COMP231

Advanced Programming

Chapter 16 JavaFX UI Controls

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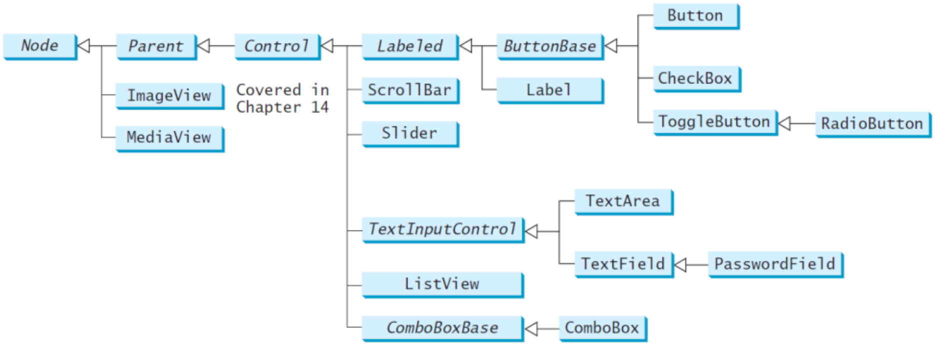
Fall Semester 2017/2018

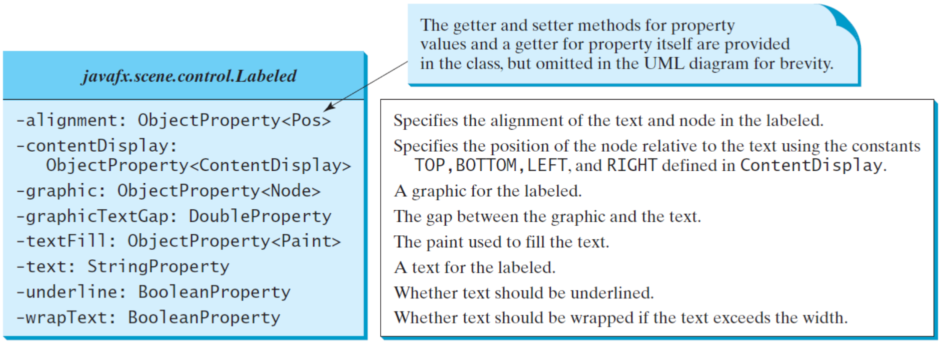
Frequently Used UI Controls



Throughout this book, the prefixes **lbl**, **bt**, **chk**, **rb**, **tf**, **pf**, **ta**, **cbo**, **lv**, **scb**, **sld**, and **mp** are used to name reference variables for **Label**, **Button**, **CheckBox**, **RadioButton**, **TextField**, **PasswordField**, **TextArea**, **ComboBox**, **ListView**, **ScrollBar**, **Slider**, and **MediaPlayer**.

Labeled

A *label* is a display area for a short text, a node, or both. It is often used to label other controls (usually text fields). Labels and buttons share many common properties. These common properties are defined in the **Labeled** class.



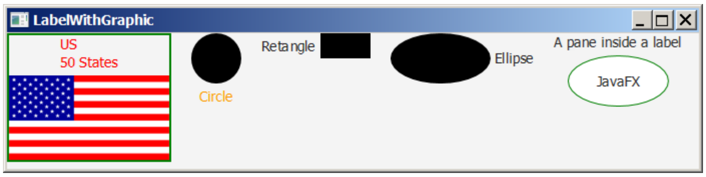
The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

