PARAMASIVAM A 24BCS198

Experiment Number : 07 **Date: 05/02/2026**

METHOD OVERLOADING AND METHOD OVERRIDING

Aim:

To understand and implement method overloading and method overriding.

PRE LAB EXERCISE

QUESTIONS

1. **What is method overloading?**

   • Method overloading means having multiple methods with the same name in the same class.
   • The methods differ by number, type, or order of parameters.
   • It supports compile-time polymorphism.

2. **What is method overriding?**

   • Method overriding occurs when a child class provides its own implementation of a parent class method.
   • The method name and parameters must be exactly the same.
   • It supports run-time polymorphism.

3. **Difference between overloading and overriding.**

   Method Overloading:
   • Same method name, different parameters
   • Happens in the same class
   • Compile-time polymorphism
   Method Overriding:
   • Same method name and same parameters
   • Happens in parent–child classes
   • Run-time polymorphism

IN LAB EXERCISE

Objective:

To demonstrate compile-time and runtime polymorphism.

PROGRAMS:

1.Student Result System (Method Overriding)

Description:

- Base class Student has method displayResult().
- Subclasses UGStudent and PGStudent override the method to show different grading systems.

Code :

```
import java.util.Scanner;

// Base class
class Student {
    String name;

    void displayResult() {
        System.out.println("Student Result");
    }
}

// UG Student subclass
class UGStudent extends Student {
    int marks;

    UGStudent(String n, int m) {
        name = n;
        marks = m;
    }

    @Override
    void displayResult() {
        double percentage = (marks / 100.0) * 100;
        System.out.println("UG Student: " + name);
        System.out.println("Marks: " + marks);
        System.out.println("Percentage: " + percentage + "%");
    }
}

// PG Student subclass
class PGStudent extends Student {
    double gpa;

    PGStudent(String n, double g) {
        name = n;
        gpa = g;
    }

    @Override
    void displayResult() {
        System.out.println("PG Student: " + name);
        System.out.println("GPA: " + gpa + " / 10");
    }
}

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

        // Input for UG student
        System.out.print("Enter UG Student Name: ");
        String ugName = sc.nextLine();
        System.out.print("Enter UG Student Marks (out of 100): ");
        int ugMarks = sc.nextInt();
        sc.nextLine(); // consume newline
        // Input for PG student
        System.out.print("Enter PG Student Name: ");
        String pgName = sc.nextLine();
        System.out.print("Enter PG Student GPA (0-10): ");
        double pgGpa = sc.nextDouble();

        // Create objects
        Student s1 = new UGStudent(ugName, ugMarks);
        Student s2 = new PGStudent(pgName, pgGpa);

        System.out.println("\n--- Student Results ---");
        s1.displayResult();
        System.out.println();
        s2.displayResult();

        sc.close();
    }
}
```

OUTPUT:

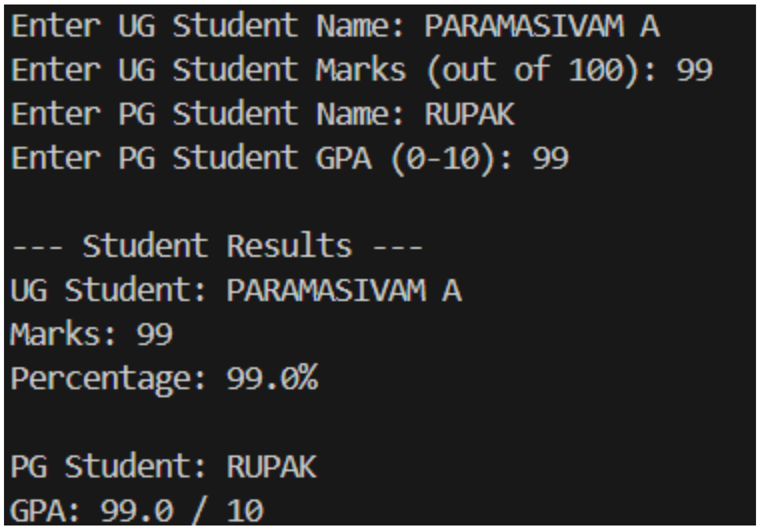
Sample Input:

```
Enter UG Student Name: Ram
Enter UG Student Marks (out of 100): 85
Enter PG Student Name: Ravi
Enter PG Student GPA (0-10): 9.2
```

Output:

```
--- Student Results ---
UG Student: Ram
Marks: 85
Percentage: 85.0%
PG Student: Ravi
GPA: 9.2 / 10
```

