User Interaction: Intro to Multi-Touch

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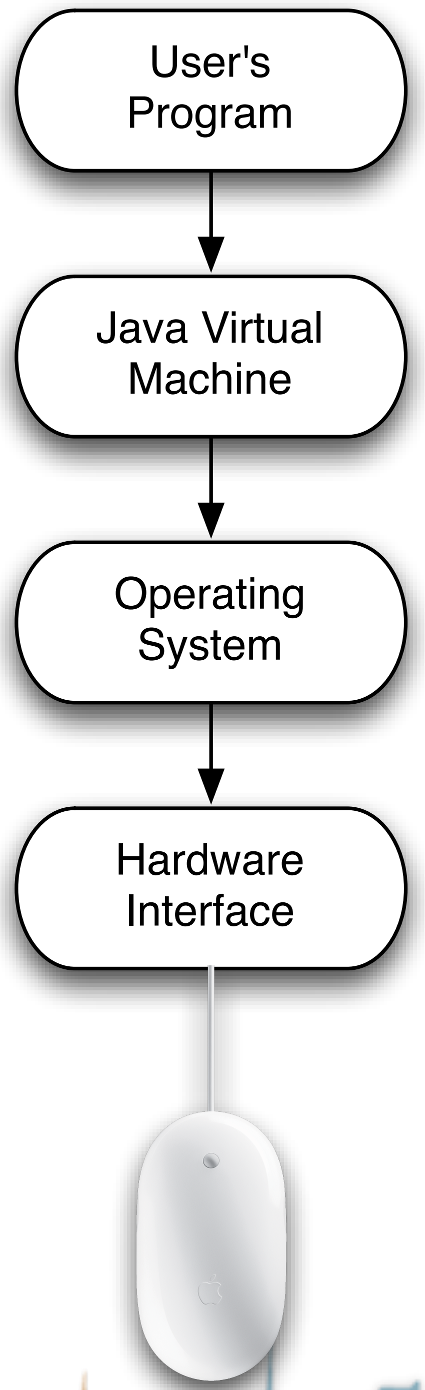
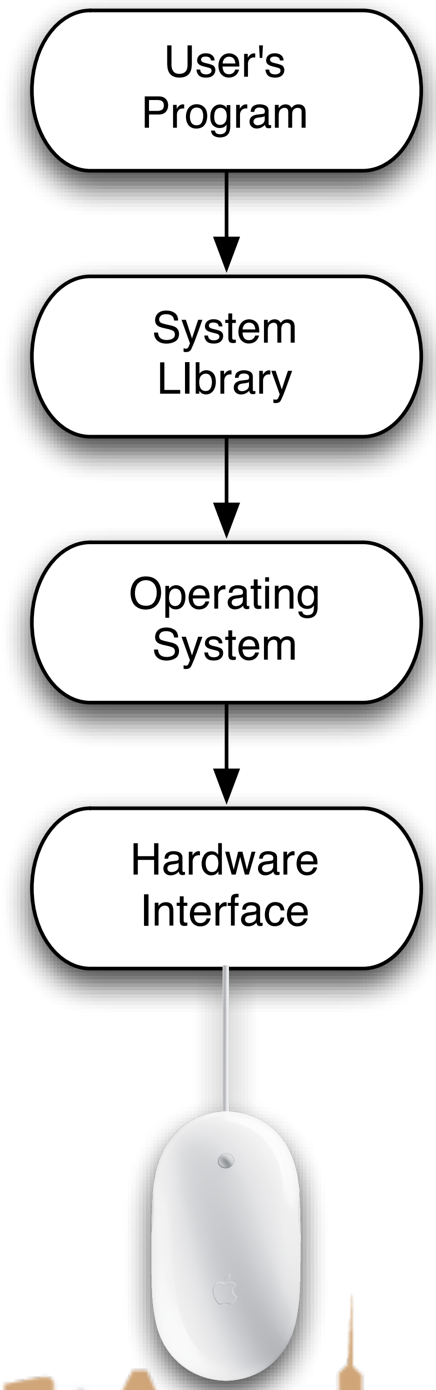
INF 133 Fall 2010

