

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:	6
Student Name:	Deep patel
Roll No :	8

Title:

1. To perform Multiple Inheritance in C++. Create a student class representing student roll number, name and branch and an exam class (derived class of student) representing the scores of the student in various subjects (maths, physics and chemistry) and sports class representing the score in sports. The sports and exam class is inherited by a result class which adds the exam marks and sports score to generate the final result.
2. To perform Hierarchical Inheritance in C++. 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 multiple inheritance using C++.

Learning Outcome:

- Understanding the inheritance concept and reusability of the code.

Course Outcome:

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

Theory:

(1.) Explain in details about inheritance, its types, syntaxes and block diagrams.

Inheritance is one of the most important feature of Object Oriented Programming.

The class that inherits properties from another class is called Sub class or Derived Class, and the class whose properties are inherited by sub class is called Base Class.

Inheritance, we have to write the functions only one time instead of three times as we have inherited rest of the three classes from base class.

Types of Classes:

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

Sub Class: The class that inherits properties from another class is called Sub class or Derived Class.

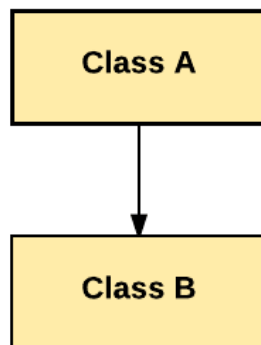
Super Class: The class whose properties are inherited by sub class is called Base Class or Super class.

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.

Syntax:

Class subclass_name : access_mode base_class

Block Diagram:

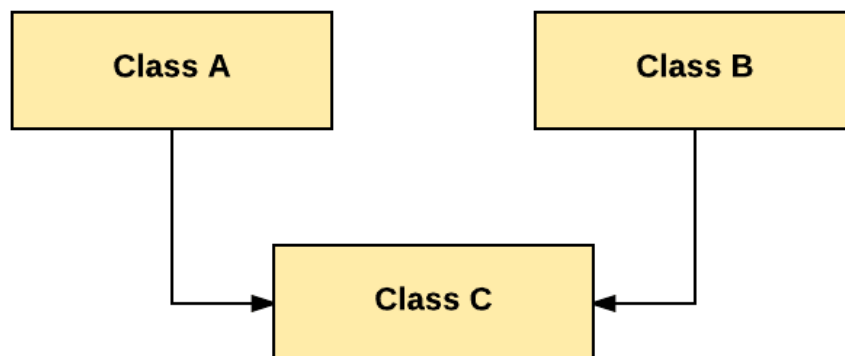


2. **Multiple Inheritance:** Multiple Inheritance is a feature of C++ where a class can inherit from more than one classes. i.e one sub class is inherited from more than one base classes.

Syntax :

Class subclass_name : access_mode base_class1 , access_mode base_class2, ...

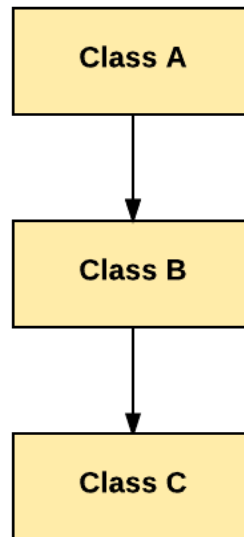
Block Diagram:



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

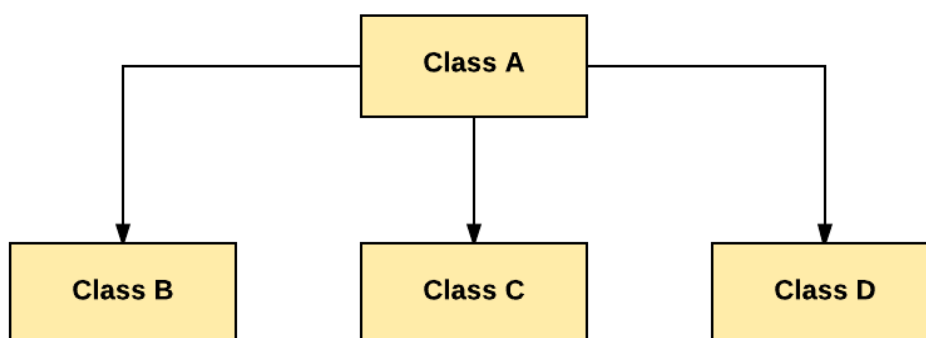
3. **Multilevel Inheritance:** In this type of inheritance, a derived class is created from another derived class.

