Inheritance

Inheritance is a mechanism in which one class inherits the property of other class is known as Inheritance

* To drive a new class from existing class is called Inheritance.
  → new class is also known as sub class or derived class.
  → Old Class or existing class is also known as base class or super class

Basic Syntax of Inheritance.

class derivedclass_name : accessmode baseclass_name.

* Derived Class or Base Class

Derived Class :- A derived class is defined as the class derived from base class.

Syntax:- class derivedclass : access_mode baseclass
{

};

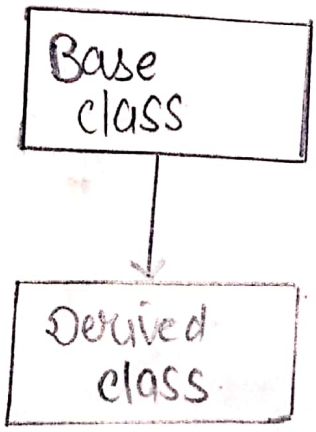
→ name of the derived class.
→ access mode can be public or private.
→ and name of the base class.

Base class:- A base class is a class in OOP, from which other classes are derived

A base class is also called parent class or super class.

Syntax:

```
class base_class_name
{
----
};
```



Types of Inheritance

1. Single Inheritance
2. Multiple Inheritance
3. Multilevel Inheritance
4. Hierarchical Inheritance
5. Hybrid Inheritance.

1 Single Inheritance

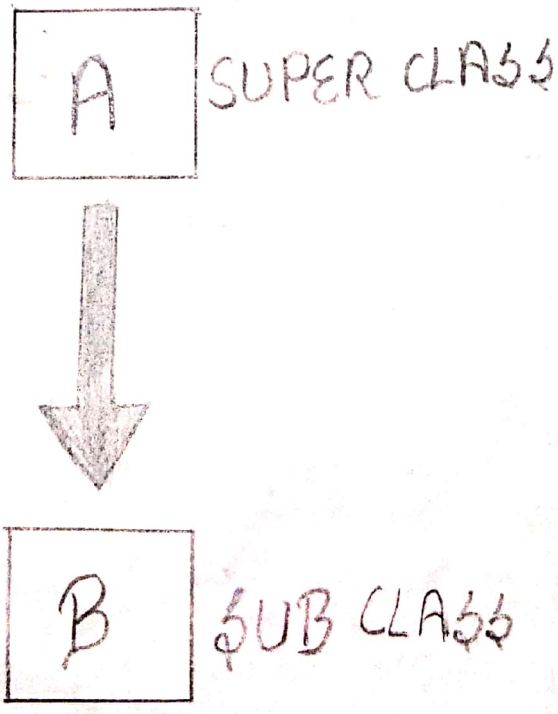
A Class which contain only one base class and only one derive class is called Single Inheritance.

It is the process of Creating a new class from an existing base class.

In Single Inheritance, a class is allowed to inherit from one class.
(One sub class is inherited by one base class)

Syntax:-

```
class derived_class_name : access_mode base_classname
{
// body of derivedclass
}
```



Example

// WAP of Single Inheritance.

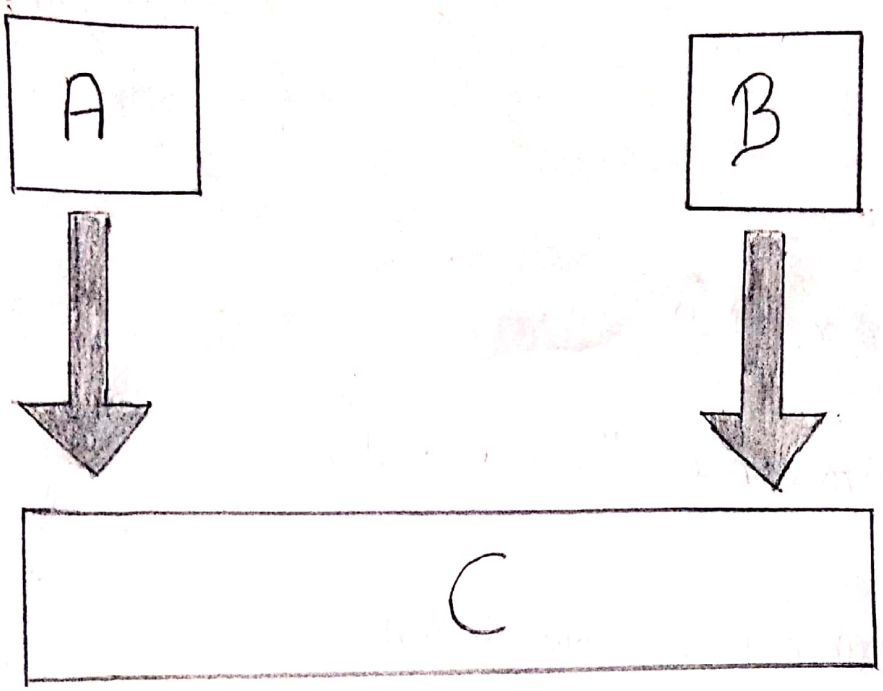
```
#include<iostream.h>
#include<conio.h>
class first
 {
 public:
 void add(int a, int b)
 {
 cout<<"addition is:"<<a+b<<endl;
 }
};
 class second:public first
 {
 public
 void display ()
  {
  add(10,20);
  }
};
 void main()
  {
  clrscr();
  second s;
  s.display();
  getch();
  }.
```

