Rajalakshmi Engineering College

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2024_28_III_OOPS Using Java Lab

REC_2028_OOPS using Java_Week 10_CY

Attempt : 1
Total Mark : 40
Marks Obtained : 40

Section 1 : COD

1. Problem Statement

Tony is an e-learning platform administrator, he oversees the user ratings for various online courses offered in the platform.

To enhance user experience, you should assist him in utilizing a HashMap to store course ratings given by learners. Regularly, he analyzes this data to identify the highest and lowest-rated courses, enabling targeted improvements and ensuring the quality of the educational content. This process assists in maintaining a competitive and engaging online learning environment for the users.

Input Format

The input consists of a string representing the course name followed by a double value representing the course's rating, in separate lines.

The input is terminated by entering "done".

Output Format

The first line of output prints the string "Highest Rated Course: " followed by the highest-rated course.

The second line prints the string "Lowest Rated Course: " followed by the lowest-rated courses.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: DSA
4.0
OOPS
4.2
C
3.2
done

Output: Highest Rated Course: OOPS
Lowest Rated Course: C

Answer

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

class CourseAnalyzer {
   public Map<String, String>
identifyHighestAndLowestRatedCourses(Map<String, Double> courseRatings) {
      double highestRating = Double.MIN_VALUE;
      double lowestRating = Double.MAX_VALUE;
      String highestRatedCourse = "";
      String lowestRatedCourse = "";

      for (Map.Entry<String, Double> entry : courseRatings.entrySet()) {
         String course = entry.getKey();
         double rating = entry.getValue();
```

```
            if (rating > highestRating) {
                highestRating = rating;
                highestRatedCourse = course;
            }
            if (rating < lowestRating) {
                lowestRating = rating;
                lowestRatedCourse = course;
            }
        }

        Map<String, String> result = new HashMap<>();
        result.put("highest", highestRatedCourse);
        result.put("lowest", lowestRatedCourse);
        return result;
    }
}

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        Map<String, Double> courseRatings = new HashMap<>();

        while (true) {
            String courseName = scanner.nextLine();
            if (courseName.equalsIgnoreCase("done")) {
                break;
            }
            double rating = Double.parseDouble(scanner.nextLine().trim());
            courseRatings.put(courseName, rating);
        }

        CourseAnalyzer analyzer = new CourseAnalyzer();
        Map<String, String> result =
analyzer.identifyHighestAndLowestRatedCourses(courseRatings);

        System.out.printf("Highest Rated Course: %s\n", result.get("highest"));
        System.out.printf("Lowest Rated Course: %s", result.get("lowest"));

        scanner.close();
    }
}
```

Status : Correct ***Marks : 10/10***

2. Problem Statement

A college professor wants to keep track of students who attend classes. Each student has a unique roll number and their attendance count increases every time they attend a class. The system should allow adding a student, marking their attendance, and displaying all students with their total attendance.

Your task is to implement a Java program using TreeSet to maintain students in sorted order of roll numbers and track their attendance count.

Operations:

A roll_no name   Add a student with roll number and name (if not already added).M roll_no   Mark attendance for the student with the given roll number (increase their count by 1).D   Display all students in ascending order of roll number along with their attendance count.

Input Format

The first line contains an integer N - the number of students.

The next N lines contain one of the following commands:

A roll_no name

M roll_no

D

- A (Add)   Adds a new student with a unique roll number and name.
- M (Mark)   Increases attendance count for the given roll number.
- D (Display)   Prints all students in ascending order of roll number.

Output Format

For D, output prints each student’s roll number, name, and attendance count in ascending order of roll number.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5
A 101 Alice
A 102 Bob
M 101
M 101
D

Output: 101 Alice 2
102 Bob 0

Answer

```
import java.util.*;
class Student implements Comparable<Student> {
   int rollNo;
   String name;
   int attendance;

   public Student(int rollNo, String name) {
      this.rollNo = rollNo;
      this.name = name;
      this.attendance = 0;
   }

   public void markAttendance() {
      this.attendance++;
   }

   public int compareTo(Student s) {
      return Integer.compare(this.rollNo, s.rollNo);
   }

   public boolean equals(Object obj) {
      if (this == obj) return true;
      if (obj == null || getClass() != obj.getClass()) return false;
      Student student = (Student) obj;
      return rollNo == student.rollNo;
   }

   public int hashCode() {
        return Objects.hash(rollNo);
    }

    public String toString() {
        return rollNo + " " + name + " " + attendance;
    }
}

