

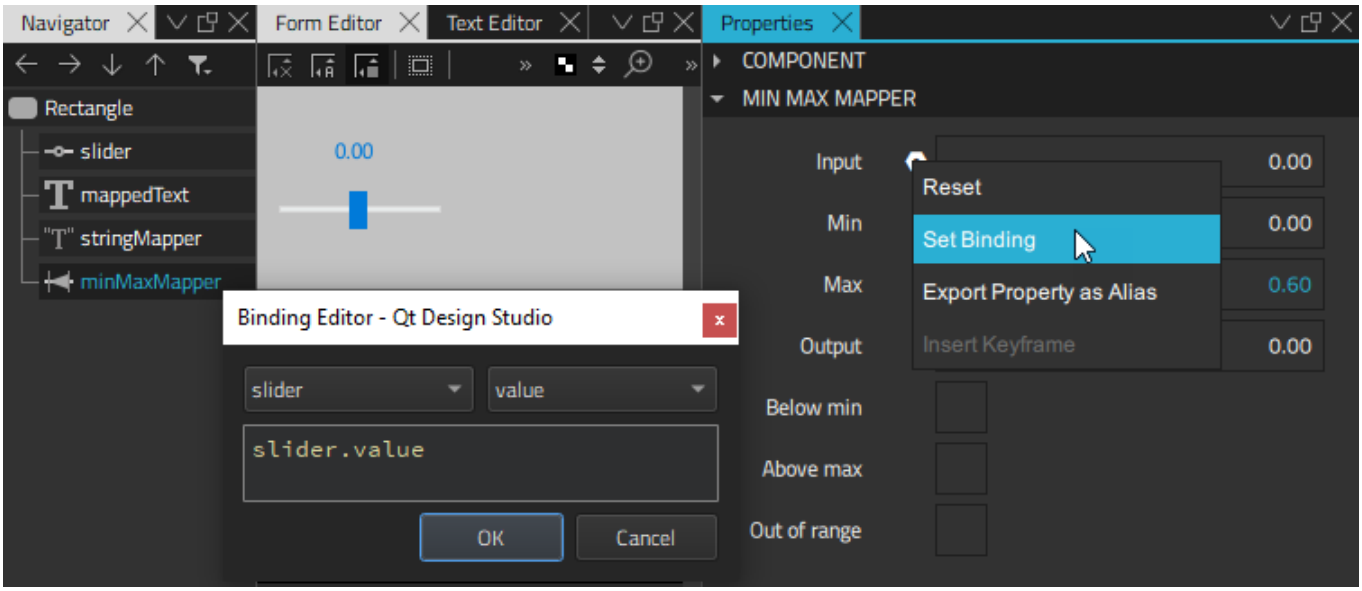


Minimum-Maximum Mapper

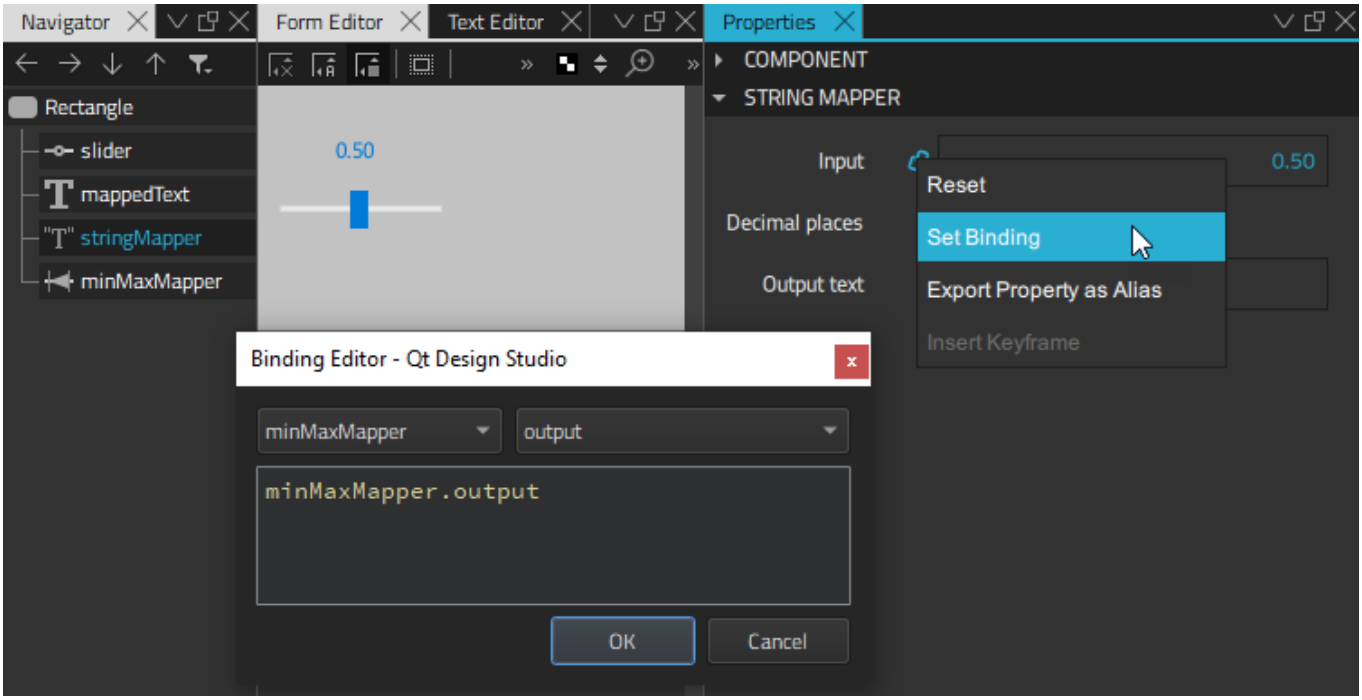
The **Min Max Mapper** component has output values even if the input value is out of range. This enables you to apply actions to values, such as changing a color in a state, even if they are below the minimum value or above the maximum value.

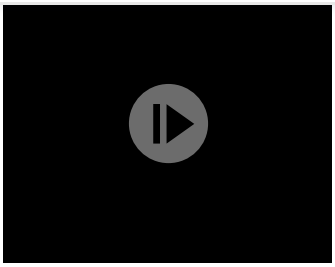
To access the values of a control, bind the **Input** property of the minimum-maximum mapper to that of the `value` property of the control.

For example, to restrict the maximum value of a slider to 0.60, regardless of the maximum value set in the slider properties, we