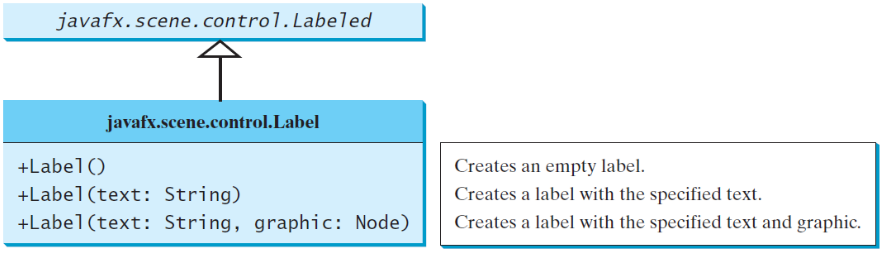
javafx.scene.control.Labeled

`-alignment: ObjectProperty<Pos>`	Specifies the alignment of the text and node in the labeled.
`-contentDisplay: ObjectProperty<ContentDisplay>`	Specifies the position of the node relative to the text using the constants `TOP`, `BOTTOM`, `LEFT`, and `RIGHT` defined in `ContentDisplay`.
`-graphic: ObjectProperty<Node>`	A graphic for the labeled.
`-graphicTextGap: DoubleProperty`	The gap between the graphic and the text.
`-textFill: ObjectProperty<Paint>`	The paint used to fill the text.
`-text: StringProperty`	A text for the labeled.
`-underline: BooleanProperty`	Whether text should be underlined.
`-wrapText: BooleanProperty`	Whether text should be wrapped if the text exceeds the width.

Label

The Label class defines labels.





javafx.scene.control.Labeled

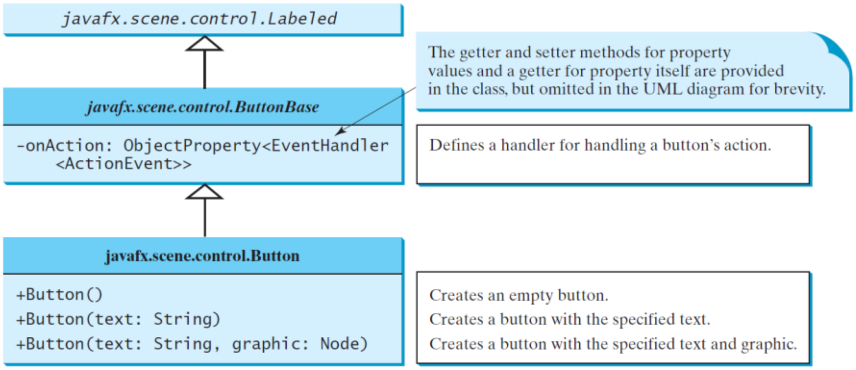
javafx.scene.control.Label

`+Label()`	Creates an empty label.
`+Label(text: String)`	Creates a label with the specified text.
`+Label(text: String, graphic: Node)`	Creates a label with the specified text and graphic.

LabelWithGraphic Run

ButtonBase and Button

A *button* is a control that triggers an action event when clicked. JavaFX provides regular buttons, toggle buttons, check box buttons, and radio buttons. The common features of these buttons are defined in **ButtonBase** and **Labeled** classes.



javafx.scene.control.Labeled

javafx.scene.control.ButtonBase

-onAction: ObjectProperty<EventHandler<ActionEvent>>

javafx.scene.control.Button

+Button()

+Button(text: String)

+Button(text: String, graphic: Node)

The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

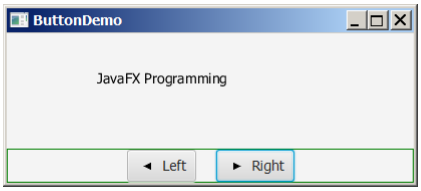
Defines a handler for handling a button's action.

Creates an empty button.

Creates a button with the specified text.

Creates a button with the specified text and graphic.

Button Example

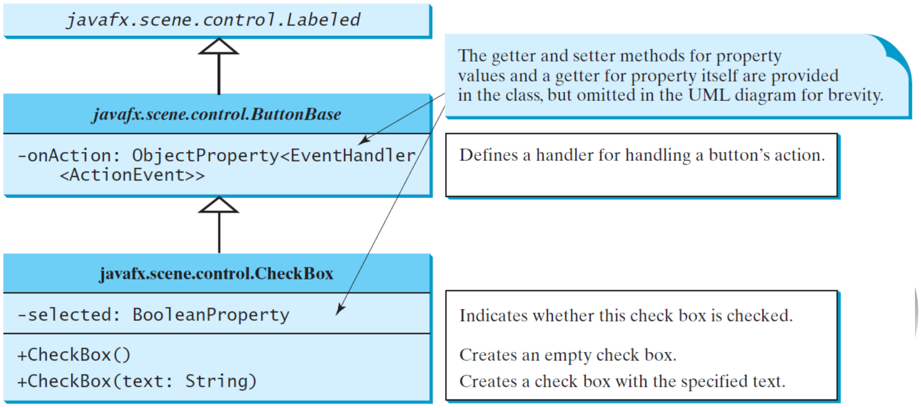


ButtonDemo

Run

CheckBox

A **CheckBox** is used for the user to make a selection. Like **Button**, **CheckBox** inherits all the properties such as **onAction**, **text**, **graphic**, **alignment**, **graphicTextGap**, **textFill**, **contentDisplay** from **ButtonBase** and **Labeled**.