Traditional Mouse Input



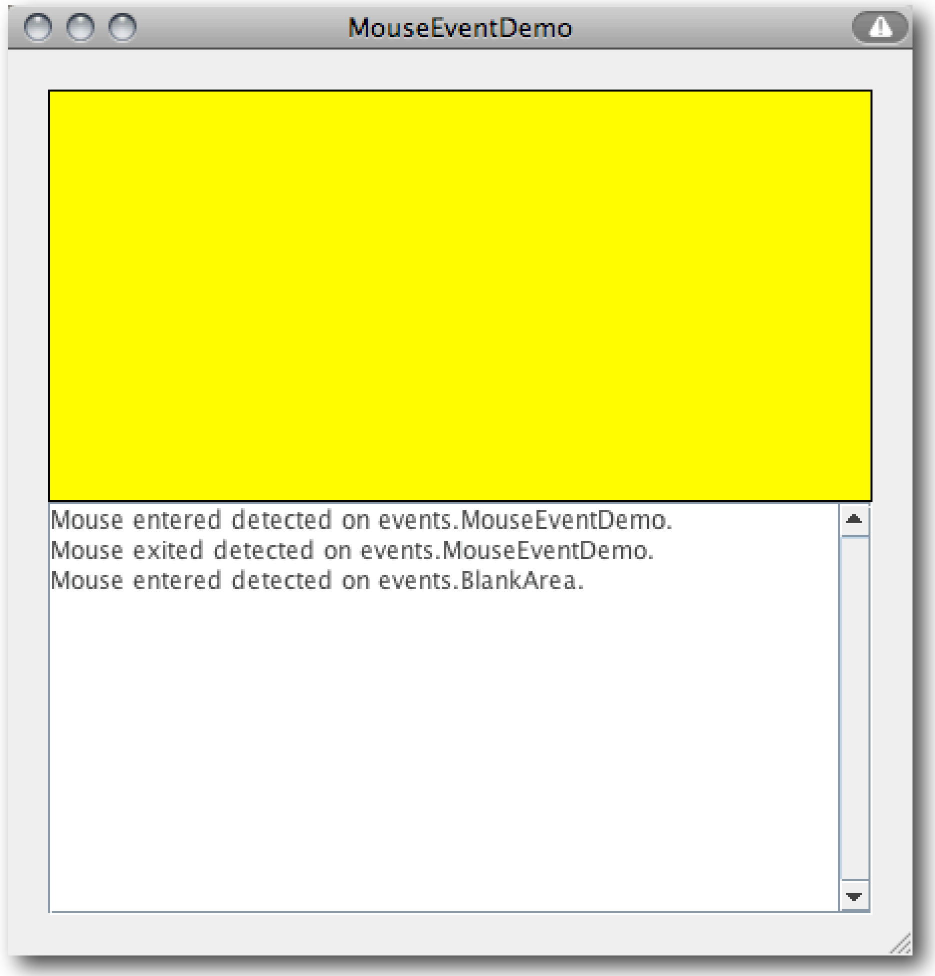


Java uses a "MouseListener" model

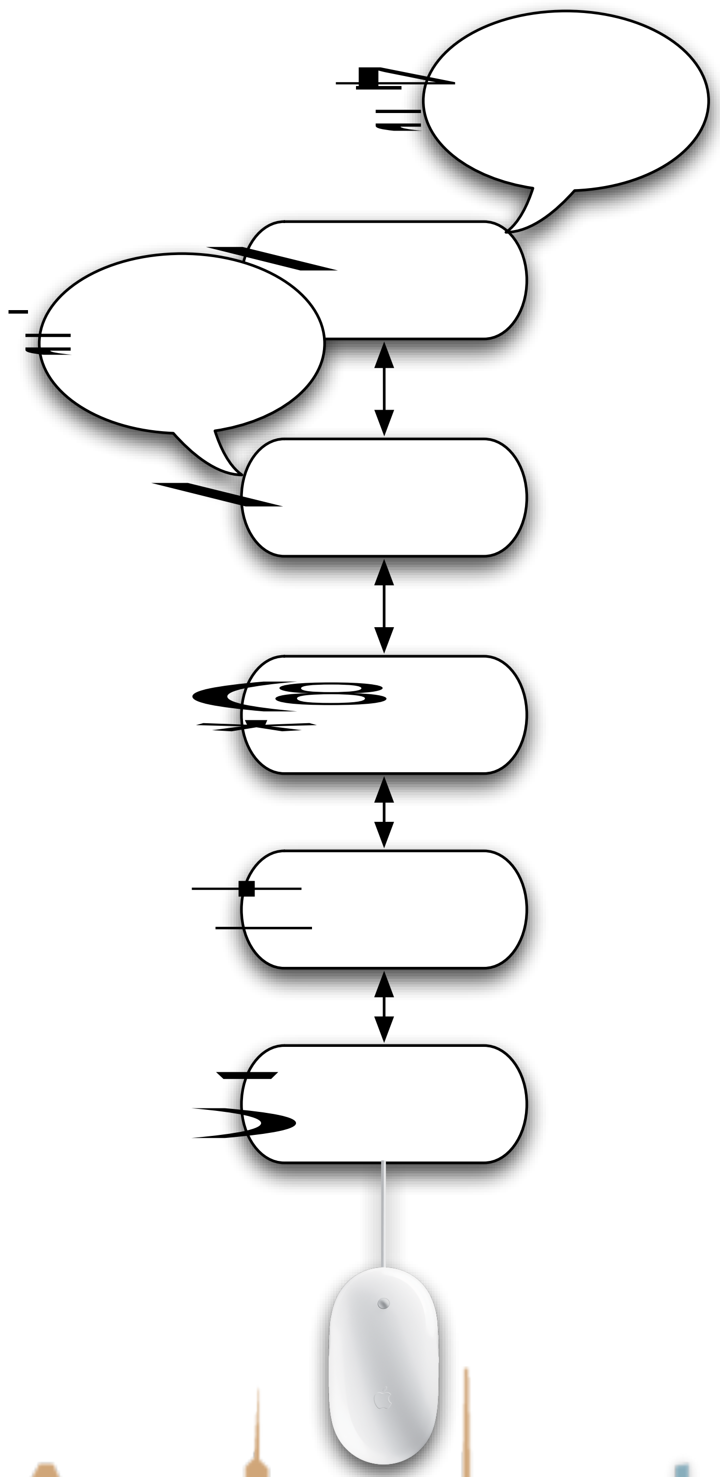
- The user asks the virtual machine to tell it when mouse events occur
  - Mouse movements
  - Mouse button press, release, click
    - button 1,2,3
  - Mouse wheel movements

Traditional Mouse Input

Java uses a "MouseListener"

