

# Rajalakshmi Engineering College

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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**

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, author;  
  
    public Book(int isbn, String title, String author) {  
        this.isbn = isbn;  
        this.title = title;  
        this.author = author;  
    }  
  
    public boolean equals(Object obj) {  
        if (this == obj) return true;  
        if (obj == null || getClass() != obj.getClass()) return false;  
        Book book = (Book) obj;  
        return isbn == book.isbn;  
    }  
  
    public int hashCode() {  
        return Objects.hash(isbn);  
    }  
}  
  
class Library {  
    HashSet<Book> books = new HashSet<>();  
  
    void addBook(int isbn, String title, String author) {  
        books.add(new Book(isbn, title, author));  
    }  
  
    void removeBook(int isbn) {  
        books.removeIf(book -> book.isbn == isbn);  
    }  
  
    void displayBooks() {  
        if (books.isEmpty()) {  
            System.out.println("No books available");  
        } else {  
            for (Book book : books) {  
                System.out.println("ISBN: " + book.isbn + ", Title: " + book.title + ",  
Author: " + book.author);  
            }  
        }  
    }  
}
```

```
        }
    }
}

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

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

### 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.*;  
  
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

#### 4. 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 times  
1 appears once  
3 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**