

# Rajalakshmi Engineering College

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## 2024\_28\_III\_OOPS Using Java Lab

### REC\_2028\_OOPS using Java\_Week 10\_MCQ

Attempt : 1  
Total Mark : 15  
Marks Obtained : 15

#### Section 1 : MCQ

1. Which method retrieves the lowest key in a TreeMap?

**Answer**

firstKey()

**Status : Correct**

**Marks : 1/1**

2. Which statement is true about HashSet and TreeSet?

**Answer**

TreeSet provides sorted elements

**Status : Correct**

**Marks : 1/1**

3. What happens if two keys have the same hash code in a HashMap?

**Answer**

A linked list is used to store values with the same hash

**Status : Correct**

**Marks : 1/1**

4. What will happen if you add a null element to a TreeSet?

**Answer**

An exception occurs

**Status : Correct**

**Marks : 1/1**

5. Which method removes all elements from a Set?

**Answer**

clear()

**Status : Correct**

**Marks : 1/1**

6. Which of the following allows null keys in Java?

**Answer**

HashMap

**Status : Correct**

**Marks : 1/1**

7. What will be the output of the following code?

```
import java.util.*;
class Main {
    public static void main(String[] args) {
        HashMap<String, Integer> map = new HashMap<>();
        map.put("X", 10);
        map.put("Y", 20);
        map.put("Z", 30);
    }
}
```

```
        map.remove("Y");  
        System.out.println(map);  
    }  
}
```

**Answer**

{X=10, Z=30}

**Status :** Correct

**Marks :** 1/1

8. Which of the following is true about TreeMap?

**Answer**

It maintains natural ordering

**Status :** Correct

**Marks :** 1/1

9. What will be the output of the following code?

```
import java.util.*;  
class Main {  
    public static void main(String[] args) {  
        HashMap<String, Integer> map = new HashMap<>();  
        map.put("A", 1);  
        map.put("B", 2);  
        map.put("C", 3);  
        System.out.println(map.containsKey("B"));  
    }  
}
```

**Answer**

true

**Status :** Correct

**Marks :** 1/1

10. Which of the following is true about HashMap?

**Answer**

It is not synchronized

**Status :** Correct

**Marks :** 1/1

11. What will happen if you add elements in descending order in a TreeSet?

**Answer**

They are sorted in ascending order

**Status :** Correct

**Marks :** 1/1

12. What will be the output of the following code?

```
import java.util.*;
class Main {
    public static void main(String[] args) {
        HashMap<String, String> map = new HashMap<>();
        map.put("A", "Apple");
        map.put("B", "Banana");
        map.put("C", "Cherry");
        map.replace("B", "Blueberry");
        System.out.println(map);
    }
}
```

**Answer**

{A=Apple, B=Blueberry, C=Cherry}

**Status :** Correct

**Marks :** 1/1

13. What happens when you add duplicate elements to a HashSet?

**Answer**

The duplicate is ignored

**Status :** Correct

**Marks :** 1/1

14. How does HashSet check for duplicate elements?

**Answer**

Using equals() and hashCode()

**Status :** Correct

**Marks :** 1/1

15. What is the time complexity of retrieving an element from a HashSet?

**Answer**

$O(1)$

**Status :** Correct

**Marks :** 1/1

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## 2024\_28\_III\_OOPS Using Java Lab

### 2028\_REC\_OOPS using Java\_Week 10\_Q1

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : COD

##### 1. Problem Statement

A city traffic management system needs to track vehicles entering a toll booth. Each vehicle is uniquely identified by its registration number. The system should allow adding vehicles to a record, ensuring that no duplicate registration numbers exist. The vehicles should be stored in a HashSet, which does not guarantee any specific order.

Your task is to implement a program using a HashSet that allows adding vehicle details and displaying the records.

##### ***Input Format***

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

The next N lines contain details of each vehicle in the format: "RegNumber

OwnerName VehicleType"

1. RegNumber (String) - A unique registration number (Alphanumeric).
2. OwnerName (String) - The name of the vehicle owner.
3. VehicleType (String, Car, Bike, or Truck) - The type of vehicle.

If a vehicle with the same registration number is already present, ignore the duplicate entry.

### ***Output Format***

The output prints the unique vehicle records in any order (since HashSet does not maintain order).

Output format: "RegNumber OwnerName VehicleType"

Refer to the sample output for formatting specifications.