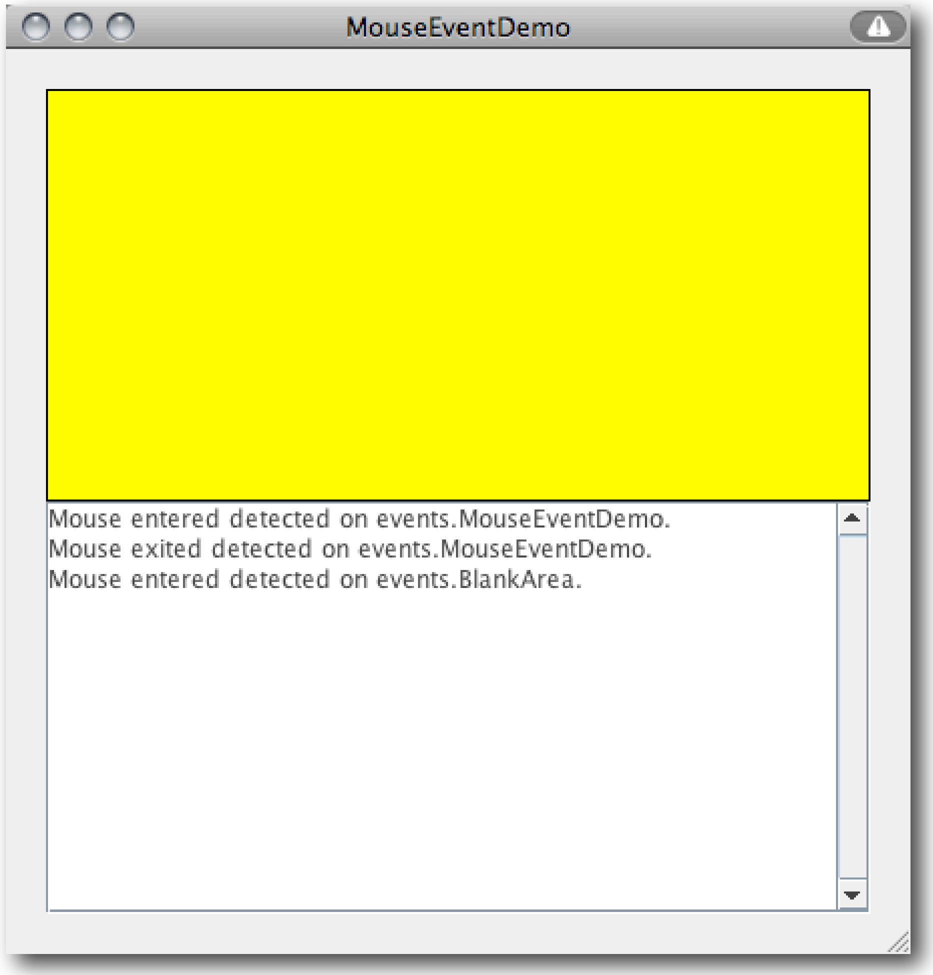

MouseEventDemo

```
Mouse entered detected on events.MouseEventDemo.
Mouse exited detected on events.MouseEventDemo.
Mouse entered detected on events.BlankArea.
```



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

Traditional Mouse Input

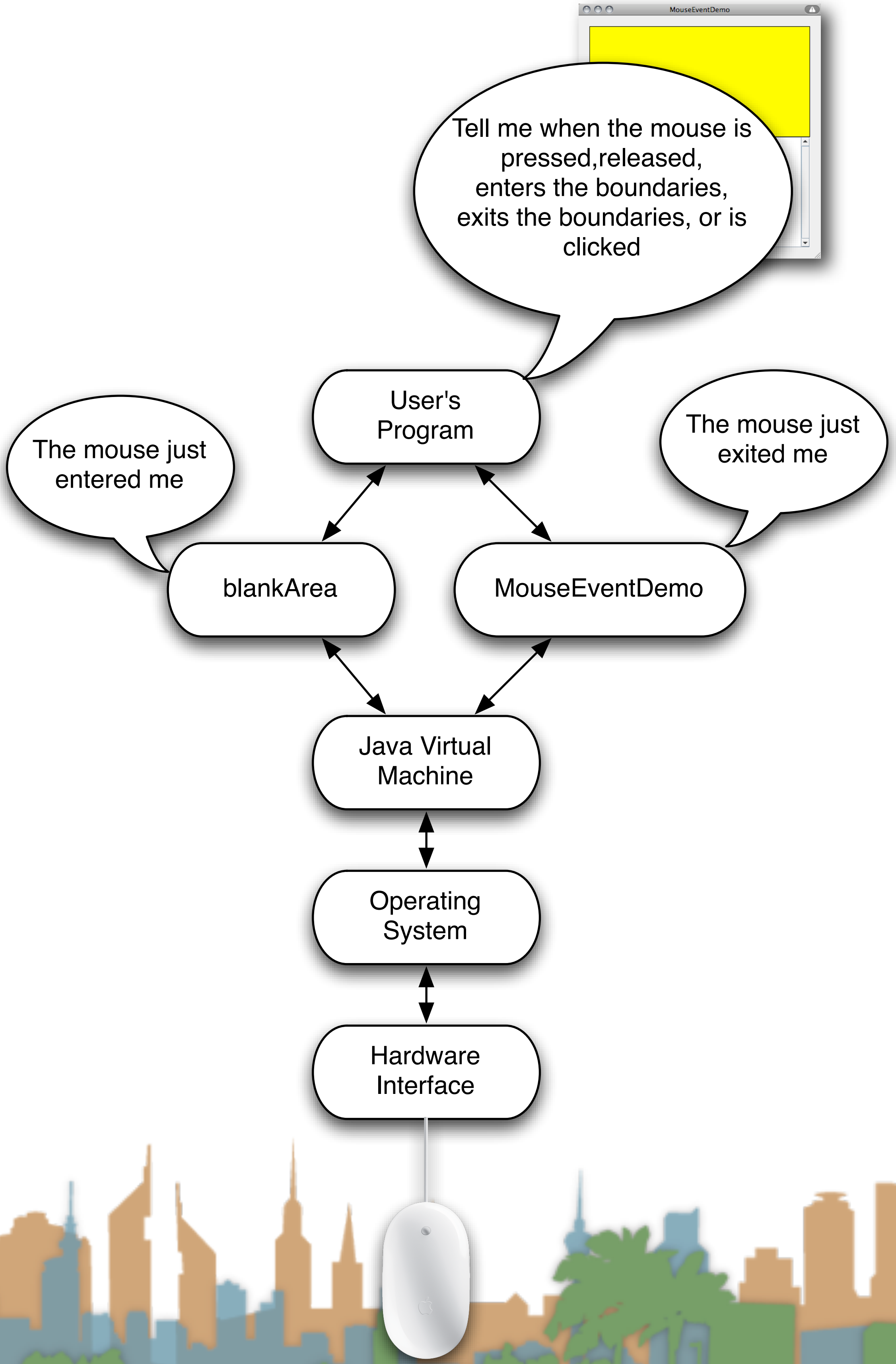


```
Mouse entered detected on events.MouseEventDemo.
Mouse exited detected on events.MouseEventDemo.
Mouse entered detected on events.BlankArea.
```

```
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) {
        textArea.append(eventDescription + " detected on "
                        + e.getComponent().getClass().getName()
                        + "." + newline);
    }
}
```

