JAVAFX COMPONENTS

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Depto. Sistemas Informáticos y Computación

UPV

Outline

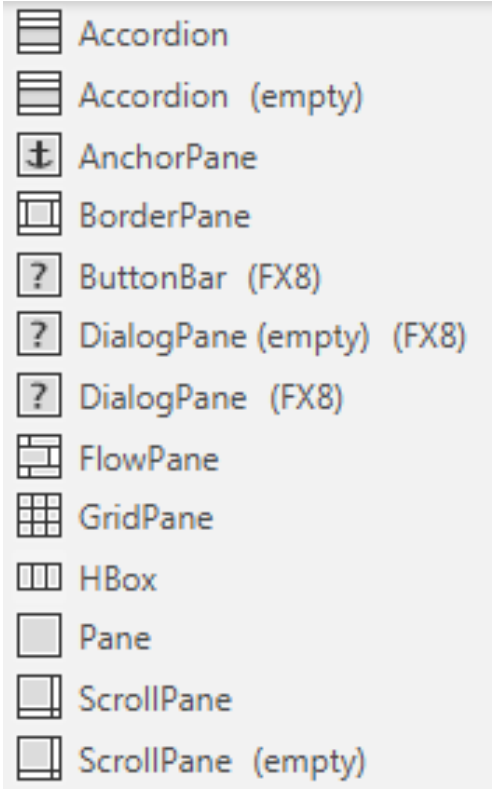
- Introduction
- JavaFX 8 Controls
- Default JavaFX application in NetBeans
- Containers
- Inspecting JavaFX applications
- Exercise

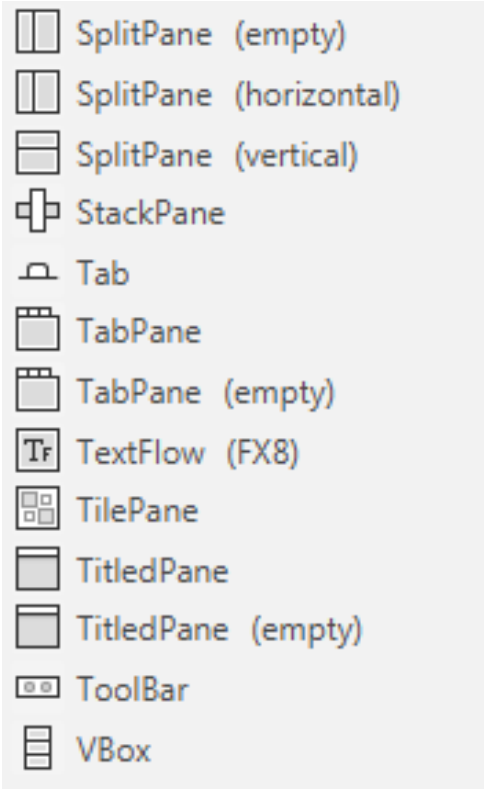
Introduction

- In this session we will study the available controls in JavaFX 8
- We will focus on how to use the containers for organizing the controls of an interface
- We will study how to control the size of the controls
- Finally, we will review how to build the examples in Ensemble using NetBeans and how to inspect running JavaFX applications for studying its scene graph

JavaFX 8 Controls

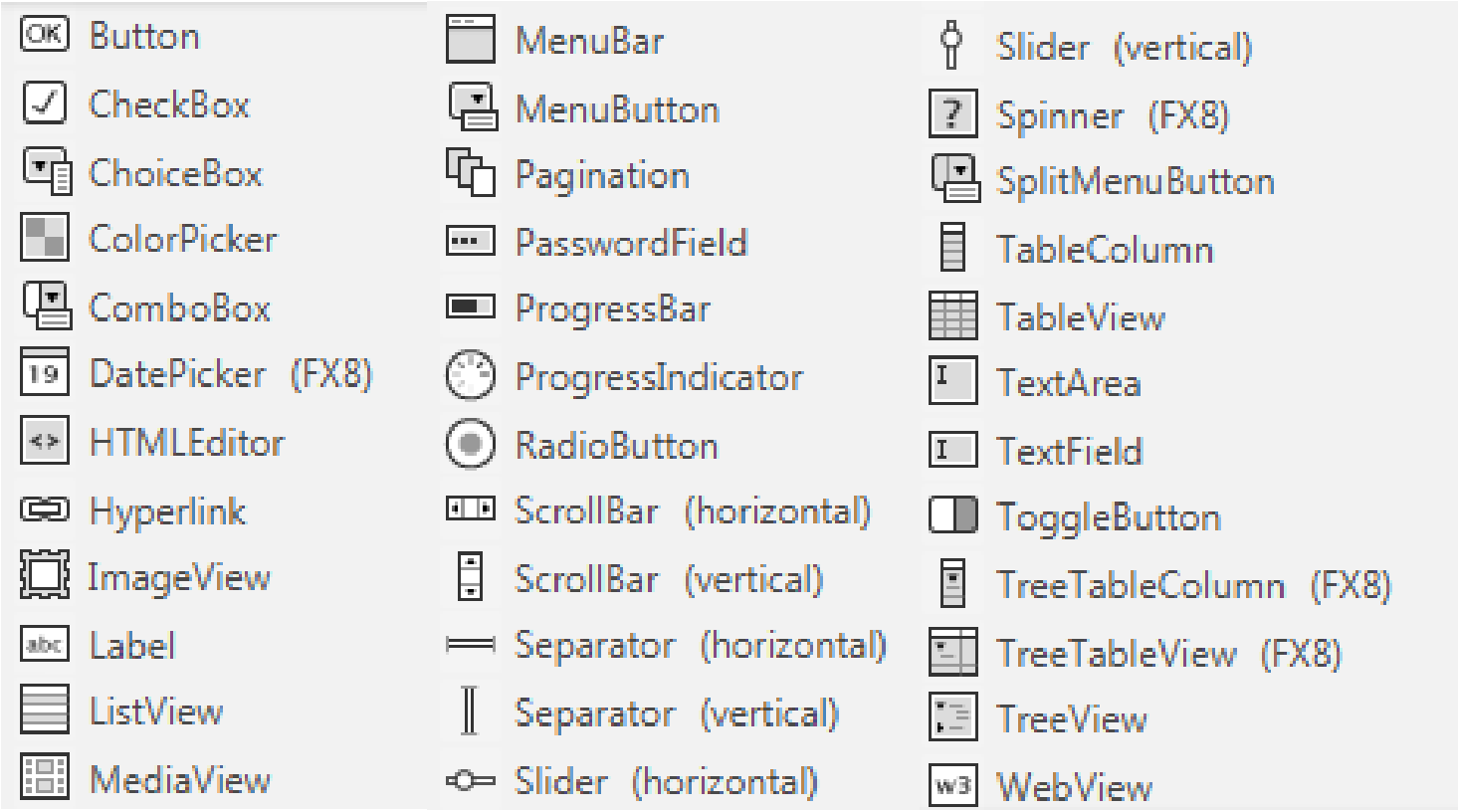
- Containers: contain other controls (and containers) and keeps them laid out automatically





