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2024_28_III_OOPS Using Java Lab

REC_2028_OOPS using Java_Week 5_CY

Attempt : 1
Total Mark : 40
Marks Obtained : 40

Section 1 : Coding

1. Problem Statement

Anjali is now working as a developer for the City Marathon Association, which wants to build a system to track and find the fastest runner among marathon participants.

Each runner's record has:

Runner ID (integer)Runner Name (string)An array of times (in minutes) taken in 5 marathon events (integers)

The system must calculate:

The average time of each runner (sum of all times / 5).Identify the fastest runner (the one with the lowest average time).If two or more runners have the same average time, the one with the lower Runner ID is considered the

fastest runner.

Anjali has been asked to implement this system using:

A class with attributes for runner details.A constructor to initialize runner details.Getter and Setter methods to retrieve and update runner details if required.A method to calculate the average time.Objects of the class to represent runners.

Finally, display each runner's details and announce the Fastest Runner.

Input Format

The first line of input contains an integer N (number of runners).

For each runner:

- The next line contains the Runner ID (integer).
- The following line contains the Runner Name (string).
- The next line contains 5 integers separated by spaces (times in minutes for 5 marathon events).

Output Format

For each runner the output prints the following details:

- Runner ID: <runner_id>
- Runner Name: <runner_name>
- Average Time: <average_time>

Finally, print "Fastest Runner: <runner_name> with <average_time> minutes"

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 1
1001
Ravi Kumar

240 250 245 255 260

Output: Runner ID: 1001
Runner Name: Ravi Kumar
Average Time: 250
Fastest Runner: Ravi Kumar with 250 minutes

Answer

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

class Runner {
    private int runnerId;
    private String runnerName;
    private int[] times; // length 5
    private int averageTime;

    public Runner(int runnerId, String runnerName, int[] times) {
        this.runnerId = runnerId;
        this.runnerName = runnerName;
        this.times = Arrays.copyOf(times, times.length);
        this.averageTime = 0;
    }

    // Getters
    public int getRunnerId() { return runnerId; }
    public String getRunnerName() { return runnerName; }
    public int[] getTimes() { return Arrays.copyOf(times, times.length); }
    public int getAverageTime() { return averageTime; }

    // Setters (if needed)
    public void setRunnerId(int runnerId) { this.runnerId = runnerId; }
    public void setRunnerName(String runnerName) { this.runnerName =
runnerName; }
    public void setTimes(int[] times) { this.times = Arrays.copyOf(times,
times.length); }

    // Method to calculate average time (sum of 5 times / 5)
    public int calculateAverage() {
        int sum = 0;
        for (int t : times) sum += t;
        this.averageTime = sum / 5; // integer division as in problem statement
```

```java
        return this.averageTime;
    }
}

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

        if (!sc.hasNextInt()) return;
        int N = sc.nextInt();

        List<Runner> runners = new ArrayList<>();

        for (int i = 0; i < N; i++) {
            int id = sc.nextInt();
            sc.nextLine(); // consume end of line after id
            String name = sc.nextLine().trim();
            int[] times = new int[5];
            for (int j = 0; j < 5; j++) {
                times[j] = sc.nextInt();
            }
            // no extra sc.nextLine() required here; nextInt will skip whitespace
            Runner r = new Runner(id, name, times);
            r.calculateAverage();
            runners.add(r);
        }

        // Print each runner's details
        for (Runner r : runners) {
            System.out.println("Runner ID: " + r.getRunnerId());
            System.out.println("Runner Name: " + r.getRunnerName());
            System.out.println("Average Time: " + r.getAverageTime());
        }

        // Find fastest runner (lowest average). Tie-break: lower Runner ID wins.
        if (!runners.isEmpty()) {
            Runner best = runners.get(0);
            for (int i = 1; i < runners.size(); i++) {
                Runner cur = runners.get(i);
                if (cur.getAverageTime() < best.getAverageTime()
                    || (cur.getAverageTime() == best.getAverageTime() &&
cur.getRunnerId() < best.getRunnerId())) {
```

```
            best = cur;
        }
    }
        System.out.println("Fastest Runner: " + best.getRunnerName() + " with " +
best.getAverageTime() + " minutes");
    }

    sc.close();
  }
}
```

Status : Correct   *Marks : 10/10*

2.   Problem Statement

You are working as a developer for CityMobile, which wants to build a
basic mobile data usage management system.

Each customer has:

A Customer ID (integer)A Customer Name (string)An Initial Data Balance
(in GB, double)

The company allows two types of operations:

Recharge – increases the data balance.Usage – decreases the data
balance only if enough data is available.

If the usage amount is greater than the available data balance, the usage
should not happen, and the balance should remain the same.

You are required to implement this system using:

A class with attributes for customer details.A constructor to initialize
customer details.Setter methods to update details if needed.Getter
methods to retrieve details.Objects of the class to represent customers.

Finally, display each customer's details after all operations.

Input Format

The first line of input contains an integer N, representing the number of customers.

For each customer:

- The next line contains the Customer ID (integer).
- The following line contains the Customer Name (string).
- The next line contains the Initial Data Balance (double).
- The next line contains the Recharge Amount in GB (double).
- The next line contains the Usage Amount in GB (double).

Output Format

For each customer, print the details in the following format:

Customer ID: <customer_id>

Customer Name: <customer_name>

Final Data Balance: <final_data_balance> GB (The final balance must be rounded to one decimal place.)

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 1
1234
Ravi Kumar
5.0
2.0
3.0
Output: Customer ID: 1234
Customer Name: Ravi Kumar
Final Data Balance: 4.0 GB

Answer

import java.io.*;

public class Main {

