159 XTENDED

A WEEKLY REVIEW

GRAPHICAL USER INTERFACES

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WHAT IS A GRAPHICAL USER INTERFACE?

- A GUI (pronounced gooey) is a user interface that includes graphical elements, such as buttons, text boxes, and icons.

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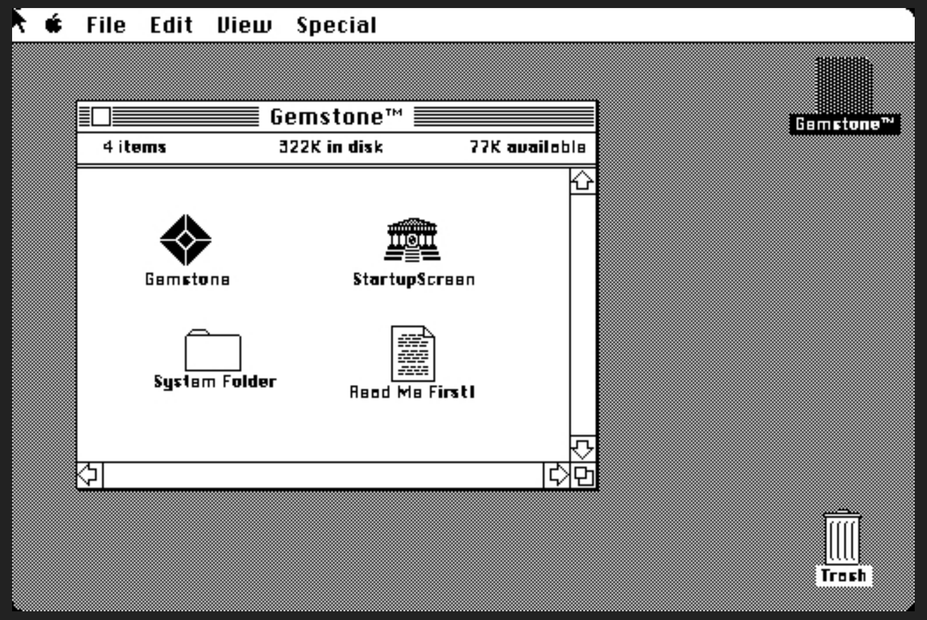

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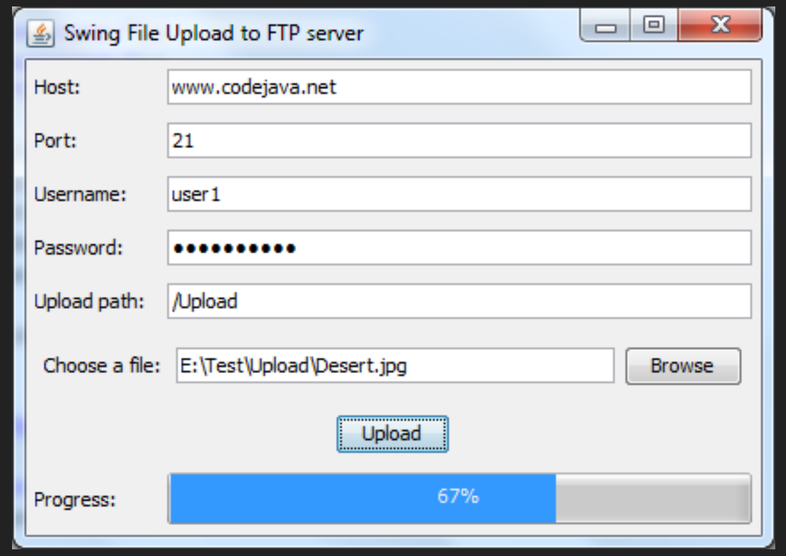
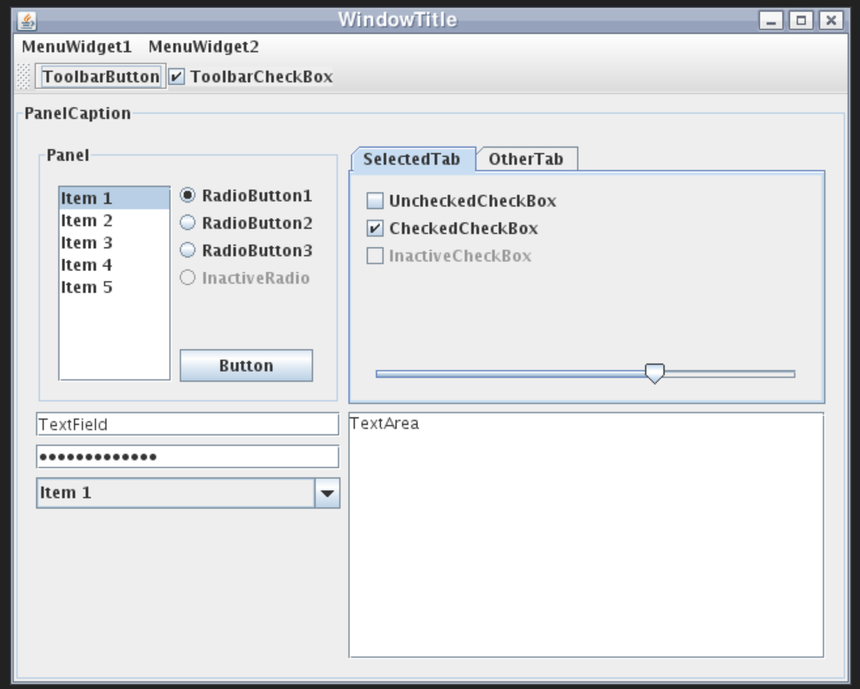
WHAT IS JAVA SWING?