JavaFX 8 Controls

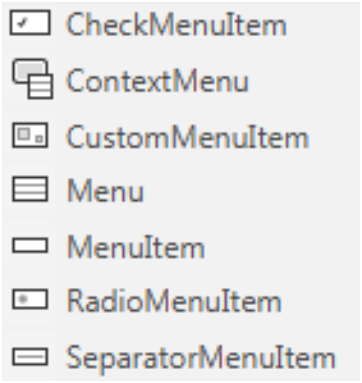
- Controls: implement user interaction



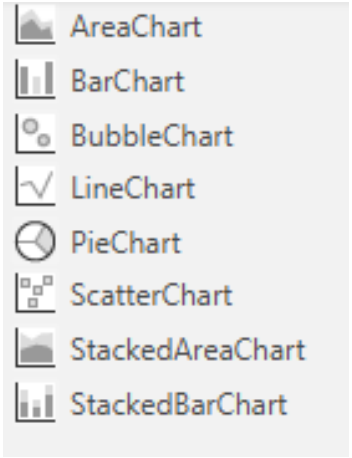
JavaFX 8 Controls

- Other controls

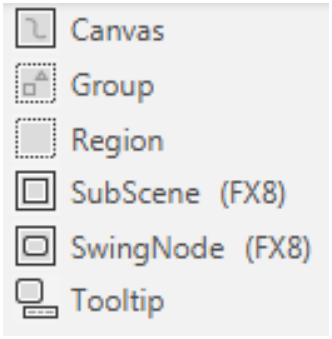
Menus



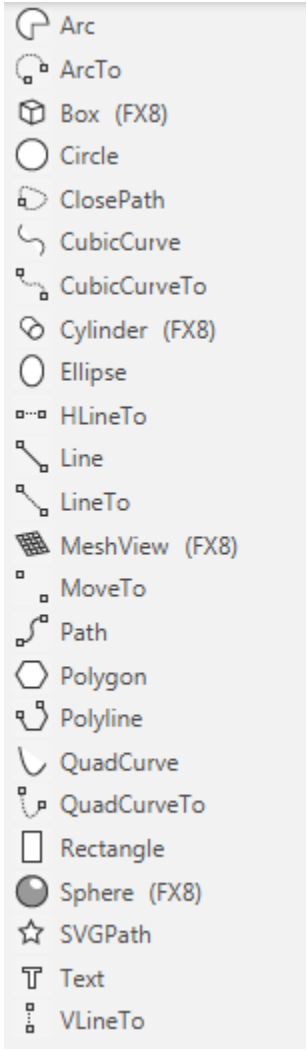
Charts



Other



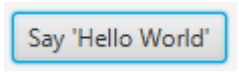
2D and 3D graphics

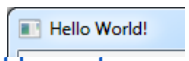


Default JavaFX Application in NetBeans

File\New Project\Java FX Application

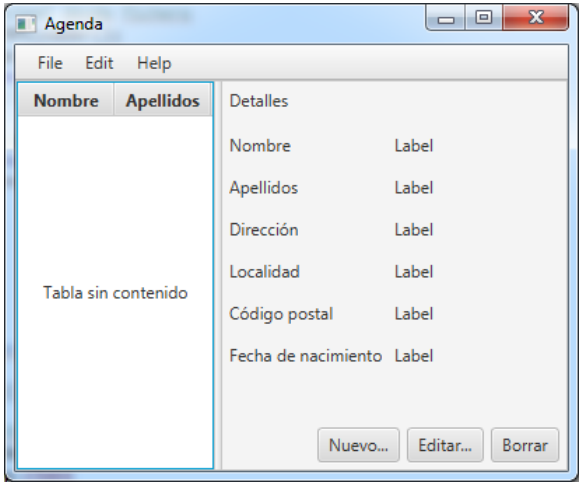
```
import javafx.application.Application;
/* and other imports */

public class HelloWorld extends Application {
  @Override
  public void start(Stage primaryStage) {
    Button btn = new Button();                          // Creates a button
    btn.setText("Say 'Hello World'");                   // Button label
    btn.setOnAction(new EventHandler<ActionEvent>() {   // Event handler:
      @Override public void handle(ActionEvent event) {// the handle method is executed
        System.out.println("Hello World!");             // whenever the button is pressed
      }
    });
    StackPane root = new StackPane();                   // Create a container
    root.getChildren().add(btn);                        // Add the button to the container
    Scene scene = new Scene(root, 300, 250);            // Create a scene with the container
    primaryStage.setTitle("Hello World!");              // Window title
    primaryStage.setScene(scene);                       // Install the scene in the stage
    primaryStage.show();                                // Show the stage
  }
  public static void main(String[] args) {
    launch(args);
  }
}
```

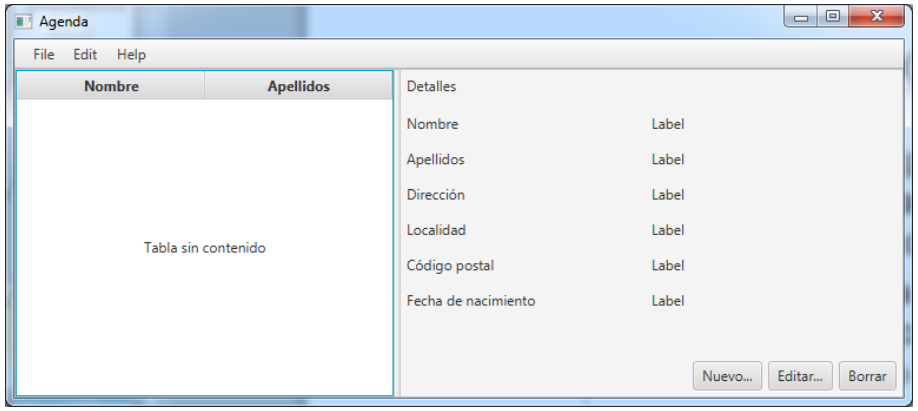




JavaFX Containers

- The developer can set in code the size and position of the widgets in the window, but it is difficult to relocate all the widgets when the window resizes
- It is easier (and mandatory in this course!) to use containers to keep the controls laid out correctly and properly sized for different window sizes



