Experiment Number : 07 **Date: 04-02-25**

Sriram B

24BCS285

CSE-A1

METHOD OVERLOADING AND METHOD OVERRIDING

Aim:

To understand and implement method overloading and method overriding.

PRE LAB EXERCISE

QUESTIONS

- ✓ What is method overloading?
  - **Method overloading** means having **multiple methods with the same name** in the **same class**, but with **different parameters** (different number, type, or order of parameters).
  - It is used to **perform similar operations in different ways**.
- ✓ What is method overriding?
- **Method overriding** means a **subclass provides its own implementation** of a method that already exists in its **parent class**,with the **same method name, same parameters, and same return type**.
- It is used to **change or extend parent class behaviour**.
- ✓ Difference between overloading and overriding.

Method Overloading	Method Overriding
Happens in **same class**	Happens in **parent–child classes**
Same method name, **different parameters**	Same method name, **same parameters**
Return type **can be different**	Return type must be **same (or covariant)**
Compile-time polymorphism	Runtime polymorphism
Does **not** require inheritance	**Requires inheritance**
Faster (resolved at compile time)	Slower (resolved at runtime)

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 ---

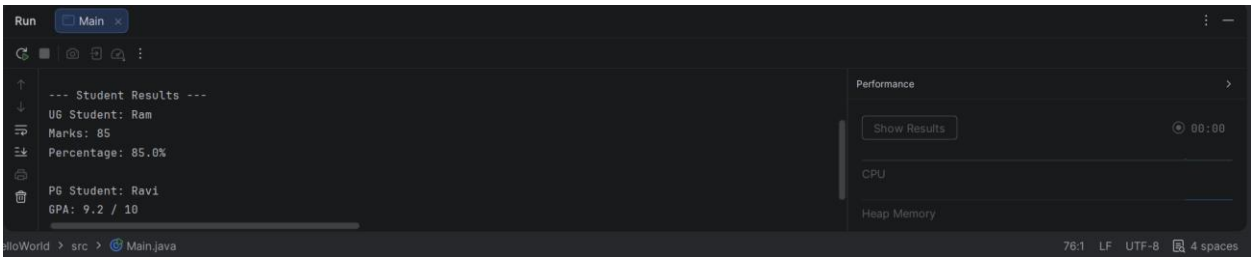
UG Student: Ram

Marks: 85

Percentage: 85.0%

PG Student: Ravi

GPA: 9.2 / 10



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

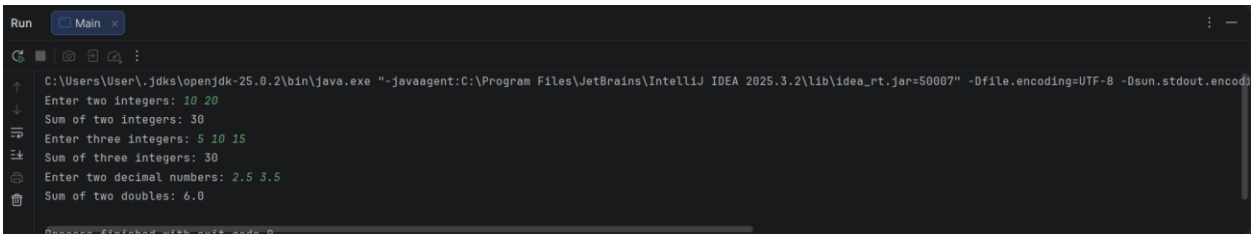
Enter two decimal numbers: 2.5 3.5

Output:

Sum of two integers: 30

Sum of three integers: 30

Sum of two doubles: 6.0



POST LAB EXERCISE

- ✓ Is return type important in method overloading and method overriding?
    - In method overloading, return type is not important because overloading depends on method name and parameter list.
    - In method overriding, return type is important and must be the same or covariant as the parent class method.

- ✓ Can you overload a method by changing only the return type?
    - No, you cannot overload a method by changing only the return type because the method signature remains the same and it causes a compile time error.

- ✓ Can static methods be overridden? Can they be overloaded?
    - Static methods cannot be overridden because they belong to the class and not to objects.
    - Static methods can be overloaded by changing the parameter list.

- ✓ Can a method be overridden if the parameter list is different?

    - No, a method cannot be overridden if the parameter list is different.
      If the parameter list is different, it becomes method overloading and not overriding.

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	