

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

Lab Number:	8
Student Name:	Shreyas Sanjay Nanaware
Roll No :	39

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 permanentEmployee 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.
-----------------	---

Faculty: Ms. Deepali Kayande

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

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.

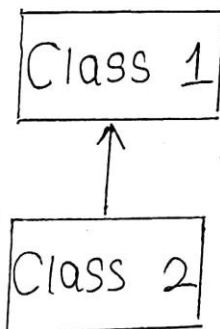
Parent Class:

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.

• Single inheritance



Syntax:-

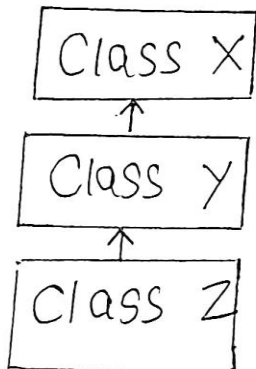
```
public class1 {}
```

```
public class 2 extends 1 {}
```

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

2. Multilevel Inheritance: In this type of inheritance, a derived class is created from another derived class.

- Multilevel inheritance.



Syntax:-

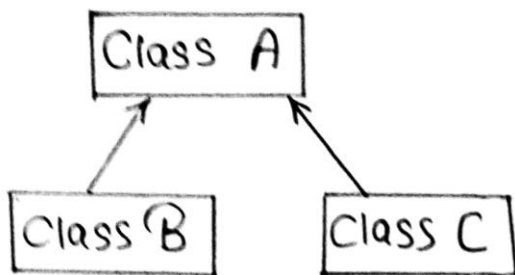
Public class X {}

Public class Y extends ~~X~~ {}

Public class Z extends Y {}

3. **Hierarchical Inheritance:** In this type of inheritance, more than one sub class is inherited from a single base class. i.e. more than one derived class is created from a single base class.

- Hierarchical inheritance



Syntax:-

Public class A {}

Public class B extends A {}

Public class C extends A {}

Also we should note one thing is that in java we cannot use multiple inheritance as that of C++ , all the other types we can use except for the multiple inheritance.

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

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.

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 salary and 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:

/*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

Faculty: Ms. Deepali Kayande

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

for 3 programmers.*//

package javaprogramming2;

import java.util.Scanner;

class Person{ //creating a class named Person

int age; //attributes

String name, address; //attributes

}

class Emp_class extends Person{ //using multilevel inheritance,inheriting
class Emp_class from Person

int Emp_id; //attributes

float Emp_salary; //attributes

}

class programmer extends Emp_class{ //using multilevel inheritance,inheriting
class programmer from Emp_class

float hike , Total_salary; //attributes

String Tech_skills; //attributes

Scanner sc = new Scanner(System.in);

void Input_details(){

System.out.println("Enter details for
programmer ");

System.out.println("Enter name: ");

name=sc.next();

System.out.println("Enter age: ");

age=sc.nextInt();

Faculty: Ms. Deepali Kayande

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

```
System.out.println("Enter address: " );
address=sc.next();
System.out.println("Enter id: " );
Emp_id=sc.nextInt();
System.out.println("Enter salary: Rs. " );
Emp_salary=sc.nextFloat();
System.out.println("Enter % hike on salary: " );
hike=sc.nextFloat();
System.out.println("Enter your technical skills:
");

Tech_skills=sc.next();
System.out.println("\n");
}

void calculation_method()
{
    Total_salary= Emp_salary+ (Emp_salary*hike)
/ 100; //calculating the total salary by adding the increment to the base salary
}

void Output_details(){
    System.out.println("Details for programmer : ");
    System.out.println("Name: " +name);
    System.out.println("Age: " +age);
    System.out.println("Address : " +address);
    System.out.println("Technical Skills: "
+Tech_skills );
```

