Starting GUIs

10-24-2011

Opening Discussion

- Minute essay comments:
  - Schedule changes.
  - Impact on the wealth gap.
  - Use of Scala in upper CS classes?
- Essays
  - Common theme, computers can't be creative or self-aware. Did any of you look up research on those topics?
  - Lots of use of "always" and "never".
  - Selectively defensive.

Case Class Recap

- Allows data grouping.

- Declaration
  - case class TypeName(field1:Type1, field2:Type2, …)

- Creation
  - TypeName(arg1, arg2, …)

- Usage
  - obj.field
  - They are immutable

Copy Method

- There is a copy method on case classes that does what the name implies.

- It can take named arguments to change certain fields in the copy.

- Example:

    - td=td.copy(mins=17::td.mins, points=15::td.points, rebounds=4::td.rebounds)

Motivation

- While text based programs still play a very big role in computing, it is mostly behind the scenes.

- You are far more used to working with Graphical User Interfaces (GUIs).

- It is time that we learn how to write GUIs in Scala.

Libraries

- There are three libraries that will wind up being relevant to our discussion.

  - java.awt – The Abstract Windowing Toolkit. Original Java GUI library.

  - javax.swing – Swing was built on top of AWT to be more flexible.

  - scala.swing – Scala code wrapped around Java Swing to aid Scala GUI programming.

Making a Window

- In order to write a GUI we need to start by popping up a window.

- For the main window of a GUI, we will make a MainFrame. For other windows there are Frame and Dialog types.

- We can set the title and size fields of the MainFrame when we create it.

- Set visible to true to bring up the window.

- Oddly, we have to prevent the script from stopping.

Active Components

- GUIs are made from components. Use scala.swing package.

  - Button(text:String)(action : => Unit).

  - new CheckBox(label:String)

    - selected:Boolean

  - new ComboBox(items:Seq[A])

    - selection.index to get the index of the current selection

  - new EditorPane(contentType:String,text:String)

More Components

- new FormattedTextField(format:String)

  - text:String that will tell you the text

- new Label(text:String)

- new ListView(items:Seq[A])

  - Use collection selection.indices to interact with the index values that are selected.

- new PasswordField or new PasswordField(text:String)

  - text:String will tell you the text

More Components

- new ProgressBar

  - min:Int, max:Int, and value:Int

- new RadioButton(text:String)

  - selected:Boolean

- new ScrollBar

  - minimum, maximum, and value are all Ints

  - Generally use ScrollPane

- new Slider

  - min, max, value

  - orientation

Still More Components

- new Table(rowData: Array[Array[Any]], columnNames: Seq[Any])

- new TextArea(text:String)

  - text:String

- new TextField(text:String)

  - text:String

Panes and Panels

- We build complex GUIs by nesting panels and panes.

  - BorderPanel

    - Can hold up to five different components in the north, south, east, west, and center positions. Add to the layout as a tuple of (Component, Position).

  - BoxPanel

    - Can hold a number of components either vertically or horizontally, each takes the space it needs. Use new BoxPanel(Orientation.Vertical). Use contents+=Button("text")(action).

More Panels

- FlowPanel

  - Components are laid out from left to right wrapping like text in a word processor. You can pass a variable length list of components as an argument at construction or add the components to contents.

- GridBagPanel

  - This panel is more complex.

- GridPanel

  - Holds a regular grid of components. You specify how many rows and columns the grid has at creation.

Panes

- ScrollPane
  - Holds a single component passed in as an argument at construction. Scroll bars automatic.

- SplitPane
  - Two components separated by a moveable bar.
  - new SplitPane(Orientation.Horizontal, leftComp,rightComp)

- TabbedPane
  - One component shown at a time. Tabs are always shown. Add components by adding Pages to the page object.

Menus

- Windows can set the MenuBar.

- Add Menu objects to the contents of the MenuBar.

- Add MenuItems to the contents of the Menus.

  - new MenuItem(Action("Exit"){ exit(0) })

Example GUI

- Let's spend the rest of class laying out and coding up a GUI for our data example.

Minute Essay

- Is there some type of GUI you would like to have as IcP #6.

- Assignment #2 is due on Wednesday.