Scalable Layouts

The position of a component in a UI can be either absolute or relative to other components. The visual components exist at a particular location in the screen coordinate system at any instant in time. The x and y coordinates of a visual component are relative to those of its visual parent, with the top-left corner having the coordinate (0, 0).

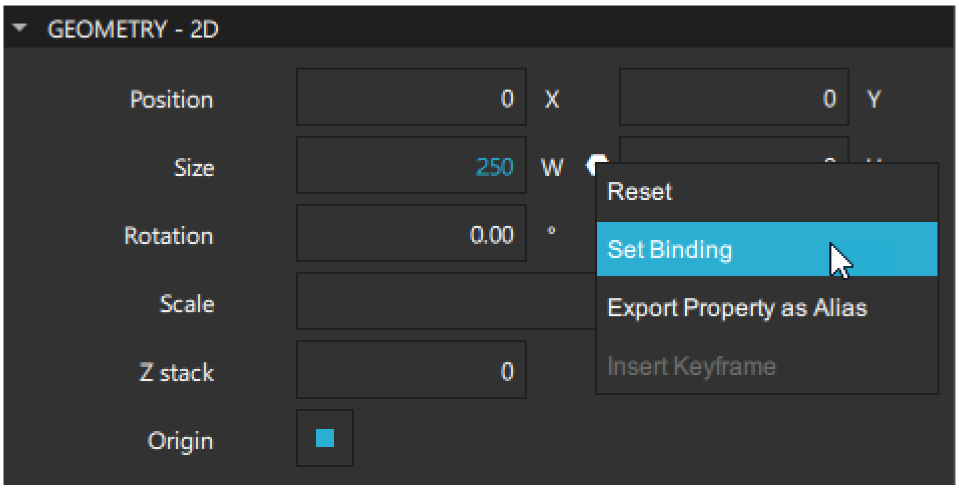
If you are designing a static UI, manual positioning provides the most efficient form of positioning components. For a dynamic UI, you can employ the following positioning methods:

- Setting Bindings
- Setting Anchors and Margins
- Aligning and Distributing Components
- Using Positioners
- Using Layouts
- Organizing Components

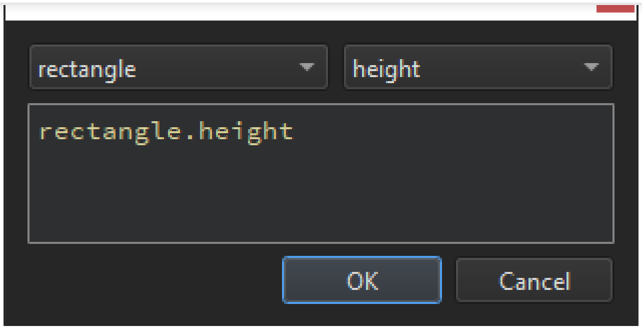
Setting Bindings

Property binding is a declarative way of specifying the value of a property. Binding allows a property value to be expressed as a JavaScript expression that defines the value relative to other property values or data accessible in the application. The property value is automatically kept up to date if the other properties or data values change.

Property bindings are created implicitly whenever a property is assigned a JavaScript expression. To set JavaScript expressions as values of properties in the Properties view, select the (**Actions**) menu next to a property, and then select **Set Binding**.



In **Binding Editor**, select a component and a property from lists of available components and their properties.



```
rectangle.height
```

Alternatively, start typing a string and press **Ctrl+Space** to display a list of properties, IDs, and code snippets. When you enter a period (.) after a property name, a list of available values is displayed. Press **Enter** to accept the first suggestion in the list and to complete the code. For more information, see Completing Code.

When a binding is set, the **Actions** menu icon changes to . To remove bindings, select **Actions** > **Reset**.

You can set bindings also on the **Bindings** tab in the Connections view. For more information, see Adding Bindings Between Properties.