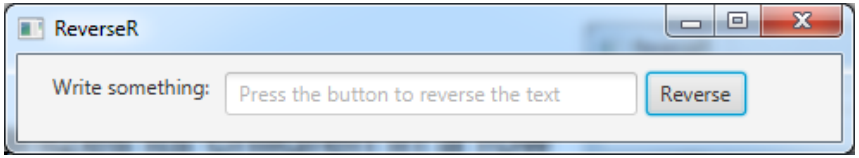


JavaFX Containers

- There are containers that organize their children is rows, columns, stacks, grids, etc.
- The container re-computes automatically the position and size of its children when the window is resized

JavaFX Containers

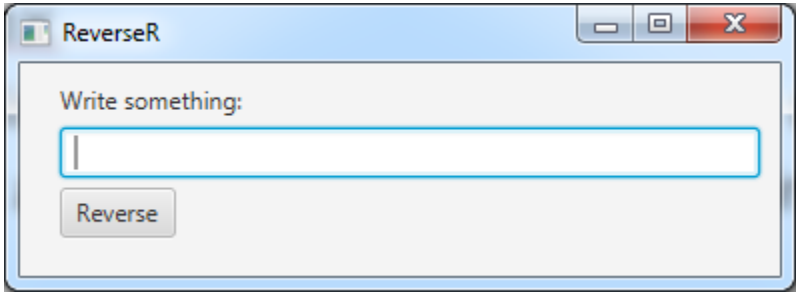
- HBox
  - Organizes its children in a row
  - We can set a space around them (padding), and the space between them (spacing)




```
Label lbl = new Label("Write something:");
TextField text = new TextField();                                  // Text box
text.setPrefColumnCount(20);                                       // Preferred size
text.setPromptText("Press the button to reverse the text");        // Prompt
Button btn = new Button("Reverse");
btn.setOnAction(new EventHandler<ActionEvent>() {
  @Override public void handle(ActionEvent event) {
    String tmp = text.getText();
    text.setText(new StringBuffer(tmp).reverse().toString());
  }});
HBox root = new HBox(5);                                           // 5 pixels between child.
root.setPadding(new Insets(10));                                   // 10 pixels around
root.getChildren().addAll(lbl, text, btn);
```

JavaFX Containers

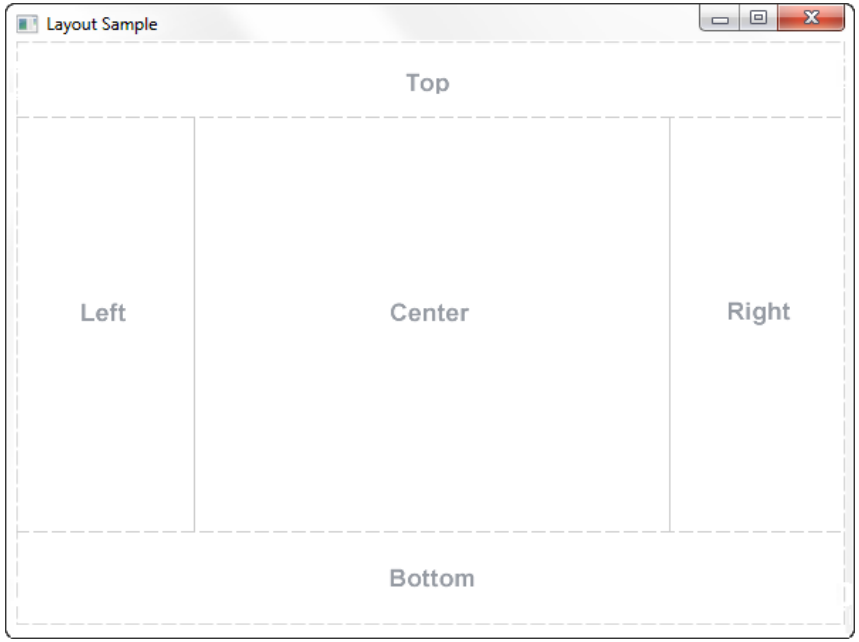
- VBox
  - Similar to HBox, but organizes its children vertically
  - It also defines *padding* and *spacing*




```
// Same code as before
VBox root = new VBox(5);                          // 5 pixels between children
root.setPadding(new Insets(10, 10, 10, 20));      // up, right, down, left
root.getChildren().addAll(lbl, text, btn);
```

JavaFX Containers

- `BorderPane`
- Defines 5 regions:
  - Top, left, center, right and bottom
  - Used for building main windows (with toolbars, status bar, navigation panel on the left and the main work area in the center)
  - If there is enough space, the center grows as needed. If there is not enough space, areas can overlap
  - There can be empty regions

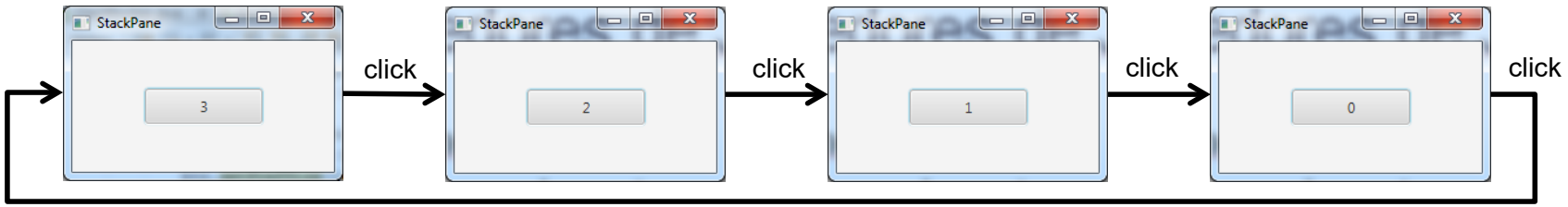



```
BorderPane root = new BorderPane();
root.setTop(new Button("Top"));
HBox group = new HBox();
group.getChildren().addAll(
   new Button("Bottom 1"),
   new Button("Bottom 2"));
root.setBottom(group);
// and setLeft, setCenter and setRight
```

