CS2383 – Fall 2024
Assignment 1 – Java Review

Due: Tuesday Sept. 17, 10am (class time)

IMPORTANT: individual work please!

Tasks:

Part 1:

Do the Exercise 1.2.7 in the textbook. Provide an example of how it works, by tracing the execution of the code on an example of your choice. Use a word that exists, containing n characters, with the following conditions: (a) n >= 10; and (b) n is not a power of 2.

Part 2:

Download the classes that are provided to you: Coin, SportCard, Stamp, MyCollection, and Asgn1. Make sure you understand them.

Context: You like to collect rare coins, stamps, and sport cards. You would like to keep your collection of items into a single data structure, hidden in a class named MyCollection. See the skeleton of this class to see which instance variable and methods that you should provide.

Note that because those objects are of different types, you will have to use polymorphism. Modify the classes Coin, SportCard, and Stamp to implement the same interface (an interface that you will create, listing the common methods). Use this to create the proper data structure inside the MyCollection class to store objects of any of those 3 types (an ArrayList is OK). Then add code for all the methods needed. You should be able to run the Asgn1 file without changing it.

Once you have this part done, print all your classes and add this to your assignment submission.

Part 3:

Make a copy of your classes from Part 2. You will have to modify them again. You probably noticed that the method to calculate an average quality does not make much sense here, due to the differences in scales for the quality value. Indeed, for a sport card, a value of 8 is really excellent, while a value of 8 for a coin or a stamp is mediocre. From this, you realize that it would be better to have separate MyCollection objects for each type of objects that you have (i.e., one for coins, one for stamps, and one for sport cards). Still, you want to reuse the same MyCollection class for each of these instances, and just make sure that once it is created, it can accept only one type of object. This can be done through generics.

- Modify the MyCollection class to receive a type as generics. Do the same on your interface.
- In the classes Coin, Stamp, and SportCard, change the interface that they are implementing. For example, if your interface in Part 2 was named “Collectible”, the new Coin class would now have to be declared as: “class Coin implements Collectible<Coin>”.
- In the MyCollection class, change all references to your interface to the new interface name (i.e., with the generic type, for example “Collectible<T>”).
- Change the Asgn1.java file, so as to create 3 MyCollection objects, one for each type of objects you have. Add the items you have to their respective collection (i.e., coins to the MyCollection object of Coins, stamps to the MyCollection object of Stamps, and etc.). Copy-paste 3 times the last 3 lines of code (i.e., code to print all elements of the collection, to get the sum of profits, and to get the average quality level), and adapt the code so that those operations are done on each of your 3 MyCollection objects.

Note: you will probably get a compile message, indicating that you have unsafe or unchecked operations. This is OK…it is just that one could create a MyCollection of a type that is not from your interface. A better implementation would check first if T is of the interface type before creating the ArrayList, and throw an exception if it is not.

Once you have this part done, print all your modified classes and add this to your assignment submission.

What to submit: a paper copy of your work (printed code for both Part 2 and Part 3, hand-written diagram for the program trace in Part 1)