javafx.scene.control.Labeled

javafx.scene.control.ButtonBase

-onAction: ObjectProperty<EventHandler<ActionEvent>>

javafx.scene.control.CheckBox

-selected: BooleanProperty

+CheckBox()

+CheckBox(text: String)

The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

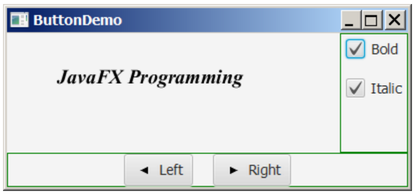
Defines a handler for handling a button's action.

Indicates whether this check box is checked.

Creates an empty check box.

Creates a check box with the specified text.

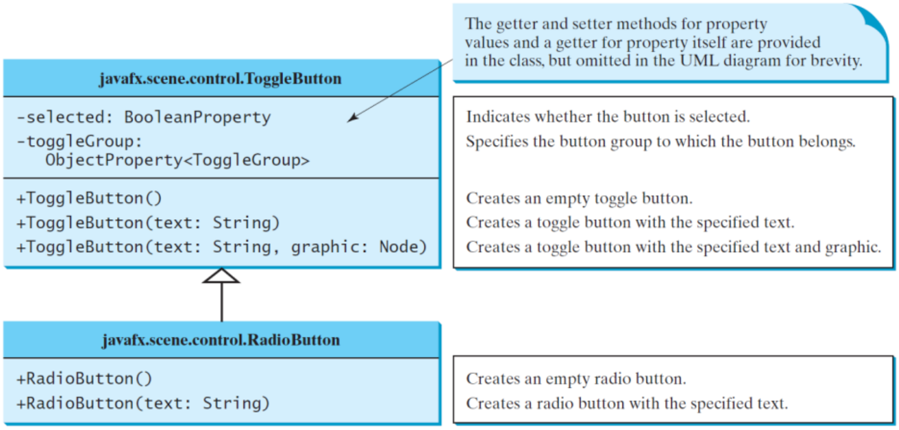
CheckBox Example



CheckBoxDemo Run

RadioButton

Radio buttons, also known as *option buttons*, enable you to choose a single item from a group of choices. In appearance radio buttons resemble check boxes, but check boxes display a square that is either checked or blank, whereas radio buttons display a circle that



The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

```
javafx.scene.control.ToggleButton

-selected: BooleanProperty
-toggleGroup:
   ObjectProperty<ToggleGroup>

+ToggleButton()
+ToggleButton(text: String)
+ToggleButton(text: String, graphic: Node)
```

Indicates whether the button is selected.
Specifies the button group to which the button belongs.

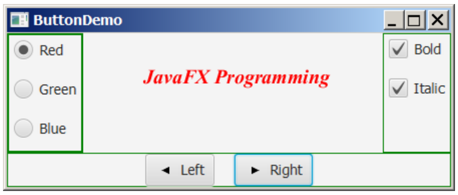
Creates an empty toggle button.
Creates a toggle button with the specified text.
Creates a toggle button with the specified text and graphic.

```
javafx.scene.control.RadioButton

+RadioButton()
+RadioButton(text: String)
```

Creates an empty radio button.
Creates a radio button with the specified text.