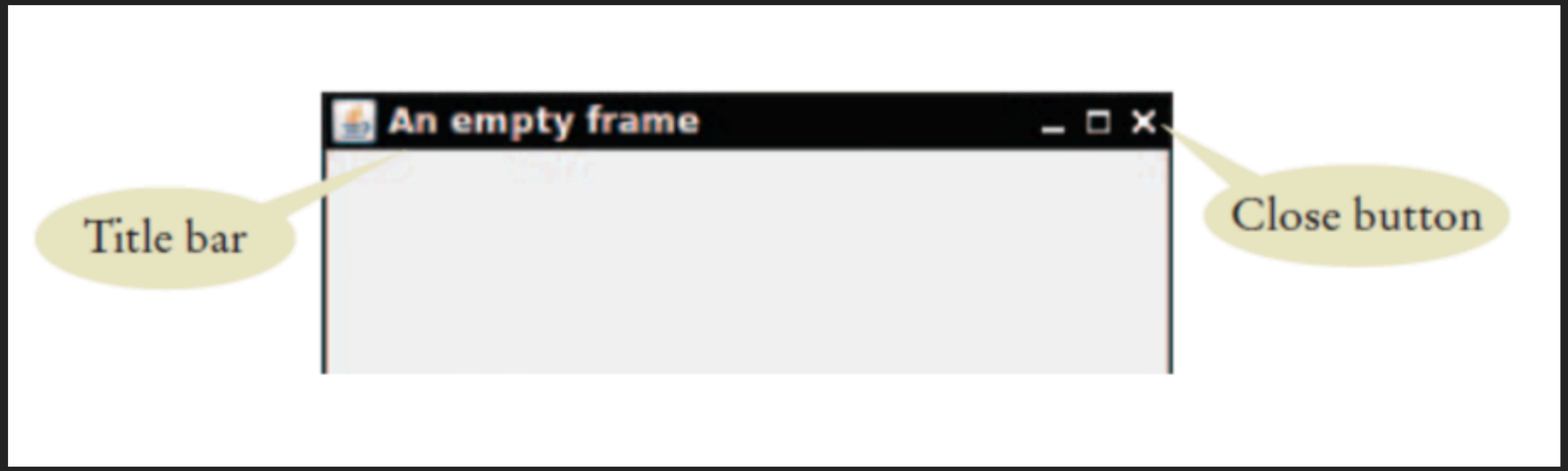
- Java Swing is a GUI toolkit for Java that enables us to integrate a graphical front end in to our Java applications.





FRAME WINDOWS

- Java's JFrame class allows you to display a new frame.



FRAME WINDOWS

- Five steps to displaying a frame:
  - 1. Construct an object of the Frame class.

```
JFrame frame = new JFrame();
```

  - 2. Set the size of the frame.

```
frame.setSize(300,400);
```

  - 3. Set the title of the frame.

```
frame.setTitle("A Boggle Player");
```

  - 4. Set the default close operation.

```
frame.setDefaultCloseOperation(
  JFrame.EXIT_ON_CLOSE);
```

  - 5. Make it visible.

```
frame.setVisible(true);
```

COMPONENTS

- You can’t add any buttons, text fields, or labels directly to a frame.
- Instead, you must construct one of Swing’s components and add it to a panel.
- Examples of components:
  - JButton
  - JLabel

COMPONENTS

- First, create the components:

```
JButton button = new JButton("Click Here");

JLabel label = new JLabel("Computer Science Rocks");
```

- Then, add them to a panel:

```
JPanel panel = new JPanel();
panel.add(button);
panel.add(label);
frame.add(panel);
```

Panels are used to group multiple components together. Then, the panel can be added to a frame.

3-PRONGED APPROACH

INHERITANCE AND SWING

- You can use inheritance to customize your frames.

```
public class BoggleFrame extends JFrame
{
    private JButton button;
    private static final int FRAME_WIDTH = 300;
    private static final int FRAME_HEIGHT = 100;

    public BoggleFrame()
    {
        button = new JButton("Begin Boggling");
        this.add(button);
        setSize(FRAME_WIDTH, FRAME_HEIGHT);
    }
}
```

Components are attributes of the class.

