PG-DAC THIRUVANANTHAPURAM & KOCHI

OOPs WITH JAVA – Collection part 2

Q1. Create an ArrayList/LinkedList collection of random integer values
i) Display unique elements from the list using HashSet

```java
import java.util.ArrayList;
import java.util.HashSet;
import java.util.LinkedList;
import java.util.Random;
import java.util.List;
import java.util.Set;

public class UniqueElements{

    Run | Debug
    public static void main(String[] args) {
        // Create an ArrayList to store random integer values
        List<Integer> integerList = new ArrayList<>();

        // Or you can use LinkedList instead
        // List<Integer> integerList = new LinkedList<>();

        // Generate and add random integers to the list
        Random random = new Random();
        for (int i = 0; i < 20; i++) {
            int randomInt = random.nextInt(10); // Generates random integers from 0 to 9
            integerList.add(randomInt);
        }

        System.out.println("Original List: " + integerList);

        // Create a HashSet to store unique elements
        Set<Integer> uniqueSet = new HashSet<>(integerList);

        System.out.println("Unique Elements: " + uniqueSet);
    }
}
```

```
nisha@nisha-Cloud:/media/sf_Vertual_Box_Share/Nisha_Ubuntu/Cdac/Java/Java_Assignment/lab12/q1$  cd /media/sf_Vertual_Box_Share/Nisha_Ubuntu/Cdac/Java/Java_Assignment/lab12/q1 ; /usr/bin/env /usr/lib/jvm/java-8-openjdk-amd64/jre/bin/java -cp /home/nisha/.config/Code/User/workspaceStorage/3b492b64b52dccac56ce87427c9cfa20/redhat.java/jdt_ws/q1_b832cb5b/bin UniqueElements
Original List: [8, 0, 9, 1, 4, 8, 1, 7, 0, 9, 2, 9, 4, 1, 3, 7, 3, 9, 2, 0]
Unique Elements: [0, 1, 2, 3, 4, 7, 8, 9]
```

ii) Display unique elements from the list in ascending order using TreeSet

```java
import java.util.ArrayList;
import java.util.List;
import java.util.Random;
import java.util.Set;
import java.util.TreeSet;

public class UniqueElementsTreeSet {

    Run | Debug
    public static void main(String[] args) {
        // Create an ArrayList to store random integer values
        List<Integer> integerList = new ArrayList<>();

        // Generate and add random integers to the list
        Random random = new Random();
        for (int i = 0; i < 20; i++) {
            int randomInt = random.nextInt(10); // Generates random integers from 0 to 9

            integerList.add(randomInt);
        }

        System.out.println("Original List: " + integerList);

        // Create a TreeSet to store unique elements in ascending order
        Set<Integer> uniqueSet = new TreeSet<>(integerList);

        System.out.println("Unique Elements in Ascending Order: " + uniqueSet);
    }
}
```

```
nisha@nisha-Cloud:/media/sf_Vertual_Box_Share/Nisha_Ubuntu/Cdac/Java/Java_Assignment/lab12/q2$ javac
 StudentTreeSet.java
\nisha@nisha-Cloud:/media/sf_Vertual_Box_Share/Nisha_Ubuntu/Cdac/Java/Java_Assignment/lab12/q2$ java
 StudentTreeSet
Unique Students in Ascending Order:
Roll No: 4, Name: Ann
Roll No: 1, Name: Arya
Roll No: 2, Name: Ben
Roll No: 5, Name: Devi
nisha@nisha-Cloud:/media/sf_Vertual_Box_Share/Nisha_Ubuntu/Cdac/Java/Java_Assignment/lab12/q2$
```

