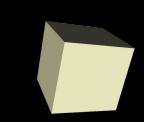
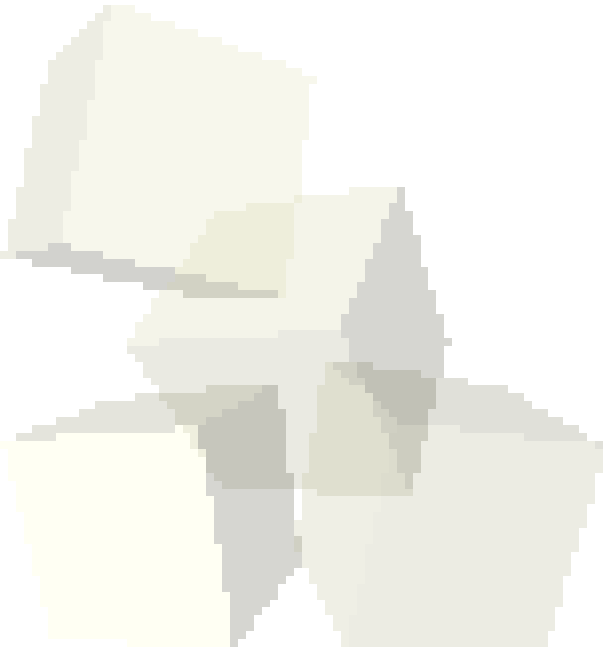


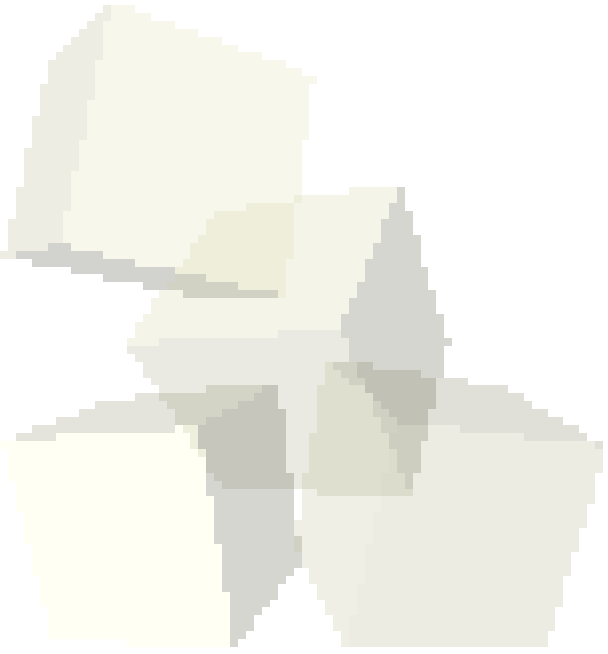
Iterators and Java2D Graphics

3-11-2010



Opening Discussion

- Let's look at solutions to the interclass problem.
- Making a linked list in C.
  - Don't forget C.
  - Pointers in C and Java.
- Do you have any questions about the assignment?
- Do you have any questions about the reading?

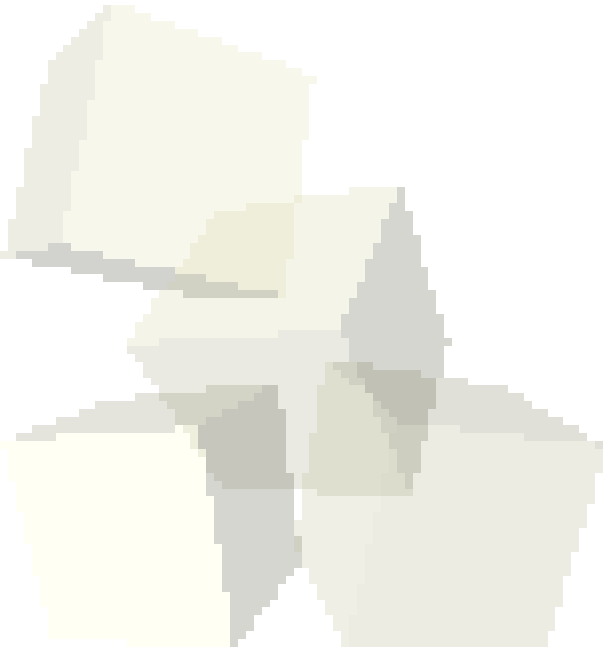


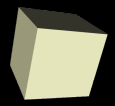
Iterators

- Direct access on linked lists is very inefficient. How then should we walk through a list with outside code? Remember that the outside code doesn't have access to the nodes so it can't use the style of loop we have been doing internally.
- The concept of an Iterator is something that abstracts the process of walking through all of the elements in a container. Iterators can not only be efficient, they also make code more flexible because they don't depend on the implementation details of the containers.

Iterating Lists

- An iterator basically needs to encapsulate the information and functionality we would put into a standard method of going through a container.
- With this in mind, what do we need to put in an iterator for an array based list?
- What would we put in an iterator for a linked list?



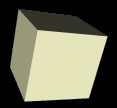


Graphics in Java

- You can do lots of things with the standard GUI elements in Swing. We've been able to set up quite a bit of a GUI using that. However, no GUI can predict everything that you will want to do and we want to be able to add custom drawing to our application.
- 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 Graphics2D class. There is also a Graphics class that provides more basic custom graphics capabilities. Graphics2D inherits from Graphics so it can do all the same things and more.

Making Custom Drawn Components

- There are three steps to making a component class that we can do custom drawing to.
  - Make a new class and have it inherit from JComponent or a subtype of it. We'll use JPanel.
  - Override the paintComponent method in your class.
  - Draw with the Graphics object that was passed into the paintComponent method.
- Let's look a bit at the Graphics2D class to see what some of the possibilities might be for what we can draw.
- Now we can do these steps in our program to make a central panel we can draw to.



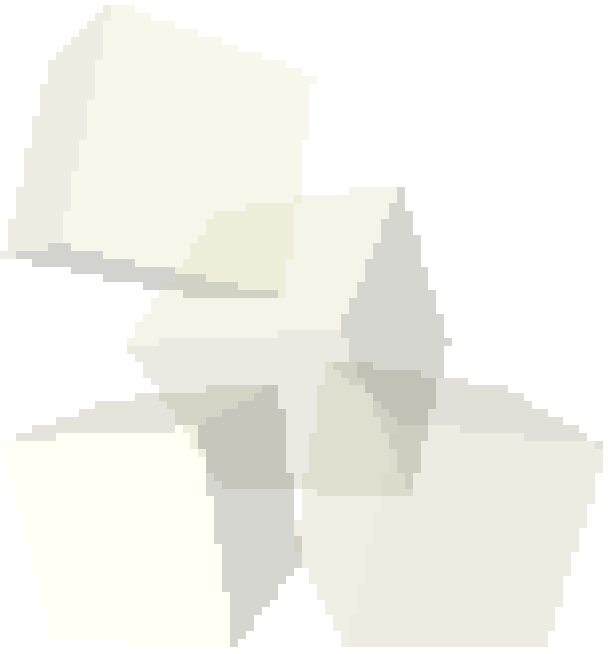
Settings

- 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
  - 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

- Of course, Graphics2D objects aren't limited to just drawing on components.
- The Image class (and it's 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.

- Let's play with our panel some to experiment with the drawing options.



Minute Essay

- What do you think we should try adding to our drawing program given that we now know how to draw?
- Interclass Problem – Write a simple drawing program similar to Paint. Use buttons for selecting at least rectangles, ellipses, and lines. Use the mouse to draw things. Have color options with JColorChooser.