

# TableView User Experience Documentation

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## 1. Introduction

This document is the user experience specification for the JavaFX Table control.

## 2. Overview

TableView is a control used for displaying and editing a list of items (rows) with multiple properties (columns). It is a complex control with many features suiting different data presentation and editing use cases. Typical example on desktop platform is a list of email and a list of TV programs on TV platform.

Please note that for Presidio release, we will implement DB-style table only. Other table styles, such as spreadsheet or properties-style table, are not part of this release. Because of that, features like cell or row spanning, grouped cells, or a selection in which all items that belongs to a rectangle formed by range's start and end points should be selected are not supported.

Figure 1 Table overview

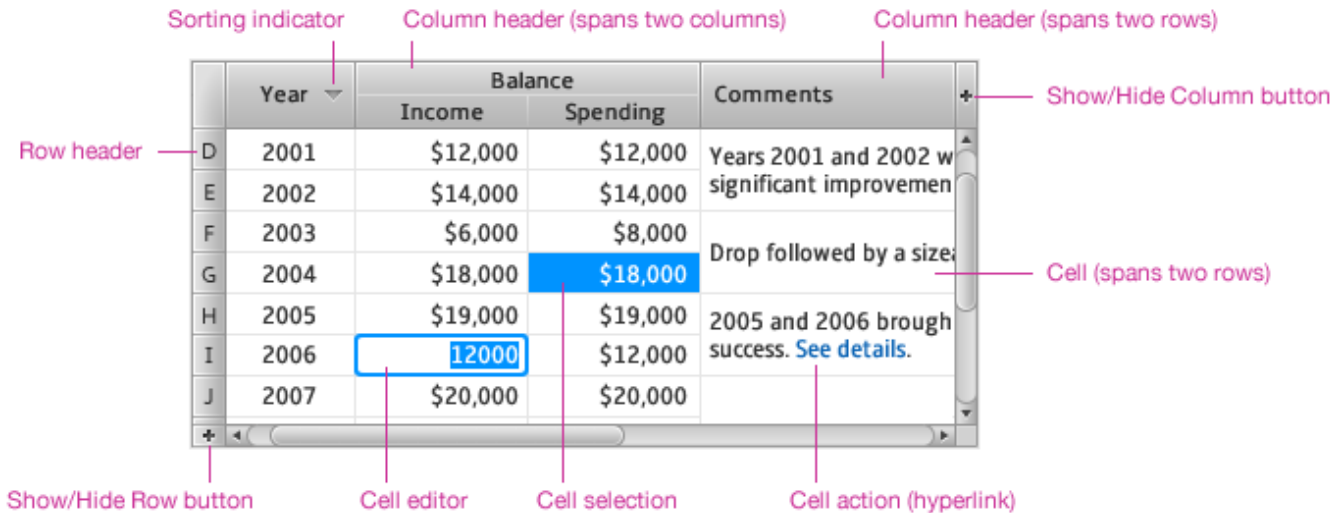


Table 1.1 Desktop Table features overview

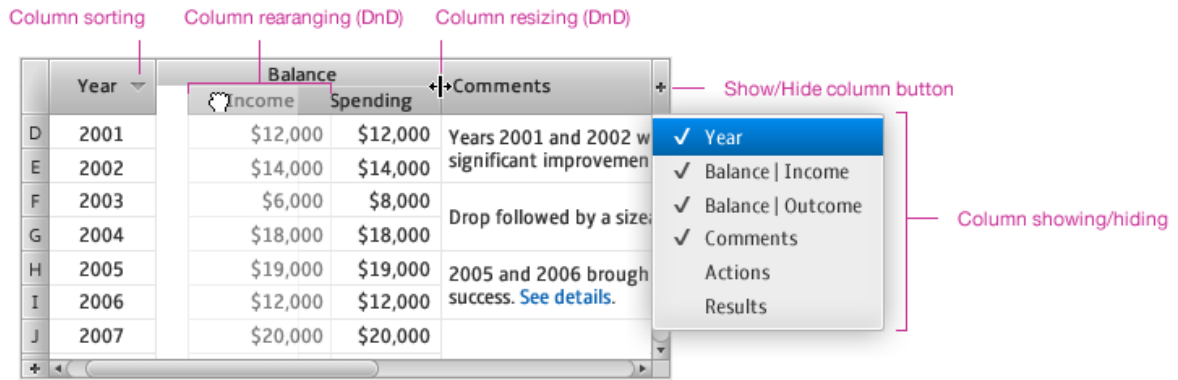
Desktop Table	Common features	Uncommon features
DB-style table	<ul style="list-style-type: none"> <li>• Column headers</li> <li>• Row and column DnD</li> <li>• Column sorting</li> <li>• Row selection</li> <li>• Various cell editors</li> </ul>	<ul style="list-style-type: none"> <li>• Column selection</li> <li>• Row and column cell spanning</li> </ul>

## 3. Desktop: Detailed Behaviors

### Column header

Header is the topmost table row showing names of columns. It is always visible as it does not scroll with content. It is a place where the user performs table column customization including **column resizing**, **column rearrangement**, **column hiding/showing** and **sorting**. Header can span multiple columns, if it shows **grouped columns** with the name of the group above individual column names.

