CSE 002: Fundamentals of Programming

Fall 2014
Laboratory Session 3: Arithmetic calculations and input

Objectives. This lab session will demonstrate how you can get input from the user and use that data to perform basic computations. (Note that this answers a question from lecture about how to input data, rather than have fixed data in a program.)

1. **Assignment:** Write a program that computes the cost of buying a some Big Macs. It uses the Scanner class to obtain from the user how many Big Macs, the cost per Big Mac, and the percentage tax (which depends on the state; 6% in PA, 8% in MA, etc). It then displays the total cost.
2. Do your assignment on Cloud9 in the folder lab03.
3. Start working on your program in a class that should be called **BigMac.java**
   a. Begin by adding comments that describe what your program does. Remember the comments begin with //.
   b. In order to use the Scanner class, you must first import it otherwise the compiler will generate error messages. The following import statement must be the first statement in your program after your comments.

   ```
   import java.util.Scanner;
   ```
   c. Now add the class and main method structures as follows
   ```
   // Document your program? Place you comments here!
   //
   //
   public class BigMac {
           // main method required for every Java program
           public static void main(String[] args) {

           }   //end of main method
   } //end of class
   ```

   Remember all Java statements should be placed inside the main method between the inner curly brackets.
   d. Next, in order to accept input, you must declare an instance of the Scanner object. You do this the same way you have been declaring other variables:

   ```
   Scanner myScanner;
   ```

e. Finally, you must call the Scanner constructor. You construct an instance of the Scanner class that you declared (e.g. myScanner) by typing the following command, which tells Scanner that you are creating an instance that will take input from STDIN:

```
myScanner = new Scanner( System.in );
```

After you have run these commands, you are ready to accept input.

f. Now prompt the user for the number of tickets by typing in

```
System.out.print(
  "Enter the number of Big Macs(an integer > 0): ");
```

Note: by using System.out.print, rather than System.out.println, the cursor will not go to the beginning of the next line after displaying the prompt "Enter…."

g. Now accept user input by using the statement

```
int nBigMacs = myScanner.nextInt();
```

This command calls a method that Scanner objects have – the "nextInt()" method. That method can only be accessed by telling Java that you need a method that is a part of the myScanner object. That is why you say (with the '.' notation) "myScanner.nextInt()". To accept a double, you will use nextDouble() method of the Scanner object, e.g., myScanner.nextDouble().

Now prompt the user for the cost Big Mac and the percent sales tax and accept the input

```
System.out.print("Enter the cost per Big Mac as"+
  " a double (in the form xx.xx): " );
double bigMac$ = myScanner.nextDouble();
System.out.print(
  "Enter the percent tax as a whole number (xx): ");
double taxRate = myScanner.nextDouble();
taxRate/=100; //user enters percent, but I want
  //proportion
```

h. Print out the output. Now you have all the input you need from the user, output the cost of the Big Macs in a pleasing format.

```
double cost$;
int dollars,   //whole dollar amount of cost
      dimes, pennies; //for storing digits
           //to the right of the decimal point
           //for the cost$
cost$ = nBigMacs*bigMac$*(1+taxRate);
//get the whole amount, dropping decimal fraction
dollars=(int)cost$;
//get dimes amount, e.g.,
// (int)(6.73 * 10) % 10 -> 67 % 10 -> 7
//  where the % (mod) operator returns the remainder
//  after the division:   583%100 -> 83, 27%5 -> 2
dimes=(int)(cost$*10)%10;
pennies=(int)(cost$*100)%10;
System.out.println("The total cost of " +nBigMacs
 +" BigMacs, at $"+bigMac$ +" per bigMac, with a" +
 " sales tax of "+ (int)(taxRate*100) + "%, is
     $"+dollars+'.'+dimes+pennies);
```

> Note: Java has an easier, but more sophisticated, way than used here to print doubles in a nice format.
> Note: The last line above ('.'+dimes+pennies) appears to be ambiguous. Is it ('.'+dimes)+pennies or is it '.'+(dimes+pennies)? What if I write System.out.println(1+2)? Do I get 3 or 12? This is just food for thought (pardon the pun).

4. Now save your code in the "/workspace/lab03" directory. Make sure that you save your program in the file "BigMac.java." Next, Compile your code.

5. Now, run your code:
If you worked out the compiler errors, you should now be pleased to find the computer printing out the following text:

```
Enter the number of Big Macs(an integer > 0): 5
Enter the cost per Big Mac as a double (in the form xx.xx):
2.22
Enter the percent tax as a whole number (xx): 7
```

```
The total cost of 5 BigMacs, at $2.22 per bigMac, with a sales
tax of 7%, is $11.87
```

Notes based on the issues we've seen in previous labs:

1) Remember that the main method must be inside the class
2) Remember to comment every line of your code so that a non-programmer can read what it does without having to read the java. Also, provide documentation at the top of the program.
3) Remember that the import statement happens OUTSIDE the class; it is the only thing in java that ever happens outside the class.
4) Try to read the compiler errors. They are really useful! They can often tell you what you did wrong in the code so that you can find the problem faster.