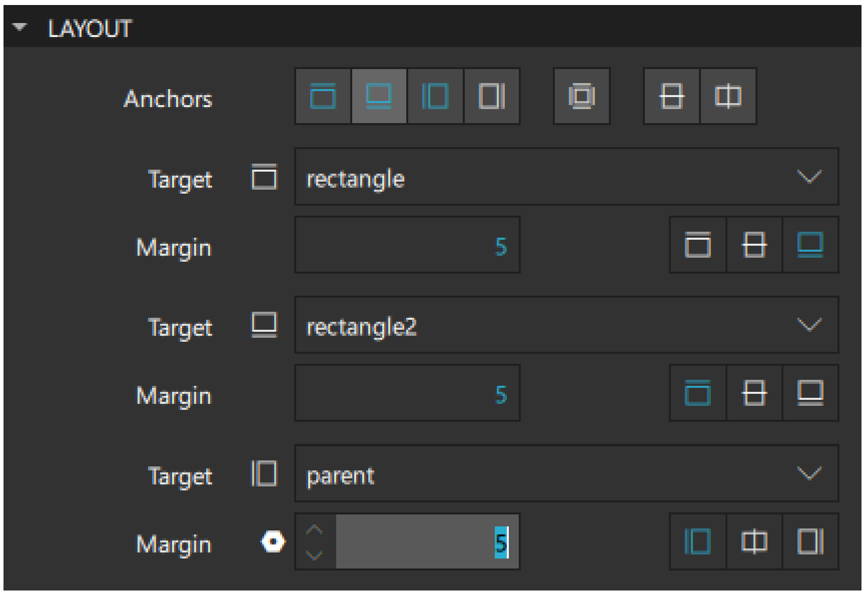
For more information on the JavaScript environment provided, see Integrating QML and JavaScript.

Bindings are a black box for Qt Design Studio and using them might have a negative impact on performance, so consider setting anchors and margins for components, instead. For example, instead of setting `parent.width` for a component, you could anchor the component to its sibling components on the left and the right.

Setting Anchors and Margins

In an anchor-based layout, each component can be thought of as having a set of invisible *anchor* lines: top, bottom, left, right, fill, horizontal center, vertical center, and baseline.

In Properties > **Layout**, you can set anchors and margins for components. To set the anchors of a component, click the anchor buttons. You can combine the top/bottom, left/right, and horizontal/vertical anchors to anchor components in the corners of the parent component or center them horizontally or vertically within the parent component.



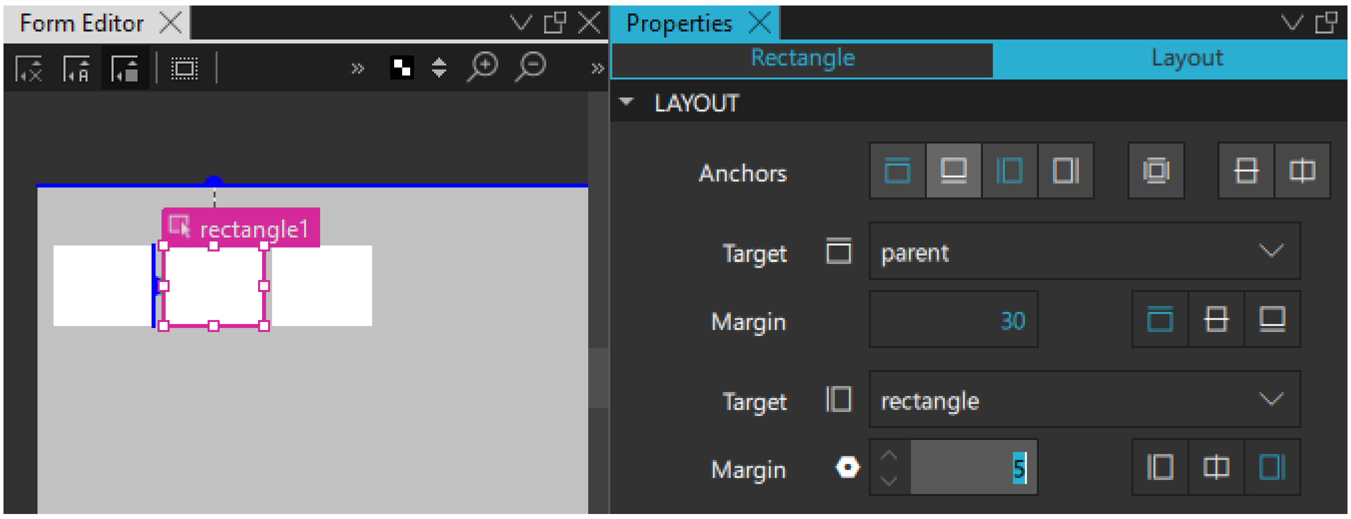
Target	rectangle
Margin	5
Target	rectangle2
Margin	5
Target	parent
Margin	5

For convenience, you can click the (**Fill to Parent**) toolbar button to apply fill anchors to a component and the (**Reset Anchors**) button to reset the anchors to their saved state.

component is anchored to its parent when you use the anchor buttons. Select a sibling of the component in the **Target** field to anchor to it instead.