drag-and-drop a **Min Max Mapper** to our example above. We select it to display its properties in **Properties**. Then, we bind the value of the **Input** property of the mapper to the value of the `value` property of the slider and set the value of the **Max** field to 0.60.



To have the maximum value displayed by the Text component, we select the **String Mapper** component and change the binding we set as the value of the **Input** field from `slider.value` to `minMaxMapper.output`.



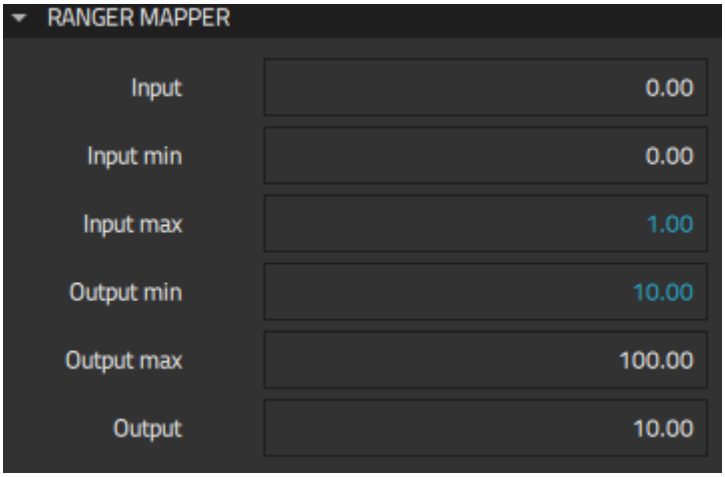


The **Out of range**, **Above max** and **Below min** check boxes are set to `true` if the value of the **Input** field is out of range.