Figure 2 Column header overview

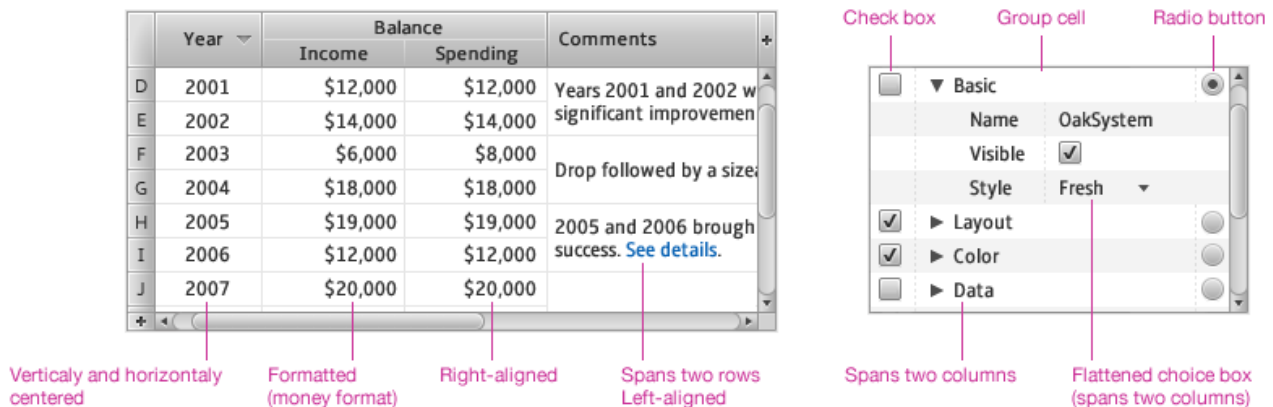


See detailed sections below describing sorting, and rearranging with resizing (not implemented in Presidio release). Column hiding and showing behaves like a regular menu button with check box menu items. See menu spec for details.

## Cell

Cells display table content as labels, icons, check boxes or other standard controls. Custom cells are also supported. Cells support **horizontal and vertical alignment**, **automatic sizing** when cell width or height automatically fits content size, and **multi-row and multi-column cells** when a cell spans multiple columns or rows. **Cell formatters** display standard textual values in predefined style, in some cases corresponding to localization settings of native platform (e.g. date, time, numbers).

Figure 3 Cell overview



In addition to displaying values or information, cells can also be selected, edited or they can represent actions. Cell space is usually limited, therefore multiple clicks are sometimes necessary to differentiate between selection or editing. Possible pointing device click behavior after clicking into an unselected cell:

- First click selects the clicked cell (or row, column). Second click edits the cell with the associated cell editor.
- First click edits the clicked cell with the associated cell editor. No change in selection.
- First click invokes the cell action represented with a hyperlink, icon, button or check box. No change in selection.
- Mixed mode when the behavior depends on the cell content being clicked. E.g. if a drop down arrow is clicked it edits the cell; if a hyperlink is clicked it invokes an action; if a label is clicked it selects the cell.

## Selection

TableView supports the following selection modes: **single-row**, **multi-cell**, and **multi-row selection**. The multi-selection modes are supported with typical Ctrl-Click when controlled with a pointing device.

Figure 4 Selection overview

	Year ▾	Balance		Comments
		Income	Spending	
D	2001	\$12,000	\$12,000	Year 2001 was the first
E	2002	\$14,000	\$14,000	
F	2003	\$10,000	\$10,000	Drop followed by a size
G	2004	\$18,000	\$18,000	
H	2005	\$19,000	\$19,000	2005 brought in some r
I	2006	\$12,000	\$12,000	
J	2007	\$20,000	\$20,000	

	Year ▾	Balance		Comments
		Income	Spending	
D	2001	\$12,000	\$12,000	Years 2001 and 2002 w
E	2002	\$14,000	\$14,000	significant improvemen
F	2003	\$6,000	\$8,000	Drop followed by a size
G	2004	\$18,000	\$18,000	
H	2005	\$19,000	\$19,000	2005 and 2006 brough
I	2006	\$12,000	\$12,000	
J	2007	\$20,000	\$20,000	

In multi-selection modes, one selected item (cell, row or column) is marked as a selection lead. It indicates the beginning of range selection when making range selection with pointing device (Shift-Click). For keyboard control, the selection lead is the focused item controlled with arrow keys.