Arbitrary anchoring is not supported. For example, you cannot specify: `anchor.left: parent.right`. You have to specify: `anchor.left: parent.left`. When you use the anchor buttons, anchors to the parent component are always specified to the same side. However, anchors to sibling components are specified to the opposite side: `anchor.left: sibling.right`. This allows you to keep sibling components together.

In the following image, the left edge of *rectangle1* is anchored to the right edge of the sibling on its left side, *rectangle*, while its top edge is anchored to the top of its parent.



Anchors

Target: parent

Margin: 30

Target: rectangle

Margin: 5

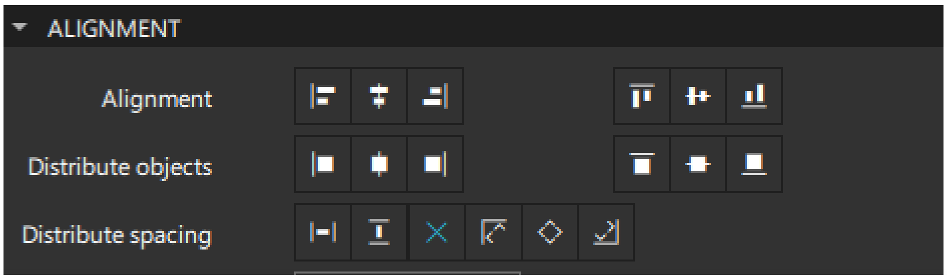
The anchors are specified as follows in code:

```
Rectangle {
    id: rectangle1
    anchors.left: rectangle.right
    anchors.top: parent.top
    anchors.leftMargin: 5
    anchors.topMargin: 30
}
```

Margins specify the amount of empty space to leave to the outside of a component. Margins only have meaning for anchors. They do not take any effect when using layouts or absolute positioning.

Aligning and Distributing Components

When you're working with a group of components, you can select them to align and distribute them evenly. As the positions of the components are fixed, you cannot apply these functions to anchored components. For scalability, you can anchor the aligned and distributed components when your design is ready.



Key object: rectangle

Select the buttons in the **Alignment** field to align the top/bottom or left/right edges of a group of components to the one farthest away from the center of the group. For example, when left-aligning, the components are aligned to the leftmost component. You can also align the horizontal/vertical centers of components, or both.

In the **Align to** field, select whether to align the components in respect to the selection, the root component, or a *key component* that you select in the **Key object** field. The key component must be a part of the selection.

You can distribute either *components* or the *spacing* between them. If the components or spacing cannot be distributed to equal pixel values without ending up with half pixels, you receive a notification. You can either allow Qt Design Studio to distribute components or spacing using the closest values possible or tweak your design so that the components and spacing can be distributed perfectly.

When distributing components, select the buttons in the **Distribute objects** field to determine whether the distance between components is calculated from their top/bottom or left/right edges or their horizontal/vertical center.

When distributing spacing, select the buttons in the **Distribute spacing** field to determine whether it is distributed evenly within a target area or at specified distances, calculated from a starting point. You can select the orientation in which the components are distributed evenly within the target area: horizontally along the x axis or vertically along the y axis.

Alternatively, you can distribute spacing in pixels by selecting one of the starting point buttons: top/left or bottom/right edge of the target area or item, or its center. The edge to use depends on whether the items are distributed horizontally or vertically:

- Select and to use the left edge of the target area or item as the starting point.
- Select and to use the top edge.
- Select and to use the right edge.
- Select and to use the bottom edge.

Note: Some components might end up outside the target area.

In the **Pixel spacing** field, you can set the space between components in pixels. You can disable the distribution of spacing in pixels by clicking the button.

Summary of Aligment Buttons

The following table summarizes the buttons available in the **Alignment** section.

