
GENERIC IS SO HOT RIGHT NOW
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Fads
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Lab 9: JavaFX

CS 2112 Fall 2021

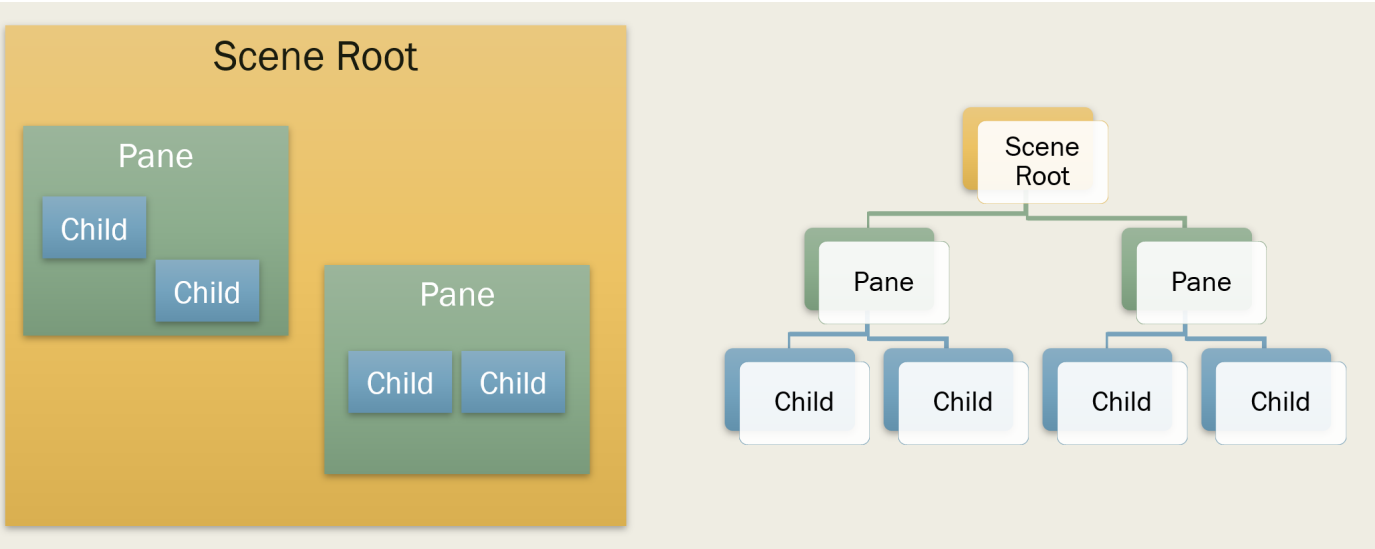
November 1 / 3, 2021

JavaFX

- JavaFX is a modern object-oriented graphics library that provides the ability to create and manipulate cross-platform compatible graphical user interfaces
- Other Java GUI libraries include AWT (Abstract Window Toolkit) and Swing

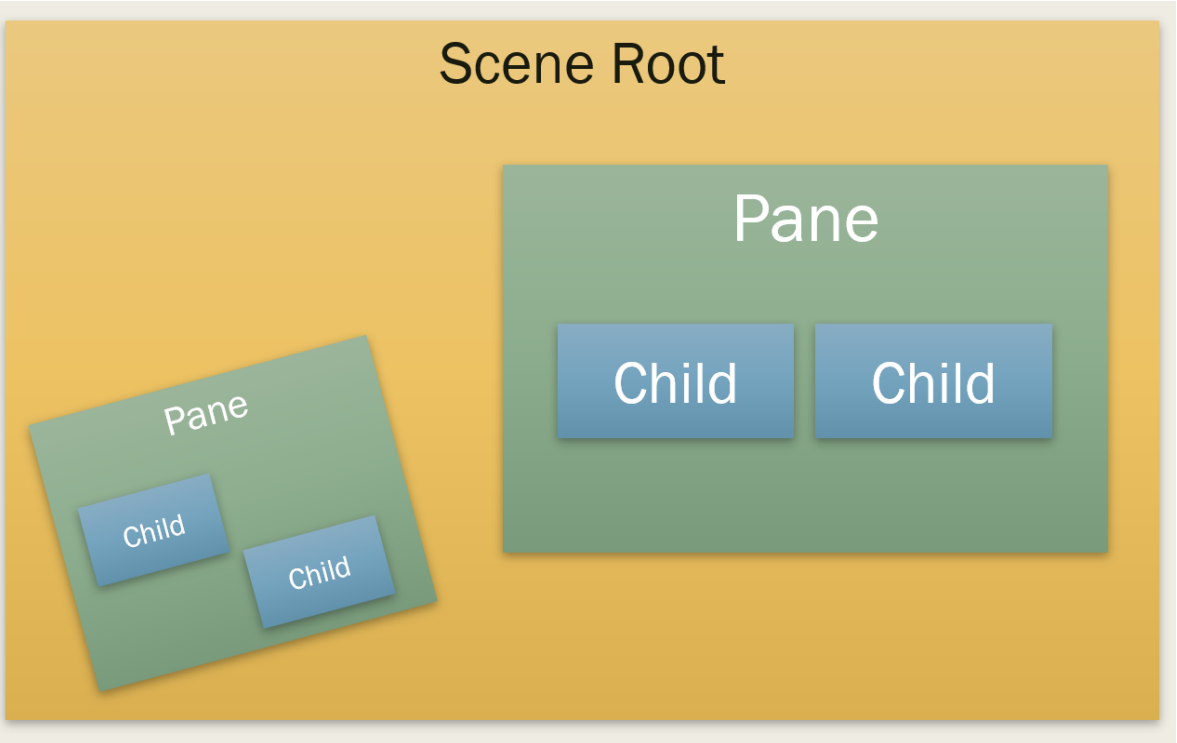
Scene Graph

JavaFX manages the user interface as a scene graph, which is actually a tree of nodes. At the root of the scene graph is some node; the node is registered with a Scene object that is in turn registered with a Stage, which corresponds to a top-level window in the application.