OUTPUT:



```
Enter UG Student Name: PARAMASIVAM A
Enter UG Student Marks (out of 100): 99
Enter PG Student Name: RUPAK
Enter PG Student GPA (0-10): 99

--- Student Results ---
UG Student: PARAMASIVAM A
Marks: 99
Percentage: 99.0%

PG Student: RUPAK
GPA: 99.0 / 10
```

2. Calculator Program (Method Overloading)

Description:
Create a Calculator class with multiple add() methods to calculate:

- Addition of 2 integers
- Addition of 3 integers
- Addition of 2 double numbers

Code:

```
import java.util.Scanner;
class Calculator {
   int add(int a, int b) {
      return a + b;
   }

   int add(int a, int b, int c) {
      return a + b + c;
   }

   double add(double a, double b) {
      return a + b;
```

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

        System.out.print("Enter two integers: ");
        int x = sc.nextInt();
        int y = sc.nextInt();
        System.out.println("Sum of two integers: " + calc.add(x, y));

        System.out.print("Enter three integers: ");
        int p = sc.nextInt();
        int q = sc.nextInt();
        int r = sc.nextInt();
        System.out.println("Sum of three integers: " + calc.add(p, q, r));

        System.out.print("Enter two decimal numbers: ");
        double a = sc.nextDouble();
        double b = sc.nextDouble();
        System.out.println("Sum of two doubles: " + calc.add(a, b));

        sc.close();
    }
}
```

Output:

Sample Input:

```
Enter two integers: 10 20
Enter three integers: 5 10 15
```

Enter two decimal numbers: 2.5 3.5

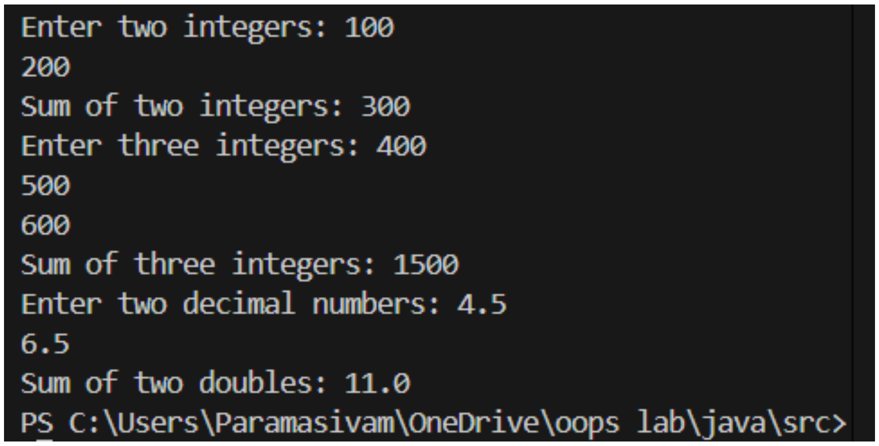
Output:

Sum of two integers: 30

Sum of three integers: 30

Sum of two doubles: 6.0

OUTPUT:



```
Enter two integers: 100
200
Sum of two integers: 300
Enter three integers: 400
500
600
Sum of three integers: 1500
Enter two decimal numbers: 4.5
6.5
Sum of two doubles: 11.0
PS C:\Users\Paramasivam\OneDrive\oops lab\java\src>
```

POST LAB EXERCISE

1. **Is return type important in method overloading and method overriding?**
   • In method overloading, return type alone is not considered for overloading.
   • In method overriding, return type must be same or covariant.
   • Method signature depends mainly on method name + parameter list.
2. **Can you overload a method by changing only the return type?**
   • No, you cannot overload a method by changing only the return type.
   • The parameter list must be different.
   • Otherwise, it causes a compile-time error.
3. **Can static methods be overridden? Can they be overloaded?**
   • Static methods cannot be overridden because they belong to the class, not objects.
   • They can be overloaded by changing the parameter list.
   • Static methods follow compile-time binding.

4. **Can a method be overridden if the parameter list is different?**

- No, the parameter list must be exactly the same.
- If parameters are different, it becomes method overloading, not overriding.
- Overriding requires same method signature.

Result:

Thus the method overloading and overriding concepts were implemented and executed successfully.

ASSESSMENT

Description	Max Marks	Marks Awarded
Pre Lab Exercise	5	
In Lab Exercise	10	
Post Lab Exercise	5	
Viva	10	
Total	30	
Faculty Signature		