### ***Sample Test Case***

Input: 5

KA01AB1234 John Car  
MH02CD5678 Alice Bike  
DL03EF9012 Bob Truck  
TN04GH3456 Mike Car  
KA01AB1234 John Car

Output: TN04GH3456 Mike Car  
KA01AB1234 John Car  
MH02CD5678 Alice Bike  
DL03EF9012 Bob Truck

### ***Answer***

```
// You are using Java
import java.util.*;
```

```
class Vehicle {
    String regNumber;
    String ownerName;
    String vehicleType;

    Vehicle(String regNumber, String ownerName, String vehicleType) {
```

```
this.regNumber = regNumber;
this.ownerName = ownerName;
this.vehicleType = vehicleType;
}
```

```
@Override
public boolean equals(Object obj) {
    if (this == obj) return true;
    if (obj == null || getClass() != obj.getClass()) return false;
    Vehicle vehicle = (Vehicle) obj;
    return regNumber.equals(vehicle.regNumber);
}
```

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

```
@Override
public String toString() {
    return regNumber + " " + ownerName + " " + vehicleType;
}
}
```

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

        HashSet<Vehicle> vehicleSet = new HashSet<>();

        for (int i = 0; i < n; i++) {
            String[] details = sc.nextLine().split(" ");
            String regNumber = details[0];
            String ownerName = details[1];
            String vehicleType = details[2];

            Vehicle vehicle = new Vehicle(regNumber, ownerName, vehicleType);
            vehicleSet.add(vehicle);
        }
    }
}
```



```
    for (Vehicle v : vehicleSet) {  
        System.out.println(v);  
    }  
    sc.close();  
}
```

**Status :** Correct

**Marks :** 10/10

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## 2024\_28\_III\_OOPS Using Java Lab

### 2028\_REC\_OOPS using Java\_Week 10\_Q2

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : COD

##### 1. Problem Statement

John is organizing a fruit festival, and the quantities of various fruits are stored in a HashMap where fruit names are keys and quantities are values.

Help him develop a program to find the total quantity of fruits for the festival by summing up the values in the HashMap.

##### ***Input Format***

The input consists of fruit quantities in the format 'fruitName:quantity', where fruitName is the name of the fruit(a string), and quantity is a double value representing the quantity.

The input is terminated by entering "done".

##### ***Output Format***

The output prints a double value, representing the sum of values in the HashMap, rounded off to two decimal places.

If the value is not numeric, print "Invalid input".

If any special characters other than ':' are entered, print "Invalid format".

Refer to the sample output for formatting specifications.

### **Sample Test Case**

Input: Banana:15.2

Orange:56.3

Mango:47.3

done

Output: 118.80

### **Answer**

```
// You are using Java
import java.util.*;
```

```
public class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        HashMap<String, Double> fruitMap = new HashMap<>();
        boolean invalidInput = false;
        boolean invalidFormat = false;

        while (true) {
            String input = sc.nextLine();
            if (input.equals("done")) {
                break;
            }

            if (!input.contains(":")) {
                invalidFormat = true;
                continue;
            }

            String[] parts = input.split(":", 2);
```

```

    if (parts.length < 2) {
        invalidFormat = true;
        continue;
    }

    String fruitName = parts[0];
    String quantityStr = parts[1];

    try {
        double quantity = Double.parseDouble(quantityStr);
        fruitMap.put(fruitName, quantity);
    } catch (NumberFormatException e) {
        invalidInput = true;
    }
}

if (invalidFormat) {
    System.out.println("Invalid format");
} else if (invalidInput) {
    System.out.println("Invalid input");
} else {
    double sum = 0.0;
    for (double value : fruitMap.values()) {
        sum += value;
    }
    System.out.printf("%.2f\n", sum);
}

sc.close();
}
}

```

**Status :** Correct

**Marks :** 10/10

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## 2024\_28\_III\_OOPS Using Java Lab

### 2028\_REC\_OOPS using Java\_Week 10\_Q3

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : COD

##### 1. Problem Statement

Priya is analyzing encrypted messages in a research project. She wants to analyze the frequency of each character in a given paragraph. The characters should be stored in a TreeMap so that the output is sorted in ascending order of characters automatically.

You are required to build a Java program that:

Uses a `TreeMap<Character, Integer>` to count how many times each character appears in the message. Ignores spaces and considers only alphabets (case-sensitive). Outputs the frequencies of characters in sorted order.

You must use a TreeMap in the class named MessageAnalyzer.

**Input Format**

The first line of input contains an integer n, the number of lines in the message.

The next n lines each contain a string (the encrypted message line).

### **Output Format**

The first line of output prints: "Character Frequency:"

Then print each character and its frequency in the format: "<character>: <count>"

Refer to the sample output for formatting specifications.

### **Sample Test Case**

Input: 2  
Hello World  
Java

Output: Character Frequency:

H: 1

J: 1

W: 1

a: 2

d: 1

e: 1

l: 3

o: 2

r: 1

v: 1

### **Answer**

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

