

CSSE 220 Day 18

Event Based Programming

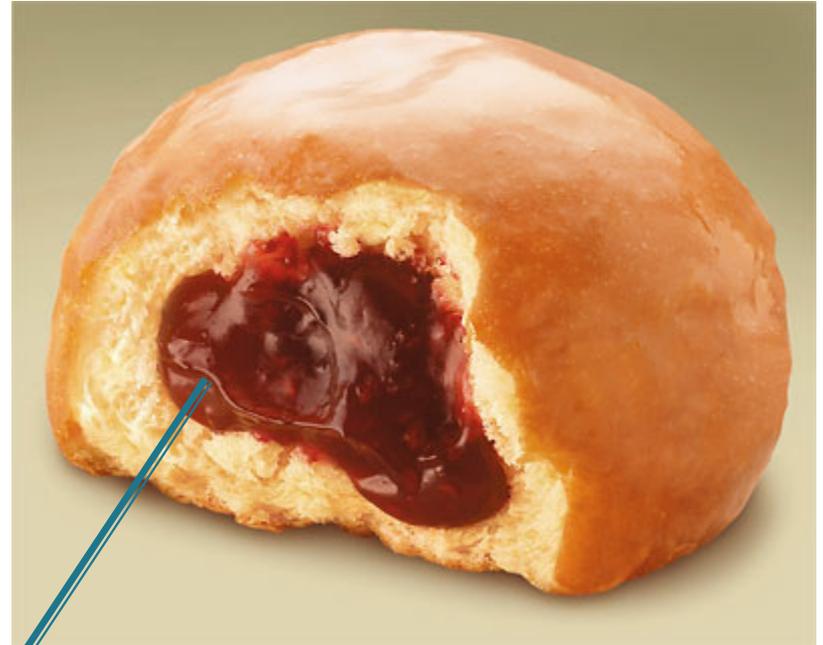
Check out *EventBasedProgramming* from SVN

Questions?

Exam 2 is in less than 2 weeks from today, on May 3 (in the evening)

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

Goody

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, ...

Using Inner Classes

- ▶ Classes can be defined **inside** other classes or methods
- ▶ Used for “smallish” helper classes
- ▶ Example: *Eclipse2D.Double*



- ▶ Often used for *ActionListeners*...

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 *ActionListeners*...

Inner Classes and Scope

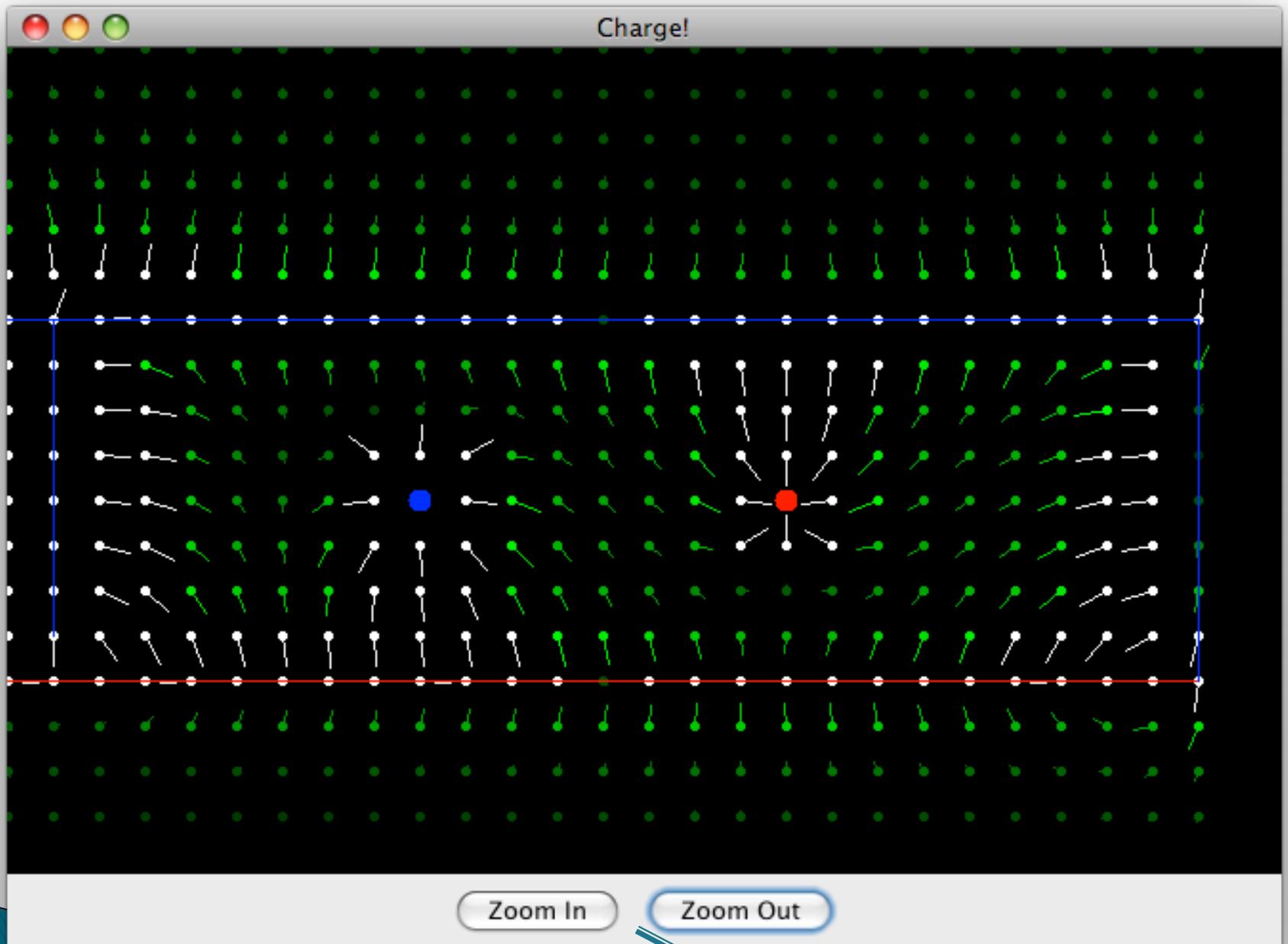
- ▶ Inner classes can access any variables in surrounding scope
- ▶ Caveats:
 - Local variables must be *final*
 - Can only use instance fields of surrounding scope if we're inside an instance method
- ▶ Example:
 - Prompt user for what porridge tastes like

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



So, how do we do this?

Repaint (and then 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.**

Mouse Listeners



```
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);  
}
```

Work Time

- » BigRational from HW 17
- BoardGames from HW 18