

Swing

(2004.06.06)

GUI Terminology

- control – Win32 GUI controls
- widget – X GUI controls
- component – Java GUI control (*JComponent* when referring to Swing components)

Java GUIs

- AWT – Abstract Windows Toolkit, basic (and original GUI package)

```
import java.awt.*;
```

```
import java.awt.event.*;
```

Java GUIs (continued)

- Java Foundation Classes
 - GUI related classes designed to solve AWT problems
 - replaces items with lighter weight items that are non-OS specific implementations
 - gives pluggable look and feel
 - increases accessibility
 - provides drag and drop, undo
 - via Swing component set

```
import javax.swing.*;
```

Class Container

- **abstract class**
- **parent for most interactive GUI classes**
- **provide containers (example: content pane) for control objects; i.e. a place / layer to put things**
- **class hierarchy**

```
java.lang.Object
    java.awt.Component
        java.awt.Container
```

<http://java.sun.com/j2se/1.4.2/docs/api/java/awt/Container.html>

Class *JComponent*

- **abstract class**
- **parent for most interactive GUI classes**
- **provides common controls**
- **class hierarchy**

```
java.lang.Object
```

```
    java.awt.Component
```

```
        java.awt.Container
```

```
            javax.swing.JComponent
```

<http://java.sun.com/j2se/1.4.2/docs/api/javax/swing/JComponent.html>

Container with Components

- use the ***getContentPane*** method of the container to access the pane of the container

```
Container getContentPane()
```

- use the ***add*** method of the pane to place the object in the pane

```
Component add(Component)
```

- use the ***addSomethingListener*** method of the component to register the object if it is a component

```
void addSomeListener(SomeListener)
```

Typical Pattern of Events for Making and using a Container

```
Jframe jf = new Jframe("Example");  
Container jfc = jf.getContentPane();  
JSomething something = new Jsomething();  
ListenerClass SomeListener  
                                = new ListenerClass();  
something.addSomeListener(SomeListener);  
jfc.add(something);  
jf.setVisible(true);
```

Container Layout

- dictates how components will be displayed using a class that implements *LayoutManager*
- setting a layout using a layout manager

```
void setLayout (LayoutManager)
```

- for now: *FlowLayout* Class
 - left-to-right flow of components
 - wraps components
 - each line centered

Pattern of Events for Making and using a Container (Amended)

```
JFrame jf = new JFrame("Example");  
Container jfc = jf.getContentPane();  
jfc.setLayout(new FlowLayout());  
JSomething something = new Jsomething();  
ListenerClass SomeListener  
                = new ListenerClass();  
something.addSomeListener(SomeListener);  
jfc.add(something);  
jf.setVisible(true);
```

JButton

- **GUI button**
- **requires an *ActionListener* implementation**

```
interface ActionListener {  
    void actionPerformed(ActionEvent e) {}  
}
```

- **example button:**

```
JButton exit = new JButton("Exit");  
exit.addActionListener(myActionListener);  
jfc.add(exit);
```

<http://java.sun.com/j2se/1.4.2/docs/api/javaw/swing/JButton.html>

Implementing *actionPerformed*

- **must get the source variable of the event**

```
Object getSource()
```

- **example:**

```
public class myActionListener
    implements ActionListener {

    public void actionPerformed(ActionEvent e) {
        if (e.getSource() == aJButton) {
            ... actions ...
        }
    }
}
```

An Example with a *JButton*

```
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;

public class FirstSwing {

    private JFrame jf;
    private Container jfc;
    private JButton exit;
    private MyActionListener mal;
    private MyWindowListener mwl;

    public static void main(String[] args) {
        FirstSwing demo1 = new FirstSwing("One", 300, 200);
        FirstSwing demo2 = new FirstSwing("Two", 50, 300);
        FirstSwing demo3 = new FirstSwing("Three", 600, 100);
    }
}
```

An Example with a *JButton* (continued)

```
public FirstSwing(String label, int x, int y) {
    mwl = new MyWindowListener();
    mal = new MyActionListener();
    jf = new JFrame(label);

    jf.setSize(300,200);
    jf.setLocation(x,y);
    jf.addWindowListener(mwl);

    jfc = jf.getContentPane();
    jfc.setLayout(new FlowLayout());

    exit = new JButton("Exit");
    exit.addActionListener(mal);

    jfc.add(exit);

    jf.setVisible(true);
}
```