For example, in the context of speed, **Above max** being `true` would mean *too fast*, whereas **Below min** being `true`, would mean *too slow*, and **Out of range** being `true` would mean *either too fast or too slow*.

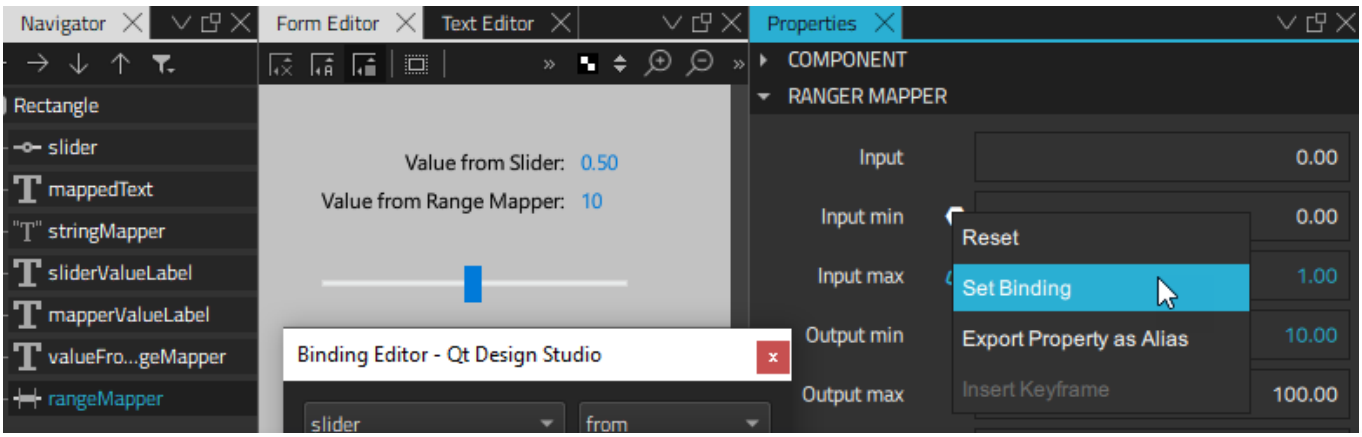
Range Mapper

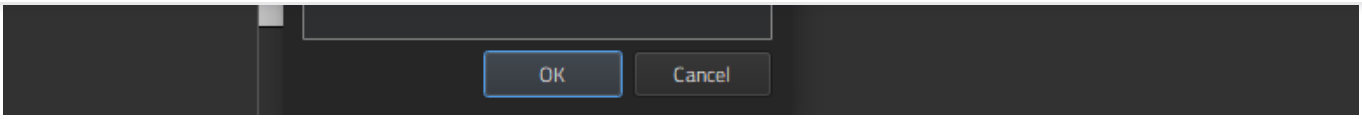
The **Range Mapper** component maps a numerical range to another range, so that the output value of the second range follows the input value of the original range. This is useful when remapping the current frame on the timeline, for example.



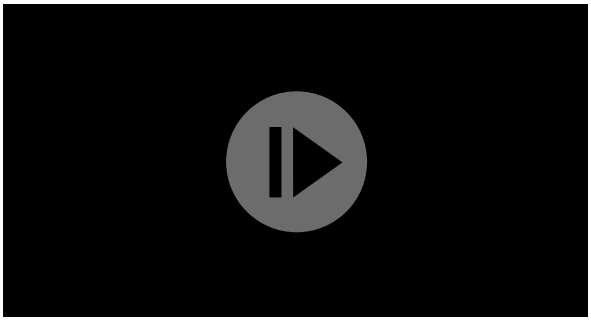
Specify the minimum and maximum input and output values in the **Input min**, **Input max**, **Output min**, and **Output max** fields and the original value in the **Output** field.