The following table assumes the first click initiates selection change. It describes behavior for cell selection. The same behavior applies to row and column selection.

**Table 2** Pointing device selection behavior

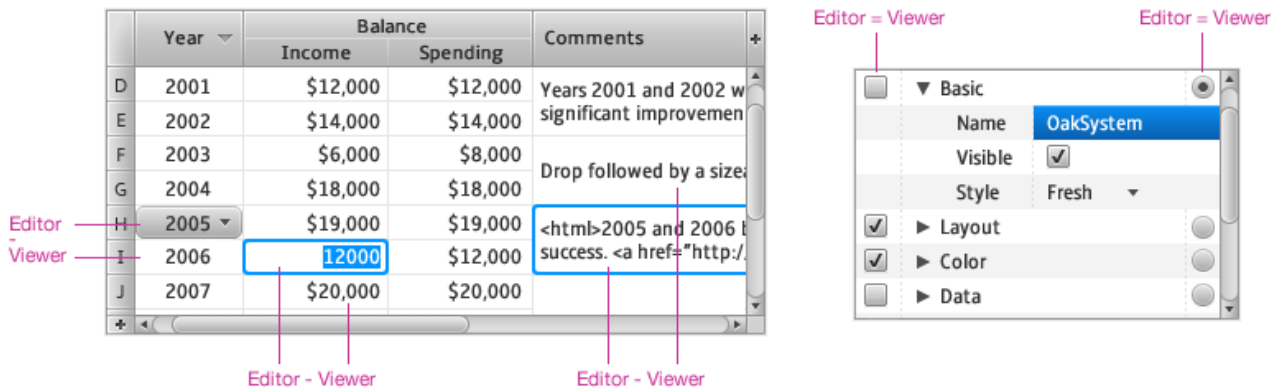
Pointer action	Target cell	Selection change
<b>Click</b>	Unselected	Select cell. Make it the lead cell.
	Selected	Edit cell if an editor is associated with the clicked cell.
<b>Ctrl-Click</b>	Unselected	Add cell to selection. Make it the lead cell.
	Selected	Clear the clicked cell from selection. Do not change the lead.
<b>Shift-Click</b>	Unselected	Add the range of cells between the lead cell and clicked cell to selection. Clicked cell becomes the lead cell.
	Selected	Clear the range of cells between the lead cell and clicked cell from selection. Do not change the lead.
<b>Double-Click</b>	Unselected	Select cell and make it the lead cell. Also if the cell has an associated action, invoke this action (e.g. open file in filesystem table view), otherwise if it has an associated editor, switch the cell to editing.
	Selected	If the cell has an associated action, invoke this action (e.g. open file in filesystem table view), otherwise if it has an associated editor, switch the cell to editing.

Note: If a cell is selected on a single click you enter the cell editing mode. If it is not selected and you double click on it, the cell becomes selected and you immediately enter the cell editing mode. You should also be able to double click on already selected cell and enter the cell editing mode.

## Cell editor

If a cell is editable, it permits the user modify cell value using a standard JavaFX control which may be different than the control used for viewing the value. For example a table cell may show a value as a label, but after clicking it it turns into a choice box with popup list open. This is necessary to keep the table appearance clean for viewing and avoid all the necessary visual clutter that would be present if every cell in the same column displayed values as a closed choice box. Cell editors are usually text boxes, choice boxes or check boxes. Custom editors are also supported.

