

Lists and Other Data Models

Applications typically need to handle and display data that is organized into list or grid views. Models, views, and delegates are used for this purpose. They modularize the visualization of data in order to give you control over the different aspects of the data. For example, you can swap a list view with a grid view with little changes to the data. Similarly, encapsulating an instance of the data in a delegate allows developers to dictate how to present or handle the data.

A *model* contains the data and its structure. There are several components for creating different types of models. A *view* is a container that displays the data in a list or a grid, or along a path. A *delegate* dictates how the data should appear in the view. The delegate takes each piece of data in the model and encapsulates it. The data is then accessible through the delegate.

To visualize data, the view's model property is bound to a model and the delegate property to a component.

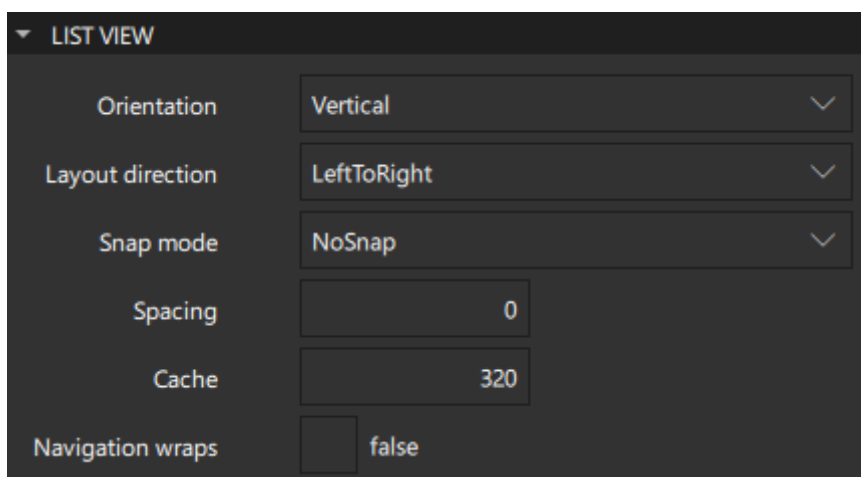
For more information, see [Models and Views in Qt Quick](#).

List and Grid Views

Create instances of **List View** and **Grid View** components to organize other component instances in list or grid format. They are available in **Components > Default Components > Views**.

A **List View** organizes other components as a list, whereas a **Grid View** organizes them as a grid. By default, components in list and grid views flow vertically from left to right. They are laid out from left to right horizontally, and from top to bottom vertically.

You can change the list view orientation in the **Orientation** field and the grid view flow in the **Flow** field. You can change the layout direction in the **Layout direction** field. By setting values for these properties, you can produce a variety of layouts.



GRID VIEW

Cell size

0

W

0

H

Flow

FlowLeftToRight

Layout direction

LeftToRight

Snap mode

NoSnap

Cache

320

Navigation wraps

☐false

Select the **Navigation wraps** check box to specify that key navigation wraps around and moves the selection to the next line or cell in the other end of the view when it reaches the end of the view.

Both list and grid views are inherently **flickable**.

The value of the **Snap mode** field determines how the view scrolling will settle following a drag or flick. By default, the view stops anywhere within the visible area. If you select **SnapToRow**, the view settles with a row (or column for a grid view top-to-bottom flow) aligned with the start of the view. If you select **SnapOneRow**, the view will settle no more than one row or column away from the first visible row at the time the mouse button is released. This option is particularly useful for moving one page at a time.

Delegate Cache

The value of the **Cache** field determines whether delegates are retained outside the visible area of the view.

If this value is greater than zero, the view may keep as many delegates instantiated as will fit within the cache specified. For example, if in a vertical view the delegate is 20 pixels high, there are three columns and the cache is set to 40, then up to six delegates above and below the visible area may be created or retained. The cached delegates are created asynchronously, allowing creation to occur across multiple frames and reducing the likelihood of skipping frames. To improve painting performance, delegates outside the visible area are not painted.

