GROUP LAB TASK 5

Date:
17TH OCT,2025

OBJECT ORIENTED PROGRAMMING

Prepared for Sir Nauman Khan

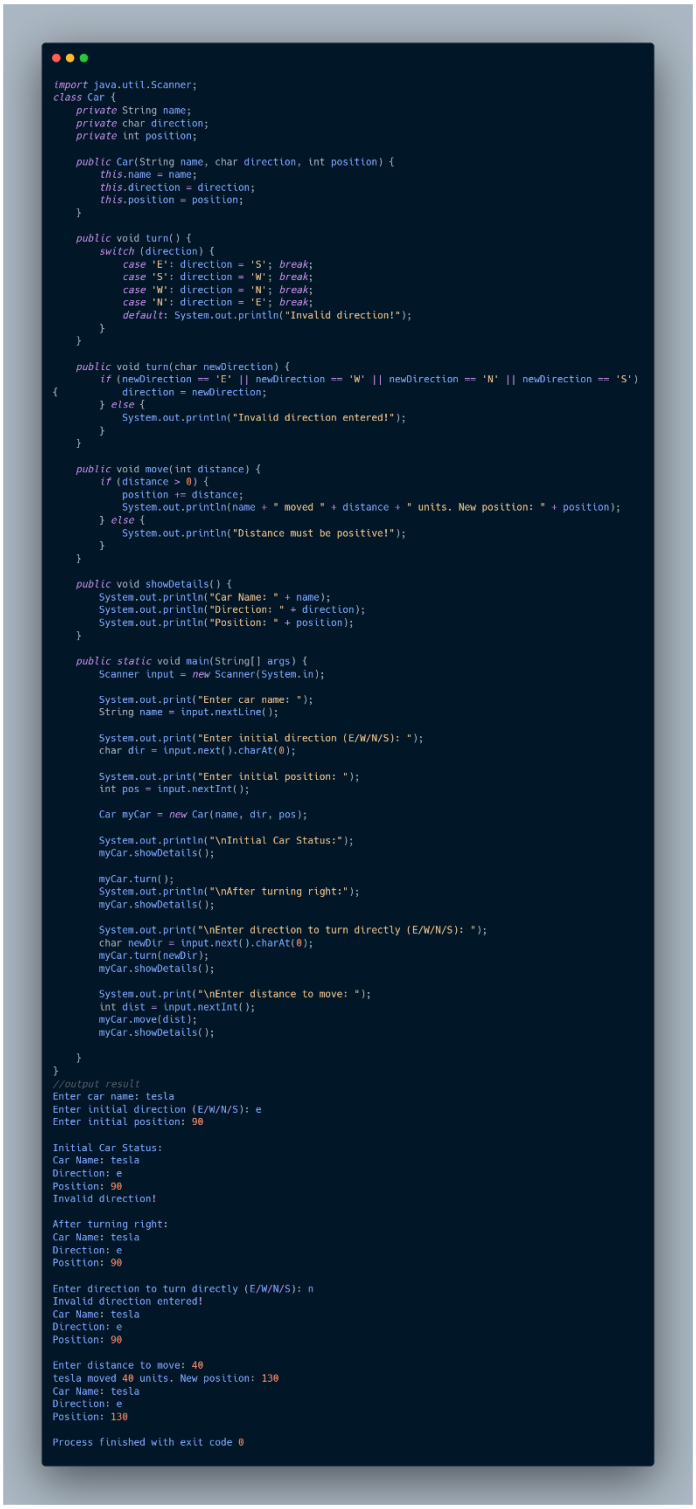
Prepared by:

MUHAMMAD TALHA — FA24-BSE-144

MUHAMMAD MEHROZ KHAN — FA24-BSE-097

MUHAMMAD HASSAN — FA24-BSE-132

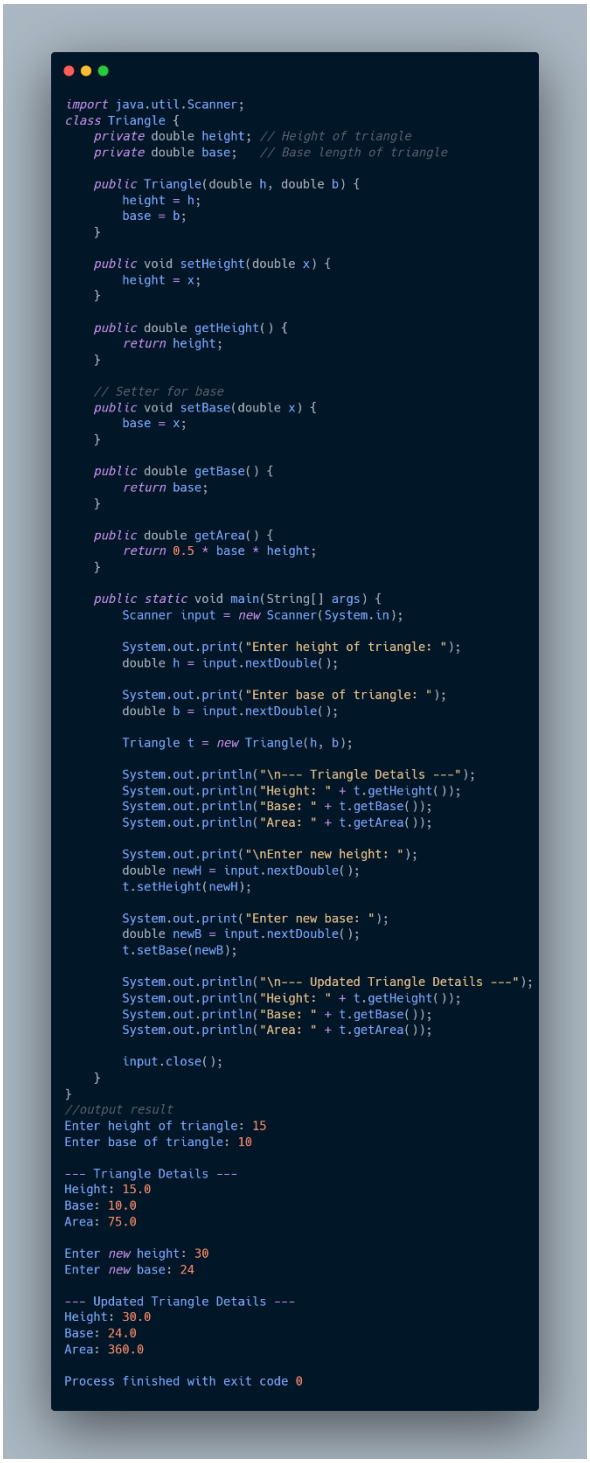
QUESTION 01:



```java
import java.util.Scanner;
class Car {
    private String name;
    private char direction;
    private int position;

    public Car(String name, char direction, int position) {
        this.name = name;
        this.direction = direction;
        this.position = position;
    }

    public void turn() {
        switch (direction) {
            case 'E': direction = 'S'; break;
            case 'S': direction = 'W'; break;
            case 'W': direction = 'N'; break;
            case 'N': direction = 'E'; break;
            default: System.out.println("Invalid direction!");
        }
    }

    public void turn(char newDirection) {
        if (newDirection == 'E' || newDirection == 'W' || newDirection == 'N' || newDirection == 'S')
{           direction = newDirection;
        } else {
            System.out.println("Invalid direction entered!");
        }
    }

    public void move(int distance) {
        if (distance > 0) {
            position += distance;
            System.out.println(name + " moved " + distance + " units. New position: " + position);
        } else {
            System.out.println("Distance must be positive!");
        }
    }

    public void showDetails() {
        System.out.println("Car Name: " + name);
        System.out.println("Direction: " + direction);
        System.out.println("Position: " + position);
    }

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

        System.out.print("Enter car name: ");
        String name = input.nextLine();

        System.out.print("Enter initial direction (E/W/N/S): ");
        char dir = input.next().charAt(0);

        System.out.print("Enter initial position: ");
        int pos = input.nextInt();

        Car myCar = new Car(name, dir, pos);

        System.out.println("\nInitial Car Status:");
        myCar.showDetails();

        myCar.turn();
        System.out.println("\nAfter turning right:");
        myCar.showDetails();

        System.out.print("\nEnter direction to turn directly (E/W/N/S): ");
        char newDir = input.next().charAt(0);
        myCar.turn(newDir);
        myCar.showDetails();

        System.out.print("\nEnter distance to move: ");
        int dist = input.nextInt();
        myCar.move(dist);
        myCar.showDetails();

    }
}
//output result
Enter car name: tesla
Enter initial direction (E/W/N/S): e
Enter initial position: 90

Initial Car Status:
Car Name: tesla
Direction: e
Position: 90
Invalid direction!

After turning right:
Car Name: tesla
Direction: e
Position: 90

Enter direction to turn directly (E/W/N/S): n
Invalid direction entered!
Car Name: tesla
Direction: e
Position: 90

Enter distance to move: 40
tesla moved 40 units. New position: 130
Car Name: tesla
Direction: e
Position: 130

Process finished with exit code 0
```