JavaFX Containers

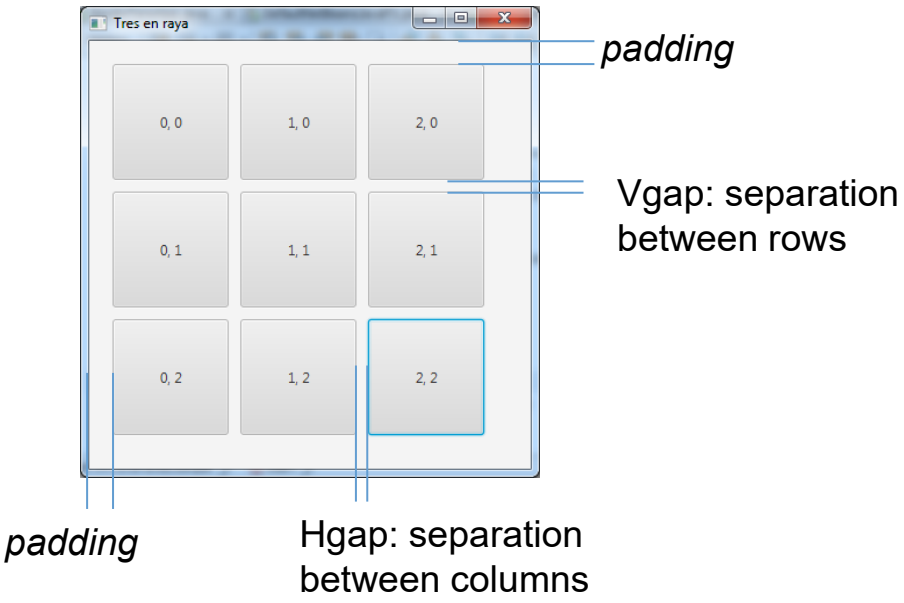
- `StackPane`
  - Organizes its elements one on top of each other
  - This allows us to overlap text onto other elements (shapes, images, etc.), or showing only an element in a stack

```
StackPane root = new StackPane();
for (int i = 0; i < 4; i++) {
  Button btn = new Button(Integer.toString(i));
  btn.setPrefSize(100, 30);
  btn.setOnAction(new EventHandler<ActionEvent>() {
    @Override public void handle(ActionEvent event) {
      ((Node)event.getSource()).toBack(); // getSource returns who fired the event
    }                                     // toBack sends the node to the back of the
  });                                     // container's children list
  root.getChildren().add(btn);
}
```



JavaFX Containers

- `GridPane`
  - Organizes its children in a matrix with rows an columns
  - A node can overflow to adjacent cells
  - Used to implement forms



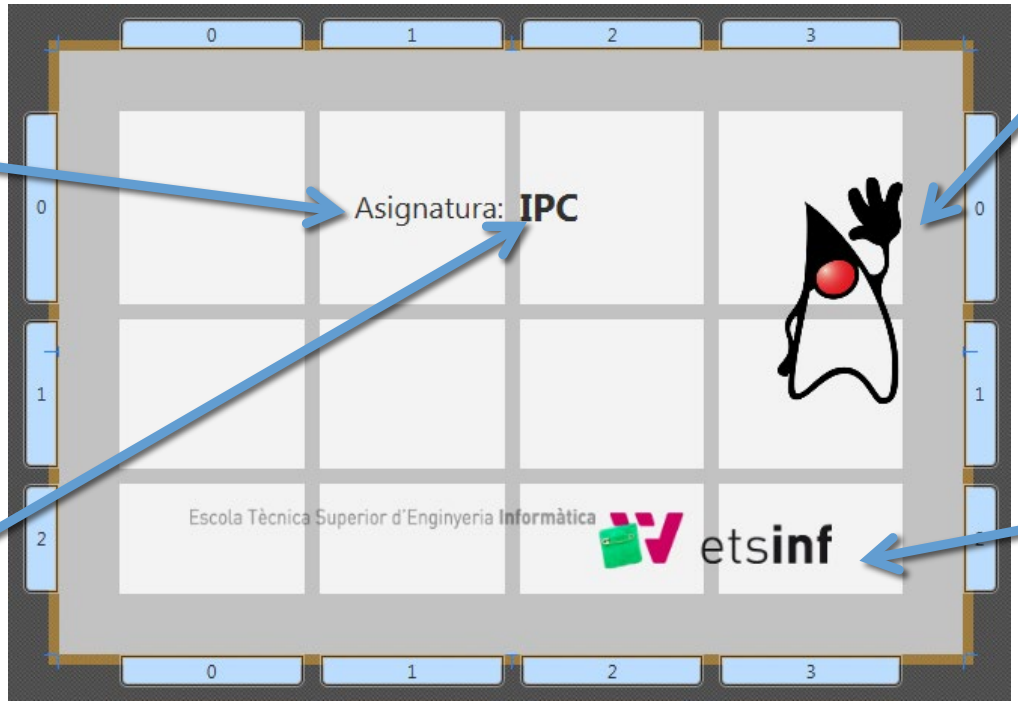

```
GridPane root = new GridPane();
for (int col = 0; col < 3; col++) {
  for (int row = 0; row < 3; row++)  {
    Button btn = new Button(
      Integer.toString(col) + ", " + row);
    btn.setPrefSize(100, 100);
    root.getChildren().add(btn);
    GridPane.setConstraints(btn, col, row);
  }
}
root.setVgap(10);
root.setHgap(10);
root.setPadding(new Insets(20));
```

JavaFX Containers

- `GridPane`: expanding to adjacent cells

```
Label
Row Index: 0
Column Index: 1
Row Span: 1
Column Span: 1
Halignment: RIGHT
```

```
Label
Row Index: 0
Column Index: 2
Row Span: 1
Column Span: 1
```




```
ImageView
Row Index: 0
Column Index: 3
Row Span: 2
Column Span: 1
Halignment: RIGHT
```

