CS100J 7 September 2006

Today's topic: Customizing a class (continued)

Quiz 2 on Tuesday:
How do you draw a folder of a subclass?
How do you evaluate a new expression (see slide 10)?
What is the purpose of a constructor (see slide 9)?

Quote for the day:
There is no reason anyone would want a computer in their home. --Ken Olson, president, chairman and founder of Digital Equipment Corp. (DEC), 1977.
The company was a huge player in computer hardware and software in CS academia in the 1970's. The old PDP machines were well known. The VAX had unix on it, and C, and Lisp. It was the main computer in most CS departments of any stature. DEC was bought by COMPAQ in the late 1990's.

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Reading for this lecture: Section 1.4, 1.5, and 1.7 (not 1.6).

Read all the "style notes", too.

Summary of lectures: On course home page, click on "Handouts" and then "Outline of lectures held so far".

Today: Class Object, method toString().
Fields (variables in a folder),
and getter and setter methods for them.
Constructors.
Static components.

Class Object: The superest class of them all

Every class that does not extend another one automatically extends class Object.

```
public class C { … }
```

is equivalent to

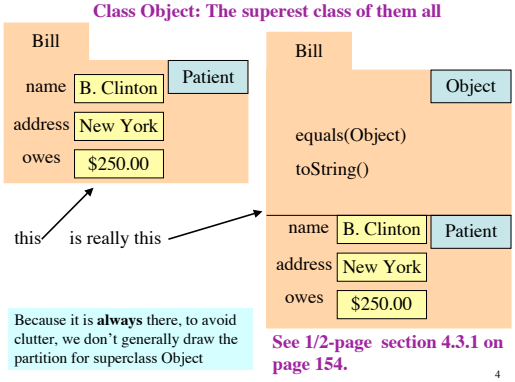
```
public class C extends Object { …}
```

See 1/2-page section 4.3.1 on page 154.

The reason for this will become clear later.

You need this information to do assignment A1.

Class Object: The superest class of them all



Because it is **always** there, to avoid clutter, we don't generally draw the partition for superclass Object

See 1/2-page section 4.3.1 on page 154.

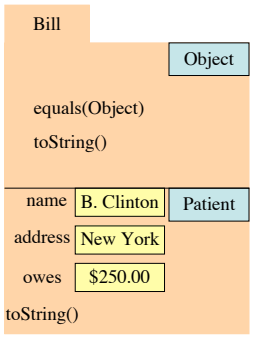
Method toString()

Convention: c.toString() returns a representation of folder c.

Put following method in Patient.

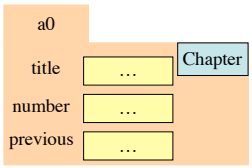
```
public String toString() {
    return name + "  " + address +
           "  " + owes;
}
```

In appropriate places, the expression c automatically does c.toString()



Field: a variable that is in each folder of a class.

We generally make fields **private** instead of **public**, so that they cannot be referenced from methods that are outside the class.




```
public class Chapter {
    private String title; // Title of the chapter
    private int number; // Number of the chapter
    private Chapter previous; // previous chapter (null if none)
}
```

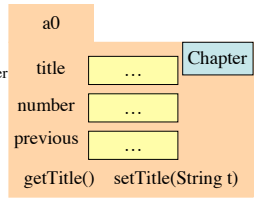
Getter and setter methods

```
/** An instance describes a chapter of
    a book */
public class Chapter {
  private String title; // Title of the chapter

  /** = the title of the chapter */
  public String getTitle() {
    return title;
  }

  /** Set the title of the chapter to t */
  public void setTitle(String t) {
    title= t;
  }

}
```



Getter methods **get** or retrieve values from a folder.

Setter methods **set** or change fields of a folder

We need a way to initialize fields when a folder is first created

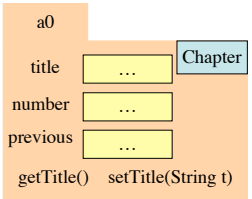
new Chapter()

creates a folder but doesn't allow us to say what values should be in it.

We would like to be able to say:

new Chapter("I am born", 1, **null**)

to set the title to "I am born", the chapter number to 1, and the previous chapter to **null**.

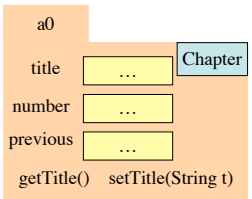


For this, we use a new kind of method, the **constructor**.

The purpose of a constructor is to initialize (some) fields of a newly created folder

```
/** An instance describes a chapter of
    a book */
public class Chapter {
  private String title; // Title of chapter
  private int number; // No. of chapter
  private Chapter previous; // previous
                           // chapter (null if none)

  /** Constructor: an instance with title t,
      chapter number i, and previous
      chapter p (null if none) */
  public Chapter(String t, int i,
                 Chapter p) {
    title= t;
    number= i;
    previous= p;
  }
}
```



The name of a constructor is the name of the class.

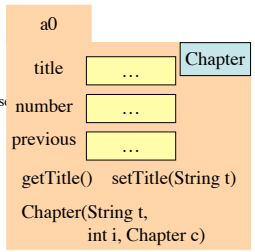
Do not put a type or **void** here

New description of execution of a new-expression

new Chapter("I am born", 1, **null**)

1. Create a new folder of class Chapter, with fields initialized to default values (0 for **int**, for example) –of cours put the folder in the file drawer.
2. Execute the constructor call

   Chapter("I am born", 1, null)
3. Use the name of the new folder as the value of the new-expression.



Memorize this new definition! Today! Now!

You can have more than one constructor

```
/** Constructor: an instance with title t,
                 chapter number i, and previous chapter
                 p (null if none) */
public Chapter(String t, int i, Chapter p) {
    title= t;
    number= i;
    previous= p;
}

/** Constructor: an instance with title t,
                 chapter number i, and previous chapter null */
public Chapter(String t, int i) {
    title= t;
    number= i;
    previous= null;
}
```

Makes it easier, more flexible, for the "user" who is using the class

A static field does not appear in each folder. It appears in the file drawer, by itself, on a piece of paper. There is only ONE copy of it.

```
public class Chapter {
  private int title; // Number of chapter
  private static int numberOfChapters= 0;
}
```

Reference the static variable using

Chapter.numberChaps

Use a static variable when you want to accumulate information about all (or some) folders.