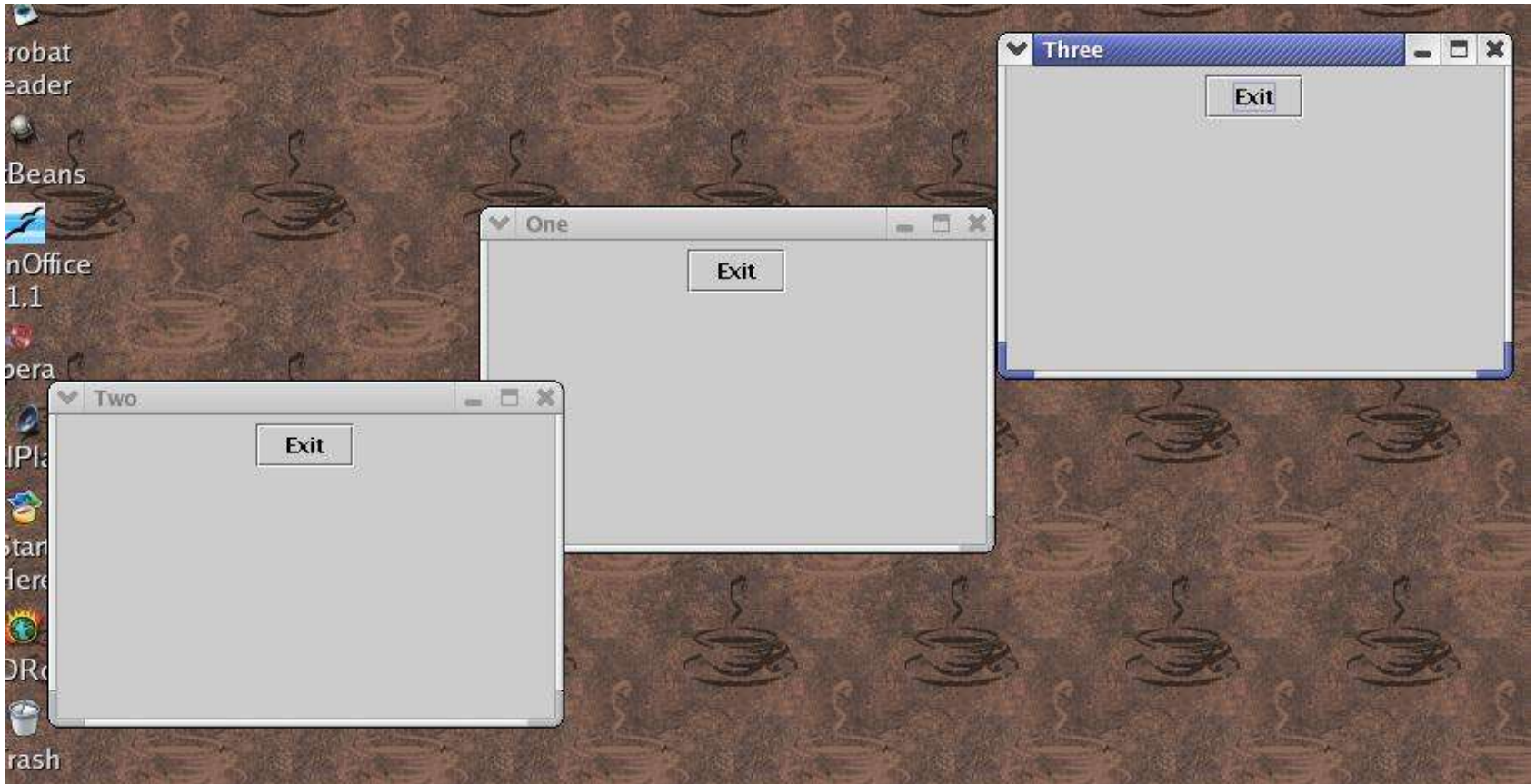
An Example with a *JButton* (continued)

```
public class MyActionListener implements ActionListener {
    public void actionPerformed(ActionEvent e) {
        if (e.getSource() == exit) {
            System.exit(0);
        }
    }
}
```

```
public class MyWindowListener implements WindowListener {
    public void windowActivated(WindowEvent e) {}
    public void windowClosed(WindowEvent e) {}
    public void windowClosing(WindowEvent e) {System.exit(0);}
    public void windowDeactivated(WindowEvent e) {}
    public void windowDeiconified(WindowEvent e) {}
    public void windowIconified(WindowEvent e) {}
    public void windowOpened(WindowEvent e) {}
}
}
```

```
}
```

An Example with a *JButton* (continued)