Icon	Purpose
	Aligns the left edges of the selected components to the one farthest away from the center of the group.
	Aligns the horizontal centers of the selected components.
	Aligns the right edges of the selected components.
	Aligns the top edges of the selected components.
	Aligns the verical centers of the selected components.
	Aligns the bottom edges of the selected components.

Icon Purpose

	centers.
	Distributes the selected components and calculates the distance between them from their right edges.
	Distributes the selected components and calculates the distance between them from their top edges.
	Distributes the selected components and calculates the distance between them from their vertical centers.
	Distributes the selected components and calculates the distance between them from their bottom edges.
	Distributes spacing between the selected components horizontally.
	Distributes spacing between the selected components vertically.
	Disables the distribution of spacing in pixels.
	Sets the top or left edge of the target area or item as the starting point for distributing spacing in pixels depending on the distribution orientation.
	Sets the center of the target area as the starting point for distributing spacing in pixels.
	Sets the bottom or right edge of the target area or item as the starting point for distributing spacing in pixels, depending on the distribution orientation.

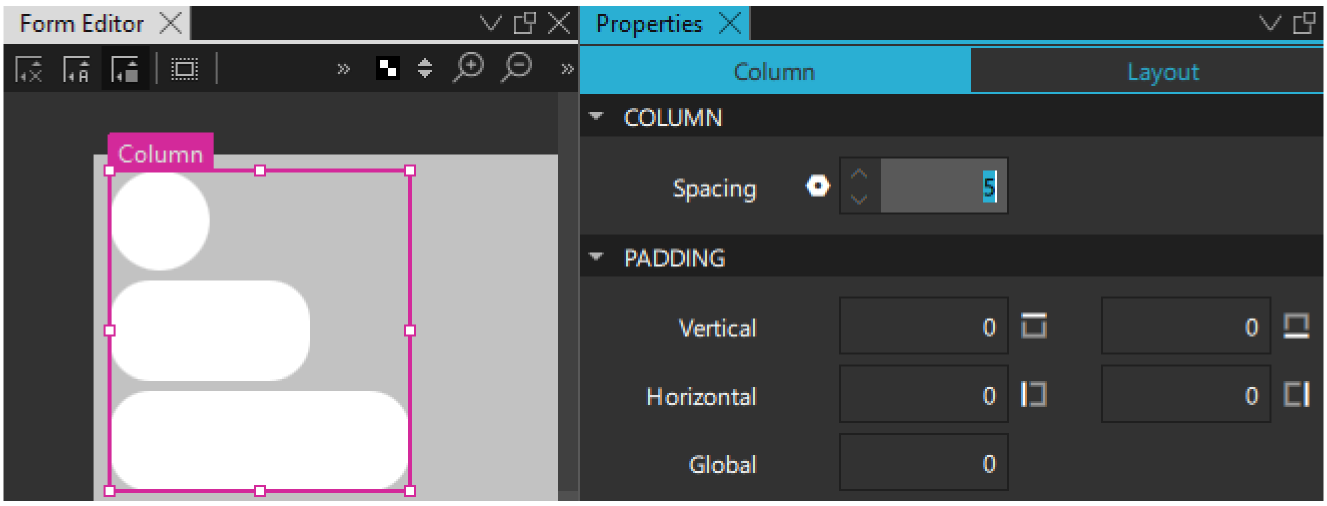
Using Positioners

Positioner components are containers that manage the positions of their child components. For many use cases, the best positioner to use is a simple column, row, flow, or grid. You can use the components available in **Components** > **Default Components** > **Positioner** to position the children of a component in these formations in the most efficient manner possible.

To position several components in a **Column**, **Row**, **Flow**, or **Grid**, select the components in the 2D view, and then select **Position** in the context menu.

Column Positioner

A **Column** positions its child components along a single column. It can be used as a convenient way to vertically position a series of components without using anchors.