Figure 5 Cell editor overview

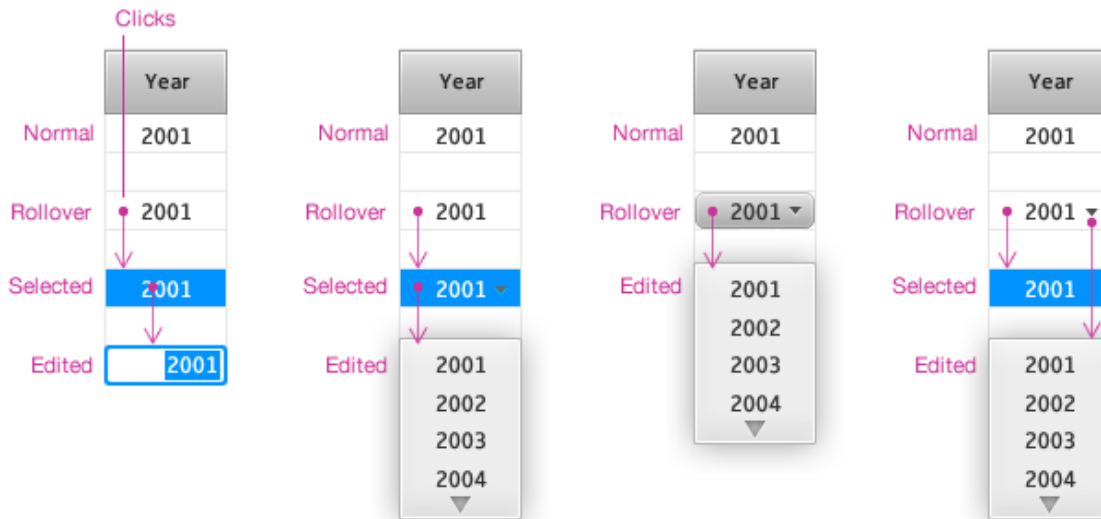


If the same control is used for viewing and editing (e.g. check boxes or radio buttons) then cell editors are visible directly and it is not necessary to select the cell before using the editor. If a different control is used for viewing and editing, developers should have the following options:

- Do not indicate the editor. This is typically used for textual values with text box editor as such editing model is well known. The text box editor appears after second click into a selected item.
- Show the whole or part of the editor after selecting the corresponding cell. This give the user visual indication the cell is editable on second click.
- Show the whole or part of the editor (e.g. a drop down button) on pointer-hover. It permits the user to invoke editor directly after clicking the editor (or part of it).

When a cell is being edited, clicking outside of the edited cell commits the value and removes the cell editor. If there was an error with committing the value, the developer needs to handle it for example by showing an error message and keeping keyboard focus in the edited cell in editing mode.

Figure 6 Click to edit behavior (4 possible alternatives; note that the pink dot represents the left mouse click)



Please note that pictures above show the behavior of the cell editor for text boxes, and choice boxes only. Other controls, e.g. check boxes or radio buttons, have the cell editor visible directly so it is not necessary to select the cell before using the cell editor.

**Normal** - shows a cell in its normal state

**Rollover** - shows appearance of a cell when the mouse cursor appears over it

**Selected** - shows appearance of a cell which the user clicked on or hit Space on (after navigating to the cell using the keyboard)

**Edited** - shows the cell editor in action

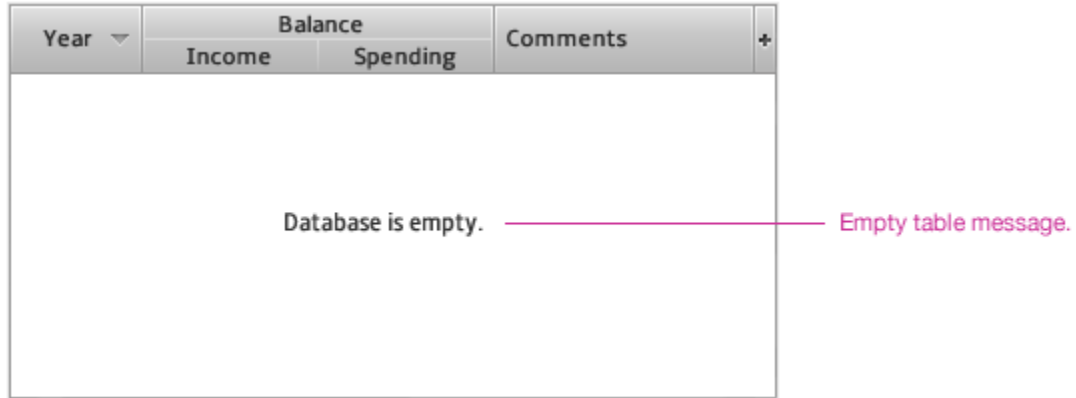
## Cell action

Some cells are actionable, which means they permit the user to invoke actions rather than edit values inline. Hyper links, icons or buttons may be used inside cells for that purpose. Similarly to cell editors, cell actions may work in mixed mode where the user needs to click exactly on the cell action (e.g. hyperlink) and clicking elsewhere inside the cell initiates cell selection.

## Empty table

If a table is empty, it permits developer to show a label or other content cross the whole table area. This is useful to explain why the table is empty.