Faculty: Ms. Deepali Kayande

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

```
        System.out.println(" Base Salary: Rs. "
+Emp_salary);

        System.out.println("Percentage hike: "+hike+ "
%");

        System.out.println("Salary after the hike: Rs. "
+Total_salary);

        System.out.println("\n");
    }
}
```

```
}

public class Lab8_1 {

    public static void main(String[] args) { //main function

        programmer object1 = new programmer();
        programmer object2 = new programmer();
        programmer object3 = new programmer();

        object1.Input_details();
        object2.Input_details();
        object3.Input_details();

        object1.calculation_method();
        object2.calculation_method();
        object3.calculation_method();

        object1.Output_details();
        object2.Output_details();
    }
}
```

Faculty: Ms. Deepali Kayande

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

```
        object3.Output_details();  
    }  
}
```

Input given :

Details of Programmer 1:

Name: Shreyas

Age:18

Address: Dombivli

ID: 39

Salary: Rs.500000

Hike: 10%

Technical Skills: Java

Details of Programmer 2:

Name: Shubham

Age:18

Address: Kalyan

ID: 27

Salary: Rs.509890

Hike: 5%

Technical Skills: Java, python

Details of Programmer 3:

Name: Chirag

Age:18

Address: Thakurli

ID: 7

Faculty: Ms. Deepali Kayande

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

Salary: Rs.589080

Hike: 7%

Technical Skills: C

Output:

```
<terminated> Lab8_1 [Java Application] C:\Users\Shreyas\.p2\pool\plugins\org
Enter details for programmer
Enter name:
Shreyas
Enter age:
18
Enter address:
Dombivli
Enter id:
39
Enter salary: Rs.
500000
Enter % hike on salary:
10
Enter your technical skills:
Java

Enter details for programmer
Enter name:
Shubham
Enter age:
18
Enter address:
Kalyan
Enter id:
27
Enter salary: Rs.
509890
Enter % hike on salary:
5
Enter your technical skills:
Python,Java
```

Faculty: Ms. Deepali Kayande

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

<terminated> Lab8_1 [Java Application] C:\Users\Shreyas\.p2\pool\p

Enter details for programmer

Enter name:

Chirag

Enter age:

18

Enter address:

Thakurli

Enter id:

7

Enter salary: Rs.

589080

Enter % hike on salary:

7

Enter your technical skills:

C

Details for programmer :

Name: Shreyas

Age: 18

Address : Dombivli

Technical Skills: Java

Base Salary: Rs. 500000.0

Percentage hike: 10.0 %

Salary after the hike: Rs. 550000.0

Details for programmer :

Name: Shubham

Age: 18

Address : Kalyan

Technical Skills: Python,Java

Base Salary: Rs. 509890.0

Percentage hike: 5.0 %

Salary after the hike: Rs. 535384.5

Details for programmer :

Name: Chirag

Age: 18

Address : Thakurli

Technical Skills: C

Base Salary: Rs. 589080.0

Percentage hike: 7.0 %

Salary after the hike: Rs. 630315.6

Faculty: Ms. Deepali Kayande

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

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 permanentEmployee 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.

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.

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

Program:

/* 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 permanentEmployee 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. */

```
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);
```

```
    }
```

Faculty: Ms. Deepali Kayande

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

```
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);
```

Faculty: Ms. Deepali Kayande

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

```
        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%

Faculty: Ms. Deepali Kayande

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

Output:

```
<terminated> Lab8_2 [Java Application] C:\Users\Shreyas\.p2\pool\plugins\org.eclipse.justj.openjdk  
Permanent Employee ID :1  
Permanent Employee salary hike percentage :10.0 %  
Salary of the Permanent Employee is: Rs. 50000.0  
Salary of the permanent employee after adding the increment is: Rs.55000.0  
Temporary Employee ID :2  
Temporary Employee salary hike percentage :5.0 %  
Salary of the Temporary Employee is: Rs. 50000.0  
Salary of the temporary employee after adding the increment is: Rs.52500.0
```