class AttendanceTracker {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        sc.nextLine();
        TreeSet<Student> students = new TreeSet<>();
        for (int i = 0; i < n; i++) {
            String[] command = sc.nextLine().split(" ");
            String operation = command[0];

            if (operation.equals("A")) {
                int rollNo = Integer.parseInt(command[1]);
                String name = command[2];
                students.add(new Student(rollNo, name));
            }
            else if (operation.equals("M")) {
                int rollNo = Integer.parseInt(command[1]);
                for (Student s : students) {
                    if (s.rollNo == rollNo) {
                        s.markAttendance();
                        break;
                    }
                }
            }
            else if (operation.equals("D")) {
                for (Student s : students) {
                    System.out.println(s);
                }
            }
        }
        sc.close();
    }
}
```

Status : Correct **Marks : 10/10**

3. Problem Statement

Aryan is developing a voting system for a college election. Each vote is recorded as an entry in an array, where every student's vote is represented by a candidate's ID. Since it's a majority-rule election, the winner is the candidate who receives more than n/2 votes, where n is the total number of votes cast.

To quickly determine the winner, Aryan decides to use a HashMap to count the occurrences of each vote and identify the candidate who has received more than half of the total votes.

Example

Input

7

2 2 1 2 2 2 3

Output

2

Explanation

The votes are: 2, 2, 1, 2, 2, 3, 2

Count of each candidate:

2 appears 5 times1 appears once3 appears once

The majority element is the one that appears more than N/2 times. Since 7/2 = 3.5, a number must appear at least 4 times to be the majority.

The number 2 appears 5 times, which is greater than 3.5, so the output is 2.

Input Format

The first line contains an integer N representing the number of votes cast.

The second line contains N space-separated integers representing the votes, where each integer corresponds to a candidate.

Output Format

The output prints an integer representing the majority element (the candidate who received more than N/2 votes).

If no such candidate exists, print -1.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 7
2 2 1 2 2 2 3
Output: 2

Answer

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

class MajorityElementFinder {
    public static int findMajorityElement(int[] arr) {
        HashMap<Integer, Integer> countMap = new HashMap<>();
        int n = arr.length;

        for (int num : arr) {
            countMap.put(num, countMap.getOrDefault(num, 0) + 1);
        }
        for (int key : countMap.keySet()) {
            if (countMap.get(key) > n / 2) {
                return key;
            }
        }
        return -1;
    }
}

class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        int N = scanner.nextInt();
        int[] arr = new int[N];

        for (int i = 0; i < N; i++) {
            arr[i] = scanner.nextInt();
        }

        int result = MajorityElementFinder.findMajorityElement(arr);
        System.out.println(result);

        scanner.close();
    }
}
```

Status : Correct ***Marks : 10/10***

4. Problem Statement

Arjun is working on a program that checks if one set of numbers is a subset of another. If Set B is a subset of Set A, the program should print "YES" followed by the sorted elements of Set B. If Set B is not a subset of Set A, the program should print "NO" followed by the average of all elements from both sets combined, rounded to two decimal places.

Implement a class Solution with the required method to perform the subset check using TreeSet in Java.

Input Format

The first line contains an integer n - the number of elements in Set A.

The second line contains n space-separated integers - the elements of Set A.

The third line contains an integer m - the number of elements in Set B.

The fourth line contains m space-separated integers - the elements of Set B.

Output Format

If Set B is a subset of Set A, print "YES" followed by the sorted values of Set B.

Otherwise, print "NO" followed by the average of all numbers in both sets (rounded to two decimal places).

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5
1 2 3 4 5
3
2 3 5

Output: YES 2 3 5

Answer

```
import java.util.*;

class Solution {
   public static void checkSubset(TreeSet<Integer> setA, TreeSet<Integer> setB,
int totalElements, double sum) {
      if (setA.containsAll(setB)) {
         System.out.print("YES ");
         for (int num : setB) {
            System.out.print(num + " ");
         }
         System.out.println();
      } else {
         double average = sum / totalElements;
         System.out.printf("NO %.2f%n", average);
      }
   }
}

class Main {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      int n = sc.nextInt();
      TreeSet<Integer> setA = new TreeSet<>();
      long sum = 0;
      for (int i = 0; i < n; i++) {
         int num = sc.nextInt();
         setA.add(num);
         sum += num;
      }
```

```
        int m = sc.nextInt();
        TreeSet<Integer> setB = new TreeSet<>();
        for (int i = 0; i < m; i++) {
            int num = sc.nextInt();
            setB.add(num);
            sum += num;
        }
        Solution.checkSubset(setA, setB, n + m, sum);
        sc.close();
    }
}
```

Status : Correct ***Marks : 10/10***