Figure 7 Empty table



## Sorting

Table permits the user to sort columns by clicking the table header and it visually indicates which column the table is sorted by. It also supports **multi-column sorting**. The user clicks on a secondary (or tertiary, etc.) sorting column while holding the Shift key down. All columns then show visual sorting indication.

Please note, that there should be an option for developers to be able to disable sorting of a column or a row.

Figure 8 Sorting overview

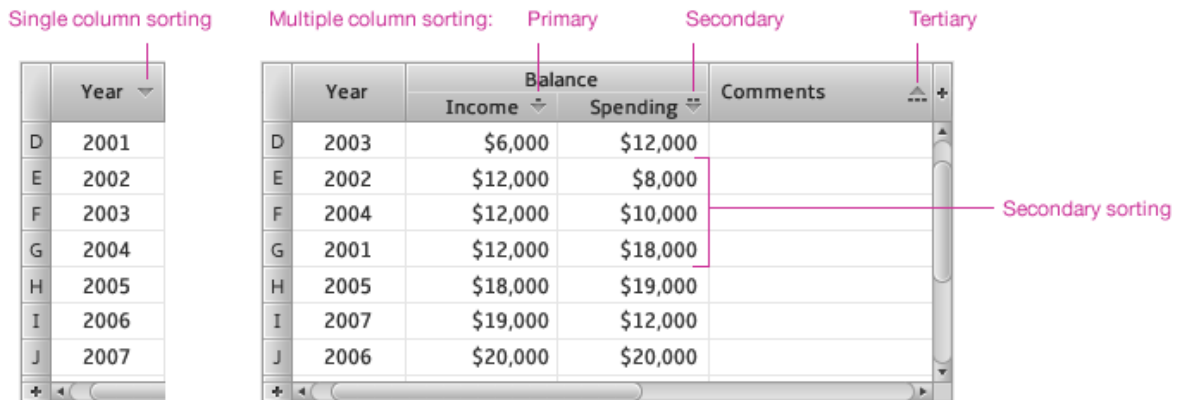


Table 3 Pointing device sorting behavior

Pointer action	Target (header)	Sorting change
Click	Unsorted	Sort ascending. Make it the primary sorting column. Reset multi-column sorting.
	Sorted (ascending)	Sort descending.
	Sorted (descending)	If table permits no sorting (natural table sorting), turn the sorting off and reset multi-column sorting. Otherwise sort ascending.
Shift-Click	Unsorted	If primary sorting column exists, sort the clicked column ascending as a secondary (or tertiary, etc.) sorting column. Otherwise make it the primary sorting column.
	Secondary sorted (ascending)	Sort descending.

Secondary sorted (descending)	Turn off sorting for this column.
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## Resizing

Table content width may be unrelated to table width, or it may be constrained to fit table width. Resizing of the whole table and table columns behaves differently in both modes.

When the user resizes the whole table width in the unconstrained mode, the table just shows or hides horizontal scroll bar as needed with no effect on column size. In constrained mode (fit to table width), it increases or decreases column widths proportionally.

When the user resizes an individual column in the unconstrained mode, the table automatically adjusts the **position** of columns on the right hand side to the resized column and keeps their width untouched. See the following figure.

**Figure 9** Column resizing unconstrained



When the user resizes a column width in the constrained mode, the table automatically adjusts the **width** of the right hand side columns. When the user increases a column width, the table decreases the width of the rightmost column until it reaches its minimum width. Then it decreases the width of the second rightmost column until it reaches minimum width and so on. When all right hand side columns reach minimum size, the user cannot increase the size of resized column any more.

When the user decreases a column width, the rightmost column increases its width until it reaches its preferred width. The preferred width is a width set by the developer or later changed by the user. When it reaches preferred width, the second rightmost column increases its width until it reaches its preferred width and so on. If the user keeps decreasing width of the column and all right hand side columns already reached their preferred size, the rightmost column increases its width even more than the preferred width to keep the constraint and fill in the table width. See the following figure.

**Figure 9.1** Column resizing constrained to fit table width

	Year	Balance		Comments
		Income	Spending	
D	2003	\$6,000	\$12,000	Short comment.
E	2002	\$12,000	\$8,000	
F	2004	\$12,000	\$10,000	
G	2001	\$12,000	\$18,000	
H	2005	\$18,000	\$19,000	
I	2007	\$19,000	\$12,000	
J	2006	\$20,000	\$20,000	

No horizontal scroll bar

dragging

	Year	Balance		Comments
		Income	Spending	
D	2003	\$6,000	\$12,000	Short com...

Resized column

Decreased width to Minimum

dragging

	Year	Balance		Comments
		Income	Spending	
D	2003	\$6,000	\$12,000	Short com...

