

# CSSE 220 Day 15

## Event Based Programming

Check out *EventBasedProgramming* from SVN

Questions?

# Get Your Game On

- » Share designs for the Game interface

# Let's Get GUI:

## 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

# 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: **Ellipse2D.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

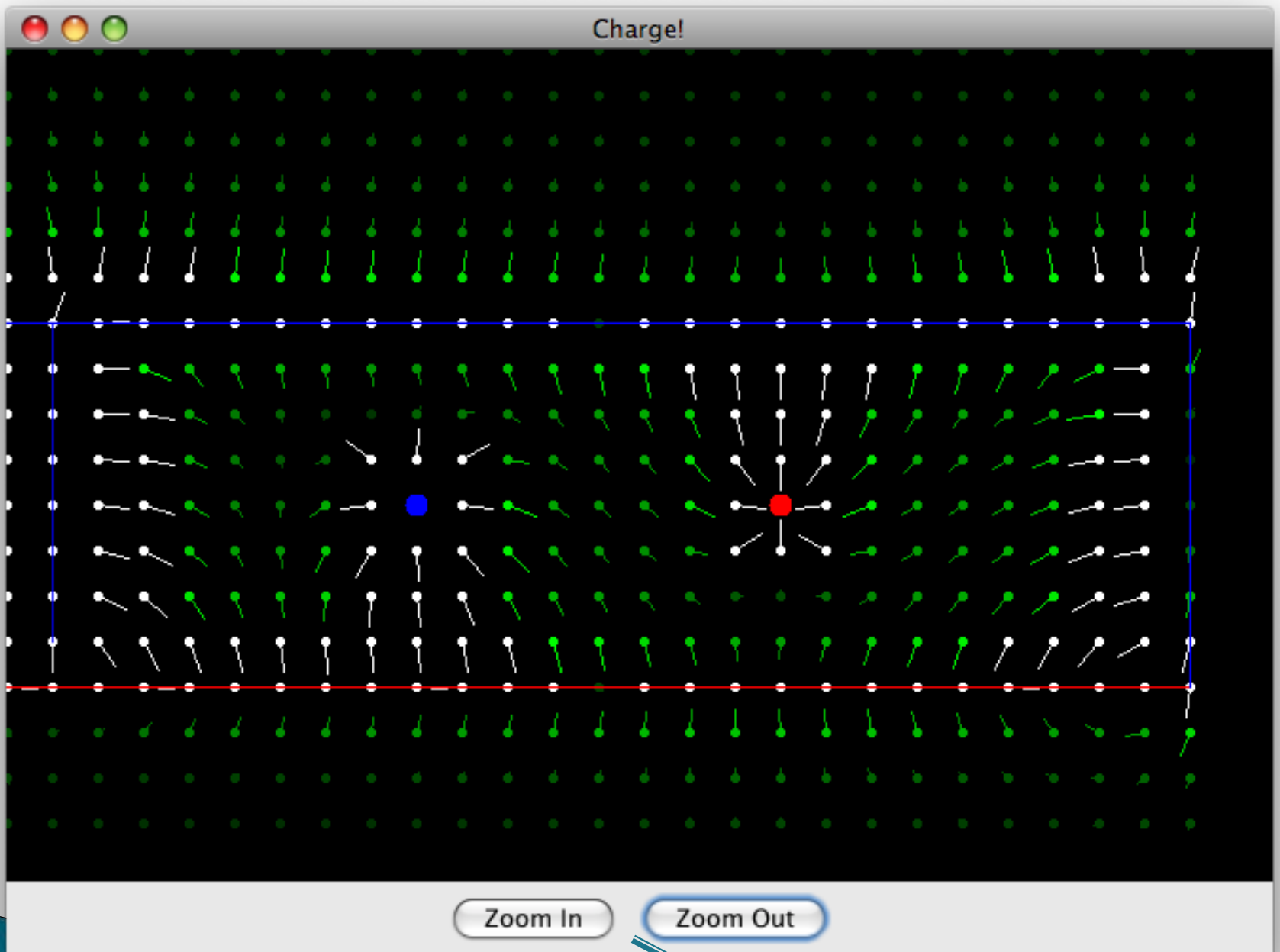


# Time to Make the Buttons

»» 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)

- ▶ With GUIs we're giving up control
  - To the user
  - To Java windowing library
- ▶ 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  
HW 14