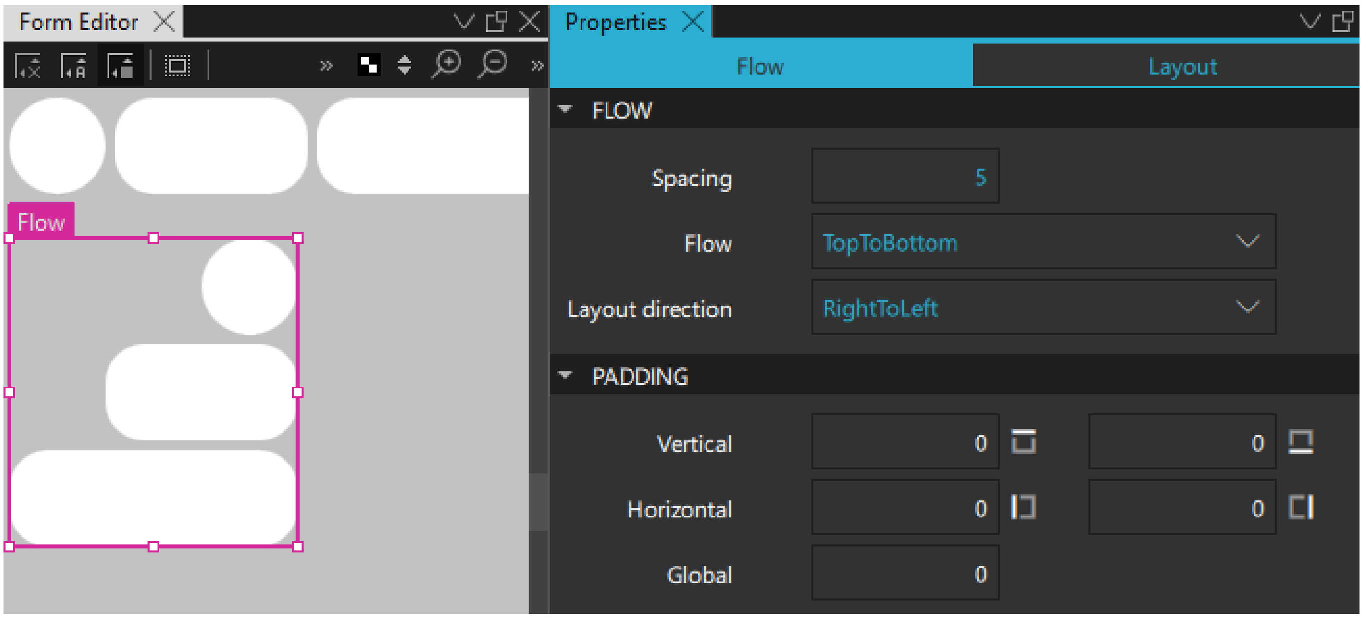
Spacing 5
Vertical 0 0
Horizontal 0 0
Global 0

For all positioners, you can specify the spacing between the child components that they contain in the **Spacing** field.

In addition, you can specify the vertical and horizontal padding between content and the left, right, top, and bottom edges of components as values of the fields in the Padding section.

A **Row** positions its child components along a single row. It can be used as a convenient way to horizontally position a series of components without using anchors.

The **Flow** component positions its child components like words on a page, wrapping them to create rows or columns of components.



