CS1007: Object Oriented Design and Programming in Java

Lecture #16

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Outline

- Java beans
- Applets

- Reading: finish chapter 7, starting 8

Announcements

- 4 more lectures after today
- 1 more homework after today (no actual code needed).
- Plan
- No class Thursday (or office hours).

Feedback

- Questions on concepts
  - Please stop me and I can give more examples
- Generic example
  - Will review some more
- Homework help
  - Will try to help later in class

Generics

- Generally when you manipulate a group of objects, in order for the compiler to be aware of the manipulations (error checking) you need to explicitly cast the general objects you are working with.

```
List myints = new LinkedList();
myints.add(new Integer(3));
Integer x = (Integer)myints.iterator().next();
```

Errors runtime

- When manipulating objects and casting, if you make a mistake on what you think is in a collection, will throw errors.

Idea

- Allow you to tell the compiler what you are thinking…

```
List<Integer> myints = new
   LinkedList<Integer>();
//adding same
Integer x = myints.iterator().next();
```

Another advantage

- Allows you to program algorithms which don't work in the dark
- Allows you to setup constraints on the objects you allow to be passed to your methods

wildcarding

- Allows you specify general types and bounded general types in your algorithms

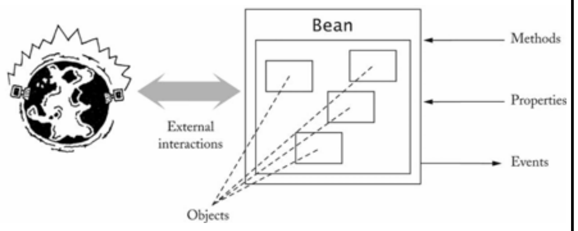
Map <String, ? extends employee>

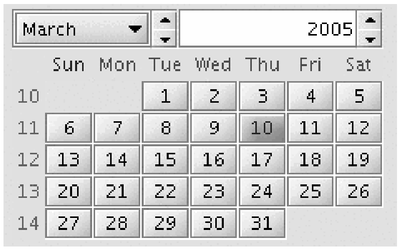
Confused?

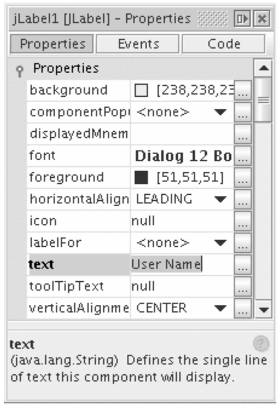
- Please review book
- Please review last lecture
- Email myself/TAs
- Can ask other students
- Use internet (not responsible for anything you happen to dig up there).

Introducing Java Beans

- Java component model
- Bean has
  - methods (just like classes)
  - properties
  - events







Properties

background	[238,238,23
componentPopı	<none>
displayedMnem	
font	Dialog 12 Bo
foreground	[51,51,51]
horizontalAlign	LEADING
icon	null
labelFor	<none>
text	User Name
toolTipText	null
verticalAlignme	CENTER

text
(java.lang.String) Defines the single line of text this component will display.

Property sheet

Façade class

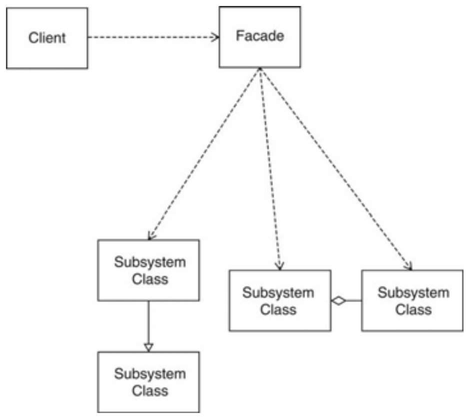
- Bean usually composed of multiple classes
- One class nominated as facade class
- Clients use only facade class methods

What kind of pattern can we extract?

- A subsystem consists of multiple classes, making it complicated for clients to use
- Implementor may want to change subsystem classes
- Want to give a coherent entry point

How JAVABEAN does it

- Define a facade class that exposes all capabilities of the subsystem as methods
- The facade methods delegate requests to the subsystem classes
- The subsystem classes do not know about the facade class



Bean Properties

- Property = value that you can get and/or set
- Most properties are get-and-set
- Can also have get-only and set-only
- Property not the same as instance field
- Setter can set fields, then call repaint
- Getter can query database

Syntax

- Not Java :-(
- C#, JavaScript, Visual Basic
- b.propertyName = value
  calls setter
- variable = b.propertyName
  calls getter

Conventions

- property = pair of methods

```
public X getPropertyName()
public void setPropertyName(X newValue)
```

- Replace propertyName with actual name

```
(e.g. getColor/setColor)
```

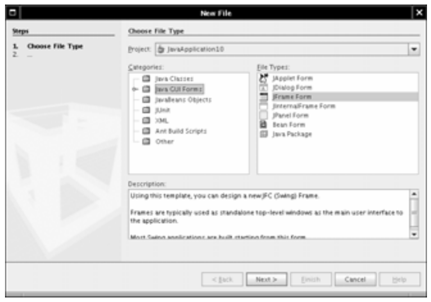
- Exception for boolean properties:

```
public boolean isPropertyName()
```

- Decapitalization hokus-pokus:

```
getColor -> color
getURL -> URL
```

Builder tool



Project: JavaApplication10

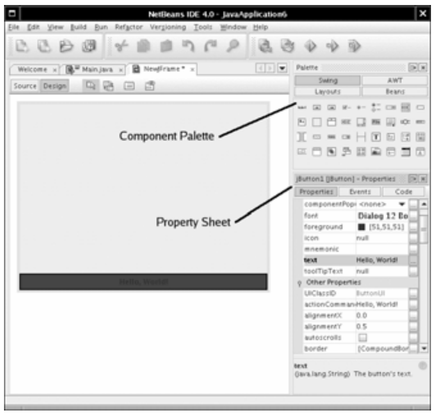
Categories: Java Classes, Java GUI Forms, JavaBeans Objects, JUnit, XML, Ant Build Scripts, Other

File Types: JApplet Form, JDialog Form, JFrame Form, JInternalFrame Form, JPanel Form, Bean Form, Java Package

Using this template, you can design a new JFC (Swing) Frame.

