IS4300 HCI

Non-Quiz

What does "JFC" stand for?

- ☐ Java Fundamental Classes
- ☐ Java Foundation Creator
- ☐ Java Fried Chicken
- ☐ Java Foundation Classes
- ☐ Java Framework Creator

Non-Quiz

What is “pluggable look and feel”?

☐ Swing components can be plugged in to each other.
☐ Swing components can be embedded in each other.
☐ Easy tailoring of individual Swing components to look and behave uniquely.
☐ Easy switching between Windows, Mac, and other “look and feels”
☐ Library of Swing plug-ins.

Ethnography Homework

Which design principles do GUIs support?

1. Feedback
2. Speak the User's Language
3. Clearly Marked Exits
4. Consistency
5. Prevent Errors
6. Minimize User Memory Load
7. Flexibility / Shortcuts
8. Simple Design
9. Good Error Messages
10. Help and Documentation
11. Use Appropriate Affordances
12. Visibility / Obviousness

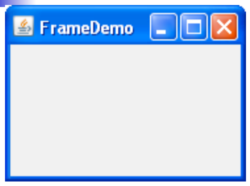
What's a GUI? Standard Elements of a GUI

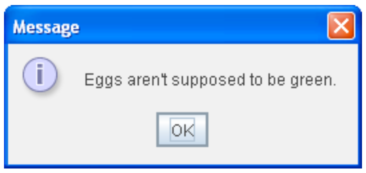
- WIMP
  - Windows
  - Icons
  - Menus
  - Pointers

What is a Widget? Examples?

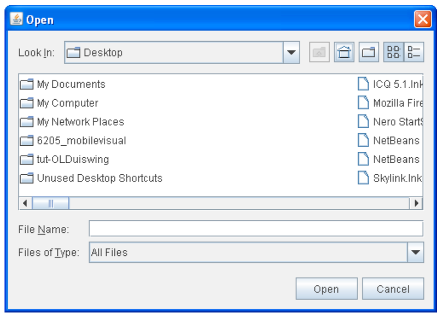
- The "Macintosh 7" 1984
  - Button
  - Slider
  - Pulldown menu
  - Check box
  - Radio buttons
  - Text entry fields
  - File pick/save
- *These have become standard*

WIMP Elements in Swing: Windows

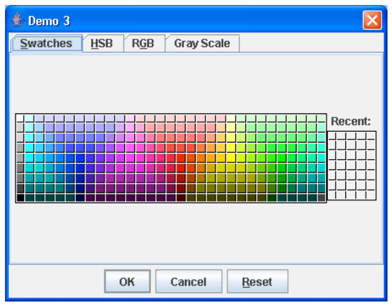




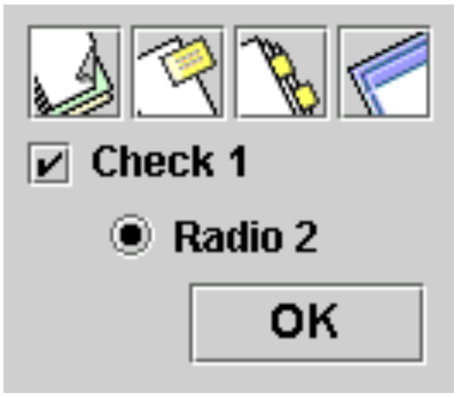
Eggs aren't supposed to be green.



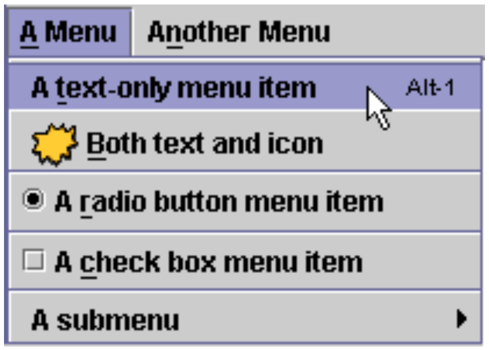
Look In: Desktop
File Name:
Files of Type: All Files