FLOW

Spacing 5

Flow TopToBottom

Layout direction RightToLeft

PADDING

Vertical 0 0

Horizontal 0 0

Global 0

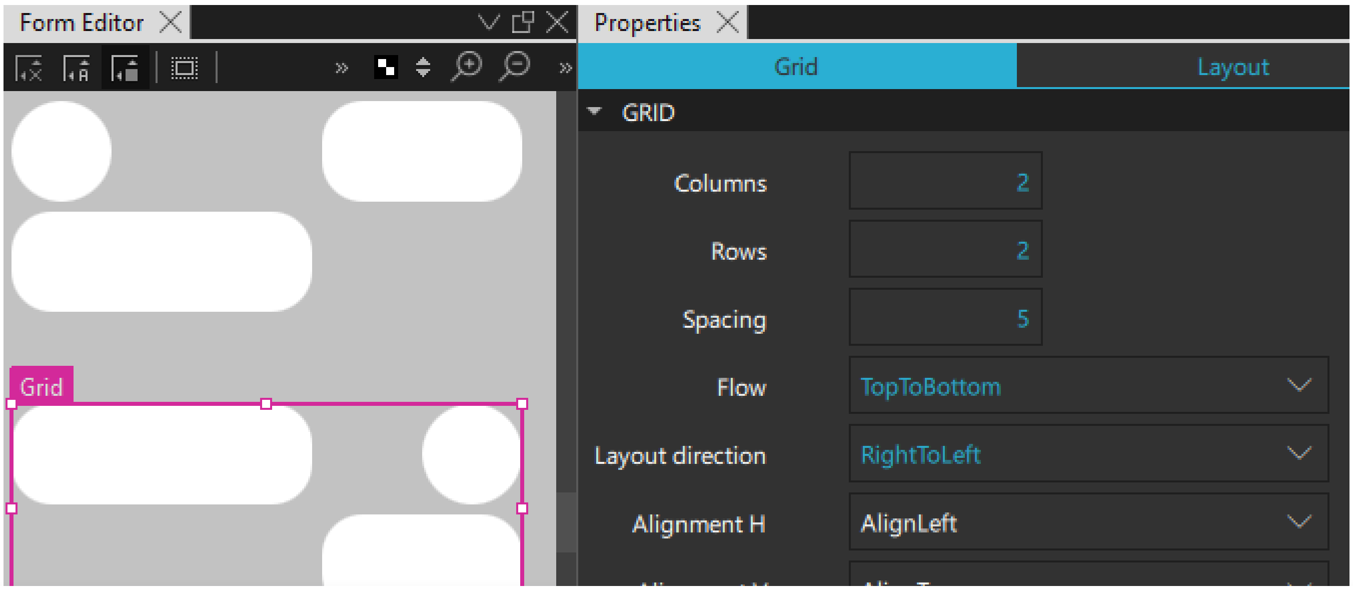
For flow and row positioners, you can also set the direction of a flow to either left-to-right or top-to-bottom in the **Flow** field. Components are positioned next to to each other according to the value you set in the **Layout direction** field until the width or height of the **Flow** component is exceeded, then wrapped to the next row or column.

You can set the layout direction to either **LeftToRight** or **RightToLeft** in the **Layout direction** field. If the width of the row is explicitly set, the left anchor remains to the left of the row and the right anchor remains to the right of it.

Grid Positioner

A **Grid** creates a grid of cells that is large enough to hold all of its child components, and places these components in the cells from left to right and top to bottom. Each component is positioned at the top-left corner of its cell with position (0, 0).

Qt Design Studio generates the grid based on the positions of the child components in the 2D view. You can modify the number of rows and columns in the **Rows** and **Columns** fields.



GRID

Columns 2

Rows 2

Spacing 5

Flow TopToBottom

Layout direction RightToLeft

Alignment H AlignLeft

By default, grid components are vertically aligned to the top. Horizontal alignment follows the value of the **Layout direction** field. For example, when layout direction is set to **LeftToRight**, the components are aligned on the left.

To mirror the layout, set the layout direction to **RightToLeft**. To also mirror the horizontal alignment of components, select **AlignRight** in the **Alignment H** field.

Summary of Positioners

The following table lists the positioners that you can use to arrange components in UIs. They are available in **Components** > **Default Components** > **Positioner**.

Icon	Name	Purpose
☰	Column	Arranges its child components vertically.
▥	Row	Arranges its child components horizontally.
⊞	Grid	Arranges its child components so that they are aligned in a grid and are not overlapping.
▚	Flow	Arranges its child components side by side, wrapping as necessary.

Using Layouts

You can use the components available in **Components** > **Qt Quick Layouts** to arrange components in UIs. Unlike positioners, layouts manage both the positions and sizes of their child components, and are therefore well suited for dynamic and resizable UIs. However, this means that you should not specify fixed positions and sizes for the child components in the Geometry - 2D section in Properties, unless their implicit sizes are not satisfactory.

You can use anchors or the width and height properties of the layout itself to specify its size in respect to its non-layout parent component. However, do not anchor the child components within layouts.

To arrange several components in a column, row, grid, or **Stack Layout**, select the components in the 2D view, and then select **Layout** in the context menu.

You can also click the ☰ (**Column Layout**), ▥ (**Row Layout**), and ⊞ (**Grid Layout**) toolbar buttons to apply layouts to the selected components.