For example, we can specify that the values of a slider range from 0 to 1. If we want to display values from 10 to 100, instead, we can bind the values of the **From** and **To** fields of the Slider component to the values of the **Input min** and **Input max** fields of a **Range Mapper** component. We then set the value of the **Output min** field to 10 and the value of the **Output max** field to 100.





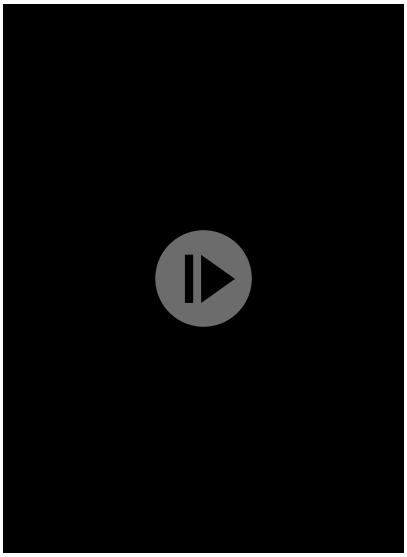
When we move the slider handle in the preview, so that the input value from the Slider component changes from 0 to 1, the output value changes from 10 to 100.



Combining Several Logic Helpers

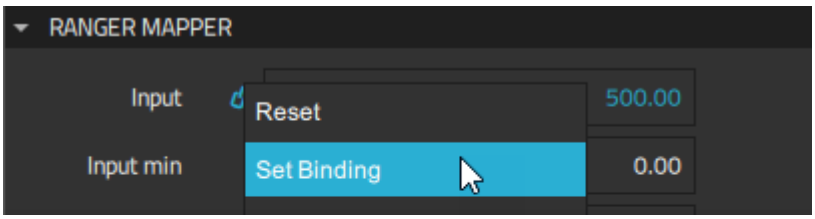
You can combine several logic helpers of the same type or different types to define the application logic.

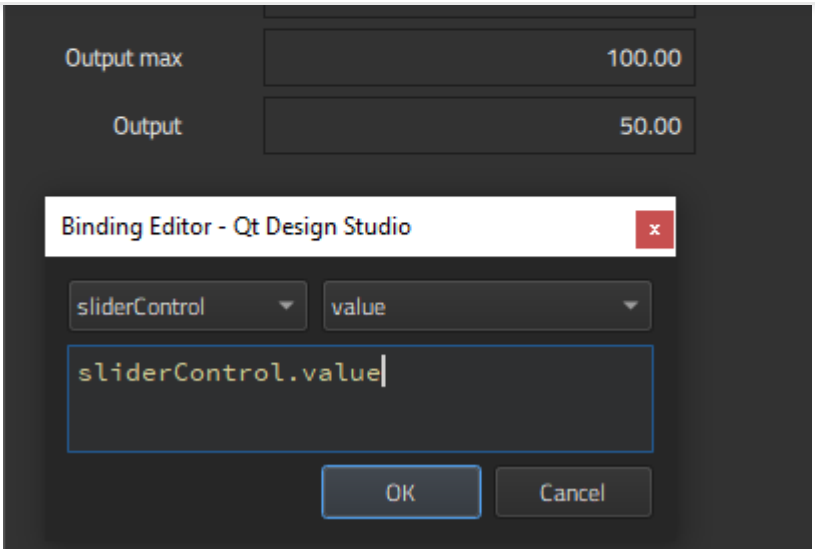
For example, we create a small application for selling a commodity. We use a **Range Mapper** component to set the price range and **Min Max Mapper** components to create a `blockedRange` where the price is either too low or too high and a *badValueRange* where the price is under or over the going value. We then use **And Operator** components to determine whether the value is below minimum or above maximum.



