GUI Application (2)

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Outline

- Introduction to FXML
- Using Scene Builder to Create UI
- Writing the Application Code
- Some More Controls in JavaFX
  - RadioButton
  - CheckBox
  - ComboBox
  - TextArea

FXML

- FXML is a scriptable, XML-based markup language for constructing Java object graphs.
  - It is ideally suited to defining the user interface of a JavaFX application
- FXML describes the components in a JavaFX scene graph
  - FXML uses tags to organize data, in a manner similar to the way that HTML uses tags to format text in a Web browser.

source: https://docs.oracle.com/javafx/2/api/javafx/fxml/doc-files/introduction_to_fxml.html

Using Scene Builder to Create UI

- Free , open-source design tool
- Generates the FXML source code as you define the user interface for your application
  - Dragging and dropping the components that you need onto a blank window
  - Visually arrange the components on the window and set various component properties to create the appearance that you want for the GUI
  - Later the UI components can be linked to the application logic

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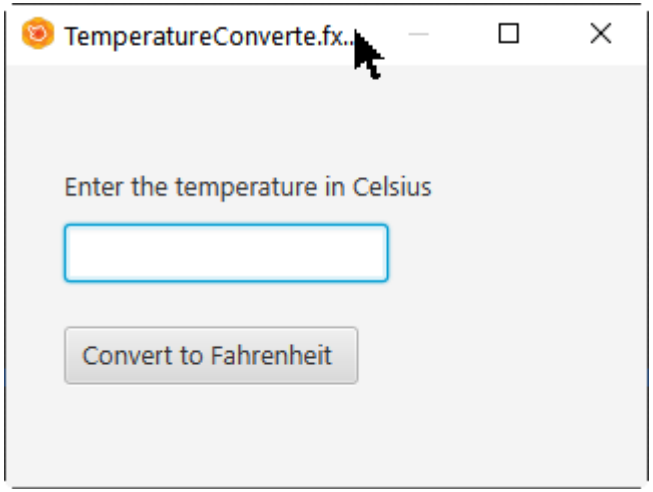
Lab (1)

- TemperatureConverter.fxml



Writing the Application Code

- Once you have saved an application's GUI to an FXML file, you can write the Java code that runs the application.
- A simple JavaFX application uses:
  - a main application class
  - a controller class

The Main Application Class (1)

- Once you have created a GUI with Scene Builder, and saved it to an FXML file, you need to write a Java class that performs the following:
  - Loads the FXML file
  - Builds the scene graph in memory
  - Displays the GUI

The Main Application Class (2)

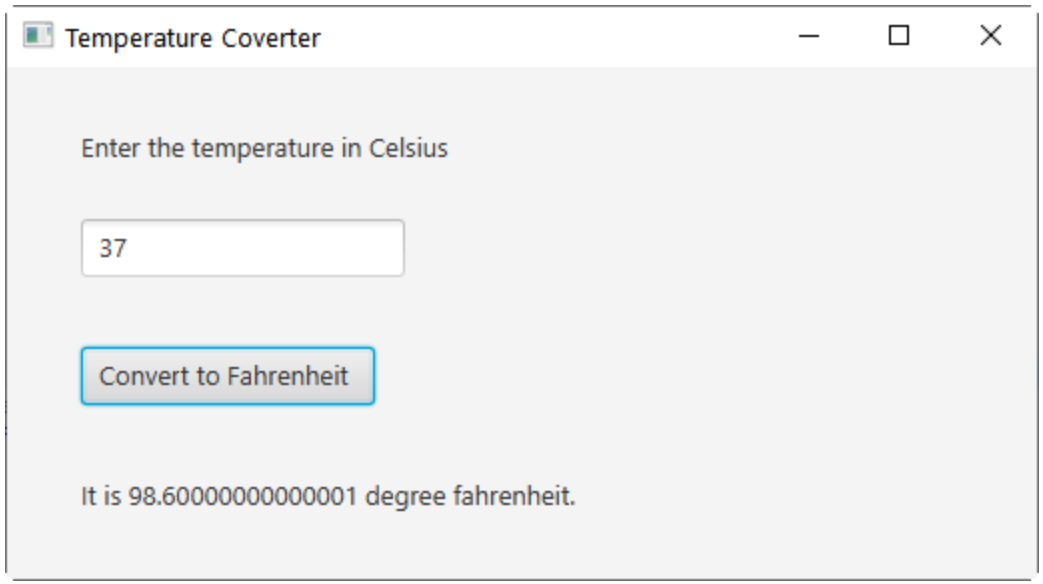
- The main class extends from `Application` and contains two methods.
  - `start()` method is automatically called when the application is launched from within the `main` method
  - `start()`receives a `Stage` as parameter