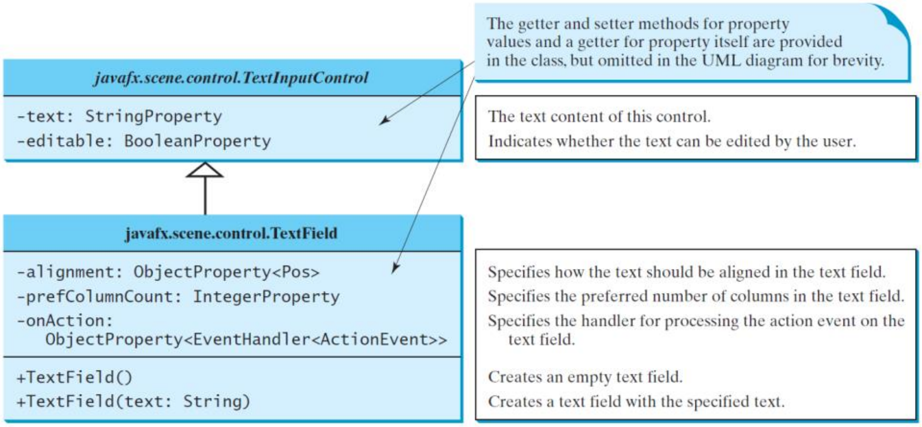
RadioButton Example



RadioButtonDemo Run

TextField

A text field can be used to enter or display a string. **TextField** is a subclass of **TextInputControl**.



javafx.scene.control.TextInputControl

-text: StringProperty
-editable: BooleanProperty

javafx.scene.control.TextField

-alignment: ObjectProperty<Pos>
-prefColumnCount: IntegerProperty
-onAction: ObjectProperty<EventHandler<ActionEvent>>

+TextField()
+TextField(text: String)

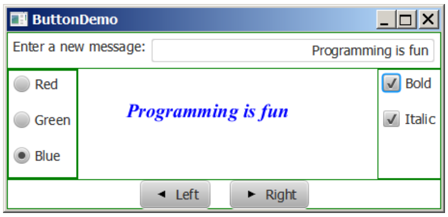
The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

The text content of this control.
Indicates whether the text can be edited by the user.

Specifies how the text should be aligned in the text field.
Specifies the preferred number of columns in the text field.
Specifies the handler for processing the action event on the text field.

Creates an empty text field.
Creates a text field with the specified text.

TextField Example



ButtonDemo

Enter a new message: Programming is fun

○ Red
○ Green
● Blue

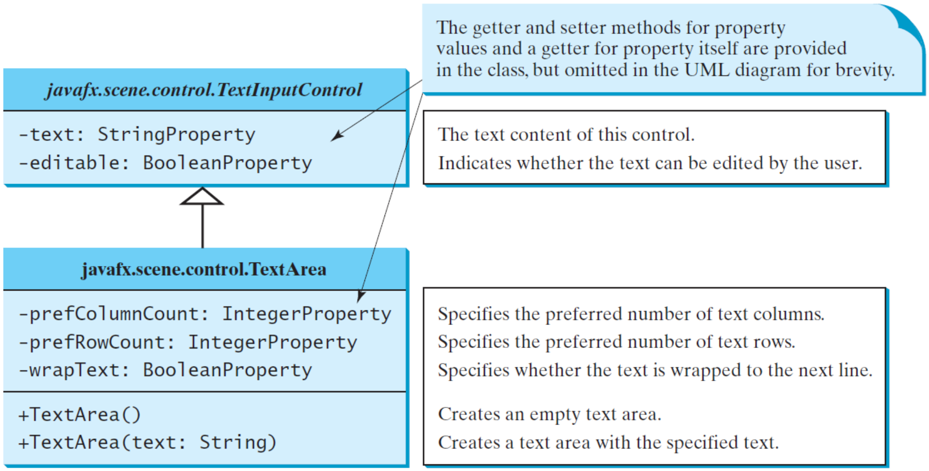
Programming is fun

☑ Bold
☑ Italic

TextFieldDemo Run

TextArea

A **TextArea** enables the user to enter multiple lines of text.



The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

javafx.scene.control.TextInputControl

-text: StringProperty
-editable: BooleanProperty

The text content of this control.
Indicates whether the text can be edited by the user.

javafx.scene.control.TextArea

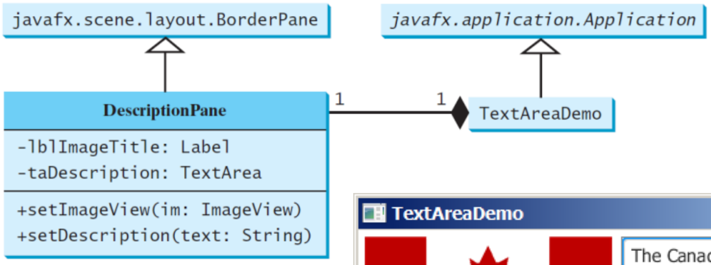
-prefColumnCount: IntegerProperty
-prefRowCount: IntegerProperty
-wrapText: BooleanProperty

+TextArea()
+TextArea(text: String)

Specifies the preferred number of text columns.
Specifies the preferred number of text rows.
Specifies whether the text is wrapped to the next line.

