CS1110 Lecture 09 28 Sept

Developing (String-processing) programs; class Vector; wrapper classes

Have your iClickers out.

Reading for Thursday's lecture: pp. 403—408, skipping section 15.1.2
* Recursion can be a difficult topic, but we'll make it easy.

13 A1s still in revision. Will get 5/10 if not done by Wed. midnight.

Prelim: 7:30-9PM Thursday 7 October.
Last name A-K: go to Olin Hall 155. Last name L-Z: go to Olin Hall 255.
If you have a conflict and *didn't receive an acknowledgment email yesterday*, email Maria Witlox, mwitlox@cs.cornell.edu TODAY.

- Past prelims are posted to the course website. Use DrJava to check *your* answers!
- Thursday: A handout will explain what is on prelim 1
- Sunday: Review session, 1-3PM, Phillips Hall 101 (if you miss it, the slides will be posted)
- A3 is due Wed night on the CMS. Form any groups beforehand.

An application: String processing, stepwise refinement, usefulness of Javadoc, problem solving

Strings are a particularly important type, because lots of information (especially non-numerical data) is stored in Strings.

For example, many webpages can, for many intents and purposes, be considered to be Strings.

Application: "scraping" (extracting) live stock quotes from the Web: `getQuote("goog")` will print out Google's [ticker symbol: "GOOG"] current stock price, and store a list of all previous stock-price requests;

`showRecord()` will return something like this:
"[aapl @ Mon Sep 27 10:00:40 EDT 2010: $294.05, aapl @ Mon Sep 27 10:00:48 EDT 2010: $293.7, goog @ Mon Sep 27 10:09:02 EDT 2010: $534.38]"

Reminder: Principles and strategies

Develop algorithm step by step, using principles and strategies embodied in "stepwise refinement" or "top-down programming". READ Sec. 2.5 and Plive p. 2-5.

- **Take small steps**. Do a little at a time
- **Refine**. Replace an English statement (what to do) by a sequence of statements to do it (how to do it).
- **Refine**. Introduce a local variable —but only with a reason
- **Compile often**
- **Intersperse programming and testing**
- **Write method specifications** —before writing the bodies
- **Separate your concerns**: focus on one issue at a time

Note the similarities to outlining and writing an essay!

Outline for writing class StockQuote

1. What information do we need to store?
   - what objects? what should be in the objects, vs. what should be static? What types should the variables be?

   a) How do we implement a list? (answer: Vectors)
2. What methods do we need? (Specify them carefully, and stub them in!)

   b) How do we implement list-based methods?
   c) How do we actually get stock-quote data?
      i. how can we access web pages?
      ii. can we treat their contents as Strings, since we're good at that?
      iii. how can we convert String prices to numbers? (answer: Wrapper classes)

Let's answer question one. Below, we've omitted "private" for brevity.

A. String symbol; // ticker symbol (case insensitive)
Date time; // time the quote was taken;
double price; // price of the stock when quote was recorded
ListOfStockQuotes record; // list of all requested quotes
public static void getQuote(String s);

B. Same as A, but getQuote(String s) is not static

C. String symbol; // ticker symbol (case insensitive)
Date time; // time the quote was taken;
double price; // price of the stock when quote was recorded
static ListOfStockQuotes record; // list of all requested quotes
public static void getQuote(String s);

C's only diff from A

D. Same as C, but getQuote(String s) is not static

E. None of the above

5

Class Vector – for maintaining lists of objects [more in lab]

In the interactions pane, you can try the following (Person.java and StockQuote.java need to be in the working directory and compiled)*:*

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

Vector v= new Vector(); // v can store any object
v.add(new JFrame());
v.add(new Person("Smith", 1990, false));
v.get(1) // returns (toString for) "Smith" object (indexing starts at 0)
v.toString() // contents of entire vector, using each object's toString()

// Important syntax: record can only store (names of) StockQuotes.
Vector<StockQuote> record= new Vector<StockQuote>();
```

6

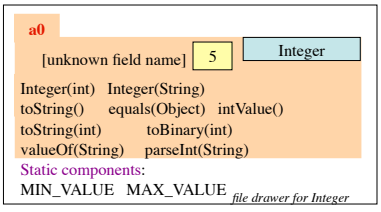
Wrapper classes – a way to treat primitive types as objects

- Sometimes objects are required; e.g., Vectors can only store objects:
  v.add(new Integer(5)); // Integer is an object version of int

[In newer versions of Java, v.add(5) is allowed; the non-object 5 is wrapped in an Integer object and the name of that object is added to v.]

- wrapper objects provide a place to store useful methods

An instance of class Integer contains, or "wraps", one *(immutable)* **int** value.



7

Each primitive type has a corresponding wrapper class.

Primitive type	Wrapper class
int	Integer
long	Long
float	Float
double	Double
char	Character
boolean	Boolean

Each wrapper class has:

- Instance methods, e.g. equals, constructors, toString,
- Useful static constants and methods.

```
Integer k= new Integer(63);        int j= k.intValue();
```

You don't have to memorize the methods of the wrapper classes. But be aware of them and look them up when necessary. Use Gries/Gries, Section 5.1, and ProgramLive, 5-1 and 5-2, as references.

8