Graphical User Interfaces

GUIs
The Plan

- Components
- Flat Layouts
- Hierarchical Layouts
- Designing a GUI
- Coding a GUI
Components

- JLabel
  text/image display
- JTextField
  single line for text input/output
- JTextArea
  multiple lines for text input/output
- JButton
  used for decisions
- JFrame
  a basic window
Components

- **JLabel**
  - text/image display
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Flat Layouts

GridLayout

BorderLayout
Flat Layouts

GridLayout
- Added left to right, top to bottom
- Expands to fill horizontally and vertically
- Each space equal width and height

BorderLayout
- Not all positions must be filled
- CENTER expands horizontally and vertically
- NORTH and SOUTH expand horizontally
- WEST and EAST expand vertically
Flat Layouts

BorderLayout

![Diagram of BorderLayout in a Java GUI](image)

- Above is a JLabel in the BorderLayout.NORTH
- In BorderLayout.WEST
- Text Area Here
- In BorderLayout.CENTER
- In BorderLayout.EAST
- Below is a JTextField in BorderLayout.SOUTH
Flat Layouts

GridLayout
Hierarchical Layouts

You can put layouts within layouts:
Hierarchical Layouts

Identify the BorderLayout and GridLayouts in the application on the right.
Hierarchical Layouts

CENTER

EAST
Hierarchical Layouts

GridLayout
Hierarchical Layouts

GridLayout
Hierarchical Layouts

Jeff: Jenny, I like your star, how did you do that?
Jenny: I just used the polygon shape, just click on 5 points and you should be able to do it.
Ann: Yeah, that's not too bad, I like the zig-zags too.
Kathy: Jeff, you guys can't get a polygon like this one.
Jeff: Kathy, draw a square on the Community Board and I'll do one of those.
Kathy: Cool polygons again.
Ann: Okay, but you've got to show us how to do it.
Chris: I prefer the plain stuff like ovals, rectangles, and triangles.
Jenny: That's just because you can't do the cool polygon stuff.
Kathy: Try a polygon, Chris, here I'll put a circle on the Community Board.
Chris: How about that, I can too! Do the polygons, let's see you do one, Jenny. Jenny: I'll do a crown.
Hierarchical Layouts

CENTER

Jeff: Jenny, I like your star, how did you do that?
Jenny: I just used the polygon shape. Just click on 5 points and you should
Jenny: be able to do it
Jeff: Yeah, that's not too bad. I like the zig-zags too.
Kathy: I'll bet you guys can't get a polygon like this one.
Kathy: Jeff, draw a square on the Community board and I'll do one of those
Kathy: cool polygons again.
Jeff: Okay, but you've got to show us how to do it.
Chris: I prefer the plain stuff like ovals, rectangles, and triangles.
Jenny: That's just because you can't do the cool polygons stuff.
Kathy: Try a polygon Chris, here I'll put a circle on the Community board.
Chris: How about that! I can too do the polygons. Let's see you do one Jenny.
Jenny: I'll do a crown.

SOUTH
Hierarchical Layouts

Jeff: Jenny, I like your star. How did you do that?
Jenny: I just used the polygon shape. Just click on 5 points and you should be able to do it.
Jeff: Yeah, that’s not too bad. I like the zig-zag, too.
Kathy: I’ll bet you guys can’t get a polygon like this one.
Kathy: Jeff, draw a square on the Community board and I’ll do one of those cool polygons again.
Jeff: Okay, but you’ve got to show us how to do it.
Chris: I prefer the plain stuff like ovals, rectangles, and triangles.
Jenny: That’s just because you can’t do the cool polygons stuff.
Kathy: Try a polygon Chris. Here I’ll put a circle on the Community board.
Chris: How about that? I can too do the polygons. Let’s see you do one Jenny.
Jenny: I’ll do a crown.
Hierarchical Layouts

- Virtually every layout we make is a hierarchy of GridLayout and BorderLayout
- Other Layouts include
  - BoxLayout
  - GridBagLayout
  - FlowLayout
  - CardLayout
Designing a GUI

- What components are needed?
- Which components are of primary importance? Secondary?
- How do the components relate to each other?
- How big are the components?
- How can they be arranged into BorderLayout and GridLayout?
Coding a GUI

1. Declare the components as instance variables
2. Write a makeComponents method to initialize the components
3. Write a layoutComponents methods to arrange the components
4. Write a constructor to call the above two methods
5. Write a setVisible method to set the primary component’s visibility (usually a JFrame).
Examples

- BorderExample.java (today)
- In code directory (GUIs.jar)
  - GridExample.java
  - CombinedExample.java
BorderExample.java

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

public class BorderExample
    extends JApplet
{
    JFrame frame;
    JTextArea middle;
    JTextField bottom;
    JButton left, right;
    JLabel title;

private void makeComponents()
{
    frame=new JFrame("BorderExample");
    middle=new JTextArea(10, 40);
    bottom=new JTextField();
    left=new JButton("left");
    right=new JButton("right");
    title=new JLabel("Title");
}
private void makeLayout() {
    Container container=frame.getContentPane();
    container.setLayout(new BorderLayout);
    container.add(new JScrollPane(middle), BorderLayout.CENTER);
    container.add(title, BorderLayout.NORTH);
    container.add(left, BorderLayout.WEST);
    container.add(right, BorderLayout.EAST);
    container.add(bottom, BorderLayout.SOUTH);
    frame.pack();
}
BorderExample.java

```java
public BorderExample()
{
    makeComponents();
    makeLayout();
}

public void setVisible(boolean vis)
{
    frame.setVisible(vis);
}
```
BorderExample.java

```java
public void init()
{
    main(null);
}

public static void main(String[] args)
{
    BorderExample example=new BorderExample();
    example.setVisible(true);
}
```