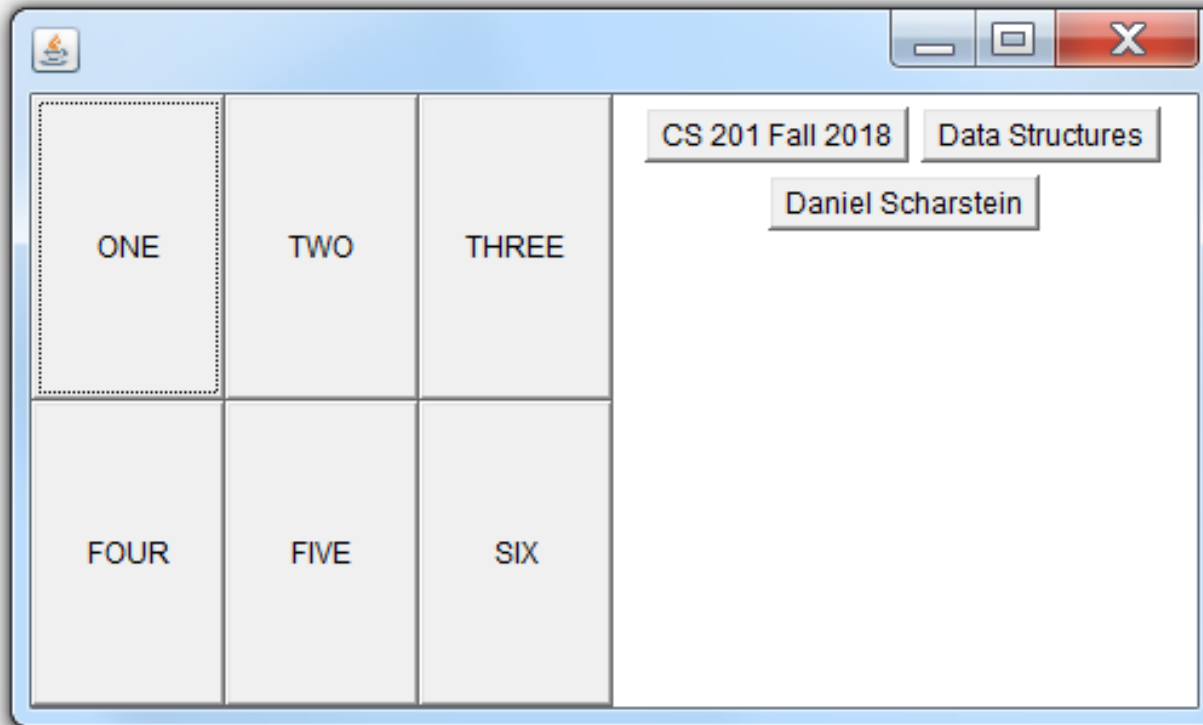


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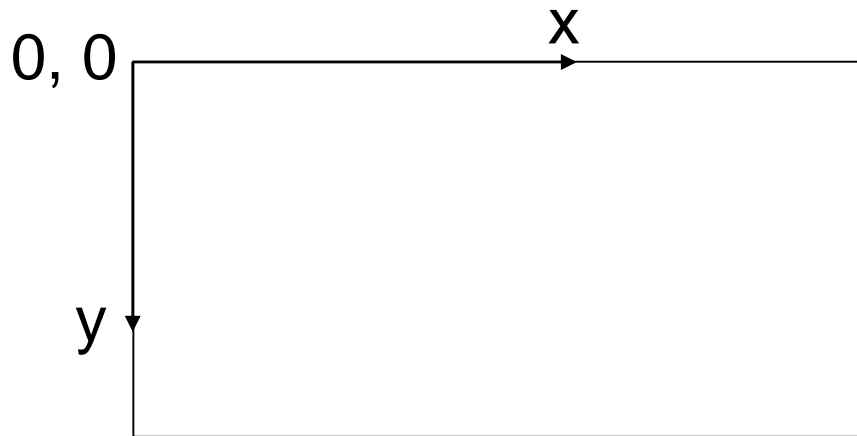
GUIs, Graphics, and Events