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

Traditional Mouse Input



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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

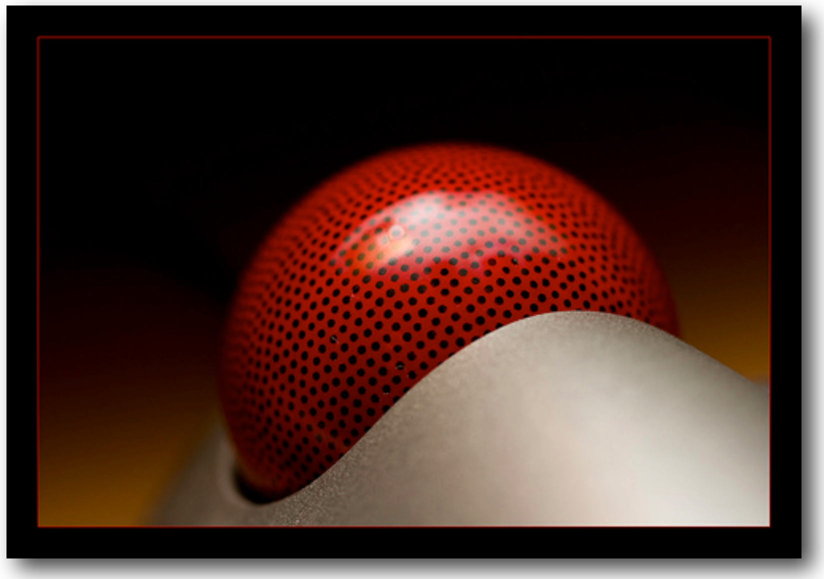
Input Event

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

Traditional Mouse Input

Different types of input devices

- What about trackpads?
- What about tablets?
- What about rollerballs?