The Controller Class

- The *controller class* is responsible for handling events that occur while the application is running.
- The controller class contains the following items:
  - The necessary import statements
  - Private variables to reference the components that have a `fx:id` in the scene graph
  - An optional initialize method that is automatically called after the FXML file is loaded
  - Event listener methods

Lab (2)

- TemperatureCoverter.java
- TemperatureCoverterController.java



Why Use FXML

- Easy for a development team to create and maintain a testable user interface
  - FXML is not a compiled language; you do not need to recompile the code to see the changes
- The content of an FXML file can be localized as the file is read
- You can use JavaScript or other scripting languages in FXML

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Steps of Creating a JavaFX Application with FXML

1. Use Scene Builder to design the GUI. Save the GUI as an FXML file.
   - Be sure to give an `fx:id` to all of the components that you plan to access in your Java code.
2. Write the code for the main application class
   - Loads the FXML file and launches the application.
3. Write the code for the controller class
   - Event handler methods for the GUI.
4. In Scene Builder, register the controller class, then register an event handler method for each component that needs to respond to events.

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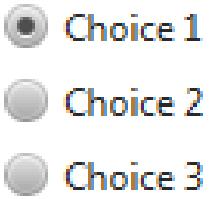
RadioButton (1)



- Behavior
  - Allow the user to select one of several possible options
  - Have a Text property that determines the text they display.
- Normally are in a toggle group.
  - Only one of the `RadioButton` controls in a toggle group may be selected at any time
  - Clicking on a `RadioButton` selects it and automatically deselects any other `RadioButton` in the same toggle group
  - You usually want one of the `RadioButtons` in a group to be initially selected.

RadioButton (2)

- If action needs to take place at the time the user clicks a `RadioButton`.
  - Write event listener methods in the controller class
  - Register the event listener in Scene Builder
- In the controller class, you can use the `RadioButton's isSelected` method to determine whether the `RadioButton` is selected or not.

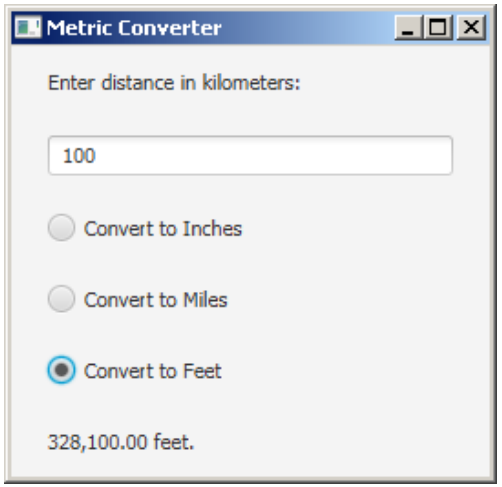
RadioButton (3)

- The `isSelected` method returns a boolean value.
  - If the `RadioButton` is selected, the method returns true . Otherwise, it returns false .

```
if (radio.isSelected()){
    // Code here executes if the radio
    // button is selected.
}
```

Lab (3)

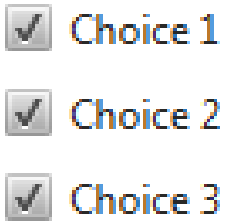
- MetricConverter.fxml
- MetricConverter.java
- MetricConverterController.java



Console Output for GUI Applications

- Be cautious about using console output for GUI Applications
  - End user would not see the console when they run a GUI application
  - Users expect to see results and enter values in GUI only
- Use console output for debugging only
  - Print variable values for debugging
  - Print exception messages for debugging

CheckBox (1)



- Behavior
  - Allow the user to make yes/no or on/off selections
  - Text property that determines the text they display
- Sometimes you want an action to take place at the time the user clicks a CheckBox.
  - you must write an event listener method in the controller class for the CheckBox
  - and then select the method as the event listener in Scene Builder.