We use one **String Mapper** component to map the slider value to a **Text** component that displays the price, as instructed in String Mapper.

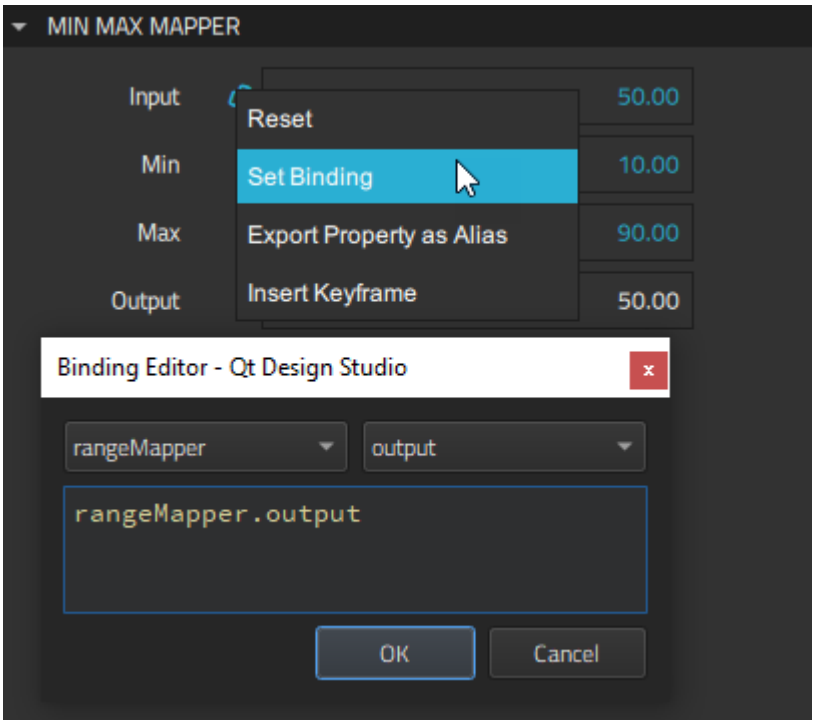
To define a price range from 0 to 1000, we bind the **Input** property of the **Range Mapper** component to the slider value and set the maximum input value for the price range in the **Input max** field to 1000. The minimum input value is 0 by default, so we don't need to change it.



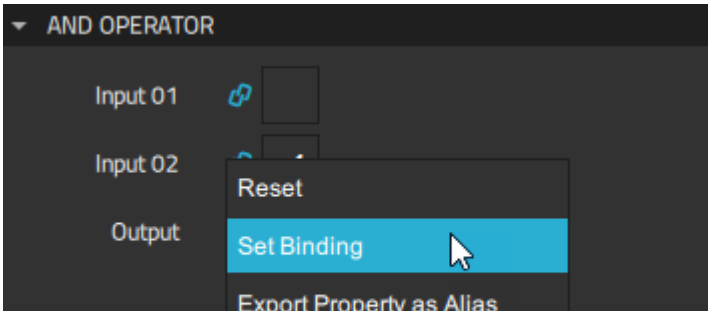


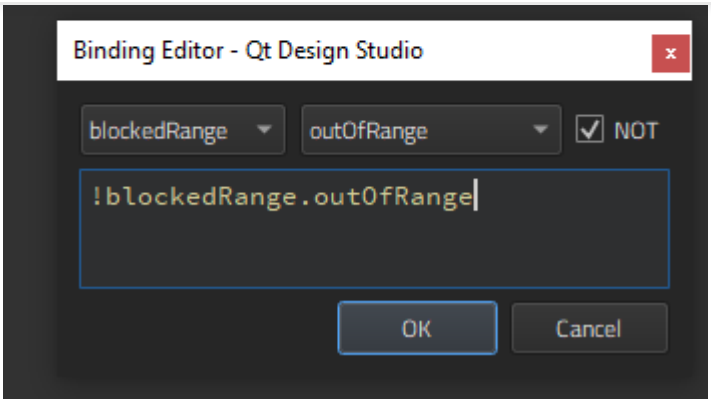
Next, we use two **Min Max Mapper** components to create a *blocked range* where the sell button will be hidden and a *bad value range* where selling is discouraged by changing the text and color of the sell hint.