The default value of this property is platform dependent, but will usually be a value greater than zero. Negative values are ignored.

The cache is not a pixel buffer. It only maintains additional instantiated delegates.

Note: Setting the **Cache** property is not a replacement for creating efficient delegates. It can improve the smoothness of scrolling behavior at the expense of additional memory usage. The fewer items and bindings in a delegate, the faster a view can be scrolled. It is important to realize that setting a cache will only postpone issues caused by slow-loading delegates, it is not a solution to this problem.

View Highlight

In the **List View Highlight** and **Grid View Highlight** sections, you can specify properties for highlighting items in views.

LIST VIEW HIGHLIGHT

Move duration	<input type="text" value="-1"/>
Move velocity	<input type="text" value="400"/>
Resize duration	<input type="text" value="-1"/>
Resize velocity	<input type="text" value="400"/>
Preferred begin	<input type="text" value="0"/>
Preferred end	<input type="text" value="0"/>
Follows current	<input checked="" type="checkbox"/> true

The current item in a list or grid view is highlighted if you set the value of the **Range** field to **ApplyRange** or **StrictlyEnforceRange**. When you select to apply the range, the view attempts to maintain the highlight within the range. However, the highlight can move outside of the range at the ends of the view or due to mouse interaction. When you select to enforce the range, the highlight never moves outside of the range. The current item changes if a keyboard or mouse action would cause the highlight to move outside of the range.

The values of the **Preferred begin** and **Preferred end** fields affect the position of the current item when the view is scrolled. For example, if the currently selected item should stay in the middle of the view when it is scrolled, set the begin and end values to the top and bottom coordinates of where the middle item would be. If the current item is changed programmatically, the view will automatically scroll so that the current item is in the middle of the view. The begin value must be less than the end value.

Select the **Follows current** check box to enable the view to manage the highlight. The highlight is moved smoothly to follow the current item. Otherwise, the highlight is not moved by the view, and any movement must be implemented by the highlight.

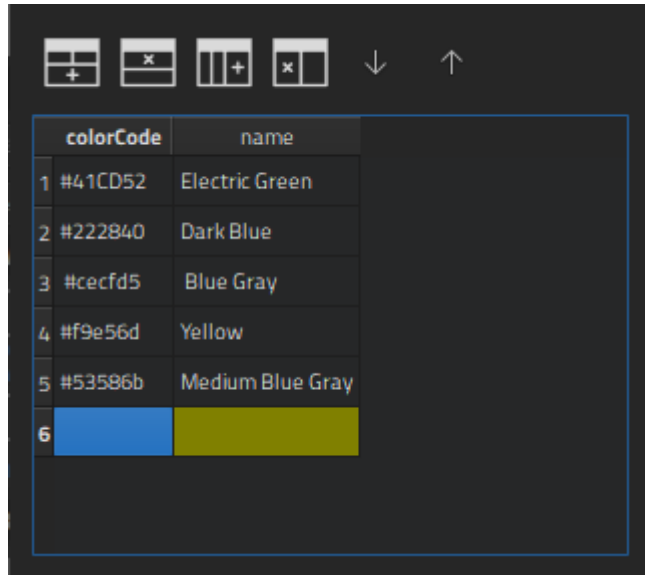
The values of the **Move duration**, **Move velocity**, **Resize duration**, and **Resize velocity** fields control the speed of the move and resize animations for the highlight.

Editing List Models

When you add a [Grid View](#), [List View](#), or [Path View](#), the [ListModel](#) and the delegate component that creates an instance for each item in the model are added automatically. For grid and list views, you can edit the list model in Qt Design Studio.