Q2. Create a class Student with rollno and name as data members.
Create an ArrayList/LinkedList of Student objects
i) Display unique elements from the list using HashSet

```java
import java.util.ArrayList;
import java.util.HashSet;
import java.util.List;

class Student {
    private int rollno;
    private String name;

    public Student(int rollno, String name) {
        this.rollno = rollno;
        this.name = name;
    }

    public int getRollno() {
        return rollno;
    }

    public String getName() {
        return name;
    }

    @Override
    public boolean equals(Object s)
    {
     Student s1= (Student)s;
    return this.rollno == s1.rollno;

    }

    @Override
    public int hashCode() {
        return rollno;
    }
}
```

```java
public class StudentHashSet{
    Run | Debug
    public static void main(String[] args) {
        // Create an ArrayList of Student objects
        List<Student> studentList = new ArrayList<>();
        studentList.add(new Student(rollno:1, name:"Jerry"));
        studentList.add(new Student(rollno:2, name:"Neethu"));
        studentList.add(new Student(rollno:3, name:"Mini"));
        studentList.add(new Student(rollno:4, name:"Mariam"));
        studentList.add(new Student(rollno:5, name:"Nisha"));// Duplicate
        studentList.add(new Student(rollno:5, name:"Nisha")); // Duplicate

        // Display unique elements using HashSet
        HashSet<Student> uniqueStudents = new HashSet<>(studentList);
        System.out.println("Unique Students (HashSet):");
        for (Student student : uniqueStudents) {
            System.out.println("Roll No: " + student.getRollno() + ", Name: " + student.getName());
        }
    }
}
```

```
nisha@nisha-Cloud:/media/sf_Vertual_Box_Share/Nisha_Ubuntu/Cdac/Java/Java_Assignment/lab12
/q2$  cd /media/sf_Vertual_Box_Share/Nisha_Ubuntu/Cdac/Java/Java_Assignment/lab12/q2 ; /us
r/bin/env /usr/lib/jvm/java-8-openjdk-amd64/jre/bin/java -cp /home/nisha/.config/Code/User
/workspaceStorage/a2e053cedb028ab00f5d610290fefe83/redhat.java/jdt_ws/q2_b832cb5c/bin Stud
entHashSet
Unique Students (HashSet):
Roll No: 1, Name: Jerry
Roll No: 2, Name: Neethu
Roll No: 3, Name: Mini
Roll No: 4, Name: Mariam
Roll No: 5, Name: Nisha
```

ii) Display unique elements from the list in ascending order using TreeSet

```java
import java.util.ArrayList;
import java.util.TreeSet;

class Student implements Comparable<Student> {
    private int rollno;
    private String name;

    public Student(int rollno, String name) {
        this.rollno = rollno;
        this.name = name;
    }

    public int getRollno() {
        return rollno;
    }
    public void setRollno(int rollno) {
        this.rollno = rollno;
    }
    public void setName(String name) {
        this.name = name;
    }

    public String getName() {
        return name;
    }

    @Override
    public int compareTo(Student s1) {
        // Compare students based on their names for ascending order
        return this.name.compareTo(s1.name);
    }

    @Override
    public String toString() {
        return "Roll No: " + rollno + ", Name: " + name;
    }
}
```

```java
public class StudentTreeSet {
    Run | Debug
    public static void main(String[] args) {
        ArrayList<Student> studentList = new ArrayList<>();
        studentList.add(new Student(rollno:1, name:"Arya"));
        studentList.add(new Student(rollno:2, name:"Ben"));
        studentList.add(new Student(rollno:3, name:"Arya")); // Duplicate
        studentList.add(new Student(rollno:4, name:"Ann"));
        studentList.add(new Student(rollno:5, name:"Devi"));
        studentList.add(new Student(rollno:6, name:"Devi")); // Duplicate

        TreeSet<Student> uniqueStudents = new TreeSet<>(studentList);

        System.out.println("Unique Students in Ascending Order:");
        for (Student student : uniqueStudents) {
            System.out.println(student);
        }
    }
}
```

```
nisha@nisha-Cloud:/media/sf_Vertual_Box_Share/Nisha_Ubuntu/Cdac/Java/Java_Assign
ment/lab12/q2$ javac StudentTreeSet.java
nisha@nisha-Cloud:/media/sf_Vertual_Box_Share/Nisha_Ubuntu/Cdac/Java/Java_Assign
ment/lab12/q2$ java StudentTreeSet
Unique Students in Ascending Order:
Roll No: 4, Name: Ann
Roll No: 1, Name: Arya
Roll No: 2, Name: Ben
Roll No: 5, Name: Devi
```

