

Graphics

3-23-2012

Opening Discussion

- Do you have any questions about the quiz?
- Minute essay comments:
 - Batman vs. Superman
 - Why do I like to remind you about robots taking over the future?
 - Length of GUI programs and complexity.
 - Largest program I've written involving GUIs.
 - Starting open file in a default location.
 - Lots of CS majors come in with no knowledge.
 - Exam grades and EC.

More

- Finding videos.
- Recharging Kiva robots.

Adding to our GUI

- I want to make the GUIs we wrote last time have full interaction before we move on today.

Motivation

- You can do lots of things with the standard GUI elements in Swing.
- We could set up quite a bit of a GUI using that. However, no GUI library can predict everything that you will want to do and we want to be able to add custom drawing to our applications.
- Uses:
 - Drawing a shot-chart in basketball.
 - Drawing Dinosaurs.
 - Drawing anything there isn't a GUI component for.

Graphics in Scala/Java

- For this we will rely on the Java2D library. Java2D was added about the same time Swing was and it is fundamentally based on the `java.awt.Graphics2D` class.
- Let's go find the Java API and find this class in it.

Making Custom Drawn Components

- We are going to follow a simple approach to doing this making a new Panel that draws what we want.
 - new Panel {
 - override def paint(g:Graphics2D) {
 - ...
 - }
 - }
- Whatever you draw to g appears in the panel.

Capabilities of Java2D

- Let's look a bit at the Graphics2D class to see what some of the possibilities might be for what we can draw.
- The `java.awt.geom` package and the `java.awt.image` package also have some useful things in them.

Settings

- There are several things that we can set on the Graphics2D object that are used when we draw things. Here are some:
 - Paint – could be a color, but there are also gradients and textures
 - Stroke – determines how lines are drawn
 - Font – how you want text to appear
 - Transform – AffineTransform allows translate, rotate, scale, or shear

Less Used Settings

- Composite – how colors combine when you draw over old stuff
- Clip – where your drawings will appear
- Render hints – other things like antialiasing

More General Drawing

- Graphics2D objects aren't limited to just drawing on components.
- The Image class (and its subtype BufferedImage) will let you get Graphics objects that you can draw to and what you draw will be on the image.
- We'll typically do this even if we are drawing to a component to implement buffering which reduces flicker.

Loading Images

- The easiest way to load images from disk is using `javax.imageio.ImageIO`.
- This class has read methods that take `File` or `URL` objects.

Minute Essay

- How do you think we would go about creating animation?
- What CSCI do you plan on taking in the fall?
 - Majors should take PoP II, Low-Level, and probably Functional.
 - Minors just take PoP II and Low-Level.