Lecture 3: ArrayList

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For Lab and Assignment

Random Number Generator

- class Random in java.util package w/ method
  - int nextInt(int n) -- returns random k s.t. $0 \le k < n$
  - See bottom of pg 30 in text.
- Create Random object once, send nextInt many times.
- See LottoHelper example.

Text Input

- Scanner class
  - Constructor: myScanner = new Scanner(System.in)
    - can use file instead of System.in
    - new Scanner(new File("filename"))
  - Read values:
    - myScanner.nextInt() -- returns an int
    - myScanner.nextDouble() -- returns a double
    - myScanner.nextLine() -- returns String -- to end of line
    - see documentation for more

Read Lab Assignment Before Lab Tomorrow!

ArrayList

- What happens if need more space in array than originally allocated?
- ArrayList is class that dynamically expands as needed.
- Part of java.util package
- To get access write import java.util.ArrayList or import java.util.*

Text uses Vector rather than ArrayList.
ArrayList more efficient if no concurrency

ArrayList Specification

- Class ArrayList<E>
- Important methods:
  - add, get, set, indexOf, isEmpty, remove, size, contains, clear
  - size, isEmpty, get, set take constant time
  - add is "amortized constant" time
- See javadoc at
  - http://download.oracle.com/javase/6/docs/api/

Java Graphics

For details, see document on course web page associated with lecture
Also see GUI cheat sheet in documentation and handouts section.

Graphics context

- All drawing is done in “paint” method of component
- public void paint(Graphics g)
  - g is a Graphics context
  - “pen” that does the drawing
  - Programmer calls repaint(), not paint!!
- Need to import classes from java.awt.*, java.awt.geom.*, & javax.swing.*
- See MyGraphicsDemo

General graphic applications

- Create an extension of component (either JPanel, JFrame, or JApplet) and implement paint method in the subclass.
  - See main method of demo to get window to show
  - Start paint method by casting g to Graphics2D to get access to new methods
- Call repaint() on component every time make a change.
  - Causes OS to schedule call of paint in event queue
  - Called automatically if window obscured and revealed

Geometric Objects

- Objects from classes Rectangle2D.Double, Line2D.Double, etc. from java.awt.geom
  - There are also float versions
  - Common superclass is Rectangular
  - Constructors take params x,y,width,height,
    - but don’t draw object
  - myObj.setFrame(x,y,width,height) can move object
  - g2.draw(myObj) -- gives outline
  - g2.fill(myObj) -- gives filled version
  - g2.drawString(“a string”,x,y) draws string

MyGraphicsDemo

- Class extends JFrame, which creates window.
  - Constructor calls super with title of window.
- Main method creates object, sets size, visibility, and enables go-away box in upper left
- Paint method creates and draws objects.

PostItStdApplication

- More sophisticated
  - JFrame contains two JPanels
  - JFrame uses BorderLayout, so add controls to JPanel in SOUTH, drawing canvas in CENTER of contentPane of JFrame
    - Ignore controls for now.
    - See GUI cheat sheet for details
  - DrawingCanvas extends JPanel -- contains paint method
  - Note use of ArrayList to hold PostIts.