IST 256

Lab Week 15, Tuesday, April 29, 2014

Exam Review Questions

(Example Solutions will be posted on Blackboard on Wednesday, April 30)

1. Suppose that we have an array with 5 elements that is declared and initialized as follows:

        int [] numbers = new int[5];
        numbers[0]= 67;
        numbers[1] = 21;
        numbers[2] = 15;
        numbers[3] = 90;
        numbers[4] = 59;

Suppose that this program also has the following bubble sort:

        int n = 5;   // n is the length of the array
        for (int i = 0; i < (n -1); i++)   // if array has n elements, number of passes is n-1
          {
                    for (int j = 0; j < (n – (i+1)); j++)   // number of comparisons in pass i
                    {
                            if (numbers[j] > numbers [j + 1)])
                            {
                                    temp = numbers[j];
                                    numbers [j] = numbers [j + 1];
                                    numbers [j + 1] = temp;
                            }
                    }
          } // end of sorting

Write down the array elements in the order that they would be after the **first** pass of the **bubble sort algorithm.**

3. Suppose that we have a class partially defined as follows:

```
public class MyClass
{
  // declaration of a variable at the class level
  String message = "hello!";
  // declaration of a method
  public int computeScore ()
  {
    // declaration of a variable inside the method
    String message = "goodbye!";

    …
  }
  // the main method
  public static main (String[] args)
  {
    System.out.println(message);
  }
}
```

What message is printed out by the main method of this program and why?

4. Design a class called Book that will contain information about a book that will demonstrate the principle of Data Hiding. For this design, write the class definition giving the declarations of the fields and the headers of the methods. (You don't have to write the body of the methods.)

The class is to be designed to hold data for books, where each book is described by the author, title, number of copies sold, and price per copy. The program using this class will need to initialize books by giving the author, title, number of copies sold and price per copy. The program will also want to access the author and title of each book and will want to find out the total price received from selling the copies of the book.

5. Describe what part of your design of the class in the previous question demonstrates the principle of Data Hiding.

6. Based on the Book class you defined in the previous questions, make an instance of the class of Books that is named *martinbook*, where the author is "George R. Martin", the title is "Game of Thrones", the number of copies sold is 46 and the price per copy is $14.95.

7. Based on the instance of class Book called *martinbook* defined in the previous question, show how to use one of the methods in the class to access the title field.

8. Suppose that we have a class called Laptop that has three fields. The fields are
    brand, which has the name of the brand (like Dell or HP),
    memory, which has the number of GB of memory (like 4 or 8), and
    harddrive, which has the number of GB of hard drive (like 160 or 500).
Here is the start of the class definition, showing the fields:
    public class Laptop {
            private String brand;
            private int memory;
            private int harddrive;

            …
Define a method within the Laptop class that checks whether the laptop meets the requirements to install some application. The method should be called recommendInstallation, and it will return a boolean result. The method has two parameters: suggestedMemory and suggestedHardDrive. If this laptop memory is larger than suggestedMemory and the laptop disk size is larger than suggestedHardDrive, return the value *true*, otherwise, return *false*.

9. Suppose that there are three classes called Computer, Desktop and Laptop and that they are related through inheritance. Give at least two relations between these classes, i.e. specify possible subclass/superclass relationships, based on your understanding of what the classes would represent.

10. Suppose that we have a subclass of Laptop called LaptopSmall that has a fixed hard drive size. Describe briefly (one sentence) how polymorphism can be used to make a method that can be used on instances of this class to test for recommended installation, as in the previous question.

11. Suppose that we have the following String variable:
    String cityName = "Syracuse";
Will the following string comparison expressions be true or false?

a. cityName.startsWith ("Syr")

b. cityName.equals ("syracuse")

c. cityName.equalsIgnoreCase ("syr")

12. Suppose that we have a file named "songplays.txt" where each line has the song *title,* the *artist* and the *number of plays*, with up to 50 songs in the file. Here are example lines from the file:

Revolution, Beatles, 53

Crazy, Gnarls Barkley, 170

Empire State of Mind, Jay-Z, 125

Crazy in Love, Beyonce, 193

First write the code for a class SongPlays with fields to describe the data, a Constructor method to initialize the three fields, a method *getTitle* to get the title field and a method *getPlays* to get the number of plays.

13. Assume that we have an array of SongPlays declared:

   SongPlays [ ] songs = new SongPlays [50]

and that data has been read from a file and stored in this array.

Suppose then that we have a Text Field (jTextField1), where the user can type a word and that they want to find all of the popular songs with that word in the title. Write the code that will get the value from this textfield and search the array to find all the songs whose title contains the word typed by the user and has more than 100 plays. Display all the song titles that matched the search in jLabel1. If no song titles match, display a message in jLabel1 to that effect.