For the blocked range, we bind the **Input** property of the minimum-maximum mapper to the **Output** value of the **Range Mapper** component and specify the maximum input value in the **Max** field.

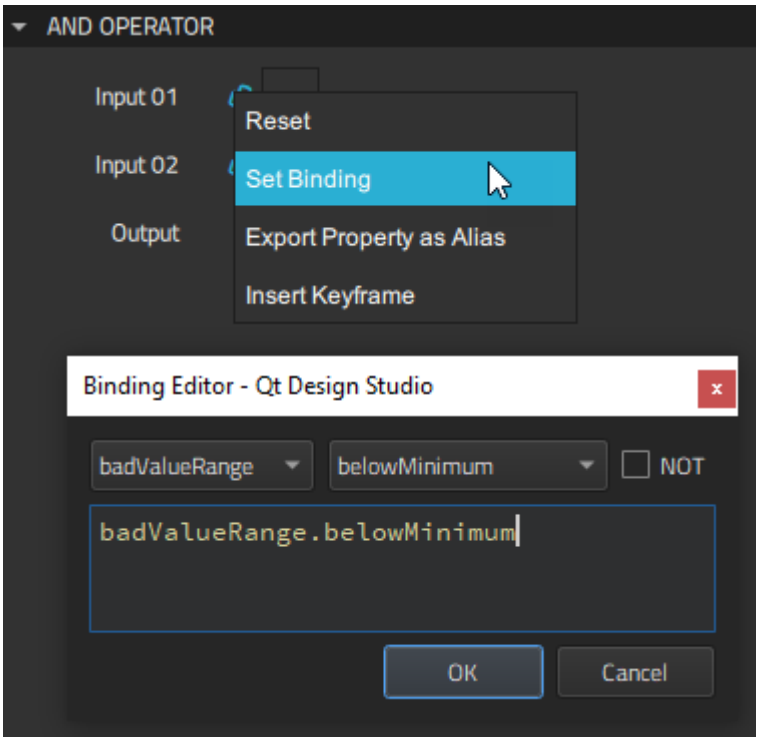


We use two **And Operator** components to determine that the sell button should be hidden when the value is in the blocked range. We do this by binding the value of the **Input 02** field to an evaluation of the value of **Out of range** field of the minimum-maximum mapper. We specify that when the value is not out of range, it evaluates to *true*.