An ImageIcon with a JButton

```
ImageIcon xIcon = new ImageIcon("x.jpg");  
exit = new JButton(xIcon);  
exit.addActionListener(mal);  
jfc.add(exit);
```

JLabel

```
JLabel jl = new JLabel("Exit Now! ");  
jfc.add(jl);
```

JToolTip

```
JToolTip jtt = new JToolTip();  
jtt.setTipText("Exit now!");  
jfc.add(jtt);
```

<http://java.sun.com/j2se/1.4.2/docs/api/javaw/swing/ImageIcon.html>

<http://java.sun.com/j2se/1.4.2/docs/api/javaw/swing/JLabel.html>

<http://java.sun.com/j2se/1.4.2/docs/api/javaw/swing/JToolTip.html>

JTextField

```
JTextField jtf;  
JLabel jl2 = new JLabel("Enter the dollar amount: ");  
jtf = new JTextField(10);  
jtf.addActionListener(mal);  
jfc.add(jl2);  
jfc.add(jtf);
```

...

```
public void actionPerformed(ActionEvent e) {  
    ...  
    } else if (e.getSource() == jtf) {  
        try{  
            amount = Double.parseDouble(jtf.getText());  
        } catch (Exception de) {  
            amount = 0;  
        }  
        System.out.println("$" + amount);  
    }  
    ....  
}
```

<http://java.sun.com/j2se/1.4.2/docs/api/javaw/swing/JTextField.html>

JCheckBox

```
JCheckBox jck1, jck2;  
MyItemListener mil = new MyItemListener();  
jck1 = new JCheckBox("Flee", true);  
jck2 = new JCheckBox("After Burners", true);  
jck1.addItemListener(mil);  
jck2.addItemListener(mil);  
jfc.add(jck1); jfc.add(jck2);
```

...

```
public class MyItemListener implements ItemListener {  
    public void itemStateChanged(ItemEvent e) {  
        if (e.getSource() == jck1) {  
            flee = !flee;  
            System.out.println(flee);  
        } else if (e.getSource() == jck2) {  
            afterBurners = !afterBurners;  
            System.out.println(afterBurners);  
        }  
    }  
}
```

<http://java.sun.com/j2se/1.4.2/docs/api/javawx/swing/JCheckBox.html>

JPanel (Mini-containers)

```
JPanel jp;  
JButton closePanel;  
Border red = BorderFactory.createLineBorder(Color.red);  
JLabel pictureThis  
    = new JLabel(new ImageIcon("robintuxsmall.jpeg"));  
jp = new JPanel();  
jp.setBorder(red);  
jp.add(pictureThis);  
closePanel = new JButton("Close");  
closePanel.addActionListener(mal);  
jp.add(closePanel);  
jfc.add(jp);
```

```
...  
public class MyActionListener implements ActionListener {  
    public void actionPerformed(ActionEvent e) {  
        ...  
    } else if (e.getSource() == closePanel) {  
        jp.setVisible(false);  
    }  
}  
}
```

Example with Previous Techniques

```
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;
import javax.swing.border.*;

public class MoreSwing {

    private JFrame jf;
    private Container jfc;

    private MyActionListener mal;
    private MyWindowListener mwl;
    private MyItemListener mil;

    private JButton exit, closePanel;
    private JTextField jtf;
    private JCheckBox jck1, jck2;
    private JPanel jp;

    private double amount;
    private boolean flee=true, afterBurners=true;
```

Example with Previous Techniques (continued)

```
public static void main(String[] args) {  
    MoreSwing demo1 = new MoreSwing("One", 300, 400);  
}
```

```
public MoreSwing(String label, int x, int y) {  
    mwl = new MyWindowListener();  
    mal = new MyActionListener();  
    mil = new MyItemListener();  
    jf = new JFrame(label);  
  
    jf.setSize(x, y);  
    jf.setLocation(x, y);  
    jf.addWindowListener(mwl);  
  
    jfc = jf.getContentPane();  
    jfc.setLayout(new FlowLayout());  
    jfc.setBackground(Color.white);  
  
    JToolTip jtt = new JToolTip();  
    jtt.setTipText("Exit now!");  
    jfc.add(jtt);  
}
```