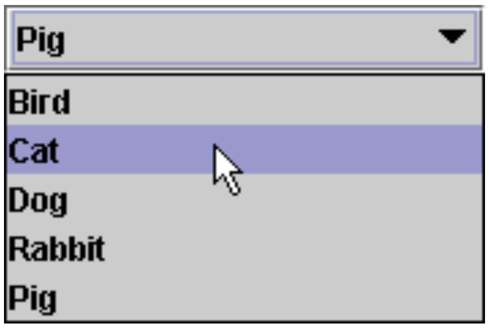
WIMP Elements in Swing: Buttons



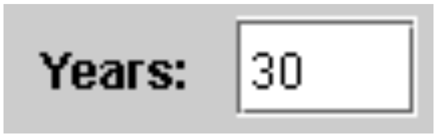
WIMP Elements in Swing: Menus

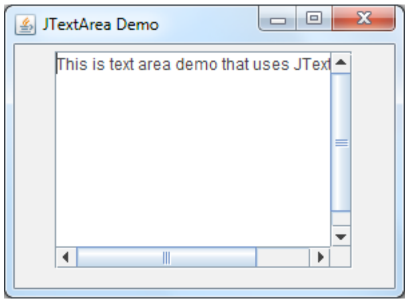


WIMP Elements in Swing: Combo Box



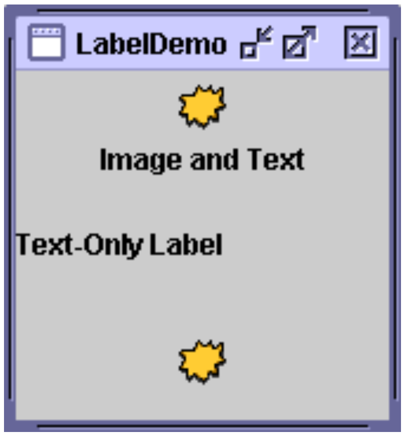
WIMP Elements in Swing: Text Field / Area



