Using Polymorphism

4/21/2008

Opening Discussion

- Let's look at some solutions to the interclass problem.

Inheritance and Subtyping

- Last class we talked about inheritance, what it provides to us, and how we do it in Java.
  - Code reuse
  - Subtyping
- We use the extends keyword when a class inherits from a class or implements when a class inherits from an interface.
- Abstract classes can't be instantiated. Abstract methods aren't implemented in that class.
- Interfaces are like completely abstract classes.
- All classes in Java inherit from the Object class.

Inheritance Example

- Let's look now at an example of inheritance in code so that we can see not only how to use it, but also the syntax for it in Java.
- Note that Eclipse can help you put in your inheritance if you specify the supertype in the dialog when you create a class.
- Use the super keyword to refer to the version of a method in the supertype.

Polymorphism

- The term polymorphism comes from Greek and it literally means many shapes. In programming it means many types.
- A polymorphic type is a type that can represent many other types. A polymorphic operation/method is one that can work with many different types.
- Polymorphism gives us a lot of power in our programming and can drastically reduce the amount of code we have to write because one method can be used with many different types.
- Subtyping from inheritance gives us polymorphism.

GUI Libraries in Java

- The GUI libraries in Java probably use inheritance more than any other set of libraries.
- There are two main packages that you use when doing GUIs in Java.
  - java.awt – the Abstract Window Toolkit was the original GUI library. It still has important helper classes.
  - javax.swing – this is a “pure” Java library built on top of AWT that we will be using.
- Let's look in that API at the Swing classes.

Components

- Everything that goes into a GUI in Java inherits from Component. (In Swing they inherit from JComponent.)
- This is where polymorphism comes into play because the code can be written to work with a Component and it will work with a button, check box, drop box, or any other component.
- The Swing library has all the basic components you would expect to be able to put into GUIs as well as many others.

JFrame

- For windows in the Swing library you use JFrames.
- Let's look at the JFrame class and write some code to open up a window.
- Now let's add one component to that frame.

Layout Managers

- What we just wrote only has one limitation, we only got to add one component to the frame.
- For adding multiple elements we use Layout Managers. These are classes that control how things go into a GUI container.
- There are many layout types, but we will only deal with a few.
    - FlowLayout
    - GridLayout
    - BorderLayout
- Some Swing components have their own layouts.

Minute Essay

- Have you done any of the reading recently? What have you read? Has it helped?
- Interclass Problem – Write a GUI that brings up a frame and puts one button and one text box in the frame. Experiment with how to lay it out to make it look good.