Example with Previous Techniques (continued)

```
ImageIcon xIcon = new ImageIcon("x.jpg");  
exit = new JButton(xIcon);  
exit.addActionListener(mal);  
jfc.add(exit);
```

```
JLabel jl = new JLabel("Exit Now!");  
jfc.add(jl);
```

```
JLabel jl2 = new JLabel("Enter the dollar amount: ");  
jtf = new JTextField(10);  
jtf.addActionListener(mal);  
jfc.add(jl2);  
jfc.add(jtf);
```

```
jck1 = new JCheckBox("Flee", true);  
jck1.setBackground(Color.white);  
jck2 = new JCheckBox("After Burners", true);  
jck2.setBackground(Color.white);  
jck1.addItemListener(mil);  
jck2.addItemListener(mil);  
jfc.add(jck1); jfc.add(jck2);
```

Example with Previous Techniques (continued)

```
Border red
    = BorderFactory.createLineBorder(Color.red);
JLabel pictureThis
    = new JLabel(new ImageIcon("robintuxsmall.jpeg"));
jp = new JPanel();
jp.setBorder(red);
jp.add(pictureThis);
closePanel = new JButton("Close");
closePanel.addActionListener(mal);
jp.add(closePanel);
jfc.add(jp);

jf.setVisible(true);

} // end constructor
```

Example with Previous Techniques (continued)

```
public class MyActionListener implements ActionListener {
    public void actionPerformed(ActionEvent e) {
        if (e.getSource() == exit) {
            System.exit(0);
        } else if (e.getSource() == jtff) {
            try{
                amount
                    = Double.parseDouble(jtff.getText());
            } catch (Exception de) {
                amount = 0;
            }
            System.out.println("$" + amount);
        } else if (e.getSource() == closePanel) {
            jp.setVisible(false);
        }
    }
}
```

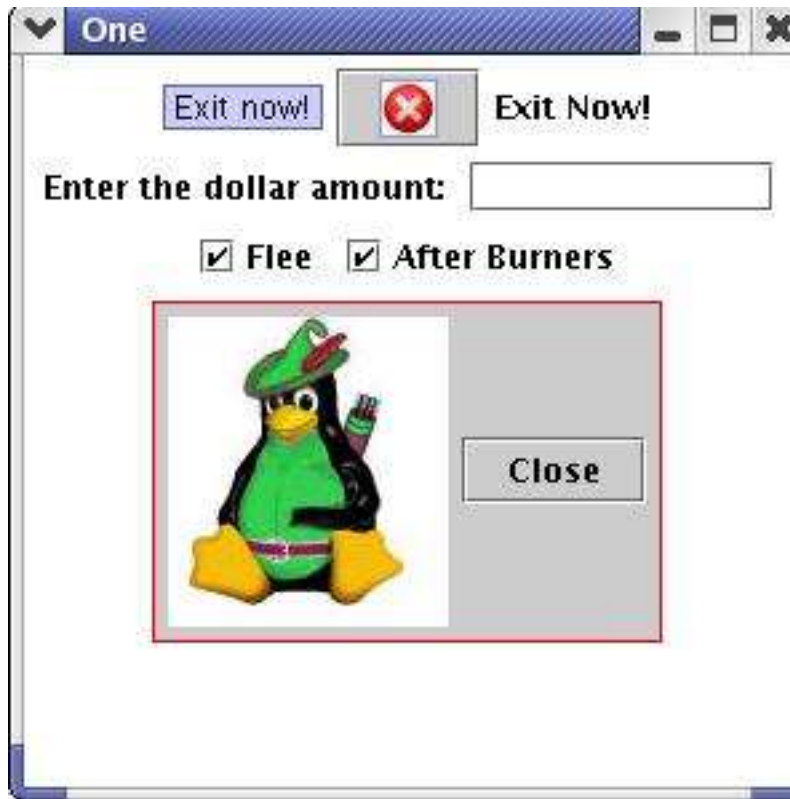
Example with Previous Techniques (continued)

```
public class MyItemListener implements ItemListener {
    public void itemStateChanged(ItemEvent e) {
        if (e.getSource() == jck1) {
            flee = !flee;
            System.out.println(flee);
        } else if (e.getSource() == jck2) {
            afterBurners = !afterBurners;
            System.out.println(afterBurners);
        }
    }
}

public class MyWindowListener implements WindowListener {
    public void windowActivated(WindowEvent e) {}
    public void windowClosed(WindowEvent e) {}
    public void windowClosing(WindowEvent e)
        {System.exit(0);}
    public void windowDeactivated(WindowEvent e) {}
    public void windowDeiconified(WindowEvent e) {}
    public void windowIconified(WindowEvent e) {}
    public void windowOpened(WindowEvent e) {}
}
} // end program
```

Example with Previous Techniques (continued)

Before closing the JPanel



After closing the JPanel