Q3. Create a HashMap collection with String key and String value.
Accept PRN and Name of 3 students and store in the collection with PRN as key and Name as value. (Please try random values for key .. not to be in ascending order)
i) Accept a PRN from user and check if it exists in the collection.
If exists display that student's name
If not add that data to the collection

```java
import java.util.HashMap;
import java.util.Map;
import java.util.Scanner;

public class StudentHashMapAdd {
    Run | Debug
    public static void main(String[] args) {
        // Create a HashMap to store student data (PRN as key, Name as value)
        Map<String, String> studentMap = new HashMap<>();

        // Accept PRN and Name of 3 students and store in the collection
        for (int i = 0; i < 3; i++) {
            Scanner scanner = new Scanner(System.in);
            System.out.print("Enter PRN for student " + (i + 1) + ": ");
            String prn = scanner.next();
            System.out.print("Enter Name for student " + (i + 1) + ": ");
            String name = scanner.next();
            studentMap.put(prn, name);
        }

        // Accept a PRN from the user and check if it exists in the collection
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter PRN to search/add: ");
        String prn = scanner.next();

        // Check if the PRN exists in the collection
        if (studentMap.containsKey(prn)) {
            // If it exists, get and display the student's name
            String name = studentMap.get(prn);
            System.out.println("Student's Name: " + name);
        } else {
            // If it doesn't exist, prompt for the name and add it to the collection
            System.out.print("Enter Name to add: ");
            String name = scanner.next();
            studentMap.put(prn, name);
            System.out.println("Data added to the collection.");
        }
```

```java
        // Display all elements in the collection
        System.out.println("Student Data in the Collection:");
        for (Map.Entry<String, String> entry : studentMap.entrySet()) {
            System.out.println("PRN: " + entry.getKey() + ", Name: " + entry.getValue());
        }

        // Close the scanner
        scanner.close();
    }
}
```

```
nisha@nisha-Cloud:/media/sf_Vertual_Box_Share/Nisha_Ubuntu/Cdac/Java/Java_Assignment/lab12/q
3$  /usr/bin/env /usr/lib/jvm/java-8-openjdk-amd64/jre/bin/java -cp /home/nisha/.config/Code
/User/workspaceStorage/dc4c047474b57975f54b4c98813a958d/redhat.java/jdt_ws/q3_b832cb5d/bin S
tudentHashMapAdd
Enter PRN for student 1: 002
Enter Name for student 1: Nisha
Enter PRN for student 2: 008
Enter Name for student 2: Arya
Enter PRN for student 3: 012
Enter Name for student 3: Anu
Enter PRN to search/add: 009
Enter Name to add: Jeni
Data added to the collection.
Student Data in the Collection:
PRN: 012, Name: Anu
PRN: 002, Name: Nisha
PRN: 008, Name: Arya
PRN: 009, Name: Jeni
```

ii) Accept a PRN from user and check if it exists in the collection.
If exists remove that data from the collection
If does not exist display a not found message
iii) Traverse through all the elements and display

```java
import java.util.HashMap;
import java.util.Map;
import java.util.Scanner;

public class StudentHashMap {
    Run | Debug
    public static void main(String[] args) {
        // Create a HashMap to store student data (PRN as key, Name as value)
        Map<String, String> studentMap = new HashMap<>();

        // Accept PRN and Name of 3 students and store in the collection
        for (int i = 0; i < 3; i++) {
            Scanner scanner = new Scanner(System.in);
            System.out.print("Enter PRN for student " + (i + 1) + ": ");
            String prn = scanner.next();
            System.out.print("Enter Name for student " + (i + 1) + ": ");
            String name = scanner.next();
            studentMap.put(prn, name);
        }

        // Accept a PRN from the user and check if it exists in the collection
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter PRN to search/remove: ");
        String prn = scanner.next();

        // Check if the PRN exists in the collection
        if (studentMap.containsKey(prn)) {
            // If it exists, get and display the student's name
            String name = studentMap.get(prn);
            System.out.println("Student's Name: " + name);

            // Remove the data if it exists
            studentMap.remove(prn);
            System.out.println("Data for PRN " + prn + " removed from the collection.")
        } else {
            // If it doesn't exist, display a "not found" message
            System.out.println("PRN not found in the collection.");
        }
```

```java
        else {
            // If it doesn't exist, display a "not found" message
            System.out.println("PRN not found in the collection.");
        }

        // Display all elements in the collection
        System.out.println("Student Data in the Collection:");
        for (Map.Entry<String, String> entry : studentMap.entrySet()) {
            System.out.println("PRN: " + entry.getKey() + ", Name: " + entry.getValue());
        }

        // Close the scanner
        scanner.close();
    }
}
```

```
nisha@nisha-Cloud:/media/sf_Vertual_Box_Share/Nisha_Ubuntu/Cdac/Java/Jav
a_Assignment/lab12/
ab12/q3$  /usr/bin/env /usr/lib/jvm/java-8-openjdk-amd64/jre/bin/java -c
p /home/nisha/.config/Co
de/User/workspaceStorage/dc4c047474b57975f54b4c98813a958d/redhat.java/jd
t_ws/q3_b832cb5d/bin StudentHashMap
Enter PRN for student 1: 002
Enter Name for student 1: Nisha
Enter PRN for student 2: 005
Enter Name for student 2: Sara
Enter PRN for student 3: 006
Enter Name for student 3: Anvi
Enter PRN to search/remove: 005
Student's Name: Sara
Data for PRN 005 removed from the collection.
Student Data in the Collection:
PRN: 002, Name: Nisha
PRN: 006, Name: Anvi
```

