CSSE 220 Day 18

Event Based Programming

Check out *EventBasedProgramming* from SVN

Questions?

Exam 2 is in less than 2 weeks from today, on Oct 22 (in the evening)

Get Your Game On

» Share designs for the Game interface

Graphical User Interfaces in Java

- We say what to draw

- Java windowing library:
  - ◦ Draws it
  - ◦ Gets user input
  - ◦ Calls back to us with events

- We handle events
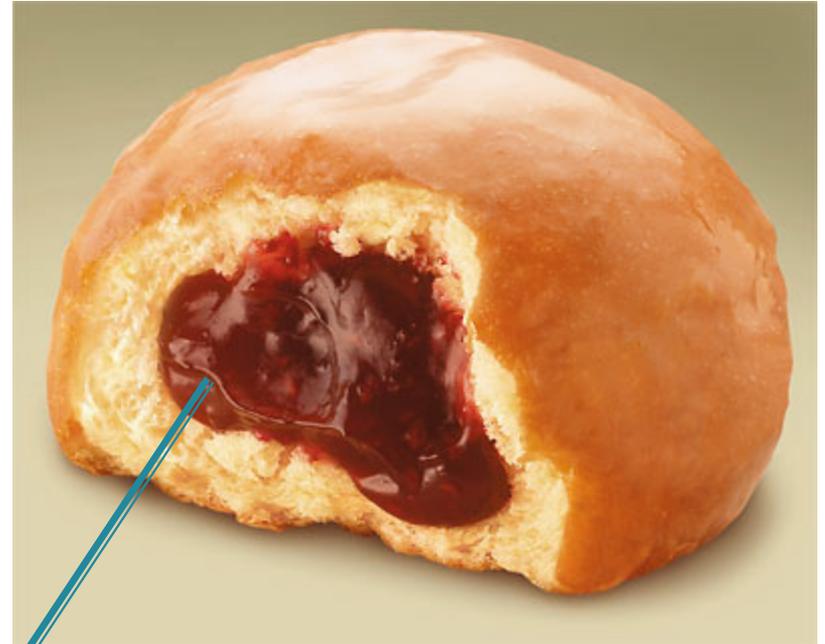
Hmm, donuts

Gooey

Handling Events

▸ Many kinds of events:
  ◦ Mouse pressed, mouse released, mouse moved, mouse clicked, button clicked, key pressed, menu item selected, …

▸ We create **event listener objects**
  ◦ that implement the right **interface**
  ◦ that handle the event as we wish

▸ We **register** our listener with an **event source**
  ◦ Sources: buttons, menu items, graphics area, …

Q1

Using Inner Classes

- Classes can be defined **inside** other classes or methods
- Used for "smallish" helper classes

- Example: `Ellipse2D.Double`

Outer class		Inner class

- Often used for `ActionListener`s…

Q2

Anonymous Classes

- Sometimes very small helper classes are only used once
  ◦ This is a job for an anonymous class!

- **Anonymous** → no name
- A special case of inner classes

- Used for the simplest **ActionListener**s...

Inner Classes and Scope

- **Inner classes can access any variables in surrounding scope**

- Caveats:
  - ◦ Local variables must be `final`
  - ◦ Can only use instance fields of surrounding scope if we're inside an instance method

- Example:
  - ◦ Prompt user for what porridge tastes like

Time to Make the Buttons

» Layout in Java windows

Key Layout Ideas

- JFrame's add(Component c) method
  - Adds a new component to be drawn
  - Throws out the old one!
- JFrame also has method add(Component c, Object constraint)
  - Typical constraints:
    - BorderLayout.NORTH, BorderLayout.CENTER
  - Can add one thing to each "direction", plus center
- JPanel is a container (a thing!) that can display multiple components

