Rajalakshmi Engineering College

Name: Kesavan M
Email: 241501083@rajalakshmi.edu.in
Roll no: 241501083
Phone: 9789504694
Branch: REC
Department: AI & ML - Section 4
Batch: 2028
Degree: B.E - AI & ML

Scan to verify results

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

The city library maintains a record of books available for lending. Each book is uniquely identified by its ISBN number, along with its title and author. The librarian wants to efficiently store and manage these records, ensuring books can be listed in the order they were added.

Your task is to implement a Library Management System using HashSet where:

The librarian adds books with ISBN, title, and author.The librarian can remove books by providing an ISBN.Finally, the librarian displays the available books in the order they were added.

Implement a class Library that will handle these operations. The main function should manage user input and interact with the Library class accordingly.

Input Format

The first line contains an integer n – the number of books to be added.

The next n lines contain three values: ISBN (integer), Title (string without spaces), and Author (string without spaces).

1. An integer employee_id
2. A string title
3. A string author name

The next line contains an integer m – the number of books to be removed.

The next m lines follow, each contains an ISBN number to remove.

Output Format

The output prints a list of books available in the library after performing all operations in the format:

"ISBN: <isbn>, Title: <title>, Author: <author>"

If no books remain, print: "No books available"

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 3
1234 JavaCompleteGuide JohnDoe
5678 PythonBasics JaneDoe
9012 DataStructures AliceSmith
1
5679

Output: ISBN: 1234, Title: JavaCompleteGuide, Author: JohnDoe
ISBN: 9012, Title: DataStructures, Author: AliceSmith
ISBN: 5678, Title: PythonBasics, Author: JaneDoe

Answer

```
import java.util.*;
```

```
class Book {
    int ISBN;
    String title;
    String author;

    public Book(int ISBN, String title, String author) {
        this.ISBN = ISBN;
        this.title = title;
        this.author = author;
    }

    @Override
    public boolean equals(Object obj) {
        if (this == obj) return true;
        if (!(obj instanceof Book)) return false;
        Book b = (Book) obj;
        return this.ISBN == b.ISBN;
    }

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

    @Override
    public String toString() {
        return "ISBN: " + ISBN + ", Title: " + title + ", Author: " + author;
    }
}

class Library {
    LinkedHashSet<Book> books = new LinkedHashSet<>();

    public void addBook(int ISBN, String title, String author) {
        books.add(new Book(ISBN, title, author));
    }

    public void removeBook(int ISBN) {
        books.removeIf(book -> book.ISBN == ISBN);
    }
```

```
    public void displayBooks() {
        if (books.isEmpty()) {
            System.out.println("No books available");
        } else {
            for (Book b : books) {
                System.out.println(b);
            }
        }
    }
}

class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        Library library = new Library();
        int n = sc.nextInt();
        for (int i = 0; i < n; i++) {
            int isbn = sc.nextInt();
            String title = sc.next();
            String author = sc.next();
            library.addBook(isbn, title, author);
        }
        int m = sc.nextInt();
        for (int i = 0; i < m; i++) {
            int isbn = sc.nextInt();
            library.removeBook(isbn);
        }
        library.displayBooks();
        sc.close();
    }
}
```

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

2. 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.*;
```

import java.util.*;

```
class WordClassifier {
    private TreeMap<Character, List<String>> map = new TreeMap<>();

    public void classifyWords(List<String> words) {
        for (String word : words) {
            char firstChar = word.charAt(0);
            map.putIfAbsent(firstChar, new ArrayList<>());
            map.get(firstChar).add(word);
        }
        displayGroupedWords();
    }

    private void displayGroupedWords() {
        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***

3. 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.*;
```

```
import java.util.*;

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

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***

4. 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

```
// You are using Java
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++;
    }

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

    @Override
    public boolean equals(Object obj) {
        if (this == obj) return true;
        if (!(obj instanceof Student)) return false;
        Student other = (Student) obj;
        return this.rollNo == other.rollNo;
    }
```

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

class AttendanceManager {
    TreeSet<Student> students = new TreeSet<>();

    public void addStudent(int rollNo, String name) {
        students.add(new Student(rollNo, name));
    }

    public void markAttendance(int rollNo) {
        for (Student s : students) {
            if (s.rollNo == rollNo) {
                s.markAttendance();
                return;
            }
        }
    }

    public void display() {
        for (Student s : students) {
            System.out.println(s.rollNo + " " + s.name + " " + s.attendance);
        }
    }
}

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

        for (int i = 0; i < N; i++) {
            String[] input = sc.nextLine().split(" ");
            if (input[0].equals("A")) {
                int rollNo = Integer.parseInt(input[1]);
                String name = input[2];
                manager.addStudent(rollNo, name);
```

```
        } else if (input[0].equals("M")) {
            int rollNo = Integer.parseInt(input[1]);
            manager.markAttendance(rollNo);
        } else if (input[0].equals("D")) {
            manager.display();
        }
    }
    sc.close();
  }
}
```

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