Writing User Interfaces

Your First Sip of Java

Feb 10, 2016

Announcements

- Hand in responses to Lab questions
- Pick up course packets (if you didn’t do this in lab)
- Make sure you submit your lab before due date
- Homework 1 online: Due Monday
- Office hours (for me, Tom, and TAs) have been posted
- Questions about Lab 1?

Java in a Nutshell

Make things that do stuff!
(with other things)
(with themselves)

A World of Things

- Things: Perform tasks & store information
- **Object** (Thing): Instance of a type or **class**
  - **Class**: Describes a family of objects
- **Objects** modify their internal state
- **Objects** interact with other objects
Java Program Structure

Classes, Objects, Methods

- Java lets programmer define **classes** of **objects**
- **Classes** describe the **data** and **functionality** of objects
  - **Data:** Numbers, strings, programmer-defined objects
  - **Functionality:** **Methods** that access or modify data in an object
- A Java program creates objects and manipulates them by invoking their methods

This Is Not A Java Program

- **Create** a bank account **T** containing $0
- **Credit** $400 to bank account **T**
- **Create** a bank account **B** containing $500
- **Credit** $300 to bank account **T**
- **Transfer** $700 from **T** to **B**
- **Debit** $1200 from bank account **B**
- **Close** bank account **B**
- **Send alert** “Account Empty!” to bank account **T**

Neither is This…

...but it’s close!

- **T** = new BankAccount();
- **T**.credit(400);
- **B** = new BankAccount(500);
- **T**.credit(300);
- **B**.transferFrom( **T**, 700);
- **B**.debit(1200);
- **B**.close();
- **T**.alert(“Account Empty!”);

A Simple Example : Hello

```java
public class Hello {
    public Hello() {
        System.out.println("Hello!");
    }
}
```

Note: Even this simple class uses other classes!
A Simple GUI: EmptyWindow

Define class EmptyWindow

Describe how to make an EmptyWindow

Give the window dimensions

GUls are complex: We need help!

EmptyWindow in Java

```java
import squint.*;
import javax.swing.);
public class EmptyWindow extends GUlManager {
    private final int WINDOW_WIDTH = 170;
    private final int WINDOW_HEIGHT = 300;
    public EmptyWindow() {
        this.createWindow( WINDOW_WIDTH, WINDOW_HEIGHT );
    }
}
```

EmptyWindow Explained

```java
import squint.*;
import javax.swing.);
public class EmptyWindow extends GUlManager {
    private final int WINDOW_WIDTH = 170;
    private final int WINDOW_HEIGHT = 300;
    public EmptyWindow() {
        this.createWindow( WINDOW_WIDTH, WINDOW_HEIGHT );
    }
}
```

Your First Java Vocabulary

- Java language words and symbols
  - class, extends, final, import, int, private, public
  - () {} .
- Class names
  - EmptyWindow
  - GUlManager: created by Tom
- Method names
  - EmptyWindow: a special name - a constructor
  - createWindow: from the class GUlManager
- Variable names
- Primitive types
  - WINDOW_WIDTH, WINDOW_HEIGHT are of type 'int'
- Objects
  - this: object of the class (EmptyWindow) being defined
- Constants
  - 170,300
- Libraries of pre-defined classes
  - squint, javax.swing
Another Example: TouchyButton

- Define class TouchyButton
  - how to make a TouchyButton
    - create an empty window
    - display text “Click on the button below” in window
    - add a button labeled “Click here” to window
  - how to respond to a button click in window
    - display text “That tickles!” in window

Writing TouchyButton

```java
import squint.*;
import javax.swing.*;

public class TouchyButton extends GUIManager {
    private final int WINDOW_WIDTH = 170, WINDOW_HEIGHT = 300;

    public TouchyButton() {
        this.createWindow( WINDOW_WIDTH, WINDOW_HEIGHT);
        contentPane.add( new JLabel( "Click on the button below" ) );
        contentPane.add( new JButton( "Click Here" ) );
    }

    public void buttonClicked() {
        contentPane.add( new JLabel( "That tickles!" ) );
    }
}
```

TouchyButton in Java

```java
import squint.*;
import javax.swing.*;

public class TouchyButton extends GUIManager {
    private final int WINDOW_WIDTH = 170, WINDOW_HEIGHT = 300;
    public TouchyButton() {
        this.createWindow( WINDOW_WIDTH, WINDOW_HEIGHT );
        contentPane.add( new JLabel( "Click on the button below" ) );
        contentPane.add( new JButton( "Click Here" ) );
    }

    public void buttonClicked() {
        contentPane.add( new JLabel( "That tickles!" ) );
    }
}
```
Types of Entities in Java

- Java language words and symbols
  - Class names
  - Method names
    - Always includes a constructor method with same name as class
  - Variable names
    - Objects
    - Primitive types
  - Constants
  - Libraries of pre-defined classes

Summary

- Java programs are composed of classes (one or more)
  - Classes describe types of objects
  - Objects have state and functionality
  - Objects are accessed/changed through method invocation
- Key words (English)
  - class, object, method, instance variable, construction, constructor, constant
- Key words (Java)
  - class, extends, final, import, int, new, private, public, void

More Examples

- ClickCounter