Assignment #3

• Add a map to Assignment #2
  • Create a spot for a map
  • Use Google maps to place the map there
  • Plot the geo-data entries on the map
  • Make your table entries link to the map (center on click)
• Enhance the map in one interesting way
  • For example, multiple map marker icons
  • More than a custom marker or an info window
User Interaction: Intro to Multi-Touch

Asst. Professor Donald J. Patterson
INF 133 Fall 2011
Traditional Mouse Input

User's Program

Java Virtual Machine

Operating System

Hardware Interface

Hardware Interface

Operating System

System Library

User's Program
Java uses a “MouseListener” model

- The user asks the virtual machine to tell it when mouse events occur
- Mouse movements
- Mouse button press, release, click
  - button 1,2,3
- Mouse wheel movements
Java uses a “MouseListener”

- “Observer” design pattern
- Example:
  - http://java.sun.com/docs/books/tutorialJWS/uiswing/events/ex6/MouseEventDemo.jnlp
public class MouseEventDemo ...

// where initialization occurs:
// Register for mouse events on blankArea and the panel.
blankArea.addMouseListener(this);
addMouseListener(this);

...

public void mousePressed(MouseEvent e) {
    saySomething("Mouse pressed; # of clicks: "
            + e.getClickCount(), e);
}

public void mouseReleased(MouseEvent e) {
    saySomething("Mouse released; # of clicks: "
            + e.getClickCount(), e);
}

public void mouseEntered(MouseEvent e) {
    saySomething("Mouse entered", e);
}

public void mouseExited(MouseEvent e) {
    saySomething("Mouse exited", e);
}

public void mouseClicked(MouseEvent e) {
    saySomething("Mouse clicked (# of clicks: "
            + e.getClickCount() + ")", e);
}

void saySomething(String eventDescription, MouseEvent e) {
    textView.append(eventDescription + " detected on "
            + e.getComponent().getClass().getName() + "." + newLine);
}
Tell me when the mouse is pressed, released, enters the boundaries, exits the boundaries, or is clicked.

```java
public class MouseEventDemo ... implements MouseListener {
    // where initialization occurs:
    // Register for mouse events on blankArea and the panel.
    blankArea.addMouseListener(this);
    addMouseListener(this);
    ...

    public void mousePressed(MouseEvent e) {
        saySomething("Mouse pressed; # of clicks: "+ e.getClickCount(), e);
    }

    public void mouseReleased(MouseEvent e) {
        saySomething("Mouse released; # of clicks: "+ e.getClickCount(), e);
    }

    public void mouseEntered(MouseEvent e) {
        saySomething("Mouse entered", e);
    }

    public void mouseExited(MouseEvent e) {
        saySomething("Mouse exited", e);
    }

    public void mouseClicked(MouseEvent e) {
        saySomething("Mouse clicked (# of clicks: "+ e.getClickCount() + ")", e);
    }

    void saySomething(String eventDescription, MouseEvent e) {
        textField.append( "detected on " + e.getComponent().getClass().getName() + "." + newline);
    }
}
```

http://java.sun.com/docs/books/tutorial/uiswing/events/mouselistener.html
Mouse Event

- When your program is told that something happened, you get extra with the event
- Single or double click?
- \((X,Y)\) of event
  - global and local coordinates
- which button was pushed \((1,2,3)\)
- Modifier keys
  - "Shift" click
Mouse Event (cont)

- When your program is told that something happened, you get extra info
- Which UI component is reporting
  - “blankArea”
- timestamp
- and a few more things
Different types of input devices

• What about trackpads?
• What about tablets?
• What about rollerballs?
Different types of input devices

- As long as the OS can translate the hardware interaction into the same events then programs are compatible.
- A tablet can “click”
- A rollerball “enters” and “exits”
- A finger on a trackpad has an (X,Y)
Multi-touch creates new interactions

- This breaks old programs
- unless the OS makes the multi-touch look like a mouse to the program
Multi-touch creates new interactions

- Watch Android 3D widget video
- What is different from working with a mouse?
Multi-touch creates new interactions

- pointer is gone
- all interaction is active
- hover is gone
- you can’t see what you are clicking
- “clicking” isn’t natural
- “swiping” is natural
Multi-touch creates new interactions

- Software has to be rewritten to be "multi-touch" aware
- The OS can give some support
  - exposing new events like
  - "pinch" (tell me when a pinch occurs)
  - "rotate" (tell me when a rotate occurs)
  - "two finger swipe"
  - "three finger swipe"
Multi-touch creates new interactions

• But multi-touch is really computer vision

Where is the mouse clicking?

What abstractions will the OS expose?
Multi-touch creates new interactions

- Watch 10/GUI video
- http://10gui.com/video/
Multi-touch terminology

- **Multi-touch** – An interactive technique that allows single or multiple users to control graphical displays with more than one simultaneous finger.

- **Multi-point** – An interactive technique that makes use of points of contact rather than movement. A multi-point kiosk with buttons would be an example.

- **Multi-user** – A multi-touch device that accepts more than one user. Larger multi-touch devices are said to be inherently multi-user.

- **Multi-modal** – A form of interaction using multiple modes of interfacing with a system.
Multi-touch terminology

- **Tabletop Computing** – Interactive computer displays that take place in the form of tabletops.
- **Direct Manipulation** – The ability to use the body itself (hands, fingers, etc) to directly manage digital workspaces.
- **Blob tracking** - Assigning each blob an ID (identifier). Each frame we try to determine which blob is which by comparing each with the previous frame.
- **Blob detection** - Process of picking out bright areas of a camera image and somehow relaying them to a computer as a touch.