CS1110 Thursday, 11 February 2010

Congratulations!! You now know the basics of OO (object-orientation).

Discussion of Methods: Executing method calls. If-statements. The return statement in a function. Local variables.

For this and next lecture: **Read chapter 2, but NOT 2.3.8!!!!**
Do the self-review exercises in 2.3.4

Please sit next to someone. We will do some work in pairs today.

The last slide concerns local variables –variables declared within a method body. We don't have time to discuss them. You are responsible for knowing about local variables. Read pp. 76-78 (sec. 2.3.7).

Take advantage: see videos of the 11:15 lecture for CS1110 on www.VideoNote.com. Log in with your Cornell netid

1

```
/** An instance keeps information about a book chapter  */
public class Chapter {
  // class invariant: meanings of fields and constraints on them
  private int number; // the chapter number, in range 0..100
  private String title; // chapter title
  private Chapter prev; // instance for the previous chapter
                        // (null if no previous chapter)

…

}
```

2

We write programs in order to do things.
Methods are the key "doers".

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

declaration of parameter t

parameters: t and n

Body (between { }) consists of statements to execute in the order in which they appear. ("Follow the recipe".)

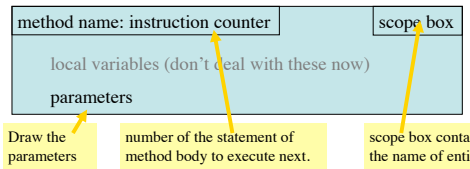
Memorize: a parameter is a variable that is declared within the parentheses of a method header.

But how is a method call executed?
How do parameters and arguments work?

3

The frame (the box) for a method call

Remember: Every method is in a folder (object) or in a file-drawer.



Draw the parameters as variables.

number of the statement of method body to execute next. Helps you keep track of what statement to execute next. Start off with 1.

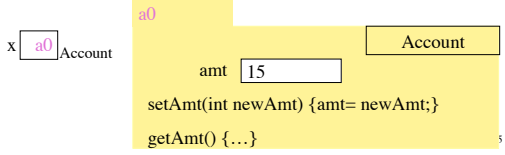
scope box contains the name of entity that contains the method —*a file drawer or object.*

The scope box contains:
For an instance method, the name of the object in which it resides
For a static method, the name of the class in which it is defined

4

To execute the call **x.setAmt(50);**

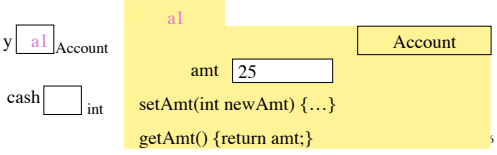
1. Draw a frame for the call.
2. Assign the value of the argument to the parameter (in the frame).
3. Execute the method body. (Look for variables in the frame; if not there, look in the place given by the scope box.)
4. Erase the frame for the call.



5

To execute the call **cash= y.getAmt();**

1. Draw frame for call.
2. Assign value of argument to parameter (in the frame).
3. Execute the method body. (Look for variables in the frame; if not there, look in the place given by the scope box.)
4. Erase the frame for the call; use the value of the return-statement expression as the function-call value.



5

new Chapter("Intro", 1)

1. Draw a frame for the call.
2. Assign arg values to pars.
3. Execute the method body.
4. Erase the frame for the call.

a8

Chapter

title null

number 0 previous null

```
Chapter(String t, int n) {
String d= t;   title= d;
number= n;   previous= null;
}
```

Note *local* variable d declared within method body. It should be drawn in frame for call.


```
/* swap x, y to put larger
    in y */
if (x > y) {
   int t;
   t= x;
   x= y;
   y= t;
}
```

if statement

Syntax:
if (<boolean expression>)
  <statement>

Execution: if the <boolean expression> is true, then execute the <statement>

```
/* Put smaller of x, y in  z */
if (x < y) {
   z= x;
}
else {
   z= y;
}
```

if-else statement

Syntax:
if (<boolean expression>)
  <statement1>
else <statement2>

Execution: if the boolean expression is true, then execute <statement1>; otherwise, execute <statement2>

Idiom: if statements and multiple return staements

```
/** = smallest of b, c, d */
public static int smallest(int b, int, c, int d) {
      if (b <= c  && b <= d) {
          return b;
      }
      // { The smallest is either c or d }
      if (c <= d) {
          return c;
      }
      // { the smallest is d }

      return d;
}
```

Assertion

Execution of statement

return <expr> ;

terminates execution of the procedure body and yields the value of <expr> as result of function call

Execution of function body must end by executing a return statement.

Syntax of procedure/function/constructor and calls

public <result type> <name> (<parameter declarations>) { … } **function**

public void <name> (<parameter declarations>) { … } **procedure**

public <class-name> (<parameter declarations>) { … } **constructor**

Exec. of a function body *must* terminate by executing a statement "**return** <exp> ;", where the <exp> has the <result type>.

Exec. of a proc body *may* terminate by executing statement "**return** ;"

Exec. of a constructor body initializes a new object of class <class-name>.

<name> (<arguments>) **function call**

<name> (<arguments>) ; **procedure call**

new <class-name> (<arguments>) **constructor call**

<arguments>: <expression>, <expression>, …, <expression>

Scope of local variable: the sequence of statements following it within the containing "block".

```
/** = the max of x and y */
public static int max(int x, int y) {
      // Swap x and y to put the max in x
      if (x < y) {
         int temp;
         temp= x;
         x= y;
         y= temp;
      }

      return x;
   }
```

scope of temp

You can't use temp down here

This is an error.