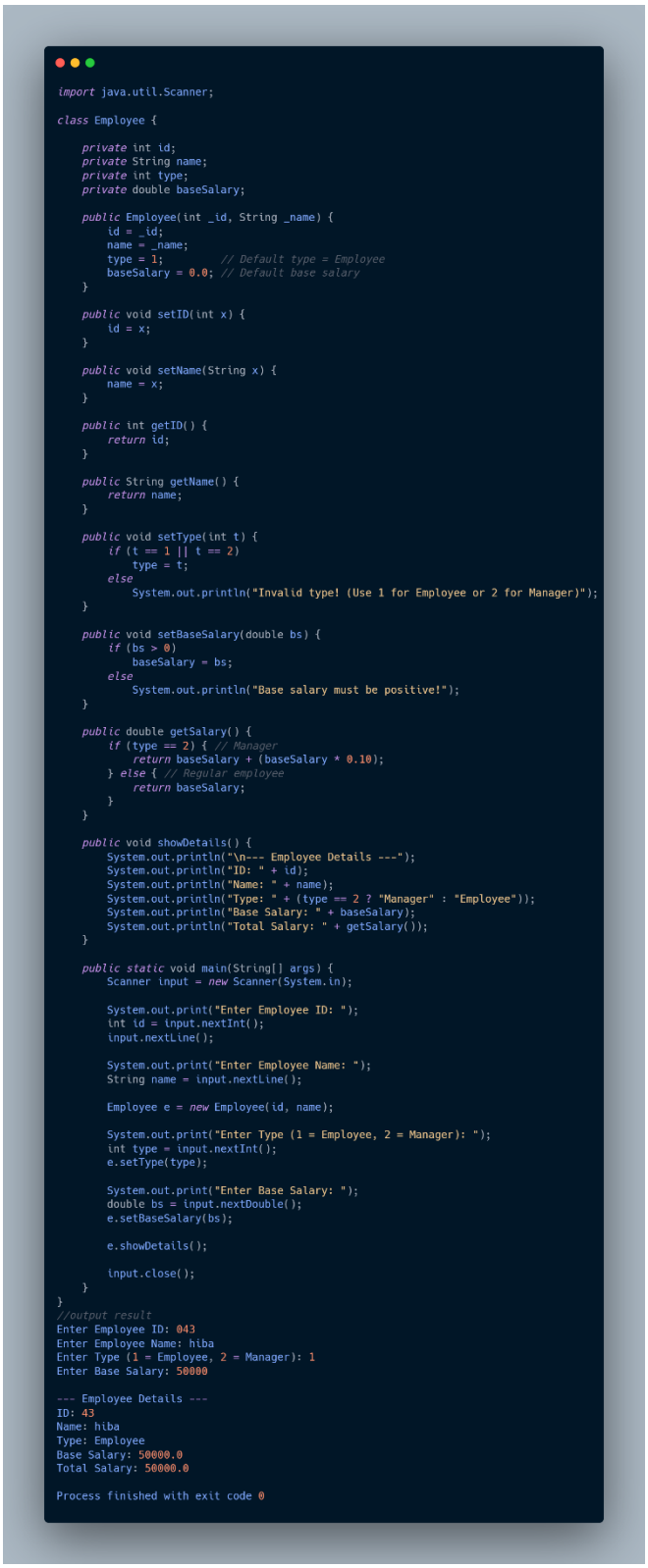
EXERCISE : METHOD OVERLOADING

QUESTION:01



```java
import java.util.Scanner;
class Triangle {
    private double height; // Height of triangle
    private double base;   // Base length of triangle

    public Triangle(double h, double b) {
        height = h;
        base = b;
    }

    public void setHeight(double x) {
        height = x;
    }

    public double getHeight() {
        return height;
    }

    // Setter for base
    public void setBase(double x) {
        base = x;
    }

    public double getBase() {
        return base;
    }

    public double getArea() {
        return 0.5 * base * height;
    }

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

        System.out.print("Enter height of triangle: ");
        double h = input.nextDouble();

        System.out.print("Enter base of triangle: ");
        double b = input.nextDouble();

        Triangle t = new Triangle(h, b);

        System.out.println("\n--- Triangle Details ---");
        System.out.println("Height: " + t.getHeight());
        System.out.println("Base: " + t.getBase());
        System.out.println("Area: " + t.getArea());

        System.out.print("\nEnter new height: ");
        double newH = input.nextDouble();
        t.setHeight(newH);

        System.out.print("Enter new base: ");
        double newB = input.nextDouble();
        t.setBase(newB);

        System.out.println("\n--- Updated Triangle Details ---");
        System.out.println("Height: " + t.getHeight());
        System.out.println("Base: " + t.getBase());
        System.out.println("Area: " + t.getArea());

        input.close();
    }
}
//output result
Enter height of triangle: 15
Enter base of triangle: 10

--- Triangle Details ---
Height: 15.0
Base: 10.0
Area: 75.0

Enter new height: 30
Enter new base: 24

--- Updated Triangle Details ---
Height: 30.0
Base: 24.0
Area: 360.0

Process finished with exit code 0
```

QUESTION:02



```java
import java.util.Scanner;

class Employee {

    private int id;
    private String name;
    private int type;
    private double baseSalary;

    public Employee(int _id, String _name) {
        id = _id;