```
class MessageAnalyzer {  
    public static void main(String[] args) {  
        Scanner sc = new Scanner(System.in);  
        int n = sc.nextInt();  
        sc.nextLine();  
  
        TreeMap<Character, Integer> charFreq = new TreeMap<>();  
  
        for (int i = 0; i < n; i++) {
```

```
String line = sc.nextLine();
for (char ch : line.toCharArray()) {
    if (Character.isLetter(ch)) {
        charFreq.put(ch, charFreq.getOrDefault(ch, 0) + 1);
    }
}

System.out.println("Character Frequency:");
for (Map.Entry<Character, Integer> entry : charFreq.entrySet()) {
    System.out.println(entry.getKey() + ": " + entry.getValue());
}

sc.close();
}
```

**Status :** Correct

**Marks :** 10/10

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## 2024\_28\_III\_OOPS Using Java Lab

### 2028\_REC\_OOPS using Java\_Week 10\_Q4

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : COD

##### 1. Problem Statement

In a ticket reservation system, you store the available seat numbers in a TreeSet. Users input their desired seat number, and the program checks whether the chosen seat is available.

Using a TreeSet ensures quick and efficient verification of seat availability, ensuring a smooth and organized ticket booking process.

##### ***Input Format***

The first line of input contains a single integer  $n$ , representing the number of available seats.

The second line contains  $n$  space-separated integers, representing the available seat numbers.



The third line contains an integer  $m$ , representing the seat number that needs to be searched.

### **Output Format**

The output displays "[ $m$ ] is present!" if the given seat is available. Otherwise, it displays "[ $m$ ] is not present!"

Refer to the sample output for the formatting specifications.

### **Sample Test Case**

Input: 4

2 4 5 6

5

Output: 5 is present!

### **Answer**

// You are using Java

import java.util.\*;

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

        TreeSet<Integer> availableSeats = new TreeSet<>();

        for (int i = 0; i < n; i++) {
            availableSeats.add(sc.nextInt());
        }

        int m = sc.nextInt();

        if (availableSeats.contains(m)) {
            System.out.println(m + " is present!");
        } else {
            System.out.println(m + " is not present!");
        }

        sc.close();
    }
}
```

}  
}  
**Status : Correct**

**Marks : 10/10**

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## 2024\_28\_III\_OOPS Using Java Lab

### REC\_2028\_OOPS using Java\_Week 10\_PAH

Attempt : 2  
Total Mark : 30  
Marks Obtained : 30

#### Section 1 : Coding

##### 1. Problem Statement

A university maintains a list of student records and wants to store them in a sorted manner based on their GPA. If two students have the same GPA, they should be further sorted by their name in lexicographical order. Implement a program that uses a TreeSet to store student records and ensures unique student IDs.

##### ***Input Format***

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

The next N lines contain details of each student in the format: "StudentID Name GPA"

- StudentID (Integer) - A unique identifier.
- Name (String) - The student's name (can contain spaces).

- GPA (Double) - The Grade Point Average.

### **Output Format**

The output prints the list of students in ascending order of GPA.

If two students have the same GPA, sort them by name.

Print details in the format: "StudentID Name GPA" in the output, GPA is rounded to two decimal places.

Refer to the sample output for formatting specifications.

### **Sample Test Case**

Input: 5

101 John 8.5

102 Alice 9.1

103 Bob 8.5

104 Zoe 7.3

105 Charlie 9.1

Output: 104 Zoe 7.30

103 Bob 8.50

101 John 8.50

102 Alice 9.10

105 Charlie 9.10

### **Answer**

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

```
class Student implements Comparable<Student> {  
    int studentID;  
    String name;  
    double gpa;
```

```
    Student(int studentID, String name, double gpa) {  
        this.studentID = studentID;  
        this.name = name;  
        this.gpa = gpa;  
    }  
}
```

```

@Override
public int compareTo(Student other) {
    if (this.studentID == other.studentID) return 0;
    int g = Double.compare(this.gpa, other.gpa);
    if (g != 0) return g;
    int n = this.name.compareTo(other.name);
    if (n != 0) return n;
    return Integer.compare(this.studentID, other.studentID);
}
}

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

        TreeSet<Student> students = new TreeSet<>();

        for (int i = 0; i < n; i++) {
            String line = sc.nextLine().trim();
            int firstSpace = line.indexOf(' ');
            int lastSpace = line.lastIndexOf(' ');
            int id = Integer.parseInt(line.substring(0, firstSpace).trim());
            String name = line.substring(firstSpace + 1, lastSpace).trim();
            double gpa = Double.parseDouble(line.substring(lastSpace + 1).trim());
            students.add(new Student(id, name, gpa));
        }

        for (Student s : students) {
            System.out.printf("%d %s %.2f%n", s.studentID, s.name, s.gpa);
        }

        sc.close();
    }
}