Resized column

Decreased width to Minimum

dragging

	Year	Balance		Comments
		Income	Spending	
D	2003	\$6,000	\$12,000	Short comment.

Resized column to Minimum

Increased width to fill the space

Increased width to previous (preferred) size

## Filtering and searching

Filtering is an advance feature permitting the user to define clear criteria for permanent display of column content. It is up to the developer to specify whether there are filters for no columns, individual columns, or all columns.

Searching is a lightweight filtering for short-lived narrowing of table content. It means that searching works across whole table.

Figure 10 Filtering overview

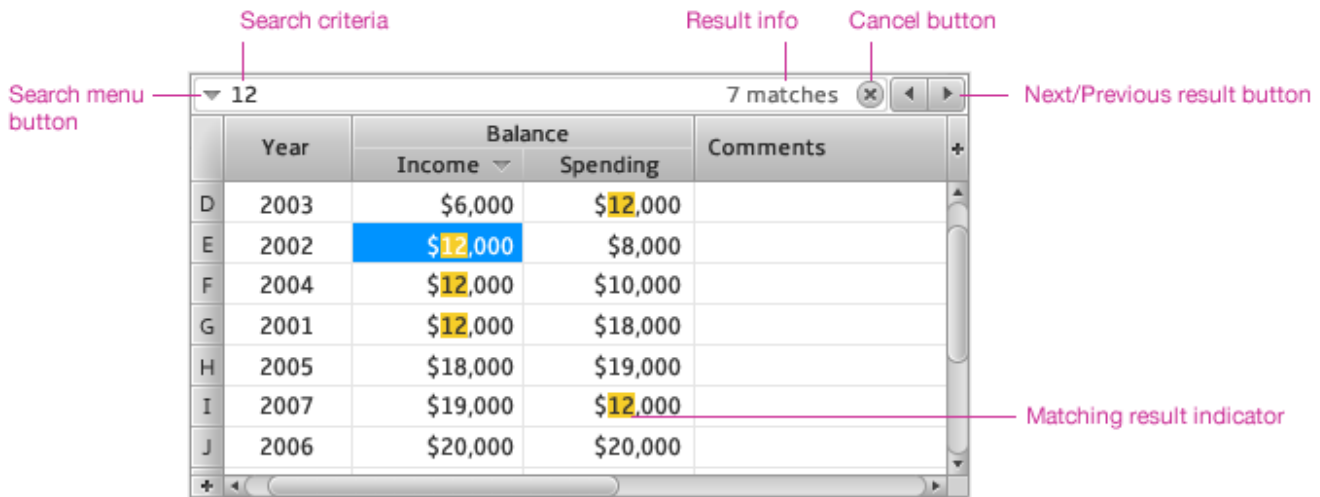
	Year	Balance		Comments
		Income	Spending	
		12000		
A	2002	\$12,000	\$8,000	
B	2004	\$12,000	\$10,000	
C	2001	\$12,000	\$18,000	

Filter criteria

Filter button

Filtered and sorted results

Figure 11 Searching overview

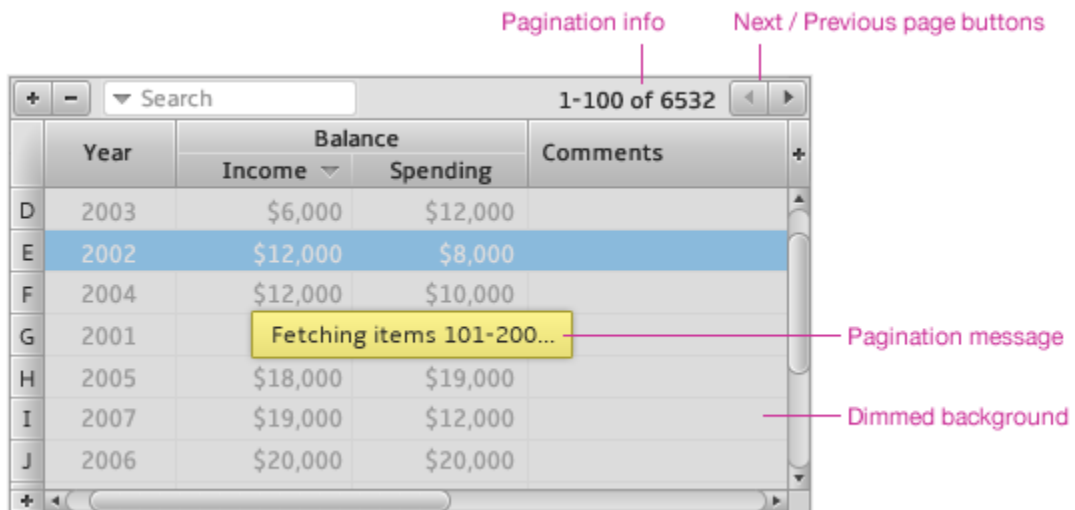


Note: In Presidio, we'll be supporting table-wide filtering (aka searching), but not filtering on specific columns (at least, not in the sense that we'll be offering any kind of 'filter bar' as shown in figure 11). Table-wide filtering will have no UI - the developer will be responsible for creating the UI as necessary.