Block Diagram:



4. **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.

Block Diagram:



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 1 : To perform Multiple Inheritance in C++. Create a student class representing student roll number, name and branch and an exam class (derived class of student) representing the scores of the student in various subjects (maths, physics and chemistry) and sports class representing the score in sports. The sports and exam class is inherited by a result class which adds the exam marks and sports score to generate the final result.

Algorithm :

Step 1: START

Step 2: Create class student, and add parameters as student roll number, name and branch.

Step 3: derive a class from student class as exam class representing the scores of the student in various subjects.

Step 4: create sports class representing the score in sports

Step 5: The sports and exam class is inherited by a result class which adds the exam marks and sports score.

Step 6: Compute the total marks of student.

Step 7: Create the object result class

Step 8: STOP

Program:

```
#include<iostream>
#include<conio.h>
using namespace std;

class student {
protected:
    int rollnum, m1, m2;
public:

    void get() {
        cout << "\nEnter the Roll no :";
```

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

```
        cin>>rollnum;

        cout << "Enter the two marks:";

        cin >> m1>>m2;

    }

};

class sports {
protected:
    int sports;

public:
    void getsports() {
        cout << "Enter the sports mark :";
        cin>>sports;

    }

};

class statement : public student, public sports {
    int total, avg;
public:

    void display() {
        total = (m1 + m2 + sports);
        avg = total / 3;
        cout << "\n\n\tRoll No   : " << rollnum << "\n\tTotal       : " << total;
        cout << "\n\tAverage   : " << avg;

    }
}
```

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

```
};
```

```
main() {  
    system("cls");  
    statement obj;  
    obj.get();  
    obj.getsports();  
    obj.display();  
    getch();  
}
```

Input Given:

```
Enter the Roll no :8  
Enter the two marks:9  
10  
Enter the sports mark :8
```

Output:

```
Enter the Roll no :8  
Enter the two marks:9  
10  
Enter the sports mark :8  
  
Roll No      : 8  
Total       : 27  
Average      : 9  
-----  
Process exited after 20.99 seconds with return value 0  
Press any key to continue . . .
```

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 2: To perform Hierarchical Inheritance in C++. 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: Start

Step 2: Create an employee class with attributes as empid, and empsalary

Step 3: In class employee create a constructor, which collects the basic info from the user, and then call a function to print the results

Step 4: Create classes permanentEmployee and TemporaryEmployee which will be derived classes of Employee, add hike attribute in these derived classes and calculate the total salary using generate_salary() method for respective types of employees.

Step 5: Create the objects of the derived classes

Step 6: calculate the salaries of permanent and temporary employees, and displayed it as output.

Step 7: Stop

Program:

```
#include <iostream>

#include <stdio.h>

using namespace std;
```

```
class basicInfo
{
    protected:
        char name[35];
        int empId;
```

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

```
char gender;

public:

void getBasicInfo(void)
{
    cout << "Enter the Name: ";
    cin.getline(name,35);
    cout << "Enter Employee Id: ";
    cin >> empId;
    cout << "Enter Gender: ";
    cin >> gender;
}

};

class deptInfo
{
protected:
    char deptName[35];
    char assignedWork[35];
    int timetocomplete;
public:
    void getDeptInfo(void)
    {
        cout << "Enter Department Name: ";
        cin >> deptName;
        cin.getline(deptName,35);
        cout << "Enter assigned work: ";
        cin >> assignedWork;
        cin.getline(assignedWork,35);
    }
};
```


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

```
    cout << "Enter time in hours to complete work: ";
    cin >> timetocomplete;
}
};

class employee: private basicInfo, private deptInfo
{
public:
    void getEmpInfo(void){
        cout << "\tEnter Employee's basic info: " << endl;

        getBasicInfo();
        cout << "\n\tEnter Employee's department info: " << endl;

        getDeptInfo();
    }
    void printEmpInfo(void)
    {
        cout << "\n\n\tEmployee's Information is: " << endl;
        cout << "\nBasic Information of employee : " << endl;
        cout << "Name: " << name << endl;
        cout << "Employee ID: " << empId << endl;
        cout << "Gender: " << gender << endl << endl;

        cout << "Department Information : " << endl;
        cout << "Department Name: " << deptName << endl;
        cout << "Assigned Work: " << assignedWork << endl;
        cout << "Time to complete work: " << timetocomplete << endl;
```