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Java Graphics (awt)

- Some AWT components support drawing



```
import java.awt.*;  
public class ... extends Frame { ...
```

- Put drawing code in:

```
public void paint(Graphics g) { ... }
```

Java Graphics continued

- Drawing commands:

```
g.drawLine(x1, y1, x2, y2);
```

```
g.drawRect(x, y, width, height);
```

```
g.drawOval(x, y, width, height);
```

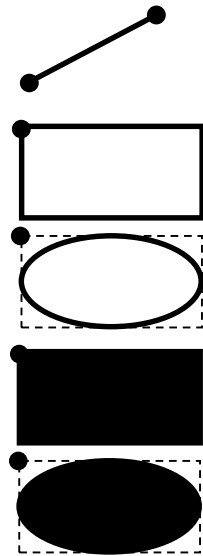
```
g.fillRect(x, y, width, height);
```

```
g.fillOval(x, y, width, height);
```

```
g.setColor(Color.RED);
```

```
g.drawString("Hi!", x, y);
```

● **Hi!**



GUI (= Graphical User Interface)

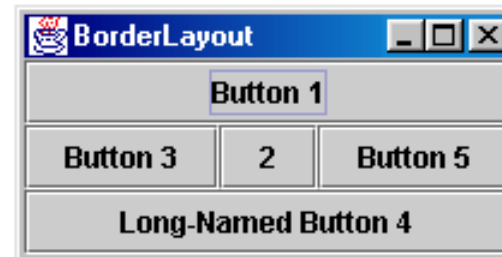
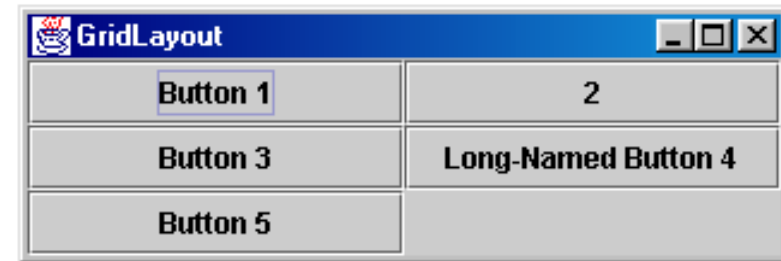
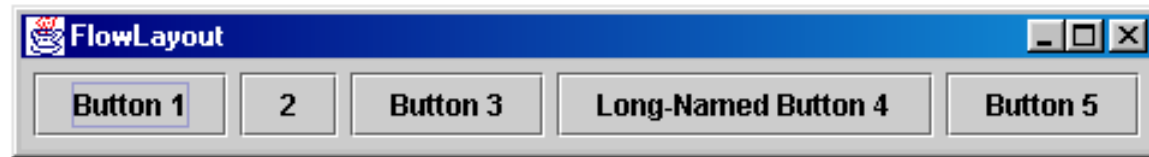


- Components:

- `new Canvas () ;` Use Drawing commands
- `new Button ("click me!") ;`
- `new Label ("Hi") ;`
- `new Choice () ;` Use “add” to add menu items
- `new Panel () ;` Use “add” to add other components
- ...

