CS 213 – Software Methodology

Spring 2017

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Lecture 4 – Jan 26
Graphical User Interface
Declarative Design

Fahrenheit-Celsius Converter

Version 2

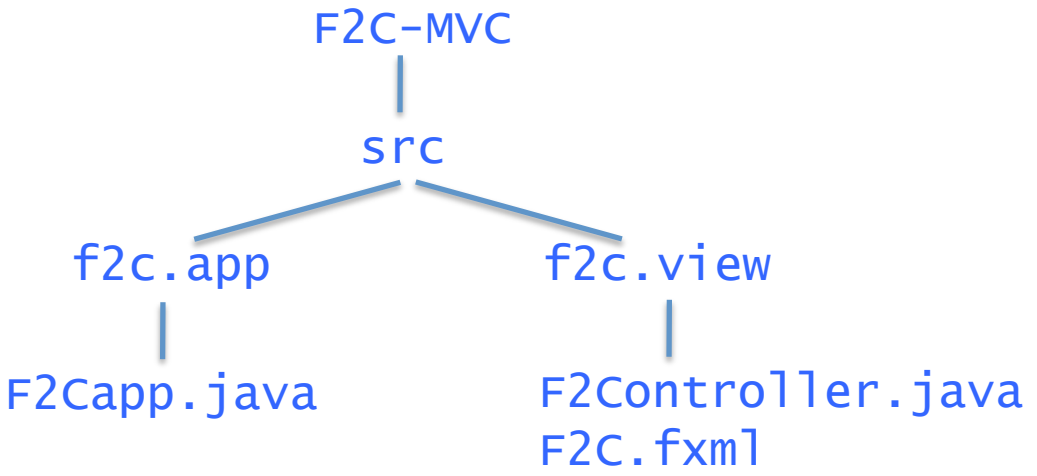
Separating View (UI in fxml) from Controller (Java code)

The MVC Code Architecture (Model-View-Controller)

Model is the set of classes
that store and manage the data

View is the set of Java classes
and non-Java design artifacts
(e.g. xml, css, etc.) that implement
the user interface

Controller is the set of classes that
broker between Model and View



(There is not always a separate Model,
and each of M, V, and C need not always
be in its own separate package)

View: Layout using fxml

```
<?xml version="1.0" encoding="UTF-8"?>

<?import javafx.scene.layout.*?>
<?import javafx.scene.control.*?>
<?import javafx.scene.text.*?>
<?import javafx.geometry.*?>


<GridPane
    xmlns="http://javafx.com/javafx/8.0.40"
    xmlns:fx="http://javafx.com/fxml/1"
    fx:controller="f2c.view.F2CController"
    vgap="10" hgap="10">


    <Text text="Fahrenheit" GridPane.valignment="BOTTOM"/>
    <Button text="&gt;&gt;&gt;" GridPane.columnIndex="1" />
    <Text text="Celsius" GridPane.columnIndex="2" GridPane.valignment="BOTTOM"/>
    <TextField prefColumnCount="10" promptText="-40.0" GridPane.rowIndex="1" />
    <Button text="&lt;&lt;&lt;" GridPane.rowIndex="1" GridPane.columnIndex="1" />
    <TextField prefColumnCount="10" promptText="-40.0"
          GridPane.rowIndex="1" GridPane.columnIndex="2" />
    <padding>
       <Insets top="10" right="10" bottom="10" left="10"/>
    </padding>
</GridPane>
```

Don't forget imports!! (Editor won't flag errors for unresolved tags.)

Name space for Java FX tags (e.g. Text)

Name space for FXML tags (e.g. fx:controller)

Row and column indexes default to 0

View: Set up SceneBuilder

- Get SceneBuilder 8.2.0 at Gluon:

http://gluonhq.com/open-source/scene-builder/

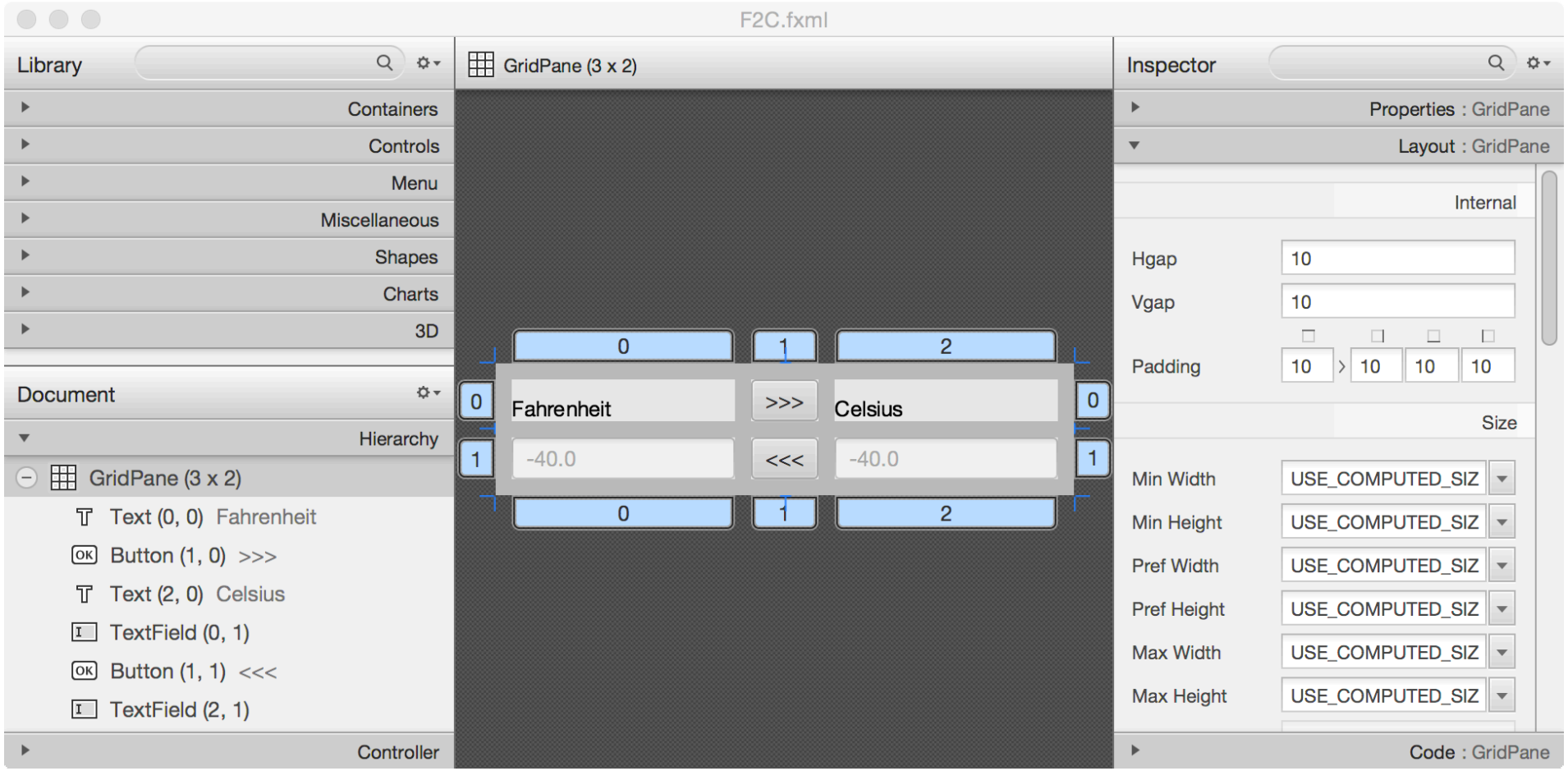
(This will allow SceneBuilder to be opened from within Eclipse)

- You can construct UIs exclusively using SceneBuilder interface, or you can write up the UI in an editor and optionally verify/polish using SceneBuilder
- To open SceneBuilder from Eclipse on an fxml file:

  Right click on fxml file -> open with -> other -> external programs (radio button) -> SceneBuilder

(or you can set Preferences -> JavaFX in Eclipse for the SceneBuilder executable and then right click on fxml file -> Open with SceneBuilder)

Verify fxml Layout with SceneBuilder



(In SceneBuilder, do Preview -> Show Preview in Window to simulate behavior)

fxml Layout – Id'ing widgets/event handler

```
...

<Text text="Fahrenheit" GridPane.valignment="BOTTOM"/>

<Button fx:id="f2c" text="&gt;&gt;&gt;" GridPane.columnIndex="1"
    onAction="#convert" />

<Text text="Celsius" GridPane.columnIndex="2" GridPane.valignment="BOTTOM"/>

<TextField fx:id="f" prefColumnCount="10" promptText="-40.0"
    GridPane.rowIndex="1" />

<Button fx:id="c2f" text="&lt;&lt;&lt;" GridPane.rowIndex="1"
    GridPane.columnIndex="1" onAction="#convert" />

<TextField fx:id="c" prefColumnCount="10" promptText="-40.0"
           GridPane.rowIndex="1" GridPane.columnIndex="2" />

<padding>
    <Insets top="10" right="10" bottom="10" left="10"/>
</padding>
```

Controller – Java Code

```
package f2c.view;

import javafx.event.ActionEvent;
import javafx.fxml.FXML;
import javafx.scene.control.Button;
import javafx.scene.control.TextField;

public class F2CController {

    @FXML Button f2c;
    @FXML Button c2f;
    @FXML TextField f;
    @FXML TextField c;

    public void convert(ActionEvent e) {
        Button b = (Button)e.getSource();
        if (b == f2c) {
            float fval = Float.valueOf(f.getText());
            float cval = (fval-32)*5/9;
            c.setText(String.format("%5.1f", cval));
        } else {
            float cval = Float.valueOf(c.getText());
            float fval = cval*9/5+32;
            f.setText(String.format("%5.1f", fval));
        }
    }
}
```

@FXML directive links widget to fxml element:
var name in code = id in layout

Name of method = name assigned in # directive in fxml file for onAction attribute

Main App for View/Controller

```
package f2c.app;

import javafx.application.Application;
import javafx.fxml.FXMLLoader;
...

public class F2CApp extends Application {

    @Override
    public void start(Stage primaryStage) throws Exception {

        FXMLLoader loader = new FXMLLoader();
        loader.setLocation(getClass().getResource("/f2c/view/F2C.fxml"));


        GridPane root = (GridPane)loader.load();

        Scene scene = new Scene(root);
        ...
    }

    public static void main(String[] args) {
        launch(args);
    }

}
```

Loading means creating objects for various widgets and layouts in the fxml file