

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:	Lovely Varshney
Roll No :	15

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:

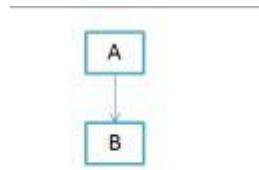
ECL304.2	Comprehend building blocks of OOPs language, inheritance, package and interfaces.
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Theory:

- Explain in details about various inheritance types supported in JAVA
1. **Single Inheritance** : When a class inherits another class, it is known as a *single inheritance*.

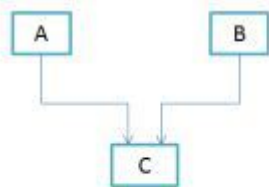
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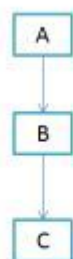
(a) Single Inheritance

2. **Multiple Inheritance** : It refers to the concept of one class extending (Or inherits) more than one base class.



(b) Multiple Inheritance

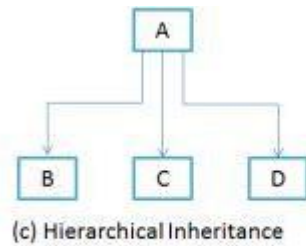
3. **Multilevel inheritance** refers to a mechanism in OO technology where one can inherit from a derived class, thereby making this derived class the base class for the new class.



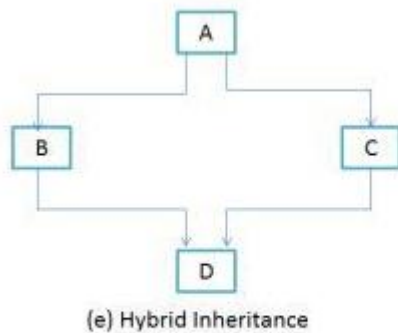
(d) Multilevel Inheritance

4. **Hierarchical Inheritance** : In such kind of inheritance one class is inherited by many **sub classes**.

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5. **Hybrid inheritance** is a combination of single and multiple inheritance. A hybrid inheritance can be achieved in the java in a same way as multiple inheritance can be!! Using interfaces.



Algorithm 1:	<p>1 – Create a parent class person and initialize its data members and take input of name, age and address.</p> <p>2- Create the derived class of person class - employee class to take input of emp_id and salaryfactor.</p> <p>3- Create the derived class of person class - programmer class to take input of hike and technical skills.</p> <p>4 – Create the Main class to call the class functionalities and display the results.</p>
Program 1:	<pre>package com.company; import java.util.*; class Person { String name; int age; String address; public Person() {</pre>

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```
        name = "";
        age = 0;
        address = "";
    }

    void getdata() {
        Scanner s = new Scanner(System.in);
        System.out.print("enter name: ");
        name = s.nextLine();
        System.out.println();
        System.out.print("enter age: ");
        age = s.nextInt();
        System.out.println();
        System.out.print("enter address: ");
        s.nextLine();
        address = s.nextLine();
        System.out.println();
    }

    void putdata() {
        System.out.println("name is: " + name);
        System.out.println();
        System.out.println("age is::" + age);
        System.out.println();
        System.out.println("address is: " + address);
        System.out.println();
    }
}

class employee extends Person {
    int emp_id;
    int salary_factor;

    public employee() {
        emp_id = 0;
        salary_factor = 0;
    }

    void getdetails() {
        Scanner s = new Scanner(System.in);
        System.out.print("enter employee id: ");
        emp_id = s.nextInt();
        System.out.println();
        System.out.print("enter Salary Factor: ");
        salary_factor = s.nextInt();
        System.out.println();
    }

    void putdetails() {
        System.out.println("employee id is ::" + emp_id);
        System.out.println();
        System.out.println("Salary Factor is::" +
salary_factor);
        System.out.println();
    }
}