```

**Status :** Correct

**Marks :** 10/10

## 2. Problem Statement

Sarah is working on a spam detection system that analyzes incoming

messages for unique patterns. Spammers often use repetitive character sequences, making it important to identify the first non-repeating character in a message.

Given a string, Sarah needs to determine the first character that appears only once. If all characters repeat, the system should return -1.

She decides to use a HashMap to efficiently track character frequencies and find the solution.

### ***Input Format***

The first line contains an integer N representing , the length of the string.

The second line contains a string of N lowercase English letters (a-z).

### ***Output Format***

The output prints a character representing the first non-repeating character. If none exist, print -1.

Refer to the sample output for formatting specifications.

### ***Sample Test Case***

Input: 10  
abacabadac

Output: d

### ***Answer***

```
// You are using Java
import java.util.*;
```

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

```

HashMap<Character, Integer> charFreq = new HashMap<>();

for (int i = 0; i < n; i++) {
    char ch = str.charAt(i);
    charFreq.put(ch, charFreq.getOrDefault(ch, 0) + 1);
}

boolean found = false;
for (int i = 0; i < n; i++) {
    char ch = str.charAt(i);
    if (charFreq.get(ch) == 1) {
        System.out.println(ch);
        found = true;
        break;
    }
}

if (!found) {
    System.out.println(-1);
}

sc.close();
}
}

```

**Status :** Correct

**Marks :** 10/10

### 3. Problem Statement

Riya is building a calendar event scheduler where each event is stored in chronological order using a TreeMap. The key represents the event time in 24-hour format (HH:MM), and the value is the event description.

She wants the system to:

Automatically sort events by time. Avoid duplicate time entries — if a duplicate time is entered, ignore the new entry. Print all scheduled events in order.

Implement this logic using a class named EventManager.

### ***Input Format***

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

The next n lines each contain a string in the format: "HH:MM Description"

(Example: 09:00 TeamMeeting).

### ***Output Format***

The first line of the output prints "Scheduled Events:"

The next k lines print each event in the format: "HH:MM - Description"

Refer to the sample output for formatting specifications.

### ***Sample Test Case***

Input: 5

09:00 TeamMeeting

13:30 LunchBreak

11:00 ProjectUpdate

09:00 Standup

15:00 ClientCall

Output: Scheduled Events:

09:00 - TeamMeeting

11:00 - ProjectUpdate

13:30 - LunchBreak

15:00 - ClientCall

### ***Answer***

// You are using Java

import java.util.\*;

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



```
TreeMap<String, String> events = new TreeMap<>();

for (int i = 0; i < n; i++) {
    String line = sc.nextLine();
    String[] parts = line.split(" ");
    String time = parts[0];
    String description = parts[1];

    if (!events.containsKey(time)) {
        events.put(time, description);
    }
}

System.out.println("Scheduled Events:");
for (Map.Entry<String, String> entry : events.entrySet()) {
    System.out.println(entry.getKey() + " - " + entry.getValue());
}

sc.close();
}
```

**Status :** Correct

**Marks :** 10/10

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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;
    String author;

    Book(int isbn, String title, String author) {
        this.isbn = isbn;
        this.title = title;
        this.author = author;
    }
}
```

```
@Override
public int hashCode() {
    return Integer.hashCode(isbn);
}
```

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

```
class Library {
    private HashSet<Book> books = new HashSet<>();
    private List<Book> insertionOrder = new ArrayList<>();

    public void addBook(int isbn, String title, String author) {
        Book b = new Book(isbn, title, author);
        if (books.add(b)) {
            insertionOrder.add(b);
        }
    }
}
```

```
public void removeBook(int isbn) {
    Book dummy = new Book(isbn, "", "");
    if (books.remove(dummy)) {
        for (int i = 0; i < insertionOrder.size(); i++) {
            if (insertionOrder.get(i).isbn == isbn) {
                insertionOrder.remove(i);
            }
        }
    }
}
```

```

        break;
    }
}

public void displayBooks() {
    if (books.isEmpty()) {
        System.out.println("No books available");
        return;
    }
    for (Book b : insertionOrder) {
        if (books.contains(b)) {
            System.out.println("ISBN: " + b.isbn + ", Title: " + b.title + ", Author: " +
b.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

Bob wants to develop a score-tracking application for a gaming tournament. Each player's score is stored in a HashMap with the player's name as the key and the score as the value.