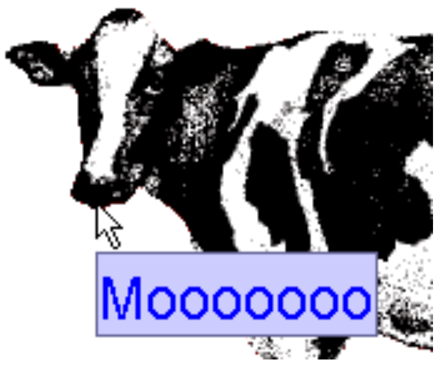


This is text area demo that uses JText

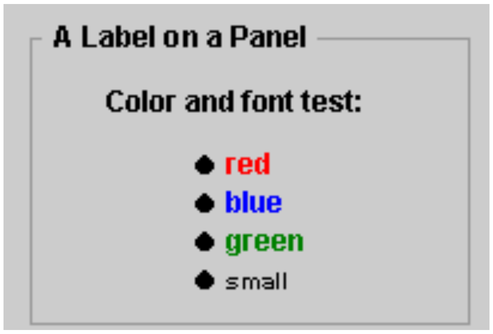
WIMP Elements in Swing: Labels



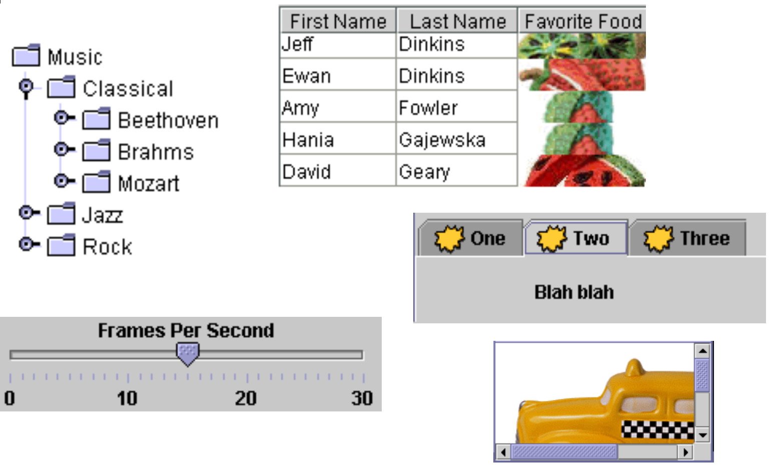
WIMP Elements in Swing: Tool tips



WIMP Elements in Swing: Embedded Panels



WIMP Elements in Swing: Advanced



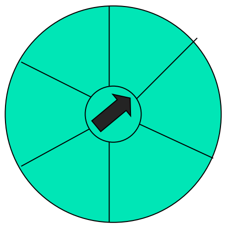
First Name	Last Name	Favorite Food
Jeff	Dinkins	
Ewan	Dinkins	
Amy	Fowler	
Hania	Gajewska	
David	Geary	

Pros and Cons of "Standard" Widget Sets?

- Pro: Collection of good interaction techniques that work well
  - uniformity is good for usability
  - Improves external consistency
- Cons: Significant stagnation
  - Failing to customize interaction techniques to tasks
  - Efficiency could be improved

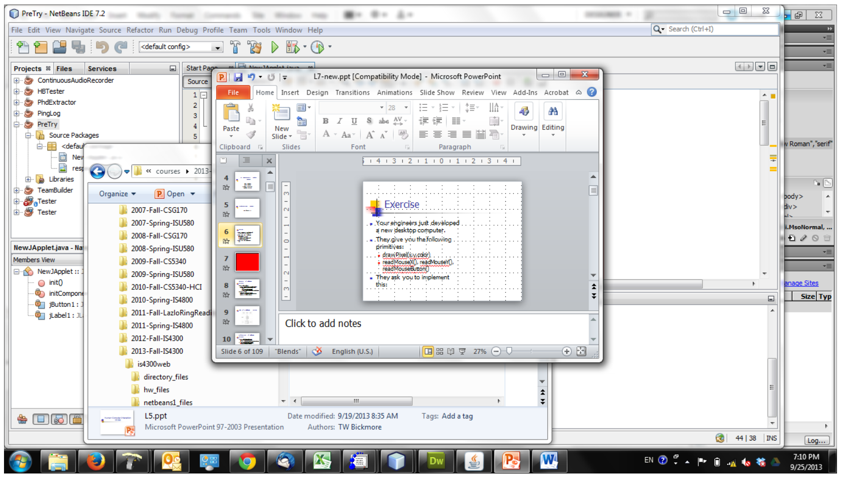
Example of non-standard widget: Pie menus

- A circular pop-up menu
  - only angle of mouse motion counts
  - *Maya, Blender, Grand Theft Auto V, Android Browser*



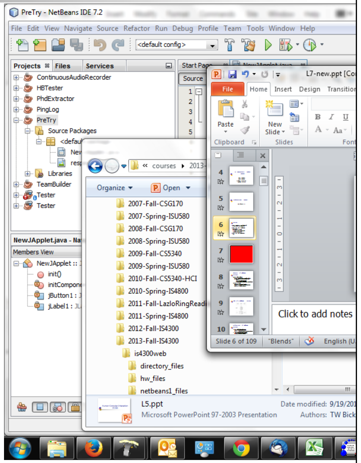
- What are Fitts' law properties?
  - minimum distance to travel
  - minimum required accuracy (dependent on # of options)
  - very fast (dependent on # of options)