class programmer extends employee {
    int hike;
    String technical_skills = "";
}
```

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```
public programmer() {
    hike = 0;
    technical_skills = "";
}
void getd() {
    Scanner s = new Scanner(System.in);
    System.out.print("enter hike: ");
    hike = s.nextInt();
    System.out.println();
    System.out.print("enter technical skills: ");
    s.nextLine();
    technical_skills = s.next();
    System.out.println();
}
void putd() {
    System.out.println("hike is ::" + hike);
    System.out.println();
    System.out.println("techincal skills is::" +
technical_skills);
    System.out.println();
}
}

public class Main {

    public static void main(String[] args) {
        programmer r[] = new programmer[4];
        r[0] = new programmer();
        r[1] = new programmer();
        r[2] = new programmer();

        for (int i = 0; i<3; i++) {
            System.out.println("Enter details of employee
" + (i+1) );

            r[i].getdata();
            r[i].getdetails();
            r[i].getd();
            r[i].putdata();
            r[i].putdetails();
            r[i].putd();
        }
    }
}
```

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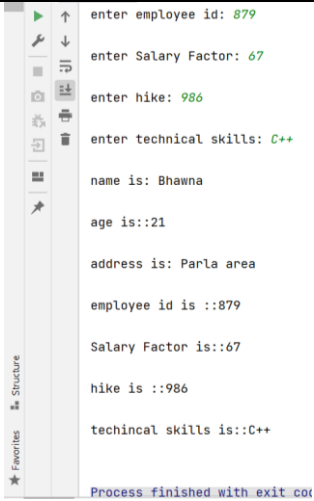
**Output
Screenshot 1:**

The image displays three sequential screenshots of a Java program running in an IDE. The program prompts the user to enter details for three employees. The first screenshot shows the input for Employee 1: name 'Lovely', age '18', address 'Laxmi nagar', employee id '234', salary factor '48', hike '987', and technical skills 'Java'. The second screenshot shows the output for Employee 1: 'employee id is ::234', 'Salary Factor is::48', 'hike is ::987', and 'techincal skills is::Java'. The third screenshot shows the input for Employee 2: name 'Sheetal', age '19', address 'Sadar bazar', employee id '567', salary factor '49', hike '675', and technical skills 'Python'. The fourth screenshot shows the output for Employee 2: 'name is: Sheetal', 'age is::19', 'address is: Sadar bazar', 'employee id is ::567', 'Salary Factor is::49', 'hike is ::675', and 'techincal skills is::Python'. The fifth screenshot shows the input for Employee 3: name 'Bhawna', age '21', address 'Parla area', and employee id '879'.

```
"C:\Program Files\Java\jdk-16.0.2\bin\java.exe"  
Enter details of employee 1  
enter name: lovely  
  
enter age: 18  
  
enter address: Laxmi nagar  
  
enter employee id: 234  
  
enter Salary Factor: 48  
  
enter hike: 987  
  
enter technical skills: Java  
  
name is: lovely  
  
age is::18  
  
address is: Laxmi nagar  
  
employee id is ::234  
  
employee id is ::234  
Salary Factor is::48  
  
hike is ::987  
  
techincal skills is::Java  
  
Enter details of employee 2  
enter name: Sheetal  
  
enter age: 19  
  
enter address: Sadar bazar  
  
enter employee id: 567  
  
enter Salary Factor: 49  
  
enter hike: 675  
  
enter technical skills: Python  
  
name is: Sheetal  
age is::19  
address is: Sadar bazar  
employee id is ::567  
Salary Factor is::49  
hike is ::675  
techincal skills is::Python  
  
Enter details of employee 3  
enter name: Bhawna  
  
enter age: 21  
  
enter address: Parla area  
  
enter employee id: 879
```