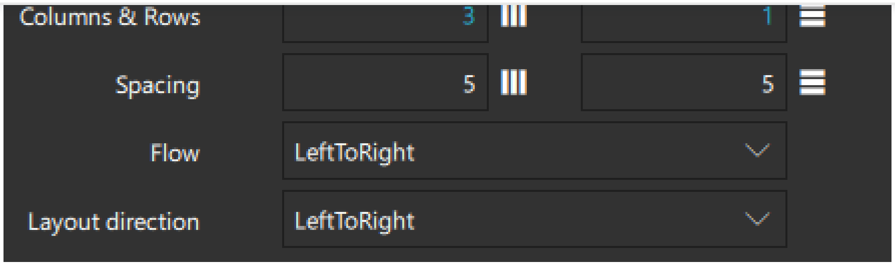
To make a component within a layout as wide as possible while respecting the given constraints, select the component in the **2D** view, and then select **Layout** > **Fill Width** in the context menu. To make the component as high as possible, select **Fill Height**.

Layout Properties

A **Grid Layout** component provides a way of dynamically arranging components in a grid. If the grid layout is resized, all its child components are rearranged. If you want a layout with just one row or one column, use the **Row Layout** or **Column Layout** component.

The child components of row and column layout components are automatically positioned either horizontally from left to right as rows or vertically from top to bottom as columns. The number of the child components determines the width of the row or the height of the column. You can specify the spacing between the child components in the **Spacing** field.

The child components of grid layout components are arranged according to the **Flow** property. When the direction of a flow is set to **LeftToRight**, child components are positioned next to to each other until the the number of columns specified in the **Columns & Rows** field is reached. Then, the auto-positioning wraps back to the beginning of the next row.



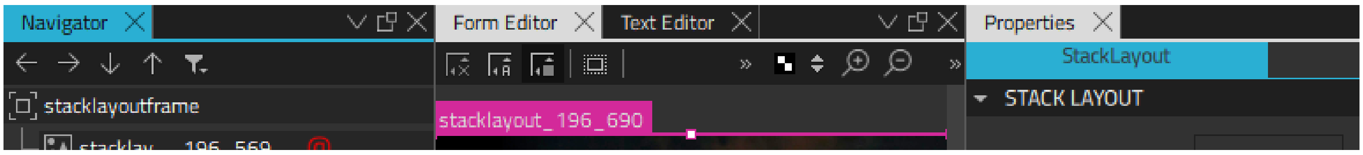
Columns & Rows 3 1
Spacing 5 5
Flow LeftToRight
Layout direction LeftToRight

If you set the direction of the flow to **TopToBottom**, child components are auto-positioned vertically using the number of rows set in the **Columns & Rows** field to determine the maximum number of rows.

You can set the layout direction to either **LeftToRight** or **RightToLeft** in the **Layout direction** field. When you select **RightToLeft**, the alignment of the components will be mirrored.

You can specify the spacing between rows and columns in the **Spacing** field.

Stack Layout



To add components to a **Stack Layout**, select the + button next to the component name in the 2D view. To move between components, select the ‹ (**Previous**) and › (**Next**) buttons.

To add a tab bar to a stack layout, right-click on the **Stack Layout** in Navigator to access the context menu, and select **Stacked Container** > **Add Tab Bar**.

To raise or lower the stacking order of a component, select **Stacked Container** > **Increase Index** or **Decrease Index**.

Summary of Layouts

The following table lists the layout components that you can use to arrange components in UIs. They are available in **Components** > **Qt Quick Layouts**.

Icon	Name	Purpose
▤	Column Layout	Provides a grid layout with only one column.
▥	Row Layout	Provides a grid layout with only one row.
▦	Grid Layout	Provides a way of dynamically arranging components in a grid.
▭	Stack Layout	Provides a stack of components where only one component is visible at a time.

You can use the **Frame** and **Group Box** controls to draw frames around groups of controls. If you don't want a frame, use the **Group** component instead.

The following table lists the UI controls that you can use to organize components in UIs (since Qt 5.7). The *Location* column indicates the location of the component in **Components**.

Icon	Name	Location	Purpose
☐	Frame	Qt Quick Controls	A visual frame around a group of controls.
■	Group	Qt Quick Studio Components	Enables handling the selected components as a group.
☐	Group Box	Qt Quick Controls	A titled visual frame around a group of controls.
■	Page	Qt Quick Controls	A styled page control with support for a header and footer.
■	Pane	Qt Quick Controls	A background that matches the application style and theme.

‹ Specifying Component Properties   Annotating Designs ›

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