GUI Implementation Support

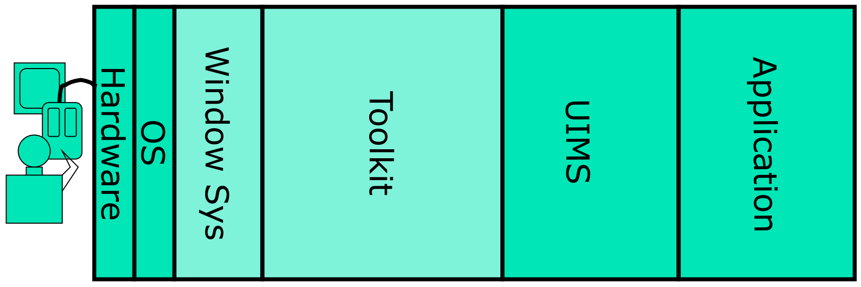


Exercise

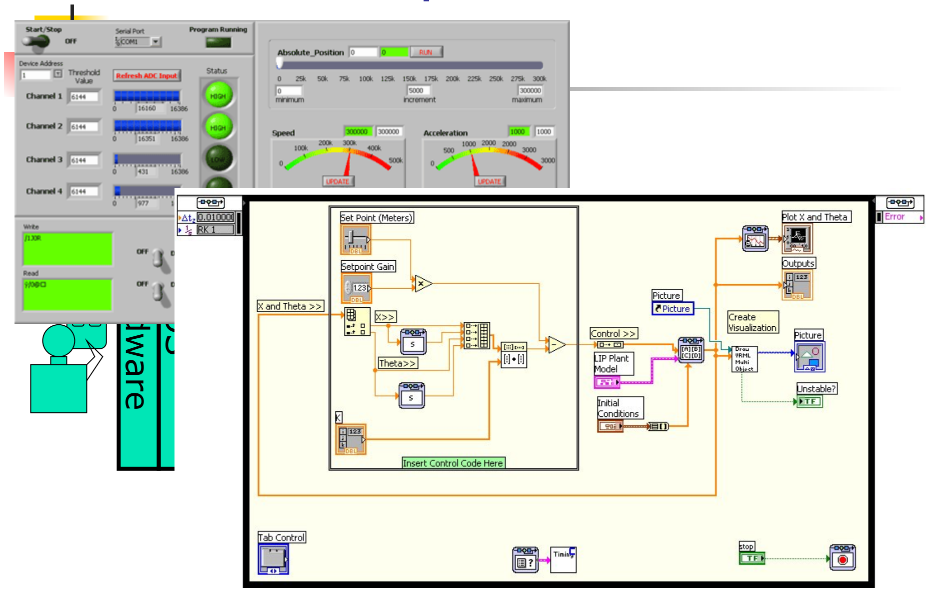
- Your engineers just developed a new desktop computer, and want a modern GUI on it.
- They give you the following primitives:
  - drawPixel(x,y,color)
  - readMouseX(), readMouseY(), readMouseButton(), readKey()
- What functionality do you need?



Myers: Levels of Abstraction in UI Software



UIMS Example: Labview

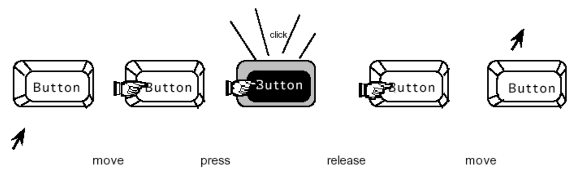


Myers' Chapter
Graphical User Interface Programming

- Why use GUI tools?
  - Makes authoring easier & more economical
  - Improves quality
  - Improves usability

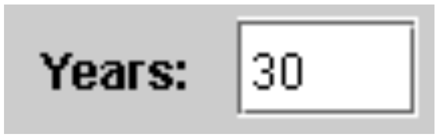
OOP and Toolkit Widgets

- Why are they so well suited?
  - Natural metaphor (direct manipulation)
  - Subclassing to create custom widgets
  - Encapsulation (data & behavior)



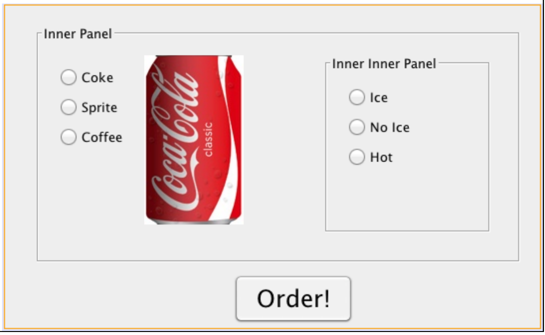
OO Toolkit Concepts #1 Specialization via Subclassing

```
java.lang.Object
    java.awt.Component
        java.awt.Container
            javax.swing.JComponent
                javax.swing.text.JTextComponent
                    javax.swing.JTextField
                    javax.swing.JTextArea
```