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	 <pre> enter employee id: 879 enter Salary Factor: 67 enter hike: 986 enter technical skills: C++ name is: Bhawna age is::21 address is: Parla area employee id is ::879 Salary Factor is::67 hike is ::986 techincal skills is::C++ Process finished with exit code 0 </pre>
Algorithm 2:	<ol style="list-style-type: none"> 1. Creating the parent class employee and initialize its data members.(EmpId ,EmpSalary) and a basic function get details() to print the details. 2. Create 2 child class permanent employee and temporary employee that inherit employee class publically. 3. In this classes , create generate salary() that return the employee salary + hike in their salary 4. In main function, Create the object of derived class and print their respective details.
Program 2:	<pre> package com.company; import java.util.*; class Employee { Scanner s=new Scanner(System.in); int emp_id; int emp_salary; Employee() { System.out.println("enter empid::"); emp_id=s.nextInt(); System.out.println("enter empsalary::"); emp_salary=s.nextInt(); } void getDetails() { System.out.println("EmployeeID is ::"); System.out.println("EmployeeSalary is ::"); } } </pre>

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```
class permanant_Employee extends Employee
{
    int hike;

    permanant_Employee( int increment)
    {
        hike = increment;
    }

    void getDetails()
    {
        System.out.println("EmployeeID is ::" +
emp_id);
        System.out.println("Employee total salary is
::" + generate_salary());
    }

    int generate_salary()
    {
        return (emp_salary + hike);
    }
}

class temporary_Employee extends Employee
{
    int hike;

    temporary_Employee( int increment)
    {
        hike = increment;
    }

    void getDetails()
    {
        System.out.println("EmployeeID is ::" + emp_id);
        System.out.println("Employee total salary is ::" +
generate_salary());
    }

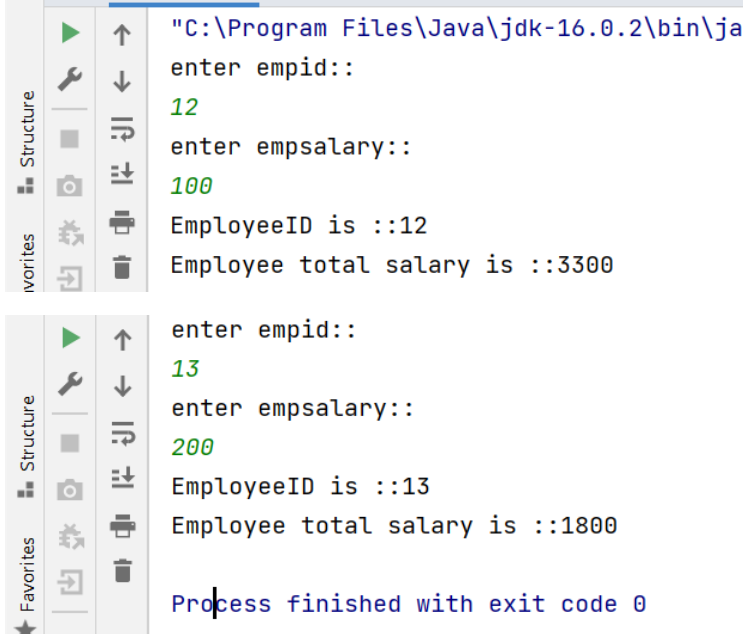
    int generate_salary()
    {
        return (emp_salary + hike);
    }
}

public class Main {

    public static void main(String[] args) {
        permanant_Employee p = new permanant_Employee(3200);
        p.getDetails();
        temporary_Employee t = new temporary_Employee(1600);
        t.getDetails();

    }
}
```


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Input given 2:	<p>For Permanent employee :</p> <p>empid – 12</p> <p>empsalary – 100</p> <p>For temporary employee :</p> <p>empid – 13</p> <p>empsalary – 200</p>
Output Screenshot 2:	 <pre> "C:\Program Files\Java\jdk-16.0.2\bin\ja enter empid:: 12 enter empsalary:: 100 EmployeeID is ::12 Employee total salary is ::3300 enter empid:: 13 enter empsalary:: 200 EmployeeID is ::13 Employee total salary is ::1800 Process finished with exit code 0 </pre>