



Using Polymorphism

11/26/2007





Opening Discussion

- Let's look at some solutions to the interclass problem.
- Minute essay responses
 - ◆ Arrays and brackets
 - ◆ The add method can add to a list at any point.
 - ◆ The differences between arrays and lists are syntax and the array is a fixed size with a fixed number of slots.
 - ◆ Which you use depends on application, but most people use arrays by default because of the simpler syntax.
 - ◆ Multidimensional arrays.



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.



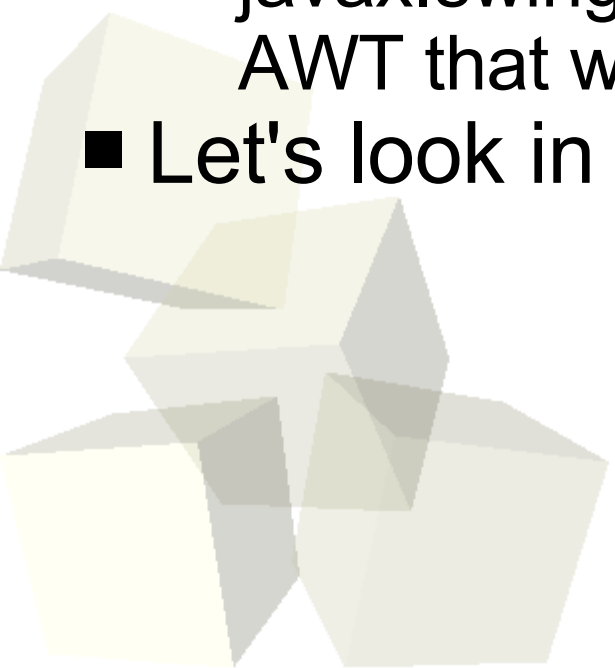
Polymorphism

- 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.



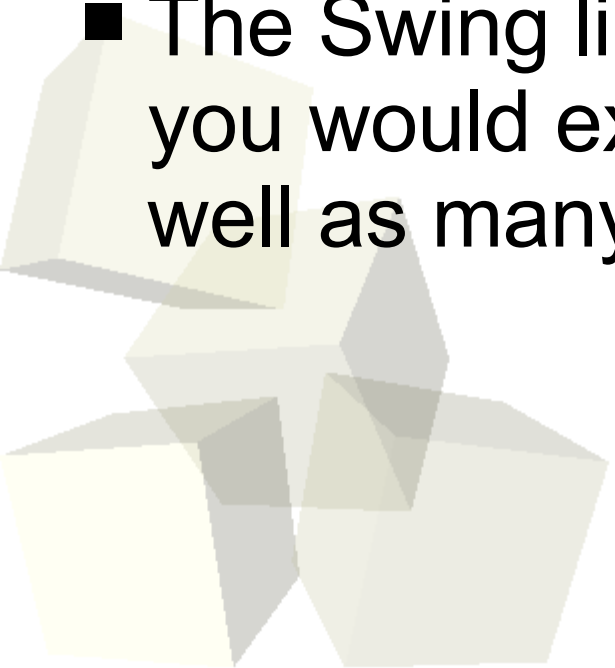
GUI Libraries in Java

- 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.





- 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.





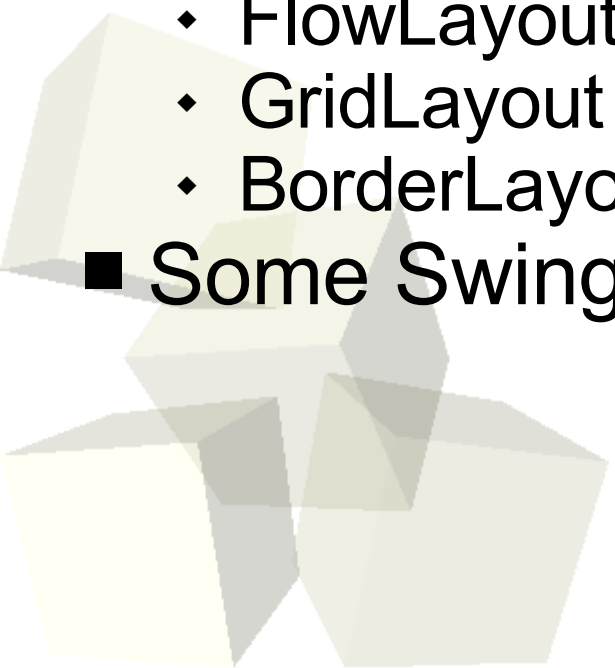
- For windows in the Swing library you use JFrames.
- Let's look at the JFrame class and write some code to open up a window.
- Now let's add one component to that frame.





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.





- 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.