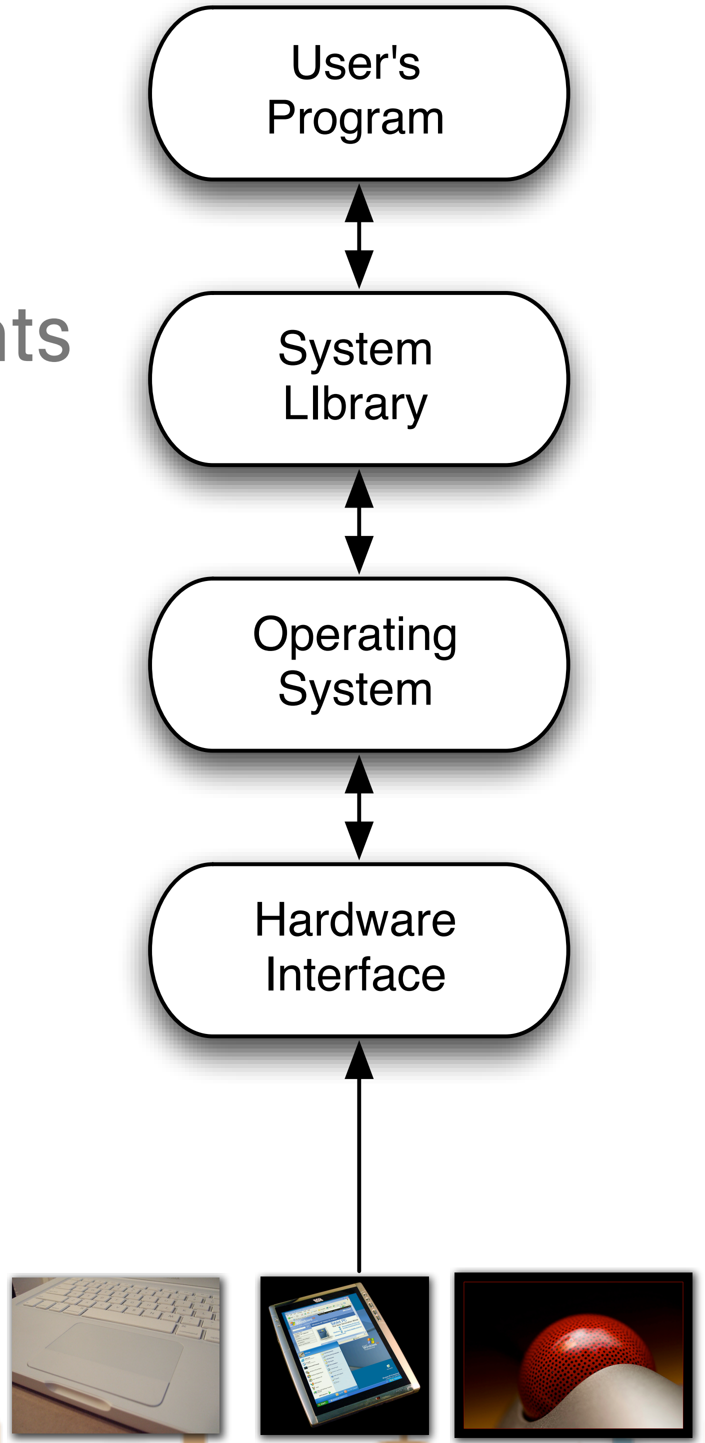


flickr: goodrob12,viagallery.com, somewhereinAK

Traditional Mouse Input

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)