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

```
    }  
};  
  
int main()  
{  
    employee emp;  
    emp.getEmpInfo();  
    emp.printEmpInfo();  
    return 0;  
}
```

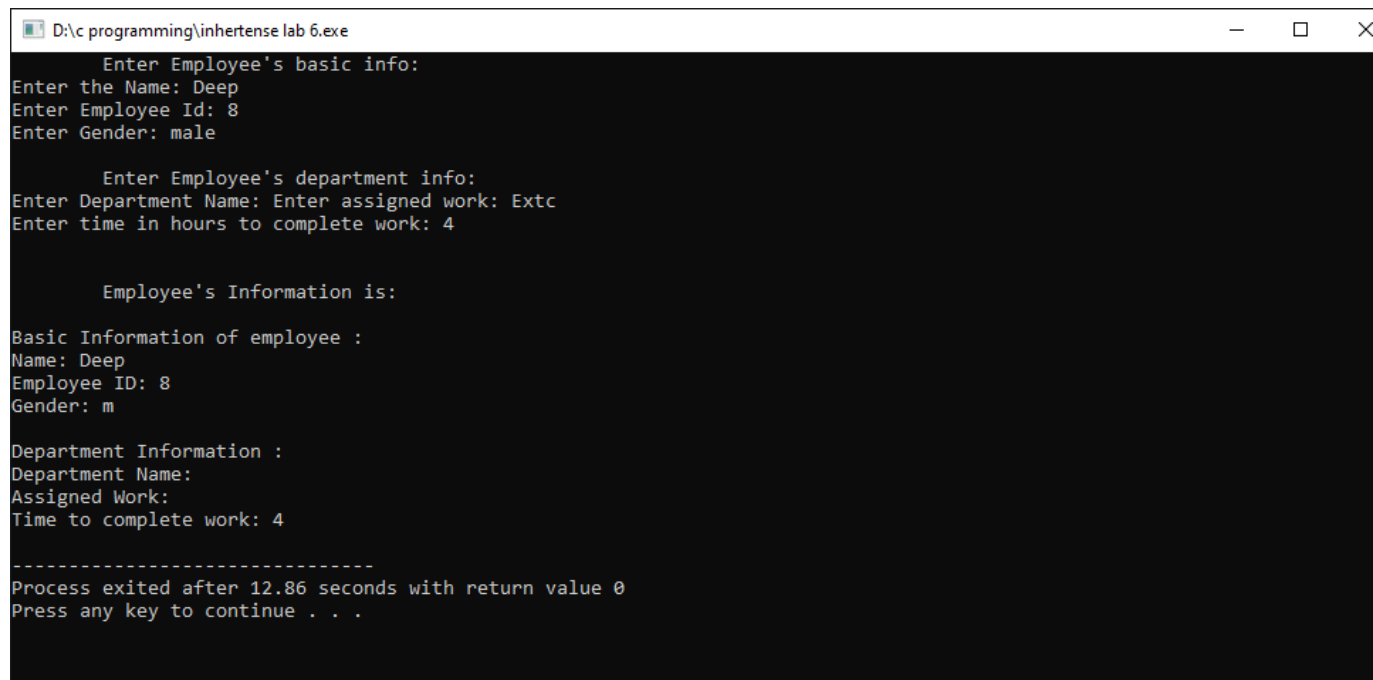
Input Given:

Enter the Name: Deep

Enter Employee Id: 8

Enter Gender: male

Output:



```
D:\c programming\inhertense lab 6.exe  
Enter Employee's basic info:  
Enter the Name: Deep  
Enter Employee Id: 8  
Enter Gender: male  
  
Enter Employee's department info:  
Enter Department Name: Enter assigned work: Extc  
Enter time in hours to complete work: 4  
  
Employee's Information is:  
Basic Information of employee :  
Name: Deep  
Employee ID: 8  
Gender: m  
  
Department Information :  
Department Name:  
Assigned Work:  
Time to complete work: 4  
  
-----  
Process exited after 12.86 seconds with return value 0  
Press any key to continue . . .
```

Faculty: Ms. Deepali Kayande