CSSE2002/7023

Semester 2, 2021

Programming in the Large

Week 8.1: Intro to GUIs

In this Session

- Why GUIs
- Java GUIs
- Basic GUI components and controls
- Panes
- Canvas

GUIs?

- Why GUIs?
  - Programs people *directly* interact with often have them.
  - They are a nice example of OO.
  - Good example of event-driven programming.
- Extra Considerations
  - Getting GUIs "wrong" is very easy – there is a lot of complexity which goes into designing good GUIs.
    - Which we won't cover in this course.

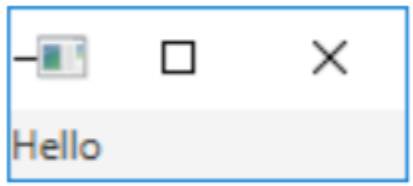
Java GUIs

Java first party GUI toolkits:

- A.W.T. - Abstract Window Toolkit (`java.awt`)
  - In Java 1.0
  - Designed to look like native applications
  - Relative positioning
- Swing (`javax.swing`)
  - Uses custom widgets
  - Looks the same everywhere – "Java" visual style, but can be themed
  - Could do fancier things – 2D, 3D, animation
  - Not actively developed anymore
- **JavaFX**
  - Uses newer Java features
  - We're using this one
    - We are not using all of it
  - Things it supports which we won't be using:
    - CSS
    - JFXML

HelloGUI

`HelloGUI.java`



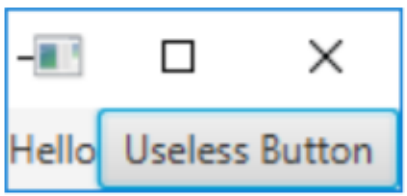
HelloGUI2

Use layout panes (in `javafx.scene.layout`) to group `Nodes` together into a single "control" – can be done recursively to form a graph.

Note `col, row` ordering for placement within grid.

Java will try to identify the minimum sensible size for the window.

`HelloGUI2.java`



Main Points

- Content forms a graph of nodes (scene graph)
- Graph is added to a *scene* (could be multiple scenes)
- A window is a *stage*
- A stage can display one scene at a time
- Program doesn't automatically end when `start()` completes

Controls

In `javafx.scene.control`

- Button
- Label
- TextArea
- TextField

Pane

javafx.scene.layout.Pane

`BorderGui.java`

This example uses the `BorderPane` class. We can:

- control behaviour when resizing
- include or leave out any combination of panes

"Ugly" Panes

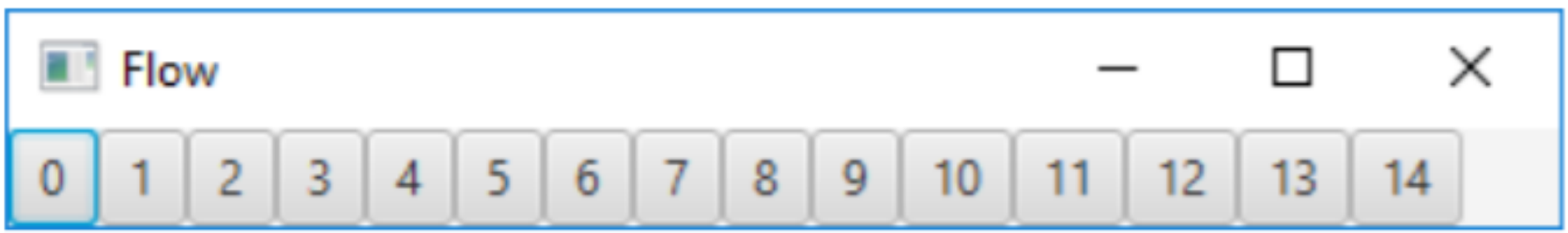
`javafx.scene.layout` has many options for laying out GUIs:

- FlowPane
- HBox (organises elements horizontally)
- VBox (organises elements vertically)
- . . . (see the Javadoc for more options)

`FlowGui.java`

FlowGUI allows us to add child elements to a list. GUI is generated automatically by placing elements horizontally (or vertically) while there is room.

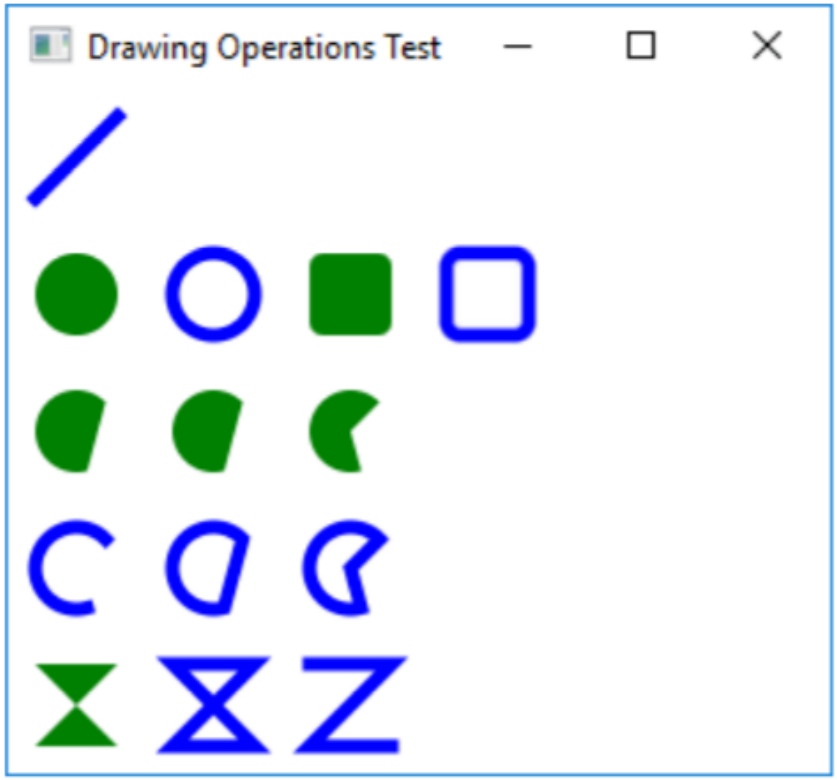
"Children" in a GUI are components within an element.



Canvas

Interface element which allows us to draw programmatically.

`BasicOpsTest.java`[1]



[1] `https://docs.oracle.com/javase/8/javafx/graphics-tutorial/canvas.htm`