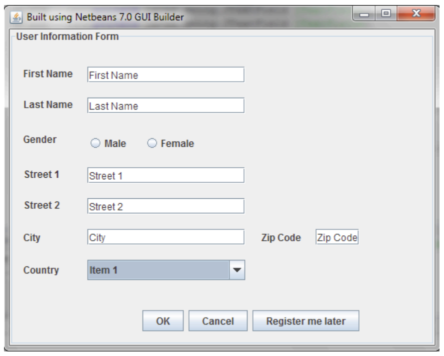
OO Toolkit Concepts #2 Composition

- Put together interactive objects at larger scale than atomic interactors
- Container objects



OO Toolkit Concepts #3 Layout

- How a container organizes its widgets within itself.


Built using Netbeans 7.0 GUI Builder

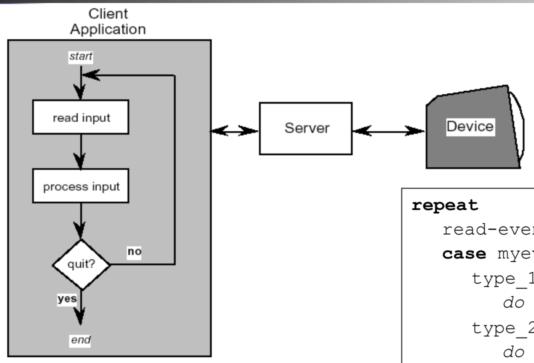
User Information Form

First Name	First Name		
Last Name	Last Name		
Gender	○ Male ○ Female		
Street 1	Street 1		
Street 2	Street 2		
City	City	Zip Code	Zip Code
Country	Item 1		

OO Toolkit Concepts #4 Event Handling

1. When anything happens in the UI
   - Mouse clicked, Window moved, Key pressed, etc
2. Windowing System creates a record
3. The event record in added to a UI event queue
4. The application (or toolkit) pulls events from the queue and acts on them in order

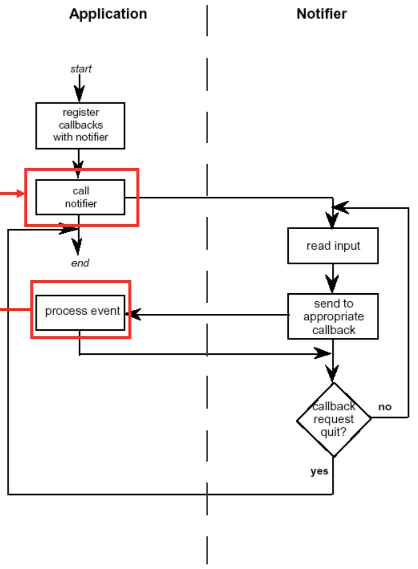
read-evaluation loop



```
repeat
   read-event(myevent)
   case myevent.type
      type_1:
         do type_1 processing
      type_2:
         do type_2 processing
      ...
      type_n:
         do type_n processing
   end case
end repeat
```

notification-based

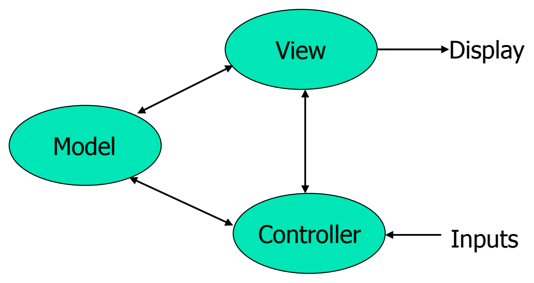
```
public class MyWindow extends JFrame … {

  public MyWindow() {
    …
    JButton jButton=new JButton("OK");
    jButton.addActionListener(
           new MyEventHandler());
    add(jButton);
    …
  }

  public class MyEventHandler … {
     public void actionPerformed(
                ActionEvent e)  {
       System.out.println("Hi mom!");
  }

}
```



OO Toolkit Concepts #5 Virtual toolkits & MVC

- Aka Cross-Platform Development Systems
- Provide a layer of abstraction above "native" toolkit
- Two approaches:
  - Map to native widgets
  - Provide own widgets