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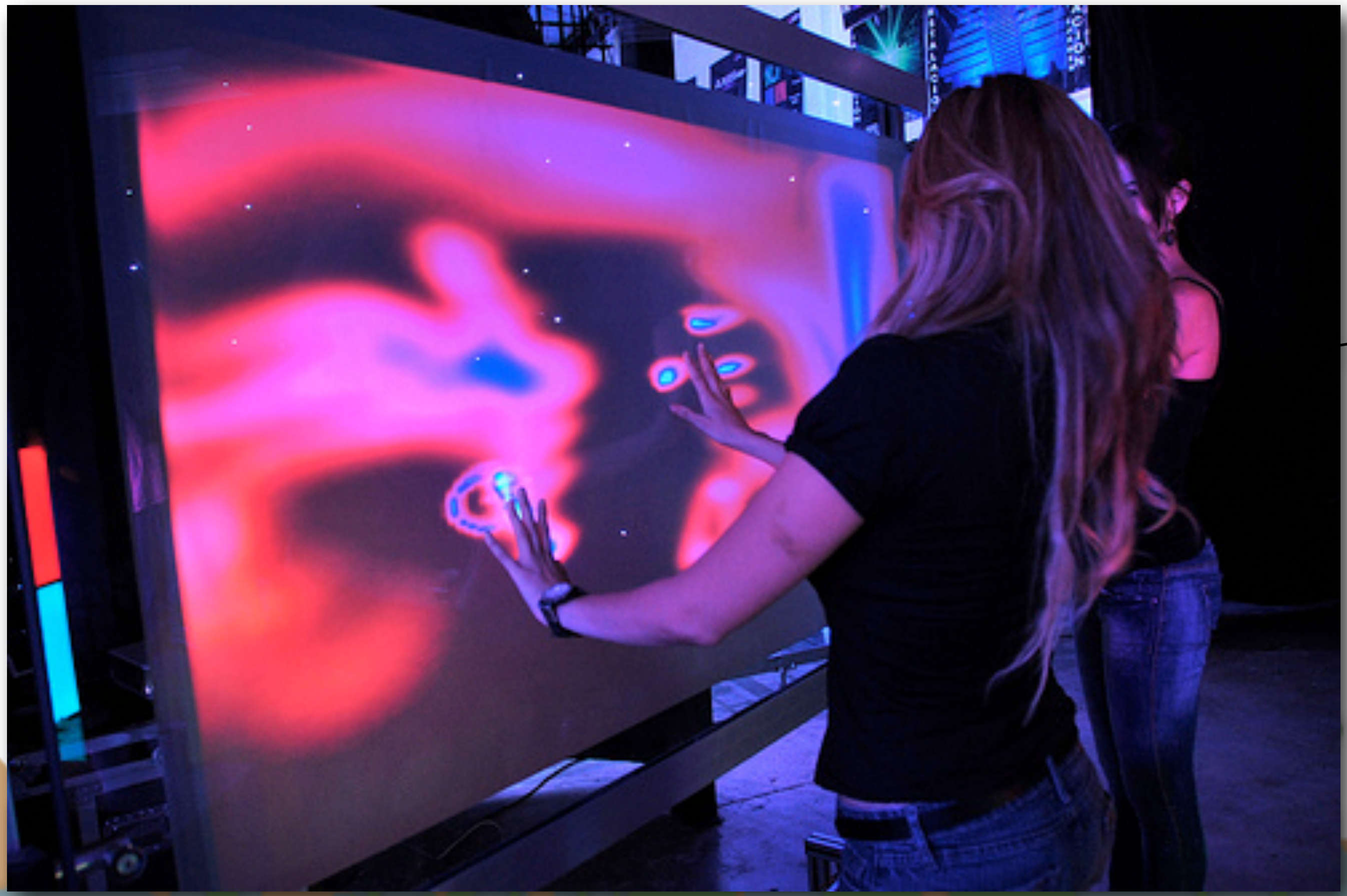
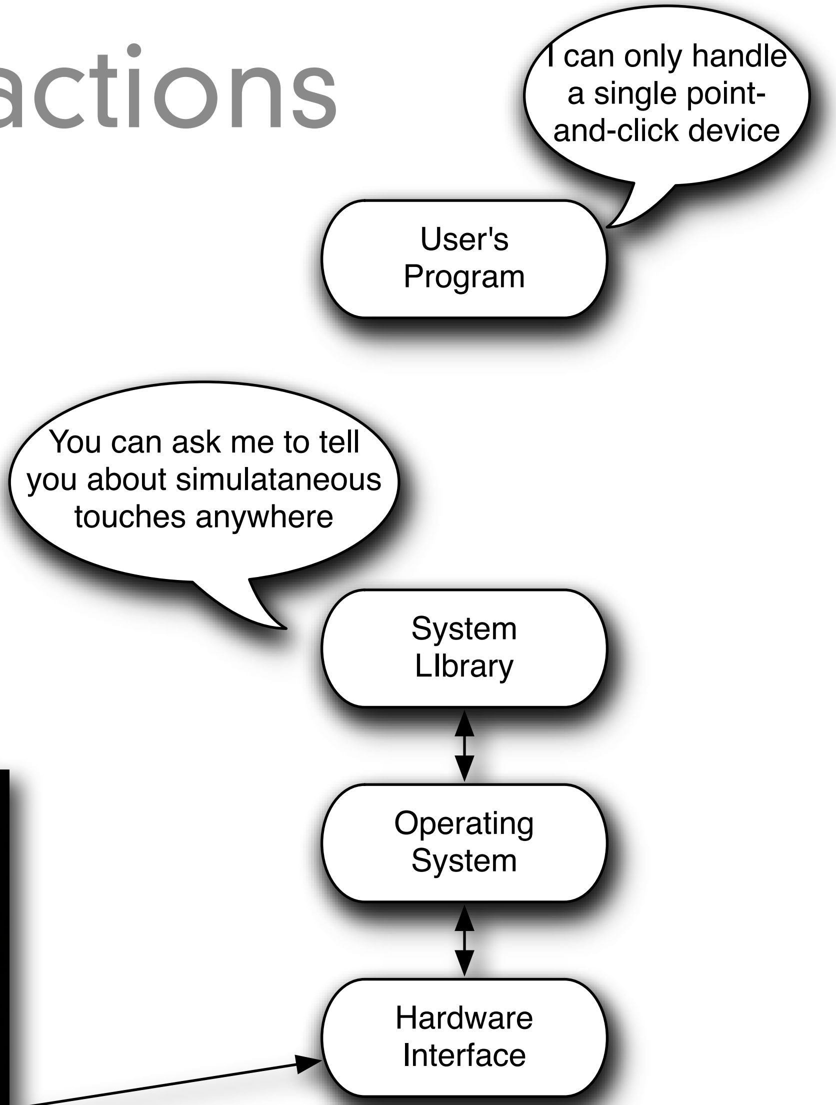
Multi-touch creates new interactions

