

# Rajalakshmi Engineering College

Name: Nandhini Velmurugan  
Email: 241901063@rajalakshmi.edu.in  
Roll no: 241901063  
Phone: 9043367699  
Branch: REC  
Department: CSE (CS) - Section 1  
Batch: 2028  
Degree: B.E - CSE (CS)

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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

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 liter For the next 500 liters (501–1000)    3 per liter  
For liters above 1000    5 per liter If 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***

```
import java.util.Scanner;
```

```
class Customer {
    private int customerId;
    private String customerName;
    private double litersConsumed;

    public Customer(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 liters = this.litersConsumed;
        double bill = 0.0;
        if (liters <= 500) {
            bill = liters * 2;
        }
    }
}
```

```

    } else if (liters <= 1000) {
        bill = (500 * 2) + ((liters - 500) * 3);
    } else {
        bill = (500 * 2) + (500 * 3) + ((liters - 1000) * 5);
    }

    if (bill > 3000) {
        bill = bill - (bill * 0.10);
    }

    return bill;
}
}

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

        int n = Integer.parseInt(sc.nextLine());
        Customer[] customers = new Customer[n];

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

            customers[i] = new Customer(id, name, liters);
        }

        for (Customer c : customers) {
            System.out.println("Customer ID: " + c.getCustomerId());
            System.out.println("Customer Name: " + c.getCustomerName());
            System.out.printf("Final Bill: %.1f\n", c.calculateBill());
        }

        sc.close();
    }
}

```

**Status :** Correct

**Marks : 10/10**

## 2. 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**

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

```
class Runner {  
    private int runnerId;  
    private String runnerName;  
    private int[] times;
```

```
    public Runner(int runnerId, String runnerName, int[] times) {  
        this.runnerId = runnerId;  
        this.runnerName = runnerName;  
        this.times = times;  
    }
```

```
    public int getRunnerId() {  
        return runnerId;  
    }
```

```
    public String getRunnerName() {
```

```
        return runnerName;
    }

    public int[] getTimes() {
        return times;
    }

    public void setRunnerId(int runnerId) {
        this.runnerId = runnerId;
    }

    public void setRunnerName(String runnerName) {
        this.runnerName = runnerName;
    }

    public void setTimes(int[] times) {
        this.times = times;
    }

    public int calculateAverageTime() {
        int sum = 0;
        for (int t : times) {
            sum += t;
        }
        return sum / times.length;
    }
}
```

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

        Runner[] runners = new Runner[n];

        for (int i = 0; i < n; i++) {
            int id = Integer.parseInt(sc.nextLine());
            String name = sc.nextLine();
            String[] parts = sc.nextLine().split(" ");
            int[] times = new int[5];
            for (int j = 0; j < 5; j++) {
                times[j] = Integer.parseInt(parts[j]);
            }
        }
    }
}
```

```

    }
    runners[i] = new Runner(id, name, times);
}

Runner fastest = runners[0];
int fastestAvg = fastest.calculateAverageTime();

for (Runner r : runners) {
    int avg = r.calculateAverageTime();
    System.out.println("Runner ID: " + r.getRunnerId());
    System.out.println("Runner Name: " + r.getRunnerName());
    System.out.println("Average Time: " + avg);

    if (avg < fastestAvg || (avg == fastestAvg && r.getRunnerId() <
fastest.getRunnerId())) {
        fastest = r;
        fastestAvg = avg;
    }
}

System.out.println("Fastest Runner: " + fastest.getRunnerName() + " with " +
fastestAvg + " minutes");

    sc.close();
}
}

```

**Status :** Correct

**Marks :** 10/10

### 3. Problem Statement

Meera is working as a developer for CityGas Supply Board, which wants to build a household gas billing system.

Each household's gas account has:

A Customer ID (integer) A Customer Name (string) Units Consumed in cubic meters (double)

The gas bill is calculated based on these rules:



For the first 50 units 4 per unitFor the next 100 units (51–150) 6 per unitFor units above 150 8 per unitIf the total bill exceeds 2000, a 15% discount is applied on the final bill.

Meera 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 Units 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> (The final bill must be rounded to one decimal place.)

Refer to the sample output for formatting specifications.

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

Input: 1

1001

Ravi Kumar

30

Output: Customer ID: 1001  
Customer Name: Ravi Kumar  
Final Bill: 120.0

**Answer**

```
import java.util.Scanner;

class GasCustomer {
    private int customerId;
    private String customerName;
    private double unitsConsumed;

    public GasCustomer(int customerId, String customerName, double
unitsConsumed) {
        this.customerId = customerId;
        this.customerName = customerName;
        this.unitsConsumed = unitsConsumed;
    }

    public void setCustomerId(int customerId) {
        this.customerId = customerId;
    }

    public void setCustomerName(String customerName) {
        this.customerName = customerName;
    }

    public void setUnitsConsumed(double unitsConsumed) {
        this.unitsConsumed = unitsConsumed;
    }

    public int getCustomerId() {
        return customerId;
    }

    public String getCustomerName() {
        return customerName;
    }

    public double getUnitsConsumed() {
        return unitsConsumed;
    }
}
```

```

public double calculateBill() {
    double units = this.unitsConsumed;
    double bill = 0.0;

    if (units <= 50) {
        bill = units * 4;
    } else if (units <= 150) {
        bill = (50 * 4) + ((units - 50) * 6);
    } else {
        bill = (50 * 4) + (100 * 6) + ((units - 150) * 8);
    }

    if (bill > 2000) {
        bill = bill - (bill * 0.15);
    }

    return bill;
}

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

        int n = Integer.parseInt(sc.nextLine());
        GasCustomer[] customers = new GasCustomer[n];

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

            customers[i] = new GasCustomer(id, name, units);
        }

        for (GasCustomer c : customers) {
            System.out.println("Customer ID: " + c.getCustomerId());
            System.out.println("Customer Name: " + c.getCustomerName());
            System.out.printf("Final Bill: %.1f\n", c.calculateBill());
        }
    }
}

```

```
        sc.close();
    }
}
```

**Status :** Correct

**Marks :** 10/10

#### 4. 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.util.Scanner;
```

```
class MobileCustomer {  
    private int customerId;  
    private String customerName;  
    private double dataBalance;
```

```
    public MobileCustomer(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 amount) {
        if (amount > 0) {
            dataBalance += amount;
        }
    }

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

public class Main {
    public static void main(String[] args) {
```

```
Scanner sc = new Scanner(System.in);

int n = Integer.parseInt(sc.nextLine());
MobileCustomer[] customers = new MobileCustomer[n];

for (int i = 0; i < n; i++) {
    int id = Integer.parseInt(sc.nextLine());
    String name = sc.nextLine();
    double initialBalance = Double.parseDouble(sc.nextLine());
    double rechargeAmount = Double.parseDouble(sc.nextLine());
    double usageAmount = Double.parseDouble(sc.nextLine());

    customers[i] = new MobileCustomer(id, name, initialBalance);

    customers[i].recharge(rechargeAmount);
    customers[i].useData(usageAmount);
}

for (MobileCustomer c : customers) {
    System.out.println("Customer ID: " + c.getCustomerId());
    System.out.println("Customer Name: " + c.getCustomerName());
    System.out.printf("Final Data Balance: %.1f GB\n", c.getDataBalance());
}

sc.close();
}
```

**Status :** Correct

**Marks :** 10/10