Graphics

3-28-2012

Opening Discussion

- Minute essay comments:
  - Final date/time is listed under "Tests" section of syllabus.
  - FPS move view in the world. That is 3-D graphics though.
  - Is it possible to change the background in Facebook?
  - What is the point of being able to scan 36 million faces/sec. Big Brother from 1984.
  - Could you make a grid of buttons that resizes like minesweeper?

More

- When do you need to use "new"?
- What is to stop something like big brother from happening?
- Any suggestions for struggling with the language/syntax?
- Will learning other languages (Java/C++) help you understand other programs?
- Favorite artist?
- Other render hints?
- Reading stack traces.
- Making the tilted String move non-tilted.

Even More

- What is my ideal form of government for America?
- Finding out about unclear parts of the API.
- First assignment is graded with comments.
- http://www.youtube.com/watch?v=K0khxr_LORc
- IcP solutions.

Key Events

- There are three event types for keys.

    - KeyPressed

    - KeyReleased

    - KeyTyped

- Listen to the keys object in a component to get these.

- Compare the key value in the event to values in the Key object.

    - if(e.key==Key.A) …

    - if(e.key==Key.Left) ...

Animations

- For animations and many other things we want code to happen at regular intervals.

- We can set this up with a javax.swing.Timer.

  - new Timer(delay:Int,ae:ActionListener)

  - Delay is in milliseconds.

  - Swing.ActionListener(handler: (ActionEvent) => Unit)

- The function body will be executed at the desired intervals.

Motivation

- There are many reasons that you might want the data you are working with to be in a particular order.

- If nothing else, humans often like seeing things in certain orders.

- It turns out that ordered data can be beneficial for the computer as well.

- Putting things in order by some value is called sorting.

Methods of Sorting

- If I ask you to sort a bunch of items, how would you go about doing it? Describe your approach.

- How does it vary for different types or configurations of objects?

O(n²) Sorts

- We are going to look at three different sorting techniques today.

- These sorts all do work that is proportional to the square of the number of elements.

- That isn't good for large collections, but the sorts are fairly simple to write.

- These work "in place" so we use arrays.

- Each involves an inner loop that reorders things and an outer loop that makes the inner one happen over and over.

Bubble Sort

- Inner loop:

  - Compare adjacent elements and swap them if they are out of order.

- Outer loop:

  - Repeat n-1 times or until no swaps are done.

  - The latter option is called a flagged bubble sort.

Selection Sort

- This is often called a min-sort or a max-sort depending on how you write it. I'll describe a min-sort here.

- Inner loop:

  - Find the smallest element and SWAP it into position if not already there.

- Outer loop:

  - Repeat n-1 times so all elements are in the right place.

- Does only O(n) swaps, but still O(n^2) comparisons.

Insertion Sort

- Inner loop:
  - Take the next element and shift it down to the right spot.

- Outer loop:
  - Run through all the elements starting with the second.

- This sort is actually a bit faster (factor of 2) on random data. It is really efficient on nearly sorted data.

Watching Them Work

- One advantage of doing graphics before sorting is that we can write code to visualize what is happening when we sort numbers with these sorts.

- Let's write this code and watch our sorts work.

Minute Essay

- Show me what would happen after each iteration of the inner loop if we min-sort these values.

  - 4, 7, 1, 3, 8, 2