Creates an empty text area.
Creates a text area with the specified text.

TextArea Example



javafx.scene.layout.BorderPane

javafx.application.Application

DescriptionPane

-lblImageTitle: Label
-taDescription: TextArea

+setImageView(im: ImageView)
+setDescription(text: String)

1

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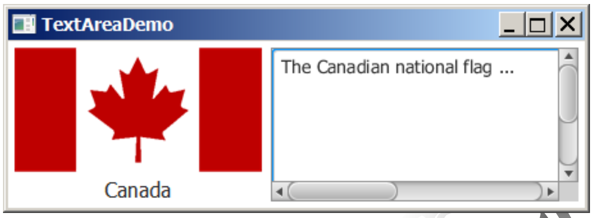
TextAreaDemo

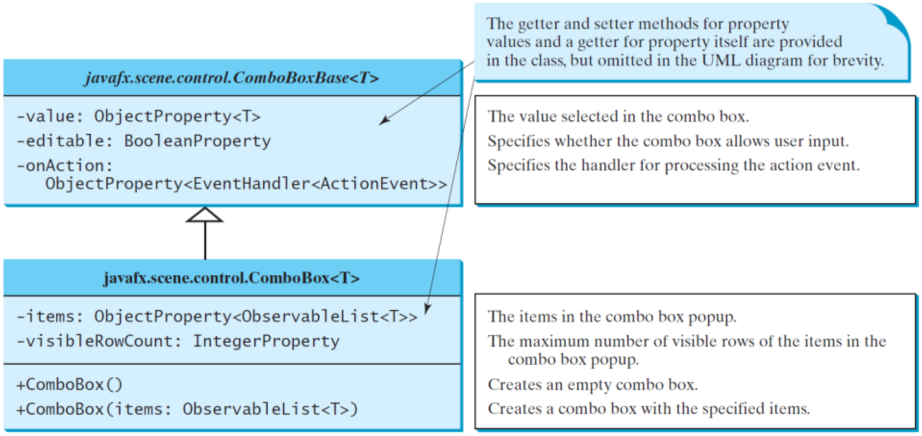


The Canadian national flag ...

DescriptionPane TextAreaDemo Run

ComboBox

A combo box, also known as a choice list or drop-down list, contains a list of items from which the user can choose.



The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

javafx.scene.control.ComboBoxBase<T>

```
-value: ObjectProperty<T>
-editable: BooleanProperty
-onAction:
   ObjectProperty<EventHandler<ActionEvent>>
```

The value selected in the combo box.
Specifies whether the combo box allows user input.
Specifies the handler for processing the action event.

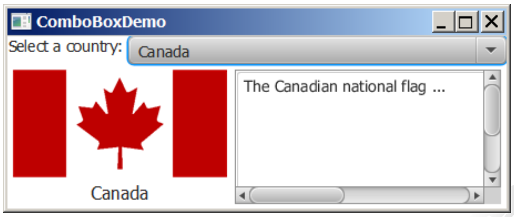
javafx.scene.control.ComboBox<T>

```
-items: ObjectProperty<ObservableList<T>>
-visibleRowCount: IntegerProperty

+ComboBox()
+ComboBox(items: ObservableList<T>)
```

The items in the combo box popup.
The maximum number of visible rows of the items in the combo box popup.
Creates an empty combo box.
Creates a combo box with the specified items.

ComboBox Example

This example lets users view an image and a description of a country's flag by selecting the country from a combo box.