```java
    static class Customer {
        private int customerId;
        private String customerName;
        private double dataBalance;

        public Customer(int customerId, String customerName, double
dataBalance) {
            this.customerId = customerId;
            this.customerName = customerName;
            this.dataBalance = dataBalance;
        }

        public void setCustomerId(int customerId) { this.customerId = customerId; }
        public void setCustomerName(String customerName) { this.customerName
= customerName; }
        public void setDataBalance(double dataBalance) { this.dataBalance =
dataBalance; }

        public int getCustomerId() { return customerId; }
        public String getCustomerName() { return customerName; }
        public double getDataBalance() { return dataBalance; }

        public void recharge(double gb) {
            if (gb >= 0) this.dataBalance += gb;
        }

        public void useData(double gb) {
            if (gb >= 0 && gb <= this.dataBalance) {
                this.dataBalance -= gb;
            }
        }
    }

    public static void main(String[] args) throws Exception {
        BufferedReader br = new BufferedReader(new
InputStreamReader(System.in));
        String line = br.readLine();
        if (line == null || line.trim().isEmpty()) return;
        int N = Integer.parseInt(line.trim());

        for (int i = 0; i < N; i++) {
            int id = Integer.parseInt(br.readLine().trim());
```

```
        String name = br.readLine();
        double initialBalance = Double.parseDouble(br.readLine().trim());
        double rechargeAmount = Double.parseDouble(br.readLine().trim());
        double usageAmount = Double.parseDouble(br.readLine().trim());

        Customer cust = new Customer(id, name, initialBalance);
        cust.recharge(rechargeAmount);
        cust.useData(usageAmount);

        System.out.println("Customer ID: " + cust.getCustomerId());
        System.out.println("Customer Name: " + cust.getCustomerName());
        System.out.println("Final Data Balance: " + String.format("%.1f",
cust.getDataBalance()) + " GB");
    }
  }
}
```

Status : Correct   *Marks : 10/10*

3. Problem Statement

Arjun is working as a developer for CityWater Supply Board, which wants to build a household water billing system.

Each household's water account has:

A Customer ID (integer)A Customer Name (string)Liters Consumed (double)

The water bill is calculated based on these rules:

For the first 500 liters   2 per literFor the next 500 liters (501–1000)   3 per literFor liters above 1000   5 per literIf the total bill exceeds 3000, a 10% discount is applied on the final bill.

Arjun has been asked to implement this system using:

A class with attributes for customer details.A constructor to initialize customer details.Setter methods to update details if needed.Getter methods to retrieve details.Objects of the class to represent customers.

Finally, display each customer's details and final bill amount.

Input Format

The first line of input contains an integer N, representing the number of customers.

For each customer:

- The next line contains the Customer ID (integer).
- The following line contains the Customer Name (string).
- The next line contains the Liters Consumed (double).

Output Format

For each customer, print the details in the following format:

Customer ID: <customer_id>

Customer Name: <customer_name>

Final Bill: <final_bill> (rounded to one decimal place)

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 1
1001
Ravi Kumar
300
Output: Customer ID: 1001
Customer Name: Ravi Kumar
Final Bill: 600.0

Answer

```java
import java.util.Scanner;

public class Main {
    static class WaterAccount {
        private int customerId;
```

```java
    private String customerName;
    private double litersConsumed;

    public WaterAccount(int customerId, String customerName, double
litersConsumed) {
        this.customerId = customerId;
        this.customerName = customerName;
        this.litersConsumed = litersConsumed;
    }


    public void setCustomerId(int customerId) { this.customerId = customerId; }
    public void setCustomerName(String customerName) { this.customerName
= customerName; }
    public void setLitersConsumed(double litersConsumed)
{ this.litersConsumed = litersConsumed; }


    public int getCustomerId() { return customerId; }
    public String getCustomerName() { return customerName; }
    public double getLitersConsumed() { return litersConsumed; }

    public double calculateBill() {
        double remaining = litersConsumed;
        double bill = 0.0;

        double firstSlab = Math.min(remaining, 500.0);
        bill += firstSlab * 2.0;
        remaining -= firstSlab;

        if (remaining > 0) {
            double secondSlab = Math.min(remaining, 500.0);
            bill += secondSlab * 3.0;
            remaining -= secondSlab;
        }

        if (remaining > 0) {
            bill += remaining * 5.0;
        }

        if (bill > 3000.0) {
            bill = bill * 0.9;
```

```
        }

        return bill;
    }
}

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);

        int N = Integer.parseInt(sc.nextLine().trim());

        for (int i = 0; i < N; i++) {
            int id = Integer.parseInt(sc.nextLine().trim());
            String name = sc.nextLine();
            double liters = Double.parseDouble(sc.nextLine().trim());