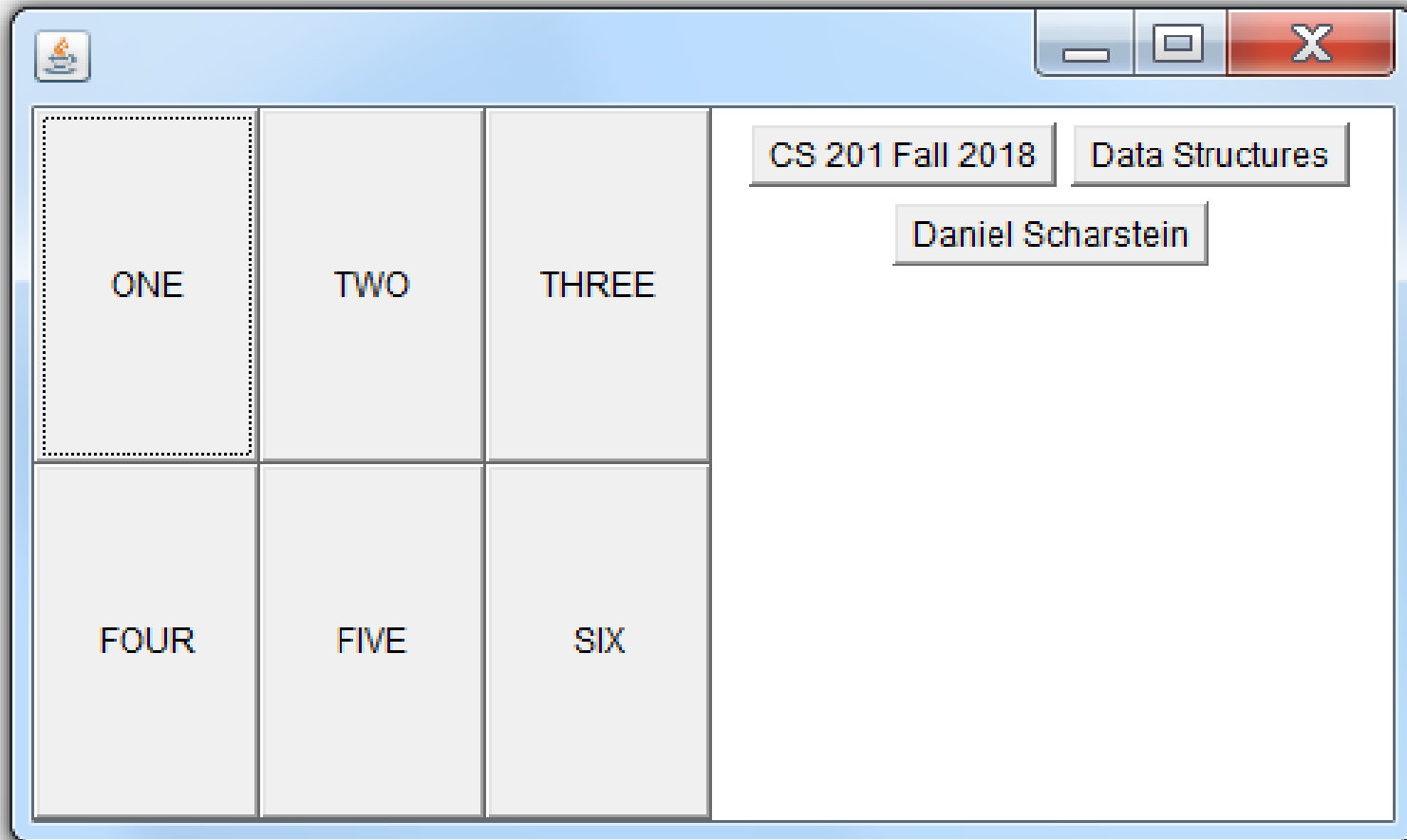
Layout Managers

- `setLayout(new ...);`
 - `FlowLayout()`
 - `add(...);`
 - `GridLayout(nrows, ncols)`
 - `add(...);`
 - `BorderLayout()`
 - `add("Center", ...);`
 - `add("North", ...);`



Layout Example

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Events

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

public class ... implements ActionListener

quitButton.addActionListener(this);

public void actionPerformed(ActionEvent evt) {
    if (evt.getSource() == quitButton) {
        ...
    }
}
```

Applets

```
import java.applet.*;

public class MyApplet extends Applet {
    public void init() { // instead of constructor
    }
}
```

Include in HTML:

```
<applet code="MyApplet.class" width=500
height=400> </applet>
```