Write a program to assist Bob that takes user input to enter player scores, calculates the maximum score from the HashMap, and prints the player with the highest score.

### ***Input Format***

The input consists of strings representing player details in the format "playerName:score".

The input is terminated by entering "done".

### ***Output Format***

The output displays a string, representing the player's name who scored the maximum.

If the value is not numeric, print "Invalid input".

If any special characters other than ':' are given, print "Invalid format".

Refer to the sample output for formatting specifications.

### ***Sample Test Case***

Input: Alice:15

Bob:56

done

Output: Bob

### ***Answer***

```
import java.util.*;  
class ScoreTracker {  
    public HashMap<String, Integer> scoreMap = new HashMap<>();
```

```

public boolean processInput(String input) {
    if (input == null) return true;
    input = input.trim();
    for (int i = 0; i < input.length(); i++) {
        char c = input.charAt(i);
        if (!(Character.isLetterOrDigit(c) || c == ':')) {
            System.out.println("Invalid format");
            return false;
        }
    }
    int first = input.indexOf(':');
    int last = input.lastIndexOf(':');
    if (first == -1 || first != last) {
        System.out.println("Invalid format");
        return false;
    }
    String name = input.substring(0, first);
    String scoreStr = input.substring(first + 1);
    if (name.isEmpty() || scoreStr.isEmpty()) {
        System.out.println("Invalid format");
        return false;
    }
    try {
        int score = Integer.parseInt(scoreStr);
        scoreMap.put(name, score);
    } catch (NumberFormatException e) {
        System.out.println("Invalid input");
        return false;
    }
    return true;
}

```

```

public String findTopPlayer() {
    String topPlayer = "";
    int maxScore = Integer.MIN_VALUE;
    for (Map.Entry<String, Integer> e : scoreMap.entrySet()) {
        if (e.getValue() > maxScore) {
            maxScore = e.getValue();
            topPlayer = e.getKey();
        }
    }
    return topPlayer;
}

```

```

    }
}

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        ScoreTracker tracker = new ScoreTracker();
        boolean validInput = true;

        while (true) {
            String input = scanner.nextLine();

            if (input.toLowerCase().equals("done")) {
                break;
            }

            if (!tracker.processInput(input)) {
                validInput = false;
                break;
            }
        }

        if (validInput && !tracker.scoreMap.isEmpty()) {
            System.out.println(tracker.findTopPlayer());
        }

        scanner.close();
    }
}

```

**Status :** Correct

**Marks :** 10/10

### 3. 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 id;
    String name;
    String department;

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

    @Override
    public int hashCode() {
        return Integer.hashCode(id);
    }

    @Override
    public boolean equals(Object o) {
        if (this == o) return true;
        if (!(o instanceof Employee)) return false;
        Employee e = (Employee) o;
        return this.id == e.id;
    }
}

class EmployeeDatabase {
    private HashSet<Employee> employees = new HashSet<>();
    private List<Employee> insertionOrder = new ArrayList<>();

    public void addEmployee(int id, String name, String department) {
        Employee e = new Employee(id, name, department);
        if (employees.add(e)) {
            insertionOrder.add(e);
        }
    }
}
```

```

    public void displayEmployees() {
        for (Employee e : insertionOrder) {
            if (employees.contains(e)) {
                System.out.println("ID: " + e.id + ", Name: " + e.name + ", Department: " +
e.department);
            }
        }
    }

    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

#### 4. 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) {
        Map<String, String> result = new HashMap<>();
        if (courseRatings == null || courseRatings.isEmpty()) {
            result.put("highest", "");
            result.put("lowest", "");
            return result;
        }

        String highestCourse = null;
        String lowestCourse = null;
        double highest = -Double.MAX_VALUE;
        double lowest = Double.MAX_VALUE;

        for (Map.Entry<String, Double> entry : courseRatings.entrySet()) {
            double r = entry.getValue();
            if (r > highest) {
                highest = r;
                highestCourse = entry.getKey();
            }
            if (r < lowest) {
                lowest = r;
                lowestCourse = entry.getKey();
            }
        }

        result.put("highest", highestCourse == null ? "" : highestCourse);
        result.put("lowest", lowestCourse == null ? "" : 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