Initialize and add components in the constructor of your subclass (or use a helper method).

EVENT HANDLING

- In a GUI, the user controls the program with a mouse and keyboard.
- The user can click on buttons, enter text into text fields, drag scroll bars, and much more in no particular order.
- The program can detect and respond to actions like a mouse move or a button click.

EVENT HANDLING

- The ActionListener interface has one method:

```
public interface ActionListener {
    void actionPerformed(ActionEvent event);
}
```

- The ClickListener class implements the ActionListener interface

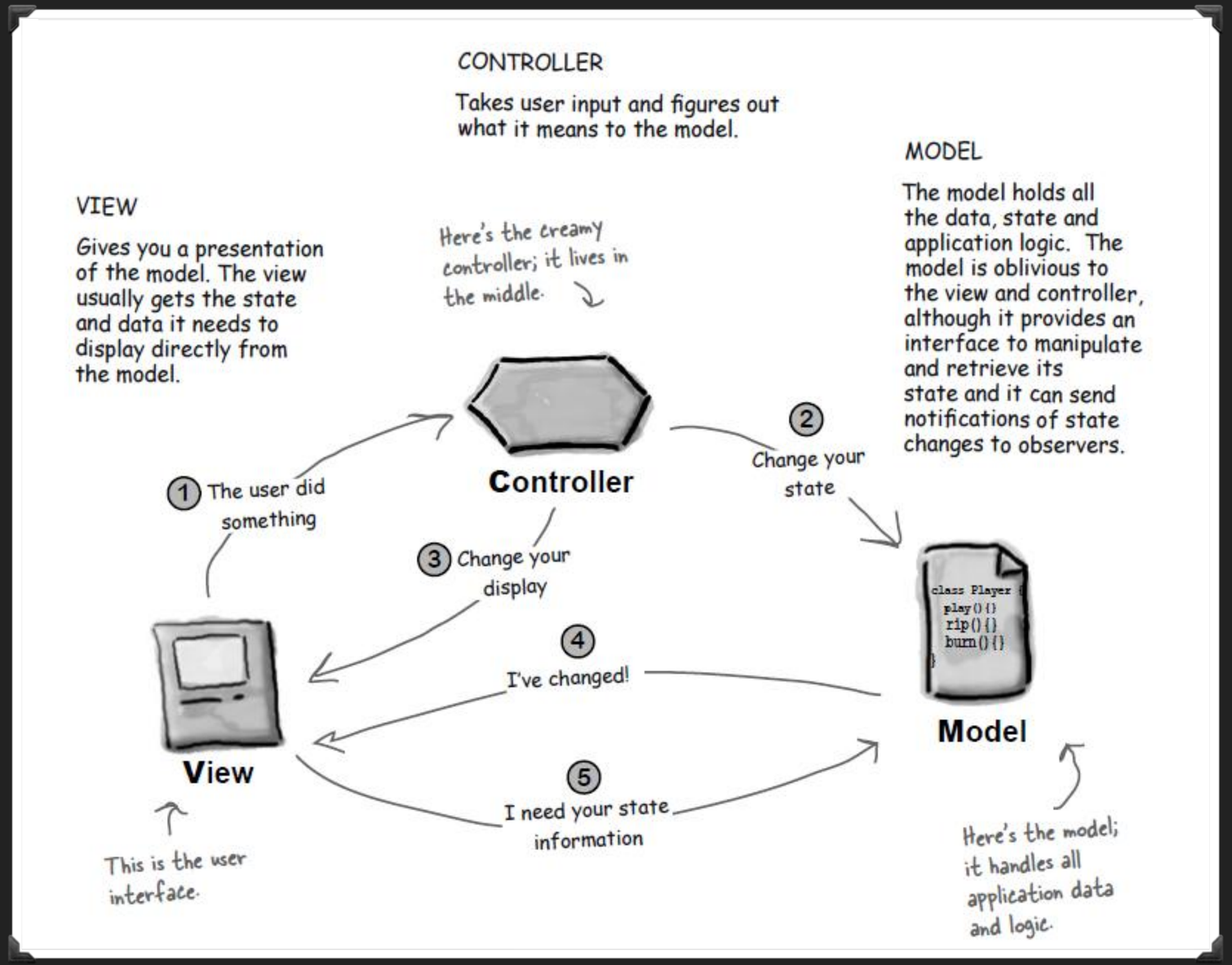
```
public class ClickListener implements ActionListener {
    public void actionPerformed(ActionEvent event)
    {
        System.out.println("I was clicked.");
    }
}
```

EVENT HANDLING

- A ClickListener object must be created, and then ‘registered’ (added) to a specific event source.

```
ActionListener listener = new ClickListener();
button.addActionListener(listener);
```

- Now, whenever the button object is clicked, it will call listener.actionPerformed, passing it the event as a parameter.



MVC ARCHITECTURE

- Model:
  Our back end code.
- View:
  Our components and frame.
- Controller:
  Our action listeners.