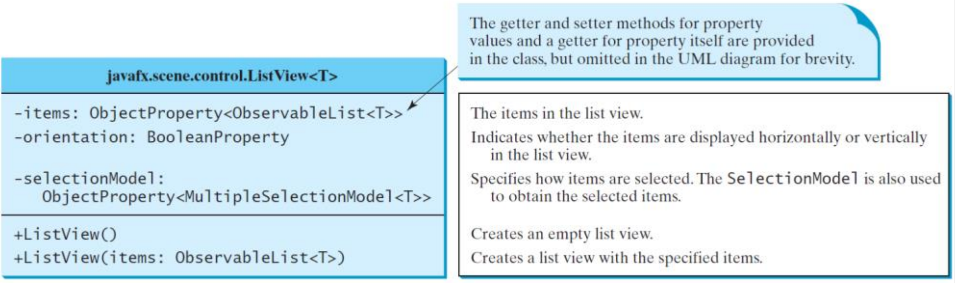
Select a country: Canada

The Canadian national flag ...

ComboBoxDemo Run

ListView

A *list view* is a component that performs basically the same function as a combo box, but it enables the user to choose a single value or multiple values.



The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

```
javafx.scene.control.ListView<T>
-items: ObjectProperty<ObservableList<T>>
-orientation: BooleanProperty

-selectionModel:
   ObjectProperty<MultipleSelectionModel<T>>

+ListView()
+ListView(items: ObservableList<T>)
```

The items in the list view.

Indicates whether the items are displayed horizontally or vertically in the list view.

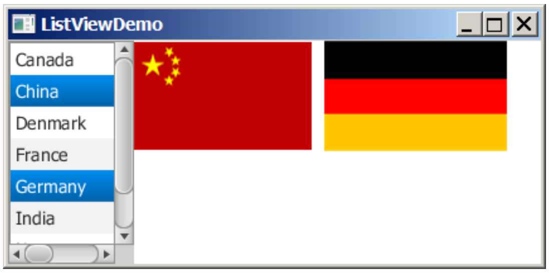
Specifies how items are selected. The `SelectionModel` is also used to obtain the selected items.

Creates an empty list view.

Creates a list view with the specified items.

Example: Using ListView

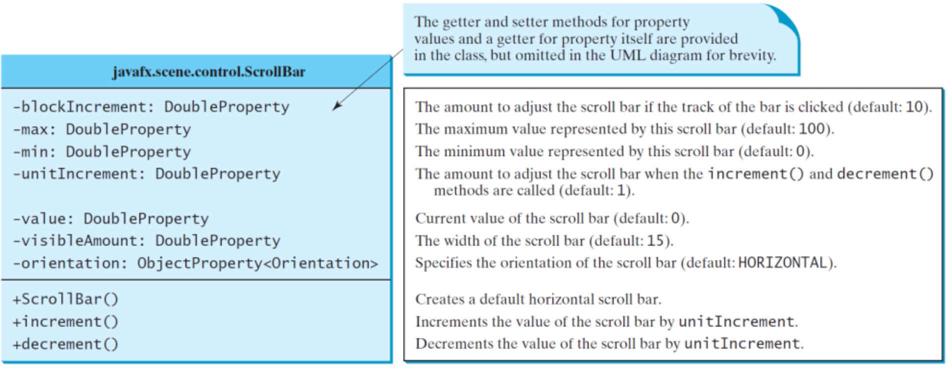
This example gives a program that lets users select countries in a list and display the flags of the selected countries in the labels.



ListViewDemo Run

ScrollBar

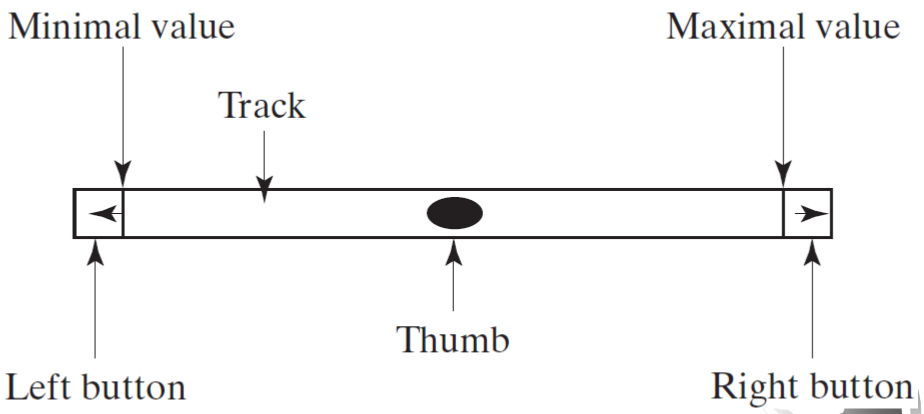
A *scroll bar* is a control that enables the user to select from a range of values. The scrollbar appears in two styles: *horizontal* and *vertical*.