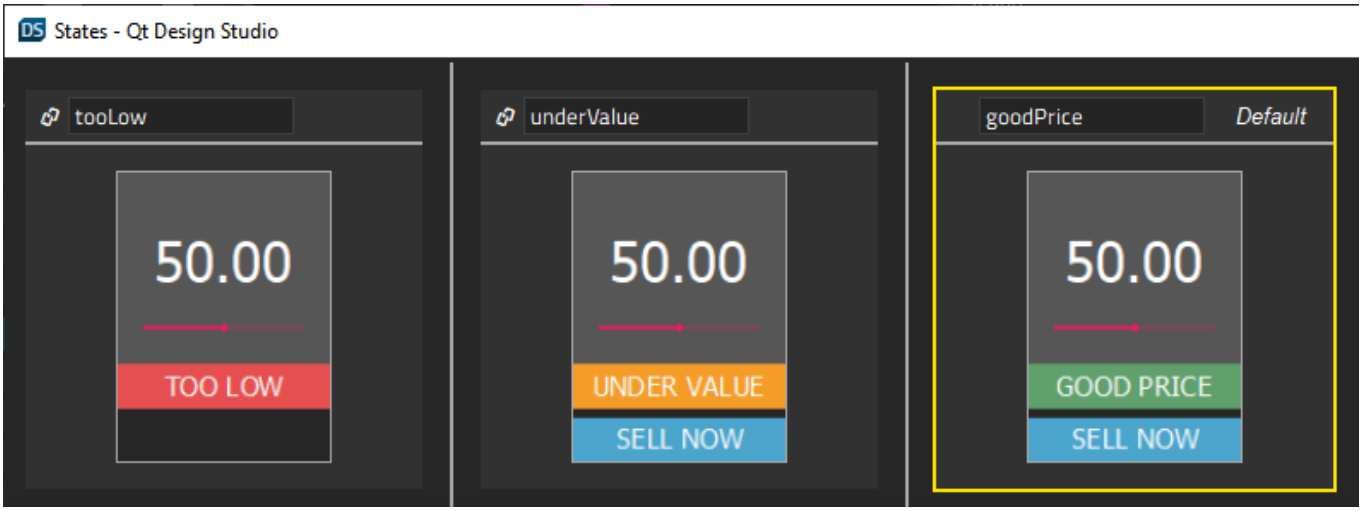




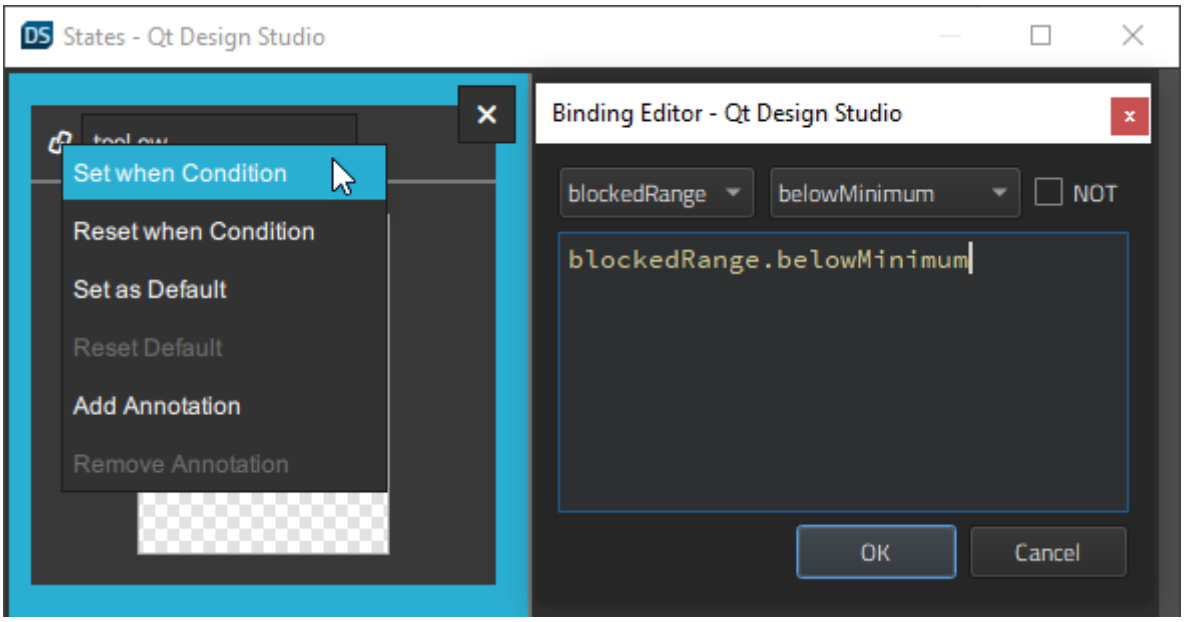
For the *underValueAnd* operator, we additionally bind the value of the **Input 01** field to the value of the **Below min** field of the minimum-maximum mapper for the bad value range. For the *overValueAnd* operator, we bind it to the value of the **Above max** field of the the same mapper.