## Pagination

On desktop platform, scrolling is a common way how to show more table rows than can fit into available table size. Sometimes when table data cannot load at once it may be desirable to show it paginated controlled by Next/Previous Page actions in the table toolbar.

Figure 12 Pagination overview



Note: The UI for this feature is not part of Presidio release.

## 4. Desktop: Keyboard Support

Table 5 Desktop Keyboard support

Windows	Mac	Action
Up	Up	Moves focus & selection up one item. Creates anchor. All previous selections are canceled.
Down	Down	Moves focus & selection down one item. Creates anchor. All previous selections are canceled.
Ctrl-Up	Cmd-Up	Moves focus up without changing selection.



<b>Ctrl-Down</b>	<b>Cmd-Down</b>	Moves focus down without changing selection.
<b>Shift-Up</b>	<b>Shift-Up</b>	<p>Expands or contracts selection up by one item. Only in multi-selection modes.</p> <p>If focus is on an unselected item, pressing Shift-Up selects all items between anchor and the item which is right above the focused item. The item which is right above the focused item is also included in the selection. All previous selections are canceled, if applicable. Available in multi-selection mode only.</p> <p>In single selection mode, Shift key should be ignored and only Up key should be processed. See description of Up behavior for more details.</p>
<b>Shift-Down</b>	<b>Shift-Down</b>	<p>Expands or contracts selection down by one item. Only in multi-selection modes.</p> <p>If focus is on an unselected item, pressing Shift-Down selects all items between anchor and the item which is right below the focused item. The item which is right below the focused item is also included in the selection. All previous selections are canceled, if applicable. Available in multi-selection mode only.</p> <p>In single selection mode, Shift key should be ignored and only Down key should be processed. See description of Down behavior for more details.</p>
<b>Space</b>	<b>Space</b>	Selects focused item if it is not selected. Creates anchor.
<b>Ctrl-Space</b>	<b>Cmd-Ctrl-Space</b>	Selects focused item if it is not selected. Deselects focused item if it is selected. Creates anchor.
<b>Shift-Space</b>	<b>Shift-Space</b>	<p>Selects all items between anchor and focused item. Focused item is also included in the selection. All previous selections are canceled, if applicable. Available in multi-selection mode only.</p> <p>In single selection mode, Shift key should be ignored and only Space key should be processed. See description of Space behavior for more details.</p>
<b>F2</b>	<b>F2</b>	Edit selected item.
<b>Home</b>	<b>Home</b>	Moves focus & selection to the first item. Creates anchor.
<b>End</b>	<b>End</b>	Moves focus & selection to the last item. Creates anchor.
<b>Shift-Home</b>	<b>Shift-Home</b>	<p>Selects all items between anchor and the first item. All previous selections are canceled, if applicable. Available in multi-selection mode only.</p> <p>In single selection mode, Shift key should be ignored and only Home key should be processed. See description of Home behavior for more details.</p>
<b>Shift-End</b>	<b>Shift-End</b>	<p>Selects all items between anchor and the last item. All previous selections are canceled, if applicable. Available in multi-selection mode only.</p> <p>In single selection mode, Shift key should be ignored and only End key should be processed. See description of End behavior for more details.</p>
<b>Ctrl-Home</b>	<b>Cmd-Home</b>	Moves focus to the first item.
<b>Ctrl-End</b>	<b>Cmd-End</b>	Moves focus to the last item.
<b>PageUp</b>	<b>PageUp</b>	<p>Move the selection up on the first fully visible item on the current page. If the first fully visible item is selected, move the selection on the first fully visible item on the previous page.</p> <p>In multi-selection mode, it cancels all previous selections. Creates anchor.</p>
<b>PageDown</b>	<b>PageDown</b>	<p>Move the selection down on the last fully visible item on the current page. If the last fully visible item is selected, move the selection on the last fully visible item on the next page.</p> <p>In multi-selection mode, it cancels all previous selections. Creates anchor.</p>
<b>Shift-PageUp</b>	<b>Shift-PageUp</b>	<p>Select all items between anchor and the first fully visible item on the current page. If the first fully visible item is already included in the selection, extend the selection to the first fully visible item on the previous page.</p> <p>All previous selections, if applicable, are canceled. Available in multi-selection mode only.</p> <p>In single selection mode, Shift key should be ignored and only PageUp key should be processed. See description of PageUp behavior for more details.</p>