The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

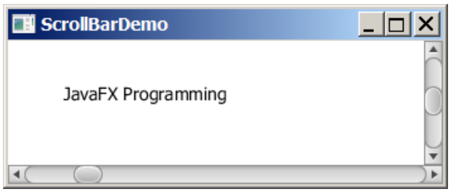
javafx.scene.control.ScrollBar	
`-blockIncrement: DoubleProperty`	The amount to adjust the scroll bar if the track of the bar is clicked (default: `10`).
`-max: DoubleProperty`	The maximum value represented by this scroll bar (default: `100`).
`-min: DoubleProperty`	The minimum value represented by this scroll bar (default: `0`).
`-unitIncrement: DoubleProperty`	The amount to adjust the scroll bar when the `increment()` and `decrement()` methods are called (default: `1`).
`-value: DoubleProperty`	Current value of the scroll bar (default: `0`).
`-visibleAmount: DoubleProperty`	The width of the scroll bar (default: `15`).
`-orientation: ObjectProperty<Orientation>`	Specifies the orientation of the scroll bar (default: `HORIZONTAL`).
`+ScrollBar()`	Creates a default horizontal scroll bar.
`+increment()`	Increments the value of the scroll bar by `unitIncrement`.
`+decrement()`	Decrements the value of the scroll bar by `unitIncrement`.

Scroll Bar Properties



Example: Using Scrollbars

This example uses horizontal and vertical scrollbars to control a message displayed on a panel. The horizontal scrollbar is used to move the message to the left or the right, and the vertical scrollbar to move it up and down.

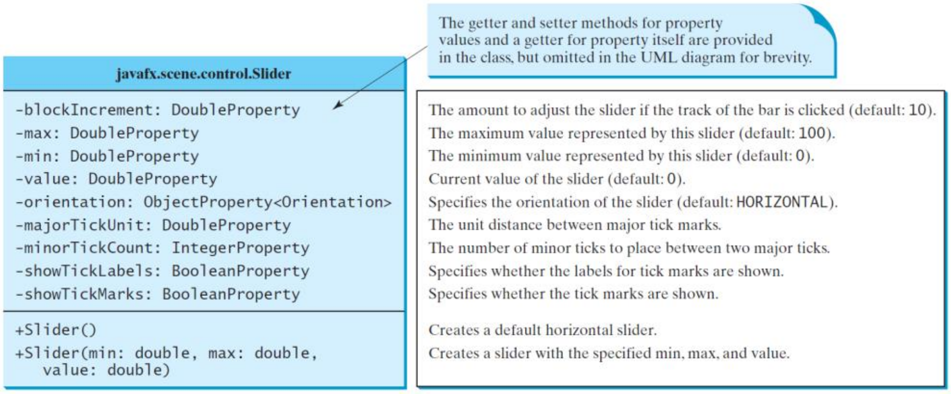


ScrollBarDemo

Run

Slider

Slider is similar to ScrollBar, but Slider has more properties and can appear in many forms.



The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

javafx.scene.control.Slider

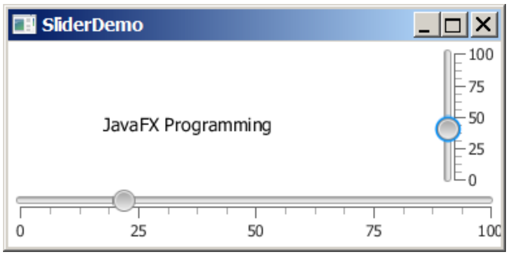
```
-blockIncrement: DoubleProperty
-max: DoubleProperty
-min: DoubleProperty
-value: DoubleProperty
-orientation: ObjectProperty<Orientation>
-majorTickUnit: DoubleProperty
-minorTickCount: IntegerProperty
-showTickLabels: BooleanProperty
-showTickMarks: BooleanProperty

+Slider()
+Slider(min: double, max: double,
   value: double)
```

The amount to adjust the slider if the track of the bar is clicked (default: 10).
The maximum value represented by this slider (default: 100).
The minimum value represented by this slider (default: 0).
Current value of the slider (default: 0).
Specifies the orientation of the slider (default: HORIZONTAL).
The unit distance between major tick marks.
The number of minor ticks to place between two major ticks.
Specifies whether the labels for tick marks are shown.
Specifies whether the tick marks are shown.