CheckBox (2)

- In the controller class, you can use the CheckBox's `isSelected` method to determine whether the CheckBox is selected or not.
- The `isSelected` method returns a boolean value.
  - If the CheckBox is selected, the method returns `true` . Otherwise, it returns `false`

```
if (checkbox.isSelected()) {
    // Code here executes if the
    // CheckBox is selected.
}
```

CheckBox (3)

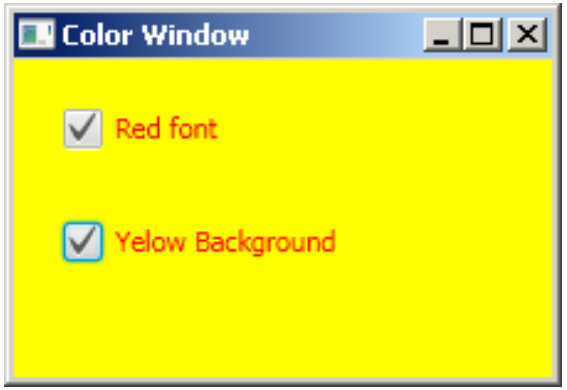
- You can select a `CheckBox` in code with the `CheckBox` class's `setSelected` method:

```
check1.setSelected(true);
```

- If you want an action to take place immediately when the user clicks a `CheckBox`, register an event handler with the `CheckBox` control.

Lab (4)

- ColorWindow.fxml
- ColorWindow.java
- ColorWindowController.java

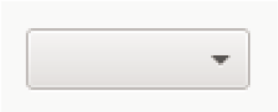


ComboBox (1)

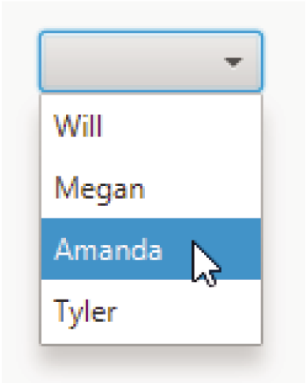
- A ComboBox presents a drop-down list of items that the user may select from.

```
ComboBox<String> nameComboBox = new ComboBox<>();
nameComboBox.getItems().addAll("Will",
"Megan", "Amanda", "Tyler");
```

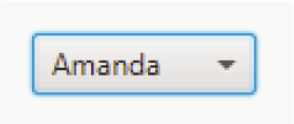
The ComboBox's initial appearance



When the user clicks the ComboBox, a list of items drops down.



The selected item is displayed by the ComboBox.



ComboBox (2)

- You can use the `ComboBox` class's `getValue()` method get the item that is currently selected:

```
String selected = comboBox.getValue();
```

- If no item is selected in the `ComboBox`, the method will return null.
- By default, `ComboBox` controls are uneditable
  - Use the `setEditable` method to make a `ComboBox` editable:

ComboBox (3)

- In FXML design, the items of a CmoboBox need to be added at the Controller class, **`initialized`** method

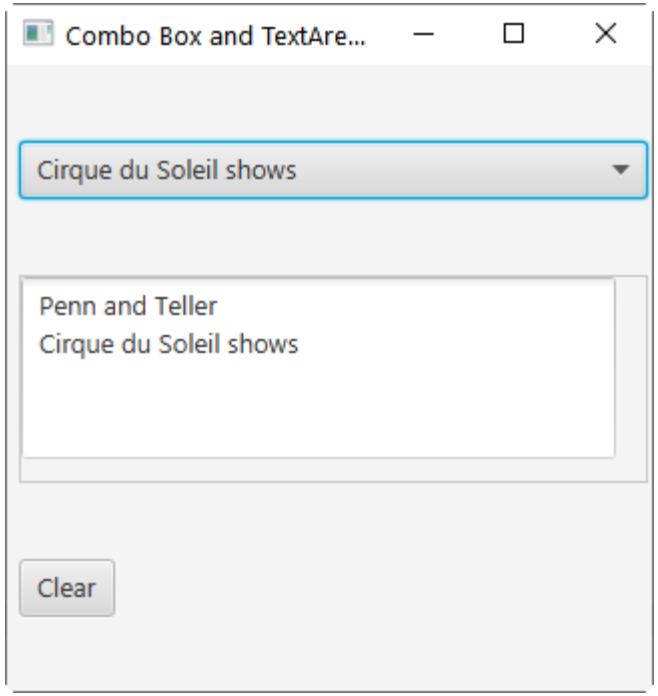
TextArea

- A `TextArea` is a multiline `TextField` that can accept several lines of text input, or display several lines of text
- By default, `TextArea` controls do not perform text wrapping
  - To enable text wrapping, use the `setWrapText` method.

```
textInput.setWrapText(true);
```

Lab (5)

- ShowSelection.fxml
- ShowSelection.java
- ShowSelectionController.java



Using Model Class in GUI Application

- Model classes can be instantiated in the controller class
  - Methods can be used to perform tasks

Exercise: Employee Data (1)

- Please create a JavaFX application to allow entry of employee name, pay rate, and working hours. Then add the employee details into a text area showing the details with total pay
  - Payroll (included in the lab files) is a model class with three fields and some methods.
  - At the action listener of the button, please instantiate Payroll objects and use its methods to complete the program

Exercise: Employee Data (2)