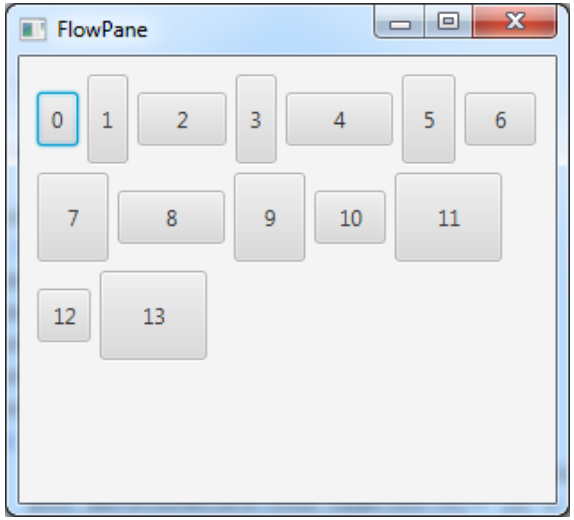
```
ImageView
Row Index: 2
Column Index: 0
Row Span: 1
Column Span: 4
Halignment:
CENTER
```

Methods in class `GridPane`:

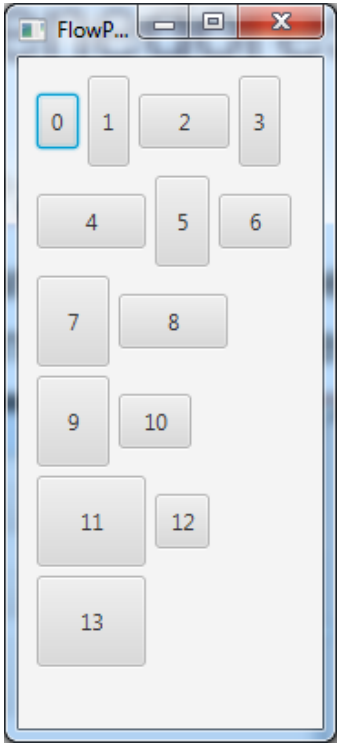
```
public void add(Node child, int columnIndex, int rowIndex, int colspan, int rowspan)
public static void setHalignment(Node child, HPos value) // Hpos.{LEFT,CENTER,RIGHT}
public static void setValignment(Node child, VPos value) // Vpos.{BASELINE, BOTTOM,
                                                                CENTER, TOP}
```

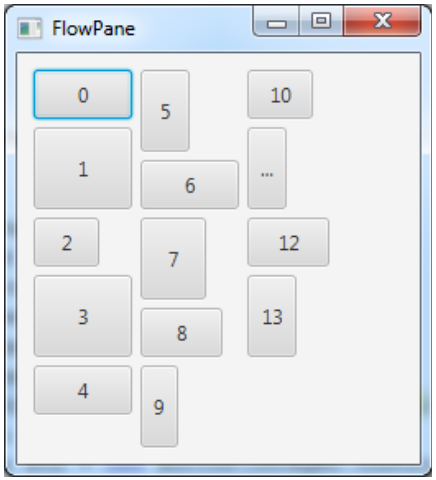
JavaFX Containers

- `FlowPane`
  - Organize its children sequentially, from left to right or top to bottom, adjusting to the container's size



Orientation: HORIZONTAL (default)

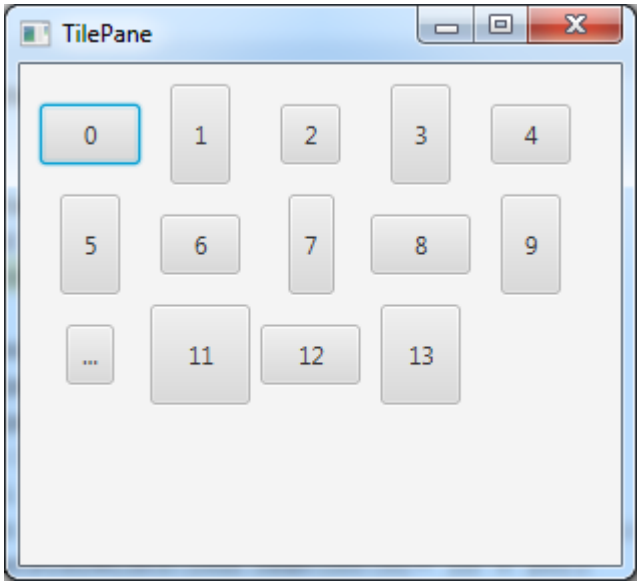




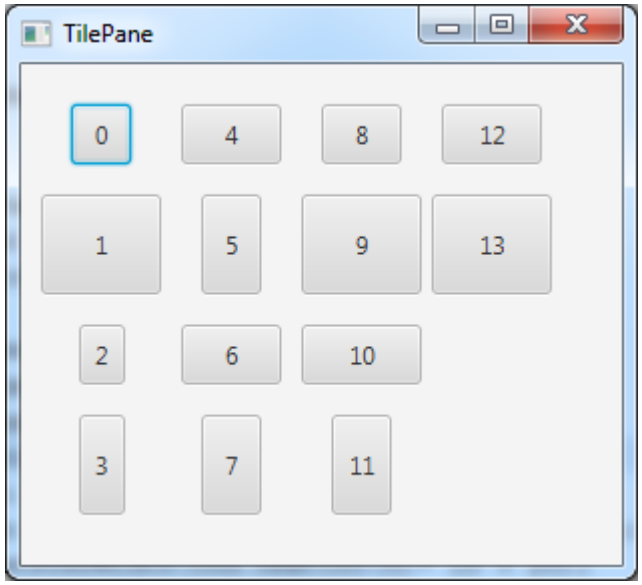
Orientation: VERTICAL

JavaFX Containers

- `TilePane`
  - Similar to `FlowPane`, but organizes its children sequentially in a matrix where each cell uses the same space, regardless of the child's size