{Output:- addition is 30}

2. Multiple Inheritance

A class can be derived from more than one base class, then such type of Inheritance is called multiple Inheritance.

It is a process of creating a new class from more than one base class.



The General representation (Syntax)

```
Class A  // base class A
{

};
Class B  // base class B
{

};
Class C: access_mode A, access_mode B // derived class C which is derived from base class A and base class B
{
};
```

// WAP of Multiple Inheritance

```
#include<iostream.h>
#include<conio.h>
class first
{
 public:
void add (int a, int b)
{
cout<<"Addition is"<<a+b<<endl;
}
};
class second
{
public:
void sub(int x, int y)
{
cout<<"substraction is :"<<x-y<<endl;
}
};
class third : public first, public second
{
public:
void mul(int a, int b)
{
cout<<"multiplication is :"<<a*b<<endl;
}
};
void main()
{
clrscr();
third t;
t.add (20,30);
```

```
t.sub(70,40);
t.mul(10,20);
getch();
}
```

(3) Multilevel Inheritance

A Process, deriving a class from another 'derived class'.

The mechanism of deriving a class from another derived class is known as Multilevel Inheritance.

Syntax:

```
Class A
{
----
}
Class B : public A
{
----
};
Class C : Public B {
----
};
```

// WAP of Multilevel Inheritance

```
#include<iostream.h>
#include<conio.h>
class first
{ public:
void add (int a, int b)
{
cout<< "addition is :"<<a+b<< endl;
}
};
class second : public first
{
public:
void sub (int a , int b)
{
cout<<" subtraction is :"<< a-b<< endl;
}
};
class third : public second
{
public:
void mul (int a, int b)
{
cout<<" multiplication is :" << a*b<< endl;
}
};
void main()
{
clrscr();
```

```
third t;
t.add (10,20);
t.sub (20,10);
t.mul (6,7);
getch();
}
```

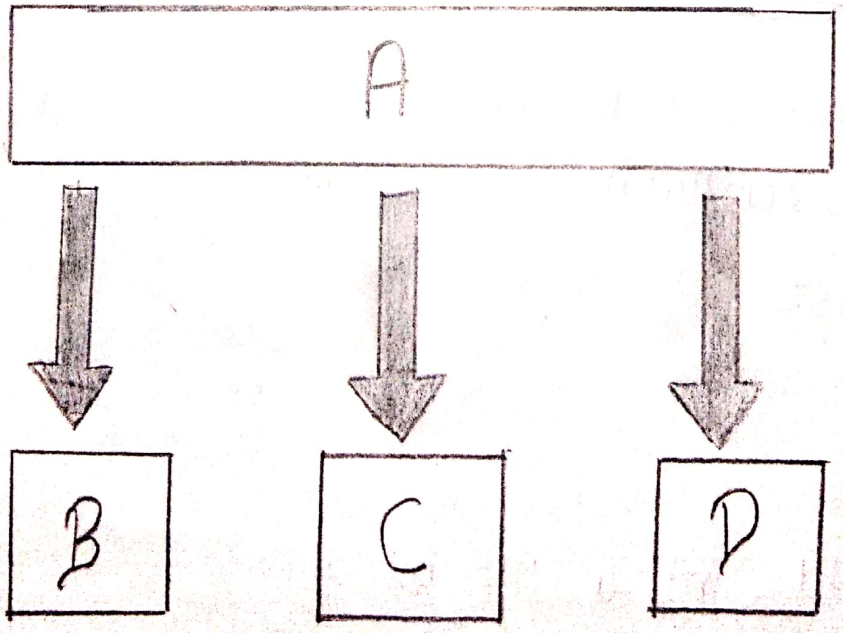
Output:- addition is 30
Subtraction is 10
Multiplication is 42

