

Graphical User Interfaces

Containers and Components

- Frame - OS-managed container used to display GUI-based java apps
- Panel - Container used to organized other GUI components (buttons, labels, etc)
- Label - Component used to display text

```
//Similar to Authority.java from Lewis/Loftus
import java.awt.*;
import javax.swing.*;

public class GUI {

    public static void main(String[] args) {

        JFrame frame = new JFrame("First GUI"); //takes title for window
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        JPanel panel = new JPanel();
        panel.setBackground(Color.red);
        panel.setPreferredSize(new Dimension(250, 75));
        JLabel label = new JLabel("My first GUI");
        panel.add(label); //add label to panel
        frame.getContentPane().add(panel); //add panel to content pane of frame
        frame.pack(); //size to the preferred size
        frame.setVisible(true); //make visible
    }
}
```

Exercises

1. Experiment with class GUI
 1. Change the color of the panel
 2. Change the size of the panel
 3. See what happens if you do not "pack"
 4. See what happens if you do not make visible
 5. Add a second label of a different color

More Components

- Buttons - Component that can be "pushed"
 - must invoke `addActionListener` in order to enable the program to respond to a button push
 - program waits for an *event* and the performs the appropriate action

```
public class GUIWButton {

    public GUIWButton() {
        JFrame frame = new JFrame("First GUI");
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        JPanel panel = new JPanel();
        panel.setBackground(Color.red);
        panel.setPreferredSize(new Dimension(250, 75));
        JLabel label = new JLabel("Count is 0");
        JButton button = new JButton("Push Me!");
        button.addActionListener(new ButtonListener(label));
        panel.add(label);
        panel.add(button);
        frame.getContentPane().add(panel);
        frame.pack(); //size to the preferred size
        frame.setVisible(true);
    }
}
```

```
private class ButtonListener implements ActionListener {
    JLabel label;
    int count;

    public ButtonListener(JLabel label) {
        this.label = label;
        this.count = 0;
    }

    public void actionPerformed(ActionEvent event) {
        count++;
        label.setText("Count is " + count);
    }
}

public static void main(String[] args) {
    GUIWButton mygui = new GUIWButton();
    System.out.println("running...");
}
```

Exercises

1. Compile and run GUIWButton.
2. Create a GUI with a label and text field. Allow the user to enter text in the text field. When the user presses enter, update the text of the label to be the text contained in the text field.
3. Add a button to the program you wrote for exercise 2. When the user presses the button OR presses enter, update the text of the label to be the text contained in the text field.
4. Modify your program from exercise 3 to keep a count of the number of times you have changed the label.