Frames are typically used as standalone top-level windows as the main user interface to the application.

Most Swing applications are built starting from this form.



componentPopu	<none>
font	Dialog 12 Bo
foreground	■ [51,51,51]
icon	null
mnemonic	
text	Hello, World!
toolTipText	null
UIClassID	ButtonUI
actionComman	Hello, World!
alignmentX	0.0
alignmentY	0.5
autoscrolls	☐
border	[CompoundBor

text
(java.lang.String) The button's text.

Packaging

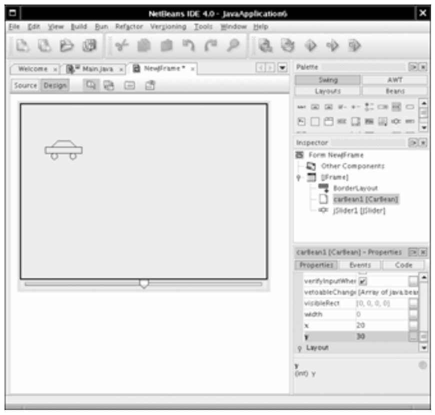
- Compile bean classes
Ch7/carbean/CarBean.java
- Create manifest file
Ch7/carbean/CarBean.mf
- Run JAR tool:
- jar cvfm CarBean.jar CarBean.mf *.class
- Import JAR file into builder environment

Composing Bean

- Make new frame
- Add car bean, slider to frame
- Edit stateChanged event of slider
- Add handler code

carBean1.setX(jSlider1.getValue());

- Compile and run
- Move slider: the car moves



verifyInputWhen	✓
vetoableChange	[Array of java.bea
visibleRect	[0, 0, 0, 0]
width	0
x	20
y	30

y
(int) y

Framework

- Set of cooperating classes
- Structures the essential mechanisms of a problem domain
- Example: Swing is a GUI framework
- Framework != design pattern
- Typical framework uses multiple design patterns

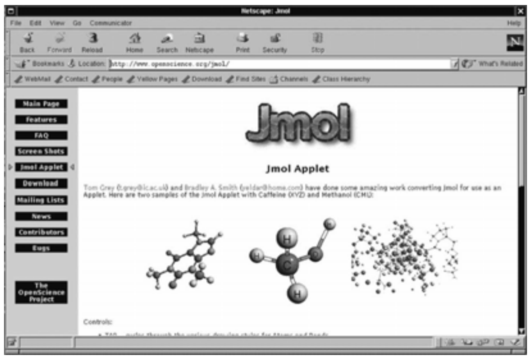
Application framework

- Implements services common to a type of applications
- Programmer forms subclasses of framework classes
- Result is an application
- Inversion of control: framework controls execution flow

Applet

- Applet: Java program that runs in a web browser
- Programmer forms subclass of Applet or JApplet
- Overwrites
  - init/destroy
  - start/stop
  - paint

Openscience.org/jmol


Netscape: Jmol
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Stop
Bookmarks Location: http://www.openscience.org/jmol/ What's Related
WebMail Contact People Yellow Pages Download Find Sites Channels Class Hierarchy
Main Page
Features
FAQ
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Jmol
Controls:

Jmol Applet

Tom Grey (t.grey@ic.ac.uk) and Bradley A. Smith (yeldar@home.com) have done some amazing work converting Jmol for use as an Applet. Here are two samples of the Jmol Applet with Caffeine (XYZ) and Methanol (CML):

Applets

- Interacts with ambient browser

getParameter
showDocument

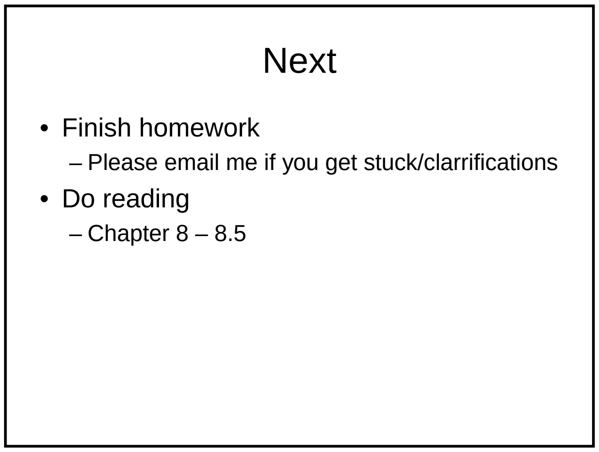
- HTML page contains applet tag and parameters

```
<applet code="BannerApplet.class"
  width="300" height="100">
   <param name="message" value="Hello,
  World!"/>
   <param name="fontname" value="Serif"/>
   <param name="fontsize" value="64"/>
   <param name="delay" value="10"/>
</applet>
```

Example

- Shows scrolling banner
- init reads parameters
- start/stop start and stop timer
- paint paints the applet surface

Ch8/applet/BannerApplet.java



Next

- Finish homework
  - Please email me if you get stuck/clarrifications
- Do reading
  - Chapter 8 – 8.5