Scene Graph Advantages

The benefit of a scene graph is that child nodes can be positioned relative to their parents. This means when the parent nodes are moved and scaled, the child nodes adjust automatically



Layout Panes

- Scene graph nodes designed to act as parents
- Automatically positions its children in logical and consistent ways
- Helps facilitate resizable windows

Layout Pane Examples

An overview of various layout panes can be found at https://docs.oracle.com/javafx/2/layout/builtin_layouts.htm
We will highlight just a few examples:

- Border Pane: provides a header and footer, along with three columns to place children in
- HBox / VBox: horizontally and vertically aligned children
- Stack Pane: multiple children at the same location (for instance, a picture on a button)
- Grid Pane: layout children in a customizable grid
- Flow Pane: automatically flow children based on available space, adding more columns as space is available

Layout Panes: Anchor Pane

- Anchor nodes relative to the edges of the anchor pane
- If anchored to two opposing edges, will make child node stretch
- Example: anchor with distance 0 to all edges to force child node to fill entire pane
- Common Use: anchor pane inside another layout pane

A Note on Performance

Unlike most of the rest of this course, GUIs are unique in that there is a hard numerical performance target.

Most computer monitors refresh at 60 Hertz, or 60 times per second. This means your program has at most 16.666 milliseconds to draw the next frame, or else your app will lag.

Scene graph nodes add overhead to your program. While they are fine for fixed UI, if you have a large number of procedurally generated elements, consider drawing directly onto a Canvas node instead of rendering them in the scene graph.

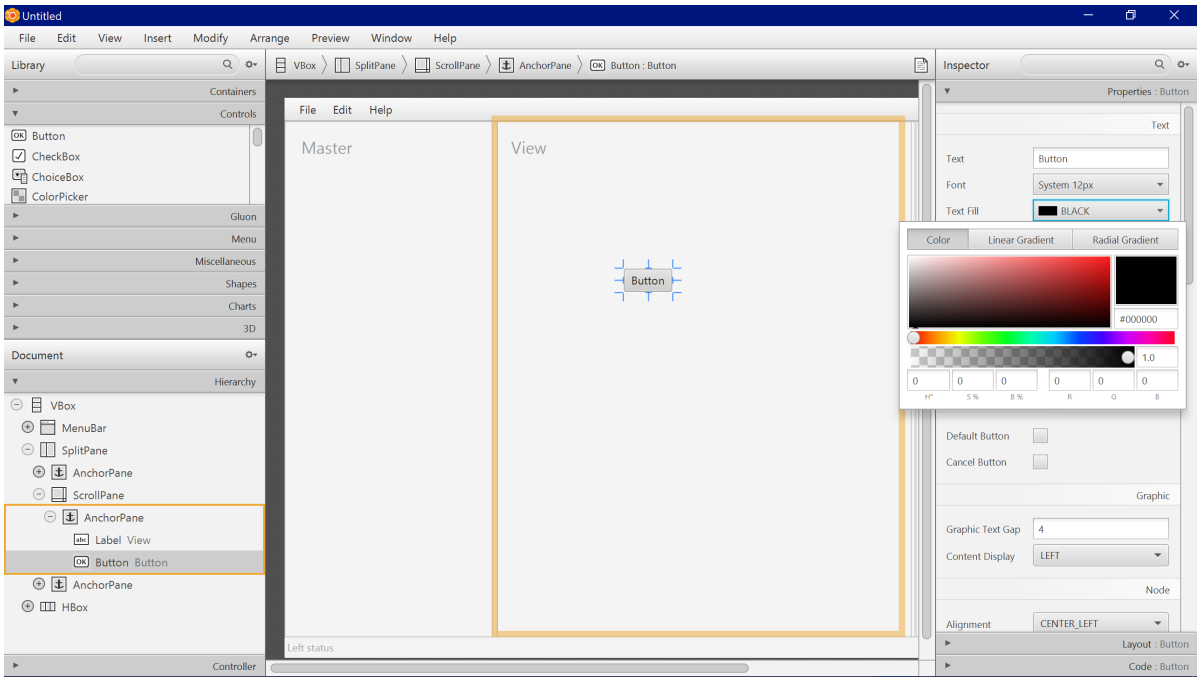
Adding Components

Components can be created and added programatically. By modifying their properties through calling their appropriate methods, the entire GUI can be constructed through code.

```
1 Parent p;
2 Node n;
3 p.getChildren().add(n);
```

Scene Builder

Alternatively, Scene Builder provides a graphical interface for designing and constructing user interfaces. Scene Builder allows for components to be created, placed, and for many of their properties to be modified.



Download Scene Builder

Scene Builder can be downloaded at the following link:

https://gluonhq.com/products/scene-builder/

FXML

Scene Builder will save your layouts into an FXML file, which can be read in through IntelliJ to create the GUI.

```
1 final URL r = getClass().getResource("main.fxml");
2 final Parent node = FXMLLoader.load(r);
3 final Scene scene = new Scene(node);
4 stage.setTitle("Lab 9 Demo");
5 stage.setScene(scene);
6 stage.sizeToScene();
7 stage.show();
```

Exercise

- Build a Tic-Tac-Toe game.
- Starter code can be found on the course website under today's lab.
- You don't have to detect winners and losers (though you may if you wish).
- Try to leverage JavaFX's scene graph to build an intuitive and flexible UI.