Supplementary Code – Quiz 1

This is a draft of the code that will be provided for all versions of Quiz 1. The locations for Quiz 1 will be posted to portal.utoronto.ca one week in advance of the quiz.

class UserAccount {

    private String userName;
    private String email;
    private int accountNum;
    public static int nextAccountNum = 1;

    public UserAccount(String userName, String email) {
        this.userName = userName;
        this.email = email;
        accountNum = nextAccountNum;
        nextAccountNum++;
    }

    protected UserAccount(String email) {
        this.email = email;
        this.accountNum = 0;
    }

    public String getUserName() {
        return userName;
    }

    public void setUserName(String newName) {
        userName = newName;
    }

    public int getAccountNum() {
        return accountNum;
    }

    public String getEmail() {
        return email;
    }

    public void setEmail(String email) {
        this.email = email;
    }

    public static int getNextAccountNum() {
        return nextAccountNum;
    }
}
public boolean equals(UserAccount ua) {
    return this.accountNum == ua.accountNum;
}

public String toString() {
    return "User Name: " + userName + ", Account Number: " + accountNum;
}

public class TemporaryUserAccount extends UserAccount {

    private String userName;
    private int accountNum;
    public static int nextAccountNum = 1;

    public TemporaryUserAccount(String userName, String email) {
        super(email);
        this.userName = userName;
    }

    public boolean equals(UserAccount ua) {
        if (!(ua instanceof TemporaryUserAccount)) {
            return false;
        } else {
            if (((UserAccount) ua).getUserName().equals(
                ((UserAccount) this).getUserName()) &&
                (((UserAccount) ua).getAccountNum()) ==
                (((UserAccount) this).getAccountNum())) {
                return true;
            }
        }
        return false;
    }

    public String toString() {
        return "Temporary Account " + accountNum + " belongs to: " + userName;
    }
}
Topics: Classes, methods, variables, constructors, static vs. instance, inheritance, types, casting, memory equals vs. the equals() method, and the toString() method.

1. Define the following terms: “instance variable”, “static variable”, “instance method”, “static method”, “constructor”, “primitive type” (What are the eight primitive types?), “subclasses of the Object class” (Are there any other classes?)

2. In the following code, identify:
   (i) any instance variables
   (ii) any static variables
   (iii) any instance methods
   (iv) any static methods
   (v) any constructors

3. Write a main method that creates an instance of each class from the Supplementary Code, and also an instance of TemporaryUserAccount that is of type UserAccount. Try calling each of the methods through each instance. When do the lookup rules apply? When can you use casting to access the methods from the parent class?

4. In general, what is the toString() method supposed to do? What is the equals() method supposed to do? Why do we usually want to override them in a subclass?

5. What is type-casting?
   If ClassA is a class and ClassB extends ClassA, consider the following code:

   ClassA ob1 = new ClassA();
   ClassB ob2 = new ClassB();

   Can you think of a reason to type-cast ob2 as an instance of ClassA? If so, what is the syntax for this? Is it possible to type-cast ob1 as an instance of ClassB? Why or why not?

6. Integer is the class associated with the primitive type int. When we use the == operator on primitive types, Java compares the values of the primitives. But for subclasses of Object, == compares the memory addresses that each instance points to. What will happen if we try to compile the following code:

   int x = 5;
   Integer y = new Integer(5);
   System.out.println(x == y);

7. Consider the constructors for UserAccount. If you only use the 2-parameter constructor, will all accounts numbers be different? What about the 1-parameter constructor?