We can now evaluate values of the **Min Max Mapper** and **And Operator** components to apply different states that display different button text and sell hints. For this purpose, we create the states and set when conditions for them.

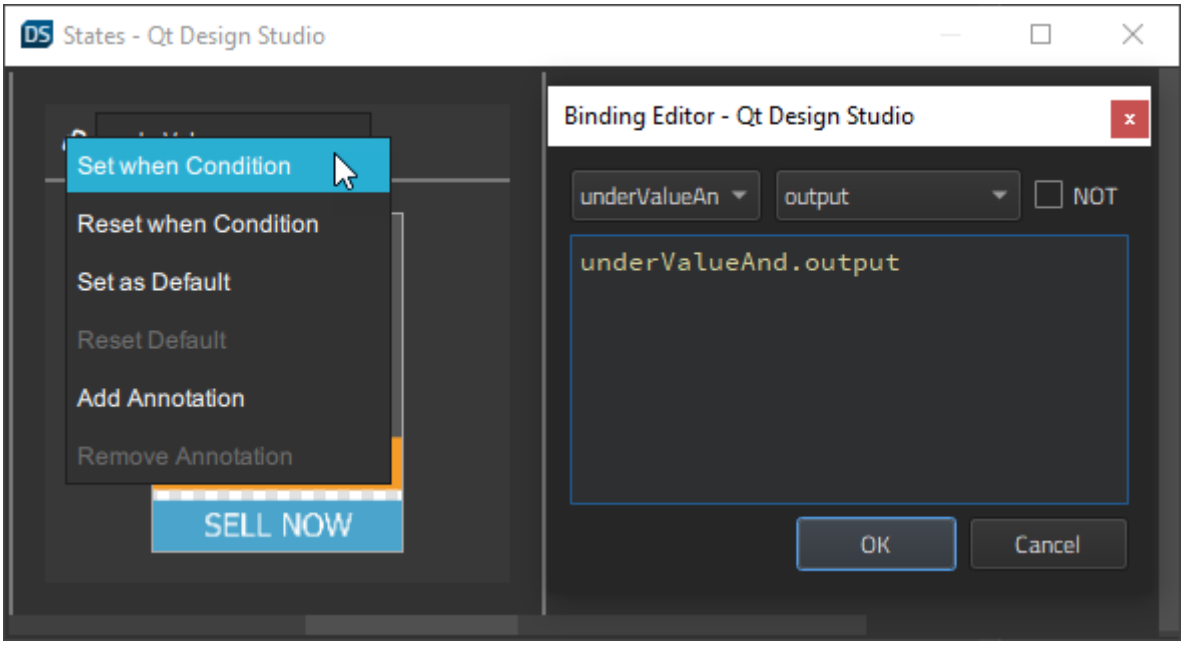


Min Max Mapper component for the blocked range evaluates to `true`.



For the *tooHigh* state at the other end of the scale, we set the when condition to apply it when the value of the **Above max** field of the **Min Max Mapper** component for the blocked range evaluates to `true`.

Next, we specify that the *underValue* state is applied when the value of the **Output** field of the *underValueAnd* **And Operator** component evaluates to `true`.



For the *overValue* state, we set the when condition to apply it when the value of the **Output** field of the *overValueAnd* component evaluates to `true`.

When we preview our application, we can see the states applied when the slider value changes.

Summary of Logic Helpers

The following table summarizes the available logic helpers.

Icon	Helper	Description
Icon	Logic	Description

	Operator	
	Bi Direct. Binding	A bi-directional binding that binds two values in both directions and keeps them in sync.
	Min Max Mapper	Maps a number to another number with a minimum and maximum value.
	Not Operator	Boolean NOT.
	Or Operator	Boolean OR.
	Range Mapper	Maps a numerical range to another range, so that the output value of the second range follows the input value of the original range.
"T"	String Mapper	Maps a number to a string with the defined precision.

‹ 2D Effects

Animations ›