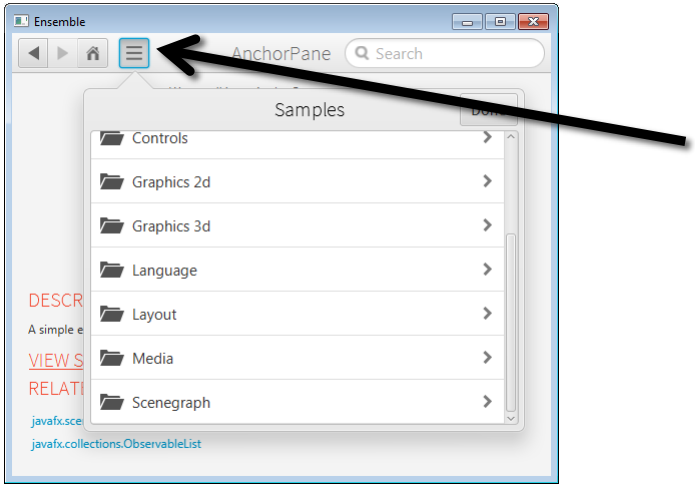
Orientation: HORIZONTAL (default)



Orientation: VERTICAL

JavaFX Containers

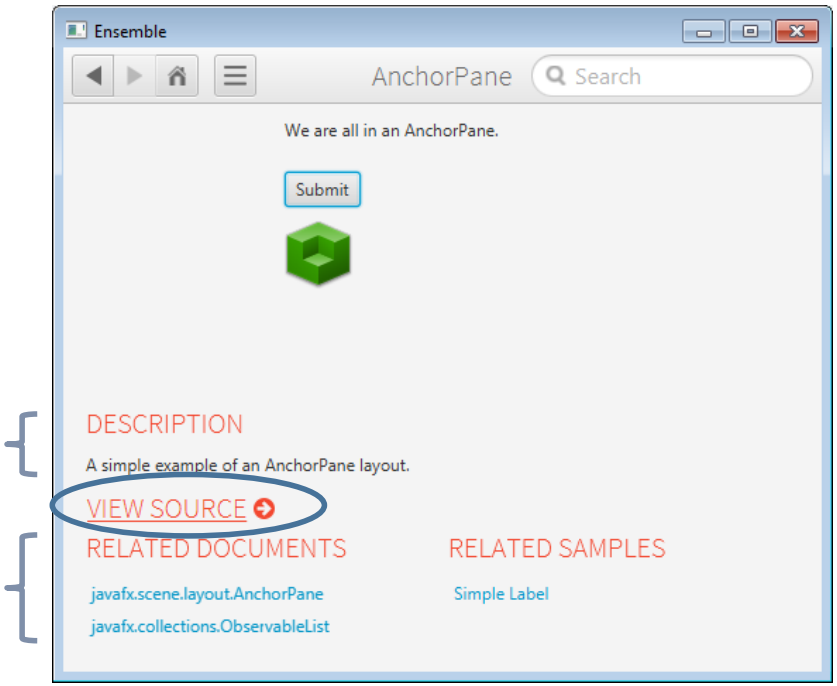
- `AnchorPane`
  - It allows anchoring their children to a given distance from the borders of the container, or to its center
  - When the window resizes, the nodes keep their relative positions to their anchor points
  - A node can be anchored to more than one anchor point
- Study the examples in Ensemble:



Click on the list icon, select the category “Layout” and open the sample for AnchorPane

JavaFX Containers

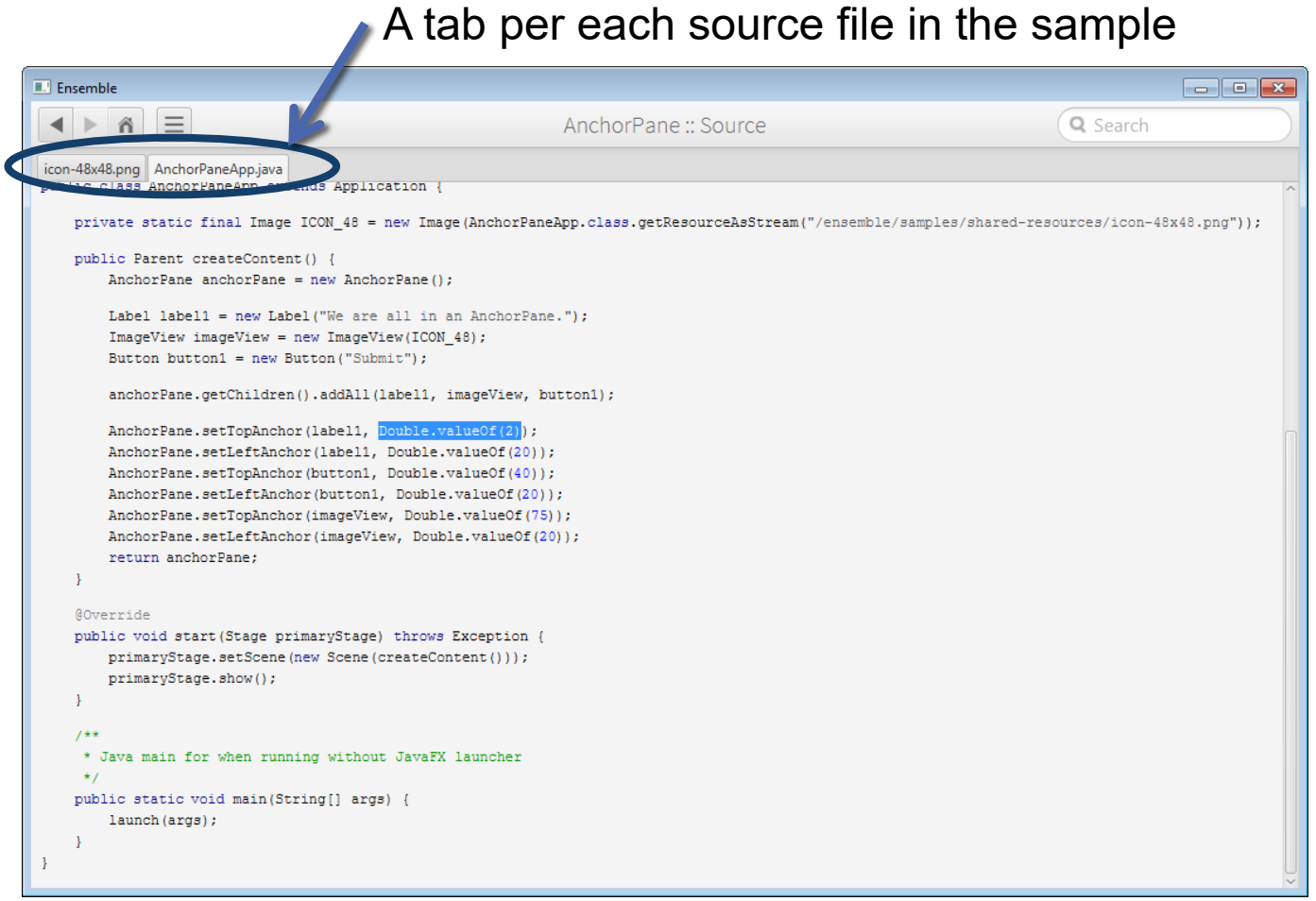
- AnchorPane
  - All the sample pages in Ensemble show:



The sample application. It is actually running and you can interact with it

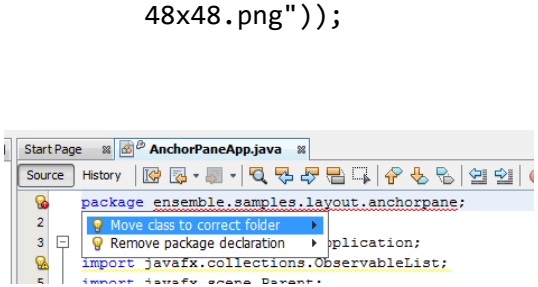
JavaFX Containers

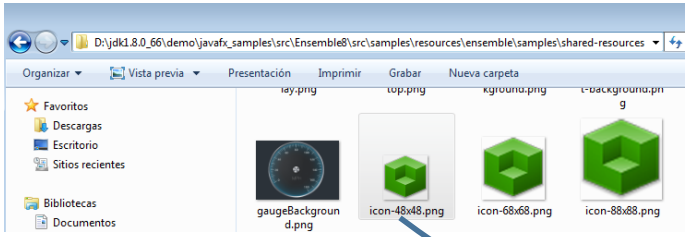
- AnchorPane

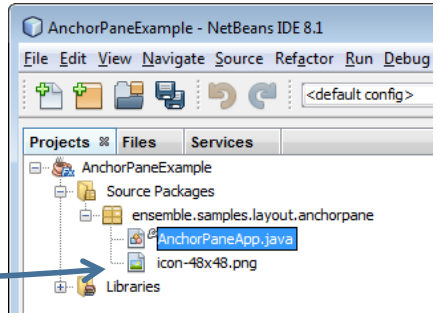


JavaFX Containers

- Compiling a sample from Ensemble using NetBeans:
  - Create a new project `JavaFX Application`
    - Uncheck the option `Create Application Class`
  - Add to the project a new Java class, using the same class name as the example (`AnchorPaneApp`)
  - Copy and paste the code in Ensemble to the previous file
    - Move the class to its package
  - Copy other resources, into the package and fix their path in the code:
    - `private static final Image ICON_48 = new Image(AnchorPaneApp.class.getResourceAsStream("/ensemble/samples/shared-resources/icon-48x48.png"));`
    - `private static final Image ICON_48 = new Image(AnchorPaneApp.class.getResourceAsStream("icon-48x48.png"));`







JavaFX Containers

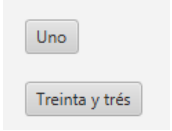
Controlling the size of the nodes

- The advantage of using the JavaFX containers is that they re-compute the position and size of their nodes when the window is resized
- The nodes can be resized according to a number of parameters, presented later
  - There are nodes that do not resize: shapes, text and groups.
- In general, we can specify:
  - a node's size using its preferred size (`Pref Width` and `Pref Height`)
  - The position of a node using the alignment properties of the container

JavaFX Containers

Controlling the size of the nodes

- By default, controls compute their preferred size depending on their content
  - The size of a button adapts to its label



- Nodes define minimum and maximum sizes
  - The maximum size of a button, by default, is set to its preferred size (typically we don't want buttons to grow)
  - Other nodes, such as `ListView`, do want to grow to use all the available space.
- We can set the following sizes
  - Preferred (`setPrefHeight`, `setPrefWidth` o `setPrefSize`)
  - Maximum (`setMaxHeight`, `setMaxWidth`, o `setMaxSize`)
  - Minimum (`setMinHeight`, `setMinWidth`, o `setMinSize`)
    - They all accept values in pixels, or `Double.MAX_VALUE`, `Control.USE_PREF_SIZE` or `Control.USE_COMPUTED_SIZE`

JavaFX Containers

Controlling the size of the nodes

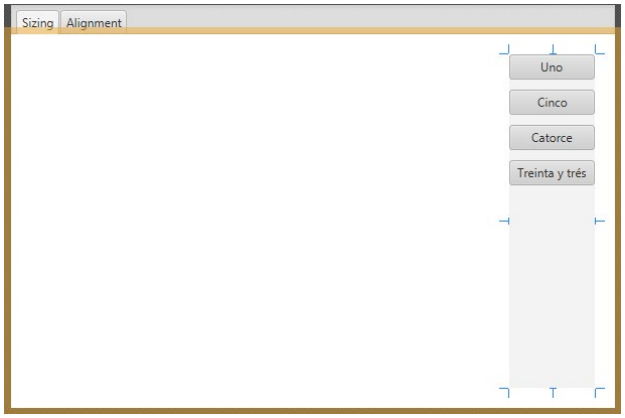
- Homogenizing the node size in a group:

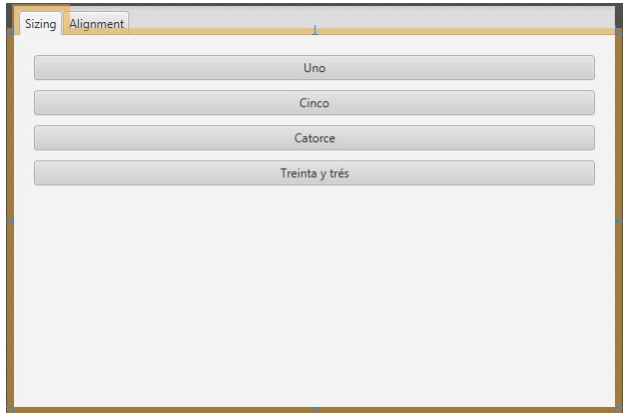
Default maximum

Maximum set to MAX_VALUE


```
VBox root = new VBox();
Button b1 = new Button("Uno");
Button b5 = new Button("Cinco");
[...]
b1.setMaxWidth(Double.MAX_VALUE);
b5.setMaxWidth(Double.MAX_VALUE);
b14.setMaxWidth(Double.MAX_VALUE);
b33.setMaxWidth(Double.MAX_VALUE);
```