Model-View-Controller Architecture for Widgets

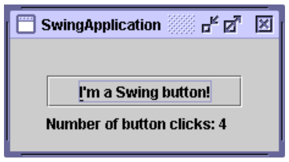


Swing

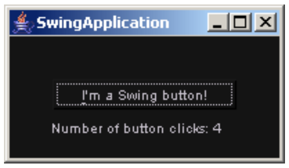
Java GUI APIs

- AWT
  - The original – now mostly obsolete as a toolkit (event handling mechanism still used in Swing)
  - Used "heavyweight" components
- Swing (~1997)
  - The current(?) standard.
  - Native window, but draws all widgets
  - Pluggable look-and-feel
- SWT (Standard Widget Toolkit)
  - Open source widget toolkit.
- JavaFX
  - Becoming new standard UI toolkit (?)

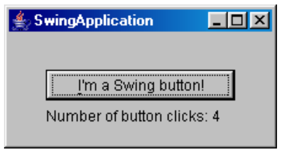
Pluggable Look-and-Feel



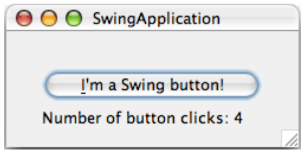
Java



GTK+

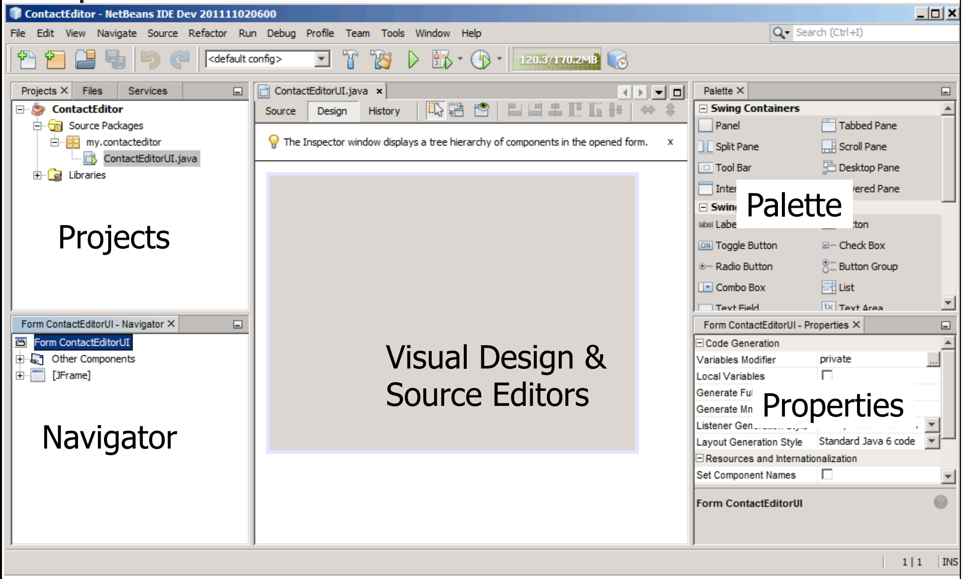


Windows



Mac

Netbeans



The Inspector window displays a tree hierarchy of components in the opened form.

Variables Modifier: private
Layout Generation Style: Standard Java 6 code

Group Exercise

- Project Teams
- Brainstorm alternative “main screens” for your project

GUI Implementation Support

Learning Objectives:

- Why GUIs?
- What is a GUI?
- Why is implementation support needed?
- What kinds of implementation support are available?
- Basic concepts in OO GUI toolkit
- Basics of Java Swing
- Use Netbeans to Design a GUI

Swing Homework I4 – Create a Restaurant Ordering App

- Two JLabels, one with an icon.
- Two JButtons, one with an icon.
- Etc.

- Email a screen shot of your app running, together with a zip archive of your project directory to is4300f16@

- Due in 1 week

To do

- Read
  - Design I (Benyon Ch 5 & 9).

- Due Monday: P2 – Requirements Analysis

- Start Homework I4 – Swing & Netbeans