            WaterAccount account = new WaterAccount(id, name, liters);
            double finalBill = account.calculateBill();

            System.out.println("Customer ID: " + account.getCustomerId());
            System.out.println("Customer Name: " + account.getCustomerName());
            System.out.printf("Final Bill: %.1f%n", finalBill);
        }

        sc.close();
    }
}
```

Status : Correct   *Marks : 10/10*

4. Problem Statement

Anjali is working as a developer for the City Basketball Association, which
wants to build a system to track and find the top scorer among basketball
players.

Each player's record has:

Player ID (integer)Player Name (string)An array of points scored in 5
matches (integers)

The system must calculate:

The total score of each player (sum of all match points).Identify the highest scorer among all players.If two or more players have the same total score, the one with the lower Player ID is considered the top scorer.

Anjali has been asked to implement this system using:

A class with attributes for player details.A constructor to initialize player details.Getter and Setter methods to retrieve and update player details if required.A method to calculate the total score.Objects of the class to represent players.

Finally, display each player's details and announce the Top Scorer.

Input Format

The first line of input contains an integer N (number of players).

For each player:

- The next line contains the Player ID (integer).
- The following line contains the Player Name (string).
- The next line contains 5 integers separated by spaces (points scored in 5 matches).

Output Format

For each player the output prints the following details:

- Player ID: <player_id>
- Player Name: <player_name>
- Total Score: <total_score>

Finally, print "Top Scorer: <player_name> with <total_score> points"

Refer to the sample output for formatting specifications.

Input: 1
1001
Ravi Kumar
10 20 30 40 50

Output: Player ID: 1001
Player Name: Ravi Kumar
Total Score: 150
Top Scorer: Ravi Kumar with 150 points

Answer

```java
// You are using Java

import java.util.*;

public class Main {

    // Player class as required
    static class Player {
        private int playerId;
        private String playerName;
        private int[] matchPoints; // length 5

        public Player(int playerId, String playerName, int[] matchPoints) {
            this.playerId = playerId;
            this.playerName = playerName;
            this.matchPoints = Arrays.copyOf(matchPoints, matchPoints.length);
        }

        // getters
        public int getPlayerId() { return playerId; }
        public String getPlayerName() { return playerName; }
        public int[] getMatchPoints() { return Arrays.copyOf(matchPoints,
matchPoints.length); }

        // setters
        public void setPlayerId(int playerId) { this.playerId = playerId; }
        public void setPlayerName(String playerName) { this.playerName =
playerName; }
        public void setMatchPoints(int[] matchPoints) {
            this.matchPoints = Arrays.copyOf(matchPoints, matchPoints.length);
```

```java
    }

    // method to calculate total score
    public int calculateTotalScore() {
        int sum = 0;
        for (int p : matchPoints) sum += p;
        return sum;
    }
}

public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    if (!sc.hasNextInt()) return; // no input
    int N = sc.nextInt();
    sc.nextLine(); // consume end of line after N

    List<Player> players = new ArrayList<>();

    for (int i = 0; i < N; i++) {
        // Read Player ID
        int id = Integer.parseInt(sc.nextLine().trim());

        // Read Player Name (may contain spaces)
        String name = sc.nextLine().trim();

        // Read 5 integers on next line (points)
        String pointsLine = sc.nextLine().trim();
        String[] tokens = pointsLine.split("\\s+");
        int[] points = new int[5];
        for (int j = 0; j < 5; j++) {
            points[j] = Integer.parseInt(tokens[j]);
        }

        Player p = new Player(id, name, points);
        players.add(p);
    }

    // Print each player's details
    for (Player p : players) {
        System.out.println("Player ID: " + p.getPlayerId());
        System.out.println("Player Name: " + p.getPlayerName());
        System.out.println("Total Score: " + p.calculateTotalScore());
```

```
    }

    // Determine top scorer (highest total; tie-breaker: lower playerId)
    Player top = null;
    for (Player p : players) {
        if (top == null) {
            top = p;
        } else {
            int totalP = p.calculateTotalScore();
            int totalTop = top.calculateTotalScore();
            if (totalP > totalTop) {
                top = p;
            } else if (totalP == totalTop) {
                if (p.getPlayerId() < top.getPlayerId()) {
                    top = p;
                }
            }
        }
    }

    if (top != null) {
        System.out.println("Top Scorer: " + top.getPlayerName() + " with " +
    top.calculateTotalScore() + " points");
    }

    sc.close();
    }
}
```

Status : Correct   *Marks : 10/10*