- In a `BorderPane`, the central area takes all the available space; the other areas only as much space as needed:



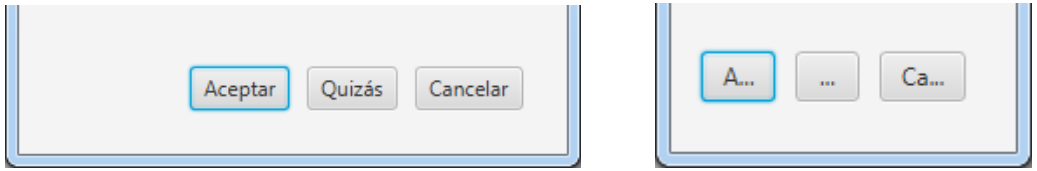


The same `VBox` as above, in the right area and in the central area of a `BorderPane`

JavaFX Containers

Controlling the size of the nodes

- For keeping a node from growing:
  - Set the maximum size to `Control.USE_PREF_SIZE`, or to a maximum size in pixels
- For keeping a node from shrinking:
  - Set its minimum size to `Control.USE_PREF_SIZE`

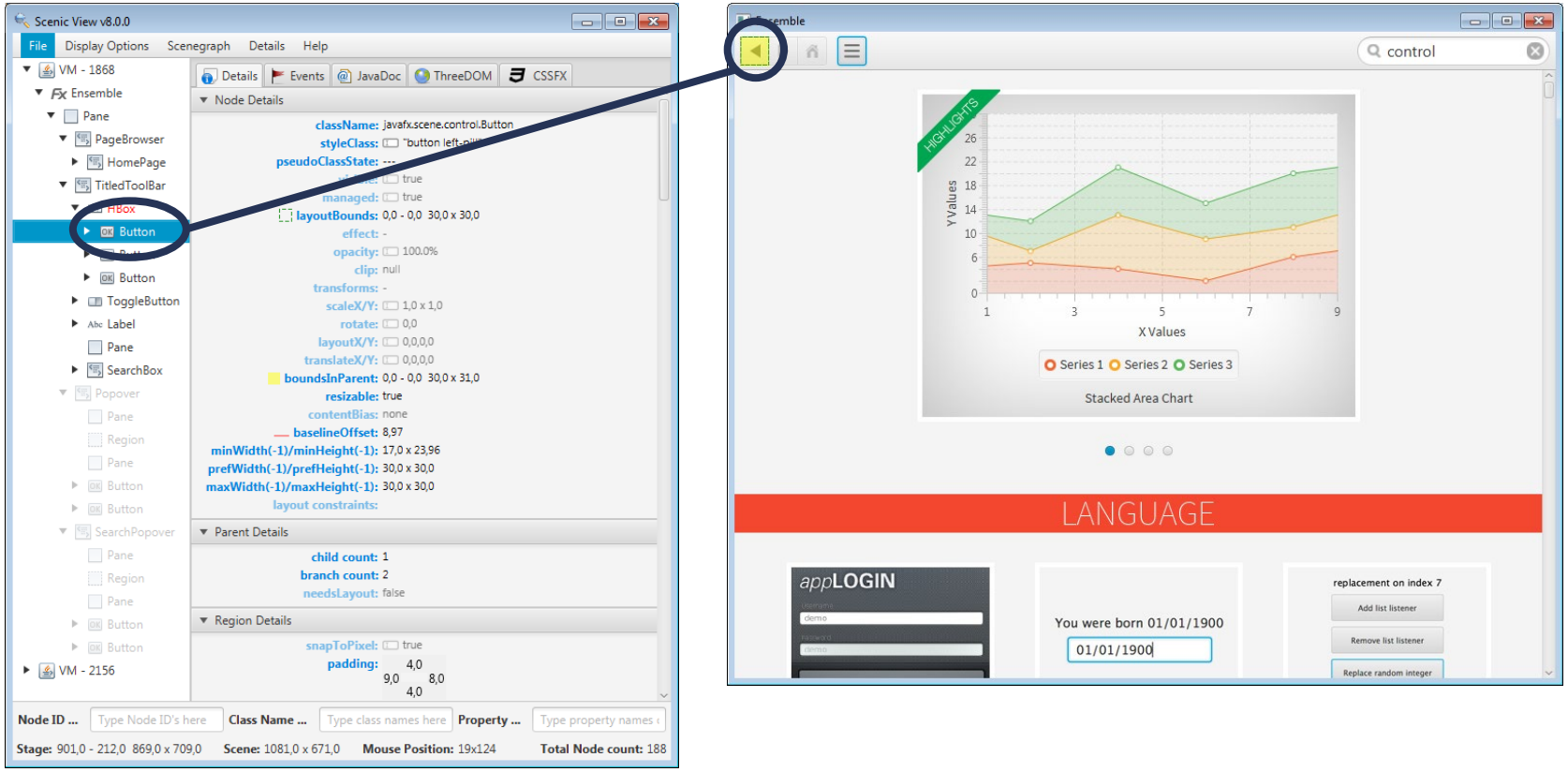


By default, buttons shrink

- For keeping a node from resizing
  - Set the minimum, maximum and preferred sizes to the same value

Inspecting JavaFX Applications

- Scenic View is an application for inspecting other running JavaFX applications



Watch this videos before next session

- Editing tools in NetBeans
  - https://goo.gl/YszduJ
- Exporting NetBeans projects
  - https://goo.gl/zkEURr

References

- JavaFX: Getting Started with JavaFX
  - http://docs.oracle.com/javase/8/javafx/get-started-tutorial/index.html
- JavaFX: Working with Layouts in JavaFX
  - http://docs.oracle.com/javase/8/javafx/layout-tutorial/index.html
- JavaFX API Documentation:
  - http://docs.oracle.com/javase/8/javafx/api/toc.htm
- Ensemble
  - Google “Java SE Development Kit Demos and Samples Downloads”
- Scenic View
  - http://fxexperience.com/scenic-view/