Q4.Repeat Q3 with TreeMap and find any difference/commonality with HashMap

i) Accept a PRN from user and check if it exists in the collection.
If exists display that student's name
If not add that data to the collection

```java
import java.util.Scanner;
import java.util.TreeMap;

public class StudentTreeMap {
    Run | Debug
    public static void main(String[] args) {
        // Create a TreeMap to store student data (PRN as key, Name as value)
        TreeMap<String, String> studentTreeMap = new TreeMap<>();

        // Accept PRN and Name of 3 students and store in the TreeMap
        Scanner scanner = new Scanner(System.in);
        for (int i = 0; i < 3; i++) {
            System.out.print("Enter PRN for student " + (i + 1) + ": ");
            String prn = scanner.next();
            System.out.print("Enter Name for student " + (i + 1) + ": ");
            String name = scanner.next();
            studentTreeMap.put(prn, name);
        }
        // Accept a PRN from the user and check if it exists in the TreeMap
        System.out.print("Enter PRN to search/add: ");
        String prn = scanner.next();

        if (studentTreeMap.containsKey(prn)) {
            // If it exists, get and display the student's name
            String name = studentTreeMap.get(prn);
            System.out.println("Student's Name: " + name);
        } else {
            // If it doesn't exist, prompt for the name and add it to the collection
            System.out.print("Enter Name to add: ");
            String name = scanner.next();
            studentTreeMap.put(prn, name);
            System.out.println("Data added to the collection.");
        }
        // Close the scanner
        scanner.close();
    }
}
```

```
nisha@nisha-Cloud:/media/sf_Vertual_Box_Share/Nisha_Ubuntu/Cdac/Java/Java_Assignment/lab12/q4$  /usr/bin/e
nv /usr/lib/jvm/java-8-openjdk-amd64/jre/bin/java -cp /home/nisha/.config/Code/User/workspaceStorage/70ebc
d5dfd23207198ad3e685141b777/redhat.java/jdt_ws/q4_b832cb5e/bin StudentTreeMap
Enter PRN for student 1: 007
Enter Name for student 1: Nisha
Enter PRN for student 2: 008
Enter Name for student 2: Neen
Enter PRN for student 3: 006
Enter Name for student 3: Jeni
Enter PRN to search/add: 004
Enter Name to add: Arya
Data added to the collection.
Student Data in the TreeMap:
PRN: 004, Name: Arya
PRN: 006, Name: Jeni
PRN: 007, Name: Nisha
PRN: 008, Name: Neen
```

ii) Accept a PRN from user and check if it exists in the collection.
If exists remove that data from the collection

If does not exist display a not found message

```java
import java.util.Scanner;
import java.util.TreeMap;
import java.util.Map;
public class StudentTreeMapRemove {
    Run | Debug
    public static void main(String[] args) {
        // Create a TreeMap to store student data (PRN as key, Name as value)
        TreeMap<String, String> studentTreeMap = new TreeMap<>();

        // Accept PRN and Name of 3 students and store in the TreeMap
        Scanner scanner = new Scanner(System.in);
        for (int i = 0; i < 3; i++) {
            System.out.print("Enter PRN for student " + (i + 1) + ": ");
            String prn = scanner.next();
            System.out.print("Enter Name for student " + (i + 1) + ": ");
            String name = scanner.next();
            studentTreeMap.put(prn, name);
        }
        // Accept a PRN from the user and check if it exists in the TreeMap
        System.out.print("Enter PRN to search/remove: ");
        String prn = scanner.next();

        if (studentTreeMap.containsKey(prn)) {
            // If it exists, get and display the student's name
            String name = studentTreeMap.get(prn);
            System.out.println("Student's Name: " + name);
            // Remove the data if it exists
            studentTreeMap.remove(prn);
            System.out.println("Data for PRN " + prn + " removed from the collection.");
        } else {
            // If it doesn't exist, display a "not found" message
            System.out.println("PRN not found in the collection.");
        }
        // Display all elements in the TreeMap
        System.out.println("Student Data in the TreeMap:");
        for (Map.Entry<String, String> entry : studentTreeMap.entrySet()) {
            System.out.println("PRN: " + entry.getKey() + ", Name: " + entry.getValue());
        }
        scanner.close();   // Close the scanner
    }
}
```

```
nisha@nisha-Cloud:/media/sf_Vertual_Box_Share/Nisha_Ubuntu/Cdac/Java/Java_Assig
nment/lab12/q4$  /usr/bin/env /usr/lib/jvm/java-8-openjdk-amd64/jre/bin/java -c
p /home/nisha/.config/Code/User/workspaceStorage/70ebcd5dfd23207198ad3e685141b7
77/redhat.java/jdt_ws/q4_b832cb5e/bin StudentTreeMapRemove
Enter PRN for student 1: 003
Enter Name for student 1: Nisha
Enter PRN for student 2: 006
Enter Name for student 2: Elizabeth
Enter PRN for student 3: 008
Enter Name for student 3: Ann
Enter PRN to search/remove: 006
Student's Name: Elizabeth
Data for PRN 006 removed from the collection.
Student Data in the TreeMap:
PRN: 003, Name: Nisha
PRN: 008, Name: Ann
```