Creates a default horizontal slider.
Creates a slider with the specified min, max, and value.

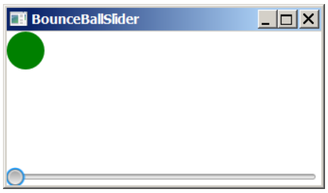
Example: Using Sliders

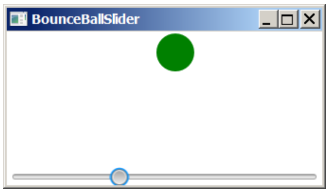
Rewrite the preceding program using the sliders to control a message displayed on a panel instead of using scroll bars.



Case Study: Bounce Ball

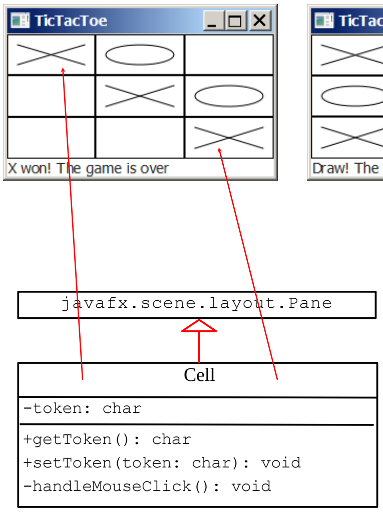
Listing 15.17 gives a program that displays a bouncing ball. You can add a slider to control the speed of the ball movement.





SliderDemo Run

Case Study: TicTacToe



X won! The game is over

Draw! The game is over

```
javafx.scene.layout.Pane
```

```
Cell
-token: char
+getToken(): char
+setToken(token: char): void
-handleMouseClick(): void
```

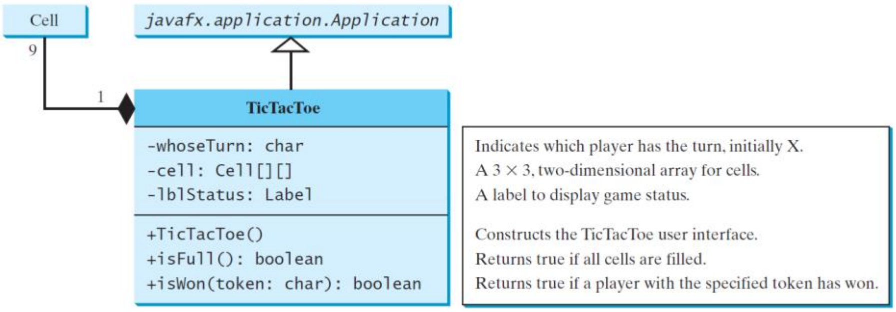
Token used in the cell (default: ' ').

Returns the token in the cell.

Sets a new token in the cell.

Handles a mouse click event.

Case Study: TicTacToe, cont.



```
TicTacToe
-whoseTurn: char
-cell: Cell[][]
-lblStatus: Label
+TicTacToe()
+isFull(): boolean
+isWon(token: char): boolean
```

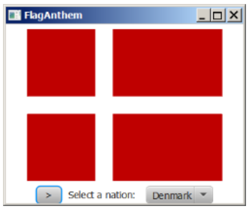
Indicates which player has the turn, initially X.
A 3 × 3, two-dimensional array for cells.
A label to display game status.

Constructs the TicTacToe user interface.
Returns true if all cells are filled.
Returns true if a player with the specified token has won.

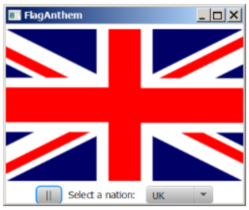
TicTacToe Run

Case Study: National Flags and Anthems

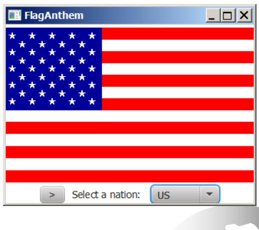
This case study presents a program that displays a nation’s flag and plays its anthem.



Select a nation: Denmark



Select a nation: UK



Select a nation: US

FlagAnthem Run