        name = _name;
        type = 1;           // Default type = Employee
        baseSalary = 0.0; // Default base salary
    }

    public void setID(int x) {
        id = x;
    }

    public void setName(String x) {
        name = x;
    }

    public int getID() {
        return id;
    }

    public String getName() {
        return name;
    }

    public void setType(int t) {
        if (t == 1 || t == 2)
            type = t;
        else
            System.out.println("Invalid type! (Use 1 for Employee or 2 for Manager)");
    }

    public void setBaseSalary(double bs) {
        if (bs > 0)
            baseSalary = bs;
        else
            System.out.println("Base salary must be positive!");
    }

    public double getSalary() {
        if (type == 2) { // Manager
            return baseSalary + (baseSalary * 0.10);
        } else { // Regular employee
            return baseSalary;
        }
    }

    public void showDetails() {
        System.out.println("\n--- Employee Details ---");
        System.out.println("ID: " + id);
        System.out.println("Name: " + name);
        System.out.println("Type: " + (type == 2 ? "Manager" : "Employee"));
        System.out.println("Base Salary: " + baseSalary);
        System.out.println("Total Salary: " + getSalary());
    }

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

        System.out.print("Enter Employee ID: ");
        int id = input.nextInt();
        input.nextLine();

        System.out.print("Enter Employee Name: ");
        String name = input.nextLine();

        Employee e = new Employee(id, name);

        System.out.print("Enter Type (1 = Employee, 2 = Manager): ");
        int type = input.nextInt();
        e.setType(type);

        System.out.print("Enter Base Salary: ");
        double bs = input.nextDouble();
        e.setBaseSalary(bs);

        e.showDetails();

        input.close();
    }
}
//output result
Enter Employee ID: 043
Enter Employee Name: hiba
Enter Type (1 = Employee, 2 = Manager): 1
Enter Base Salary: 50000

--- Employee Details ---
ID: 43
Name: hiba
Type: Employee
Base Salary: 50000.0
Total Salary: 50000.0

Process finished with exit code 0
```

