Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
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Lab Number:	**8**
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Title:

1. To perform Multilevel Inheritance in JAVA. Create a Person class representing name, age and address. Inherit person class to employee class with emp ID and salary factor. Inherit the Employee class to programmer class with technical skills and hike attributes. Implement valid methods to input the details from the user in the main method and display for 3 programmers.
2. To perform Hierarchical Inheritance in JAVA. Create an Employee class with attributes EmpID and EmpSalary. Also create necessary methods/constructors to accept these values from the user. Create classes permenantEmployee and TemporaryEmployee which will be derived classes of Employee. Mention hike attribute in these derived classes and calculate the total salary using generate_salary() method for respective types of employees. Objects of the derived classes should be created and salaries for the permanent and temporary employees should be calculated and displayed on the screen.

Learning Objective:

- Students will be able to perform multilevel inheritance using JAVA.
- Students will be able to perform hierarchical inheritance using JAVA

Learning Outcome:

- To understand how to use the private members using friend function and friend class.

Course Outcome:

ECL304.2	Comprehend building blocks of OOPs language, inheritance, package and interfaces.

Theory:

- **Explain in details about various inheritance types supported in JAVA**

  Ans: The process by which one class acquires the properties(data members)

and functionalities(methods) of another class is called inheritance. The aim
of inheritance is to provide the reusability of code so that a class has to write
only the unique features and rest of the common properties and functionalities can be extended from the another class.

Child Class:

The class that extends the features of another class is known as child class,
sub class or derived class.

Parent Class:

The class whose properties and functionalities are used(inherited) by another
class is known as parent class, super class or Base class.

Mentioned below are the types of inheritance that can be implemented in java.

1. **Single Inheritance**: In single inheritance, a class is allowed to inherit from only one class. i.e. one sub class is inherited by one base class only.

2.**Multilevel Inheritance**

When there is a chain of inheritance, it is known as *multilevel inheritance*. As you can see in the example given below, BabyDog class inherits the Dog class which again inherits the Animal class, so there is a multilevel inheritance.

3.**Hierarchical Inheritance Example**

When two or more classes inherits a single class, it is known as *hierarchical inheritance*. In the example given below, Dog and Cat classes inherits the Animal class, so there is hierarchical inheritance.

Algorithm :	**Step 1**: Create a class person and declare its attributes name, age , address

	respectively. **Step 2**: Create a class Emp_class which is inheriting class person but it does have its own attributes namely Emp_id and Emp_salary. **Step 3**: Then we create a programmer class which is inheriting Emp_class using the concept of multilevel inheritance. **Step 4**: Programmer class has its own attributes namely hike, total salaryand Tech_skills. This class also has 3 methods namely Input_details() , calculation_method() ,and Output_details() ,for taking the user input , calculating the salary and displaying the output. **Step 5**: In the main function we have created 3 objects of the programmer class representing the 3 programmers. Using those objects we have accessed the methods to get the desired output.
Program:	package inheritance; import java.util.Scanner; class person{ Scanner t= new Scanner(System.in);

	String name;
	int age;
	String address;
	void printData() {
	System.out.println("Enter the name,age and address of
	the person ");
	name=t.next();
	age=t.nextInt();
	address=t.next();
	}
	}
	class employee extends person{
	Scanner t= new Scanner(System.in);
	int EmpID;
	float salary;
	void display() {
	System.out.println("Enter the Employee ID and salary ");
	EmpID=t.nextInt();
	salary=t.nextFloat();
	}
	}
	class programmer extends employee{
	double hike=0.1;
	String tech="Java, Python,C";

```
void calc() {
super.printData();
super.display();
System.out.println("The name of the person is "+name);
System.out.println("The age of the person is "+age);
System.out.println("The address of the person is
"+address);
System.out.println("The employee id of the person is
"+EmpID);
System.out.println("The salary of the person is
"+salary);
System.out.println("The technical skills are: "+tech);
System.out.println("The total salary of the employee is
"+(salary+(salary*hike)));
}
}
public class inheritance {
public static void main(String[] args) {
programmer p1=new programmer();
p1.calc();
```

	programmer p2=new programmer();
	p2.calc();
	programmer p3=new programmer();
	p3.calc();
	}
	}

Input given:	**-**
Output Screenshot:	

Algorithm :	Step 1: Create a class employee with the required attributes like EmpID and EmpSalary and take these values for both the permanent employee and the temporary employee from the user. Step 2: Then in class permanent employee which is inheriting the class employee , using generate_Salary method take the value of percentage hike for the permanent employees salary from the user. Step 3: Then calculate the total salary after adding the percentage hike accordingly and display the output. Step 4: Then in class temporary employee which is inheriting the class employee , using generate_Salary method take the value of percentage hike for

	the temporary employees salary from the user. Step 5: Then calculate the total salary after adding the percentage hike accordingly and display the output. Step 6: In the main function create two objects for both the permanent employee and the temporary employee class and call the methods in the respective class using the 2 objects in order to get the output

Program:	package javaprogramming2;
	import java.util.Scanner;
	class Emp{ //creating a class
	int Permanent_EmpID=1; //attributes
	int Temporary_EmpID=2; //attributes
	float Salary=50000; //attributes
	void Output_Salary_Permanent() { //methods to display
	salary
	System.out.println("Salary of the Permanent
	Employee is: Rs. " + Salary);
	}
	void Output_Salary_Temporary() {
	System.out.println("Salary of the Temporary
	Employee is: Rs. " + Salary);
	}
	}

	class Permanent_Employee extends Emp{ //inherited class
	float increment_on_salary =10;
	void increment() { //methods to display the employee
	info and salary calculations
	System.out.println("Permanent Employee ID
	:"+Permanent_EmpID);
	System.out.println("Permanent Employee salary hike
	percentage :"+increment_on_salary+" % ");
	super.Output_Salary_Permanent();
	System.out.println("Salary of the permanent employee
	after adding the increment is: Rs."
	+(Salary+((Salary*increment_on_salary)/100)));
	}
	}
	class Temporary_Employee extends Emp{ //inherited class
	float increment_on_salary =5;
	void increment() { //methods to display the employee
	info and salary calculations
	System.out.println("Temporary Employee ID
	:"+Temporary_EmpID);
	System.out.println("Temporary Employee

	salary hike
	percentage :"+increment_on_salary+" % ");
	super.Output_Salary_Temporary();
	System.out.println("Salary of the temporary employee
	after adding the increment is: Rs." +(Salary
	+((Salary*increment_on_salary)/100)));
	}
	}
	public class Lab8_2 {
	public static void main(String[] args) { //main function
	Permanent_Employee object1 = new
	Permanent_Employee(); //creating a object
	Temporary_Employee object2 = new
	Temporary_Employee(); //creating a object
	object1.increment(); //calling the methods using the
	objects
	object2.increment(); //calling the methods using the
	objects
	}

Input given:	Salary of Permanent employee: Rs.50000 Percentage hike on permanent employee's salary: 10% Salary of Temporary employee: Rs.50000

	Percentage hike on temporary employee's salary: 5%
Output Screenshot:	