420-202-RE DATA STRUCTURES AND OBJECT-ORIENTED PROGRAMMING

Assignment 1

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Q1: For the given array of fixed length, you have to interact with the user for the input and do the following tasks:

Create a menu program that lists the following

- Add an element
- Find all the repeated elements
- Size of entire array
- Display which element has repeated a greater number of times
- Remove an element
- sort
- Display
- Exit

Note: Until user exits, the interface should keep on asking the user for an option.

Q2:

Utilizing an ArrayList, collect n strings from the user. Add any string that is not already present in the ArrayList to eliminate duplicates. The objective is to remove duplicates and then sort the collection. Additionally, ensure the removal of strings regardless of capitalization.

Input: montreal, Canada, Canada, Montreal, Vancouver, Capital, Dawson, cegep

Output:

```
ArrayList after processing:
[Canada, Capital, cegep, Dawson, montreal, Vancouver]
```

Q 3:

Upon examining the UML diagram provided below, your task is to determine the optimal approach for designing the ***RectangleAdapter*** Class. Would you prefer it to function as an abstract class, where the Square and Rectangle subclasses implement the methods? Alternatively, would you classify it as an interface for other classes to implement, or as a base class for the subclasses to extend their behaviors? After making your decision, proceed to implement all the methods in every child class and provide a justification for your choice.

Q4) Given the bank class (see below), design and implement a java program based on the given properties. The fields:

- Name should take TD and RBC
- Branch should take CDG, StMichel, StLaurent
- Revenue should take the range 500k – 100K
- Address could be some arbitrary address
- NoOfCustomers could be 200 and 250 obviously

Now write a driver main class, create 5 objects for each bank and store in the ArrayList. Answer the following queries:

4.1) Find all the branch names of a particular bank whose revenue is between 600k to 750k

4.2) Count total number of customers for all the banks

4.3) Display the bank that makes more revenue

```java
public class Bank {
    String name;
    String branch;
    Double revenue;
    String address;
    int noOfCustomers;
    public String getName() { return name; }
    public void setName(String name) { this.name = name;}
    public String getBranch() {
        return branch;
    }
    public void setBranch(String branch) {
        this.branch = branch;
    }
    public Double getRevenue() {
        return revenue;
    }
    public void setRevenue(Double revenue) {
        this.revenue = revenue;
    }
    public String getAddress() {
        return address;
    }
    public void setAddress(String address) {
        this.address = address;
    }
    public int getNoOfCustomers() {
        return noOfCustomers;
    }
    public void setNoOfCustomers(int noOfCustomers) {
        this.noOfCustomers = noOfCustomers;
    }
}
```

Q5 : Write a java program for the following problem:

- ✓ A family is going to circus and the aim is find the total price based upon the following conditions:
- ✓ Each family can have one or more members.
- ✓ Depending on the day of the week, prices are not the same.
- ✓ Depending on the age of the person, prices are not the same.
- ✓ Price list:
  - Week days (Monday to Thursday)
    - Child: 15$
    - Adult: 20$
  - Friday night
    - Child: 25$
    - Adult: 30$
  - Weekends (Saturday and Sunday)
    - Child: 35$
    - Adult: 40$

How the program should interact with the user:

```
1: Mon 2: Tue 3: Wed
4: Thu 5: Fri 6: Sat
7: Sun

Which day are we?          __
How old is person 1?       __
Another person?            Y
How old is person 2?       __
Another person?            N
People count:              __
Total is:              $_____
```

Important Note : copy the code to the world file and for every task, include the screenshot of output for various scenarios