EXERCISE : CLASSES AND OBJECTS

QUESTION :01

```java
import java.util.Scanner;

class Date {
    // Attributes
    private int day;
    private int month;
    private int year;

    public Date(int d, int m, int y) {
        day = d;
        month = m;
        year = y;
    }

    public void showDate() {
        System.out.println("Date: " + day + "/" + month + "/" +
year};

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

        System.out.print("Enter day: ");
        int d = input.nextInt();

        System.out.print("Enter month: ");
        int m = input.nextInt();

        System.out.print("Enter year: ");
        int y = input.nextInt();

        Date today = new Date(d, m, y);

        System.out.println("\nYou entered:");
        today.showDate();

        input.close();
    }
}
//output result
Enter day: 2
Enter month: 5
Enter year: 2025

You entered:
Date: 2/5/2025

Process finished with exit code 0
```

QUESTION : 02

```java
//PERSON CLASS :

import java.util.Date;
import java.text.SimpleDateFormat;

public class Person {
    private String name;
    private int age;
    private Date dateOfBirth;

    // No-argument constructor
    public Person() {
        this.name = "";
        this.age = 0;
        this.dateOfBirth = new Date(); // sets current date
    }

    // Parameterized constructor
    public Person(String name, int age, Date dateOfBirth) {
        this.name = name;
        this.age = age;
        this.dateOfBirth = dateOfBirth;
    }

    // Getter and Setter for name
    public String getName() {
        return name;
    }
    public void setName(String name) {
        this.name = name;
    }

    // Getter and Setter for age
    public int getAge() {
        return age;
    }
    public void setAge(int age) {
        this.age = age;
    }

    // Getter and Setter for dateOfBirth
    public Date getDateOfBirth() {
        return dateOfBirth;
    }
    public void setDateOfBirth(Date dateOfBirth) {
        this.dateOfBirth = dateOfBirth;
    }

    // Display method
    public void display() {
        SimpleDateFormat sdf = new SimpleDateFormat("dd-MM-yyyy");
        System.out.println("Name: " + name);
        System.out.println("Age: " + age);
        System.out.println("Date of Birth: " + sdf.format(dateOfBirth));
        System.out.println("-----------------------------------");
    }
}

//MAIN CLASS

import java.text.ParseException;
import java.text.SimpleDateFormat;
import java.util.Date;

public class Main {
    public static void main(String[] args) {
        // Create a date formatter
        SimpleDateFormat sdf = new SimpleDateFormat("dd-MM-yyyy");

        try {
            // Create Date objects for birth dates
            Date dob1 = sdf.parse("15-02-2001");
            Date dob2 = sdf.parse("09-11-1999");

            // Create two Person objects using parameterized constructor
            Person person1 = new Person("Ali Khan", 24, dob1);
            Person person2 = new Person("Sara Ahmed", 26, dob2);

            // Display both persons' details
            System.out.println("------ PERSON DETAILS ------\n");
            person1.display();
            person2.display();

        } catch (ParseException e) {
            System.out.println("Error: Invalid date format! Please use dd-MM-yyyy.");
        }
    }
}


//OUTPUT :

Name: Ali Khan
Age: 24
Date of Birth: 15-02-2001
-----------------------------------
Name: Sara Ahmed
Age: 26
Date of Birth: 09-11-1999
-----------------------------------
```