<b>Shift-PageDown</b>	<b>Shift-PageDown</b>	<p>Select all items between anchor and the last fully visible item on the current page. If the last fully visible item is already included in the selection, extend the selection to the last fully visible item on the next page.</p> <p>All previous selections, if applicable, are canceled. Available in multi-selection mode only.</p> <p>In single selection mode, Shift key should be ignored and only PageDown key should be processed. See description of PageDown behavior for more details.</p>
<b>Ctrl-PageUp</b>	<b>Cmd-PageUp</b>	<p>Move focus up on the first fully visible item on the current page. If the first fully visible item is focused, move focus on the first fully visible item on the previous page.</p>
<b>Ctrl-PageDown</b>	<b>Cmd-PageDown</b>	<p>Move focus down on the last fully visible item on the current page. If the last fully visible item is focused, move focus on the last fully visible item on the next page.</p>
<b>Ctrl-A</b>	<b>Cmd-A</b>	<p>Selects entire table. Focus remains on the same item. In multi-selection mode only.</p>
<b>Esc</b>	<b>Esc</b>	<p>Cancels editing.</p>
<b>Enter</b>	<b>Enter</b>	<p>Confirms editing (depends on the cell editor).</p>
<b>Ctrl-Shift-Up</b>	<b>Cmd-Shift-Up</b>	<p>Expands selection up by one item. Only in multi-selection modes.</p> <p>If focus is on an unselected item, pressing Ctrl-Shift-Up selects all items between anchor and the item which is right above the focused item. The item which is right above the focused item is also included in the selection. Available in multi-selection mode only.</p> <p>In single selection mode, Shift key should be ignored and only Ctrl-Up (Cmd-Up) should be processed. See description of Ctrl-Up behavior for more details.</p>
<b>Ctrl-Shift-Down</b>	<b>Cmd-Shift-Down</b>	<p>Expands selection down by one item. Only in multi-selection modes.</p> <p>If focus is on an unselected item, pressing Ctrl-Shift-Down selects all items between anchor and the item which is right below the focused item. The item which is right below the focused item is also included in the selection. Available in multi-selection mode only.</p> <p>In single selection mode, Shift key should be ignored and only Ctrl-Down (Cmd-Down) should be processed. See description of Ctrl-Down behavior for more details.</p>
<b>Ctrl-Shift-Space</b>	<b>Cmd-Shift-Space</b>	<p>Selects all items between anchor and focused item. Focused item is also included in the selection. Create anchor. Available in multi-selection mode only.</p> <p>In single selection mode, Shift key should be ignored and only Ctrl-Space (Cmd-Space) should be processed. See description of Ctrl-Space behavior for more details.</p>
<b>Ctrl-Shift-Home</b>	<b>Cmd-Shift-Home</b>	<p>Selects all items between anchor and the first item. Available in multi-selection mode only.</p> <p>In single selection mode, Shift key should be ignored and only Ctrl-Home (Cmd-Home) should be processed. See description of Ctrl-Home behavior for more details.</p>
<b>Ctrl-Shift-End</b>	<b>Cmd-Shift-End</b>	<p>Selects all items between anchor and the last item. Available in multi-selection mode only.</p> <p>In single selection mode, Shift key should be ignored and only Ctrl-End (Cmd-End) should be processed. See description of Ctrl-End behavior for more details.</p>
<b>Ctrl-Shift-PageUp</b>	<b>Cmd-Shift-PageUp</b>	<p>Select all items between anchor and the first fully visible item on the current page. If the first fully visible item is already included in the selection, extend the selection to the first fully visible item on the previous page.</p> <p>Available in multi-selection mode only.</p> <p>In single selection mode, Shift key should be ignored and only Ctrl-PageUp (Cmd-PageUp) should be processed. See description of Ctrl-PageUp behavior for more details.</p>
<b>Ctrl-Shift-PageDown</b>	<b>Cmd-Shift-PageDown</b>	<p>Select all items between anchor and the last fully visible item on the current page. If the last fully visible item is already included in the selection, extend the selection to the last fully visible item on the next page.</p> <p>Available in multi-selection mode only.</p> <p>In single selection mode, Shift key should be ignored and only Ctrl-PageDown (Cmd-PageDown) should be processed. See description of Ctrl-PageDown behavior for more details.</p>