1. Drag-and-drop a **Grid View** or **List View** from **Components > Default Components > Views** to the **Navigator** or **2D** view.
2. Right-click the view in **Navigator**, and select **Edit List Model** in the context-menu to open the list model editor:



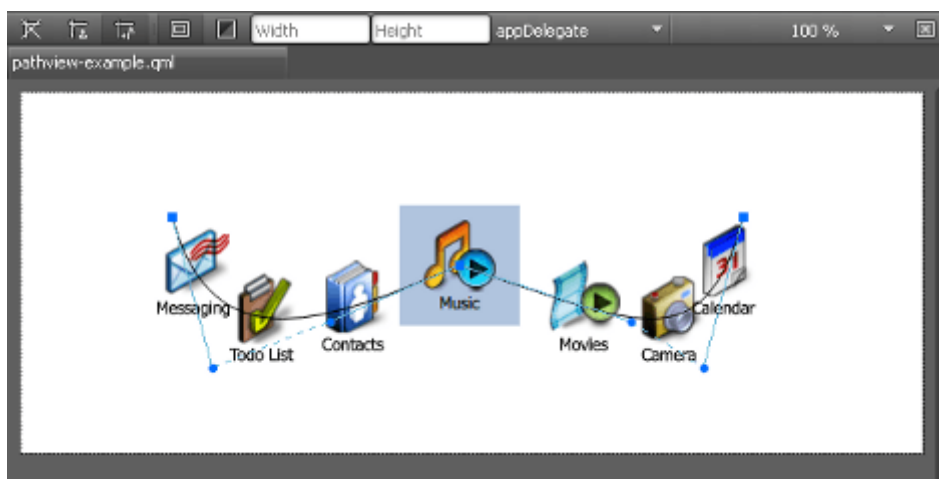
3. Double-click the column headings and cells to change their values.
4. Use the toolbar buttons to add, remove, or move rows and columns. In a list, each column represents a property and each row adds a list item.

You can replace the default model and delegate with other, more complex models and delegates in the **Code** view. **Item Delegate** and **Swipe Delegate** components are also available in **Components > Qt Quick Controls**.

Path View

A **Path View** component lays out data provided by data models on a **Path**.

A graphical spline editor enables you to specify path view paths, which is a non-trivial task to do in the **Code** view.



To start editing the path, double-click the path view in the **2D** view. The editor composes the path of **PathCubic** path objects. They are cubic Bezier curves to a given position with two control points. Drag and drop the control points in the **2D** view to construct the curve.

In addition, **PathLine** and **PathQuad** path objects are supported indirectly. To make a curve segment linear, select

By default, the path is closed, which means that its start and end points are identical. To create separate start and end points for it, right-click an edit point to open a context menu, and deselect **Closed Path**.

To add intermediary points to a curve segment, select **Split Segment** in the context menu.

In the **Path View** section, you can specify other properties for the path view. The value of the **Drag margin** field specifies the maximum distance from the path that initiates mouse dragging.

The screenshot shows two sections of the Qt Design Studio interface. The top section, titled 'PATH VIEW', contains five properties: 'Interactive' (checked), 'Drag margin' (0), 'Flick deceleration' (100), 'Offset' (0), and 'Item count' (-1). The bottom section, titled 'PATH VIEW HIGHLIGHT', contains four properties: 'Range' (StrictlyEnforceRange), 'Move duration' (300), 'Preferred begin' (0.00), and 'Preferred end' (0.00).

PATH VIEW	
Interactive	<input checked="" type="checkbox"/> true
Drag margin	0
Flick deceleration	100
Offset	0
Item count	-1

PATH VIEW HIGHLIGHT	
Range	StrictlyEnforceRange
Move duration	300
Preferred begin	0.00
Preferred end	0.00

Select the **Interactive** check box to make an item flickable. The value of the **Flick deceleration** field specifies the rate at which a flick will decelerate.

In the **Offset** field, specify how far along the path the items are from their initial positions. This is a real number that ranges from 0 to the value of the **Item count** field, which displays the number of items in the model.