Q3–4
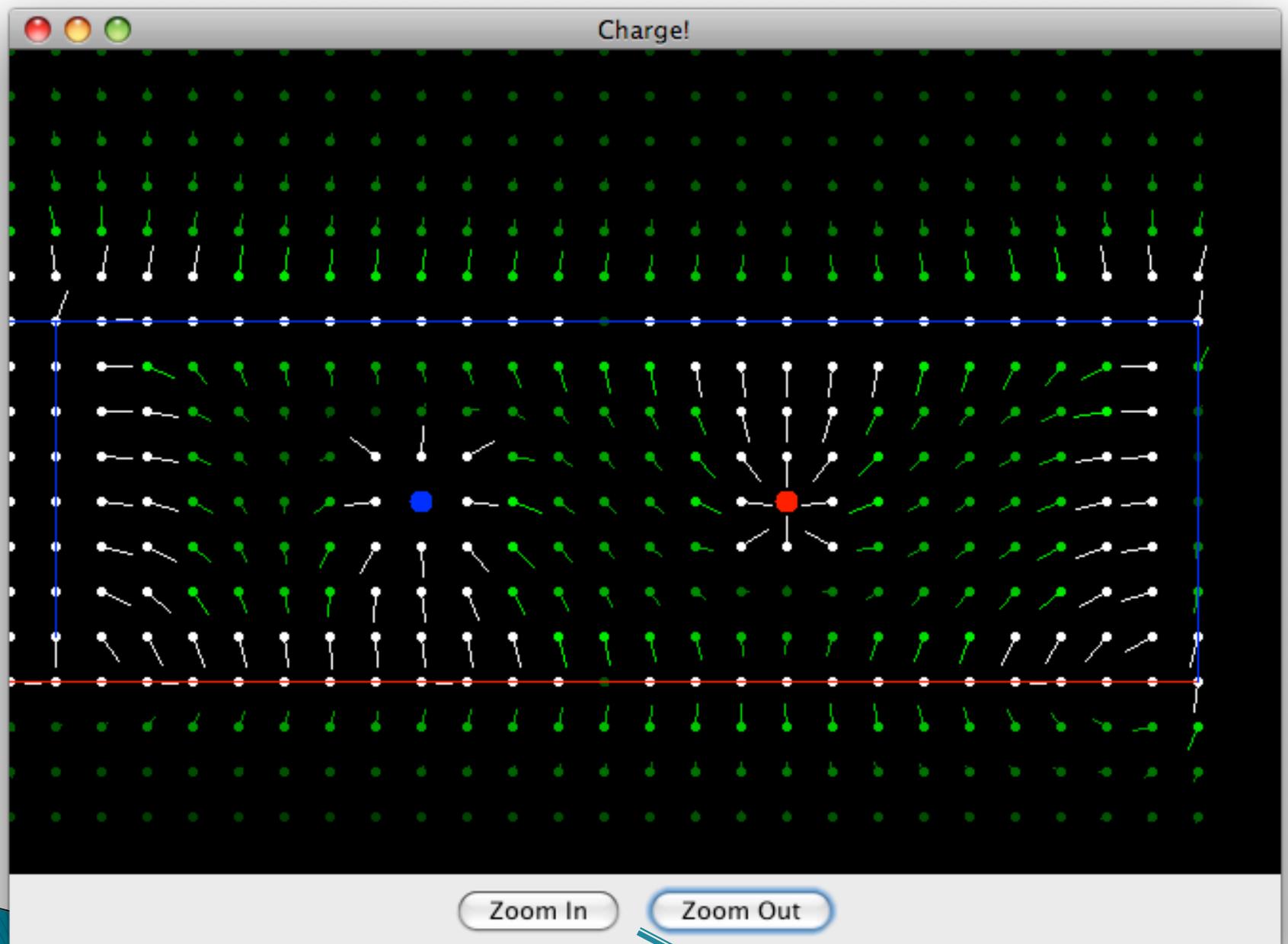
So, how do we do this?

Repaint (and thin no more)

- To update graphics:
  - We tell Java library that we need to be redrawn:
    - `space.repaint()`
  - Library calls `paintComponent()` when it's ready

- Don't call `paintComponent()` yourself! It's just there for Java's call back.

Q5

Mouse Listeners

```java
public interface MouseListener {
    public void mouseClicked(MouseEvent e);
    public void mouseEntered(MouseEvent e);
    public void mouseExited(MouseEvent e);
    public void mousePressed(MouseEvent e);
    public void mouseReleased(MouseEvent e);
}
```

Q6

Work Time

>> BigRational from HW 17
BoardGames from HW 18

Q7-8