(4) Hierarchical Inheritance

In this type of Inheritance, multiple derived classes inherits from a single base class.

If more than one class is inherited from the base class, It's known as hierarchical Inheritance

for example:- Dog, Cat, Horse are derived from Animal Class.



Syntax:-

```
Class baseclass
{
----
};
class first_derivedclass : public base_class
{
----
};
class second_clerivedclass : public base_class
{
---
};
class third_derivedclass : public base_class
{
----
};
```

Example // WAP of Hierarchical Inheritance

```
#include<iostream.h>
#include<conio.h>
class first
{
public:
void add (int a, int b)
```

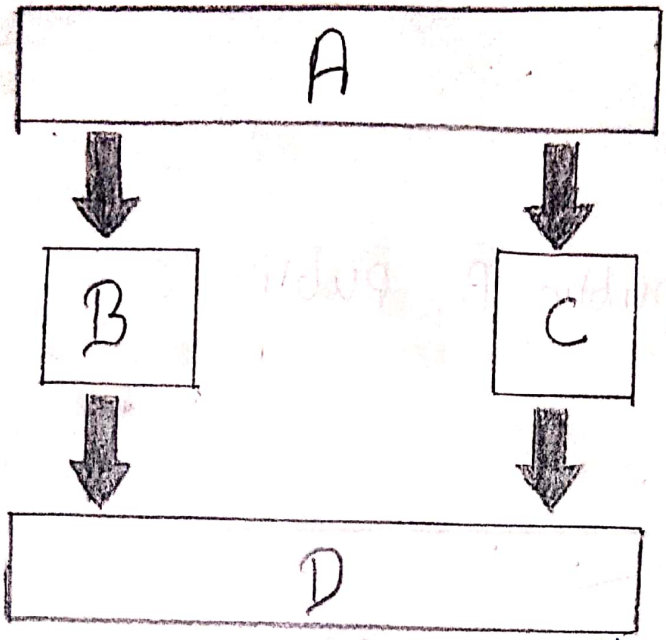
```
{
cout<< "addition is : "<< a+b<< endl;
}
};
class second: public first
{
public:
void sub (int a, int b)
{
cout<< "subtraction is : "<< a-b <<endl;
}
};
class third: public first
{
public:
void mul (int a, int b)
{
cout<< "multiplication is: "<<a*b<< endl;
}
};
class fourth: public first
{
public:
void div(int a, int b)
{
cout<< "division is : "<< a/b<< endl;
};
```

```
void main()
{
clrscr();
first f;
f.add(10,20);
second s;
s.add(3,4);
s.sub(20,10);
third t;
t.add(5,6);
t.mul(7,6);
fourth g;
g.add(1,5);
g.div(4,2);
getch();
}
```

⑤ Hybrid Inheritance:-(Virtual base class / Virtual Inheritance)

Hybrid Inheritance is combination of Hierarchical and Multilevel Inheritance.

It can also be called multi path Inheritance.



In this 'D' has two direct base classes 'B' and 'C', and 'B', 'C' classes have a common Base Class 'A'. The 'D' class inherits the features of 'A' class by two separate paths. The 'A' class is known indirect base class.

Syntax

```
class A
{
 - - - -
};
```

```
class B : public A
{
 ---
};
class C : public A
{
 ---
};
class D : public B, public C
{
 ---
};
```

// WAP of Hybrid Inheritance.

```
#include<iostream.h>
#include<conio.h>
class a
{
public:
    void show()
    {
    cout<<"This is class a";
    }
};
```

```
class b : virtual public a
{
};
class c : virtual public a
{
};
class d : public b , public c
{
};
void main()
{
clrscr();
d Obj;
obj.show();
getch();
}
```

(Output)- This is class a