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




I can only handle a single point-and-click device
User's Program
You can ask me to tell you about simulataneous touches anywhere
System LIbrary
Operating System
Hardware Interface

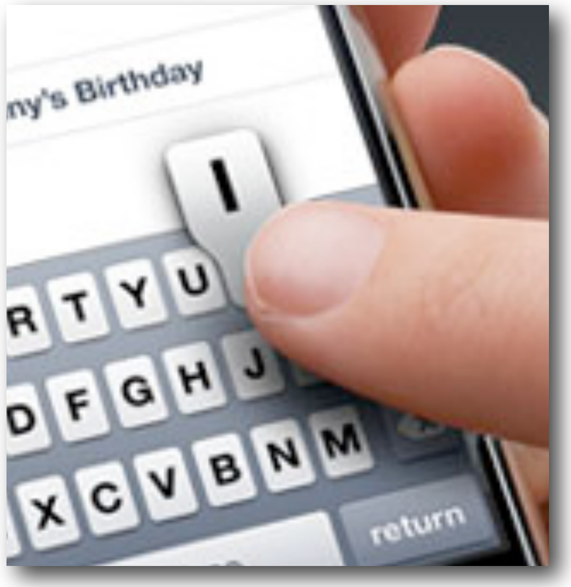
flickr:desertzarzamora

Multi-touch creates new interactions

- Watch Android GUI 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

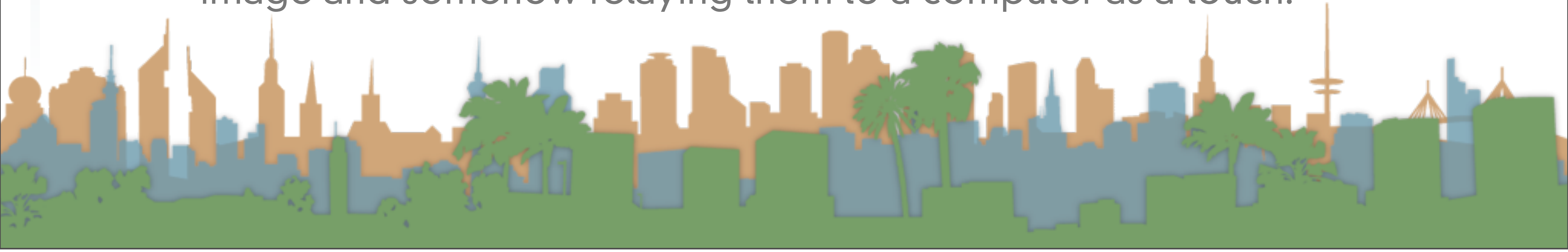
- Watch 10/GUI video
  - http://10gui.com/video/

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.



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