In the **Path View Highlight** section, you can specify properties for **highlighting** path objects.

Note: You can also use the **SVG Path Item** Studio Component to specify an SVG path data string that draws a path.

SVG Path Item

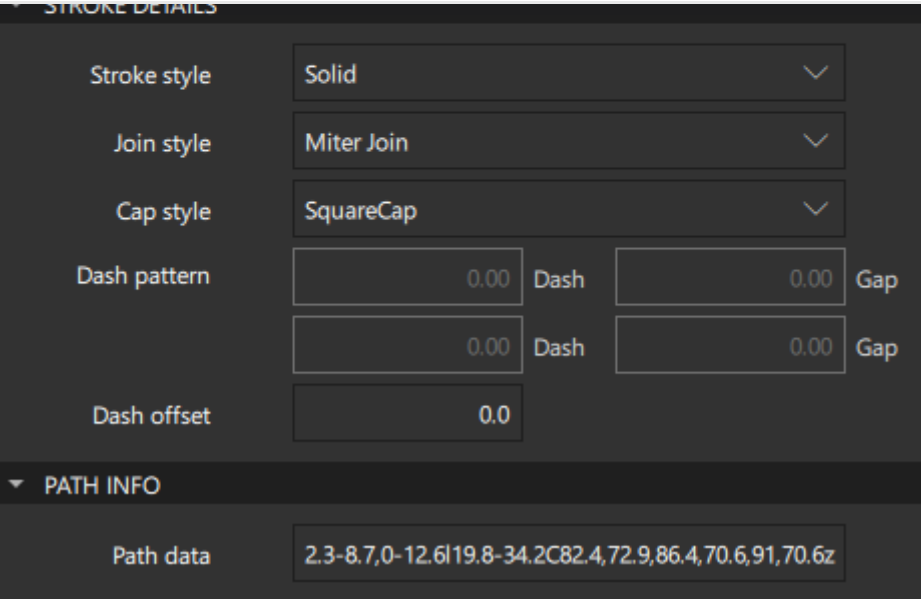
The **SVG Path Item** component uses an SVG path data string to draw a path as a line.

Setting path colors is described in **Picking Colors**.

The stroke property values that specify the appearance of the path are described in **Strokes**.

The screenshot shows the 'SVG PATH ITEM' section of the Qt Design Studio interface. It contains two properties: 'Fill color' (white) and 'Stroke color' (red). Each property has a corresponding hex code field: '#ffffff' for fill and '#ff0000' for stroke.










SVG PATH ITEM	
Fill color	<input type="text" value="#ffffff"/> Hex
Stroke color	<input type="text" value="#ff0000"/> Hex



The **Path data** field in the **Path Info** section contains the SVG path data string that specifies the path. For more information, see [W3C SVG Path Data](#).

Summary of Model Components

The following table lists the components that you can use to add data models to UIs. The *Location* column indicates the location of the component in **Components**. The *MCU* column indicates which components are supported on MCUs.

Icon	Name	Location	MCU	Purpose
	Grid View	Default Components - Views		A grid vizualization of a model.
	Item Delegate	Qt Quick Controls		A standard view item that can be used as a delegate in various views and controls, such as ListView and ComboBox .
	List View	Default Components - Views	✓	A list vizualization of a model.
	Path View	Default Components - Views		Vizualizes the contents of a model along a path.
	Scroll View	Qt Quick Controls		Provides scrolling for user-defined content. It can be used instead of a Flickable component.
	Stack View	Qt Quick Controls		A stack-based navigation model.
	SVG Path Item	Qt Quick Studio Components		An SVG path data string that is used to draw a path as a line.
	Swipe Delegate	Qt Quick Controls		A view item that can be swiped left or right to expose more options or information. It is used as a delegate in views such as ListView .
	Name Swipe	Qt Quick	✓	Enables users to navigate pages by swiping sideways.



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