Rajalakshmi Engineering College

Name: RamRohith Muthusamy
Email: 240701419@rajalakshmi.edu.in
Roll no: 240701419
Phone: 8248706370
Branch: REC
Department: CSE - Section 5
Batch: 2028
Degree: B.E - CSE

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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

David is managing an employee database where each employee has a unique ID, name, and department. He wants to ensure that duplicate employee IDs are not added to the system. Implement a Java program that allows adding employees to the system, displaying all employees, and checking if an employee exists based on the given ID.

Implement a class EmployeeDatabase that contains a HashSet to store employee records. The Employee class should be a user-defined object containing employee details. The main class should handle user operations and interact with the EmployeeDatabase class.

Input Format

The first line contains an integer n representing the number of employees to be added.

The next n lines follow, each containing:

1. An integer employee_id
2. A string name
3. A string department

The next line contains an integer m representing the number of queries.

The next m lines follow, each containing an employee ID to check for existence.

Output Format

The output prints a list of all employees added in the format:

"ID: <employee_id>, Name: <name>, Department: <department>"

For each query, output "Employee exists" if the ID is found, otherwise "Employee not found".

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 3
101 John IT
102 Alice HR
103 Bob Finance
2
101
104

Output: ID: 101, Name: John, Department: IT
ID: 102, Name: Alice, Department: HR
ID: 103, Name: Bob, Department: Finance
Employee exists
Employee not found

Answer

import java.util.*;

```
class Employee {
    int employeeId;
    String name, department;

    public Employee(int employeeId, String name, String department) {
        this.employeeId = employeeId;
        this.name = name;
        this.department = department;
    }

    @Override
    public int hashCode() {
        return Objects.hash(employeeId);
    }

    @Override
    public boolean equals(Object obj) {
        if (this == obj) return true;
        if (obj == null || getClass() != obj.getClass()) return false;
        Employee e = (Employee) obj;
        return this.employeeId == e.employeeId;
    }

    @Override
    public String toString() {
        return "ID: " + employeeId + ", Name: " + name + ", Department: " +
department;
    }
}

class EmployeeDatabase {
    HashSet<Employee> employees = new HashSet<>();

    public void addEmployee(int id, String name, String department) {
        employees.add(new Employee(id, name, department));
    }

    public void displayEmployees() {
        for (Employee e : employees) {
            System.out.println(e);
        }
    }
```

```
    public boolean checkEmployee(int id) {
        return employees.contains(new Employee(id, "", ""));
    }
}

class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        EmployeeDatabase db = new EmployeeDatabase();
        int n = sc.nextInt();
        for (int i = 0; i < n; i++) {
            int id = sc.nextInt();
            String name = sc.next();
            String department = sc.next();
            db.addEmployee(id, name, department);
        }
        db.displayEmployees();
        int m = sc.nextInt();
        for (int i = 0; i < m; i++) {
            int id = sc.nextInt();
            if (db.checkEmployee(id))
                System.out.println("Employee exists");
            else
                System.out.println("Employee not found");
        }
        sc.close();
    }
}
```

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

2. 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) {

    String highestCourse = "";
    String lowestCourse = "";
    double highestRating = Double.MIN_VALUE;
    double lowestRating = Double.MAX_VALUE;

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

        if (rating > highestRating) {
            highestRating = rating;
            highestCourse = course;
        }

        if (rating < lowestRating) {
            lowestRating = rating;
            lowestCourse = course;
        }
    }

    Map<String, String> result = new HashMap<>();
    result.put("highest", highestCourse);
    result.put("lowest", lowestCourse);

    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***

3. Problem Statement

A linguist named Meera is classifying a list of words based on their first character. She wants to store words grouped by their starting letter using a TreeMap so that the groups appear in sorted order of characters (i.e., 'a' to 'z'). For each letter, all words starting with that letter should be stored in the order they appear.

Implement the logic inside a class named WordClassifier using the TreeMap<Character, List<String>> collection.

Input Format

The first line of the input contains an integer n, representing the number of words.

The next n lines each contain a word.

Output Format

The first line of the output prints: "Grouped Words by Starting Letter:"

The next lines print each character key and its list of words in the format:

"letter: word1 word2 word3...

..."

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5
dog
deer
cat
cow
camel

Output: Grouped Words by Starting Letter:
c: cat cow camel
d: dog deer

Answer

```
import java.util.*;

class WordClassifier {
    public void classifyWords(List<String> words) {

        TreeMap<Character, List<String>> map = new TreeMap<>();

        for (String word : words) {
            char initial = word.charAt(0);
            if (!map.containsKey(initial)) {
                map.put(initial, new ArrayList<>());
            }
            map.get(initial).add(word);
        }

        System.out.println("Grouped Words by Starting Letter:");
        for (Map.Entry<Character, List<String>> entry : map.entrySet()) {
            System.out.print(entry.getKey() + ": ");
            for (String word : entry.getValue()) {
                System.out.print(word + " ");
            }
            System.out.println();
        }
    }
}
```

```
public class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = Integer.parseInt(sc.nextLine());

        List<String> words = new ArrayList<>();
        for (int i = 0; i < n; i++) {
            words.add(sc.nextLine());
        }

        WordClassifier classifier = new WordClassifier();
        classifier.classifyWords(words);
    }
}
```

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**