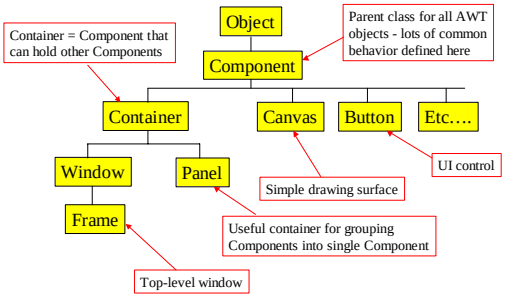
CSE 413 Spring 2000

Java AWT Notes

AWT Class Hierarchy (partial)



A Simple Java Application

```
Import java.awt.*;
// free-standing application w/Window
public class App extends Frame {
   public void paint(Graphics g) {
      redraw screen when requested by window manager
   }

   other function declarations

  // main program -- create window etc.
  Public static void main(String args[]){
     App app = new App( );
     set up window app
     app.show( );
      continue processing
  }
```


Java Application Notes

- `paint()` is called by the window manager as needed, i.e., asynchronously.
- Component can request redrawing by calling `repaint()`
- Window manager doesn't call `paint()` directly - it calls `update()`. The default implementation inherited from component is (roughly)

```
public void update(Graphics g){
   set window to background color
   paint(g);
}
```

- Override `update()` if desired (ex. less flicker)

Event Handling

- User interface components generate *events*
- Objects (often other components) can register themselves to receive events of interest
- When an event happens, an appropriate method is called in all *listeners* (all interested objects)
- A listener object must implement the interface corresponding to the events, which means implementing all methods declared in the interface
- Need `import java.awt.event.*;` (or import all of `java.awt.*`)

Example: Track Mouse

```
Public class TrackMouse
  extends Frame
  implements MouseMotionListener {
    // instance variables
    int locX = 100;  // last mouse
    int locY = 100;  //   location

    // constructor - register this
    // object to receive mouse move
    public TrackMouse( ) {
      addMouseMotionListener(this);
    }
    ...
```

Example: Track Mouse (cont)

```
// MouseMotionListener methods
public void MouseMoved( ) { }

public void MouseDragged
                  (MouseEvent e){
   locX = e.getX();
   locY = e.getY();
   repaint();
}

// repaint screen
public void paint(Graphics g){
  g.drawString("Here!",locX,locY);
}
```


Example: Button

- Most user-interface components need to be allocated, added to an appropriate container, and interested objects need to register to receive events.

```
Public class WatchButton
  extends Frame
  implements ActionListener {
    // instance variables
    Button belly;  // the button
    ...
```


Example: Button (cont)

```
// constructor - create button,
// add to this Frame
// and register as a listener
public WatchButton( ) {
  belly = new Button("press me");
  add(belly);
  belly.addActionListener(this);
}
 ...
```


Example: Button (concl)

```
// react to button press
public ActionPerformed
              (ActionEvent e) {
  if (e.getSource()==belly){
     respond to button press
  }
} ...
```

- The test isn't strictly necessary if we know that `belly` is the only button that could generate the event.
- Many other UI components (text boxes, dials, …) generate similar events. The `ActionEvent` contains details of the event (source, kind, data values, locations, …).

Layout Managers

- A Layout Manager is associated with every `Container`. The layout manager is responsible for positioning components in the container when the container is redrawn.
- Basic layout manager classes
  - `FlowLayout` - arranges components from left to right, top to bottom. Nothing Fancy
  - `GridLayout` - regularly spaced rows and columns
  - `BorderLayout` - Components can be placed in the Center, North, South, East, or West. Useful trick: to place several controls in one of these places, create a `Panel` containing the controls, then place the `Panel` in one of the 5 `BorderLayout` locations.
  - `GridBagLayout` - General constraint layout. Can create almost any effect, but can take some work to do it. If you're comfortable with complex HTML tables, you'll feel at home.

Layout Manager Example

- In the constructor for a Container

```
public SomeContainer( ) extends ... {
  …
  button c = new Button("cold");
  button w = new Button("warm");
  setLayout(new BorderLayout( ));
  add(c, "North");
  add(w, "South");
  ...
}
```

- Also need to add listeners for the buttons, etc.