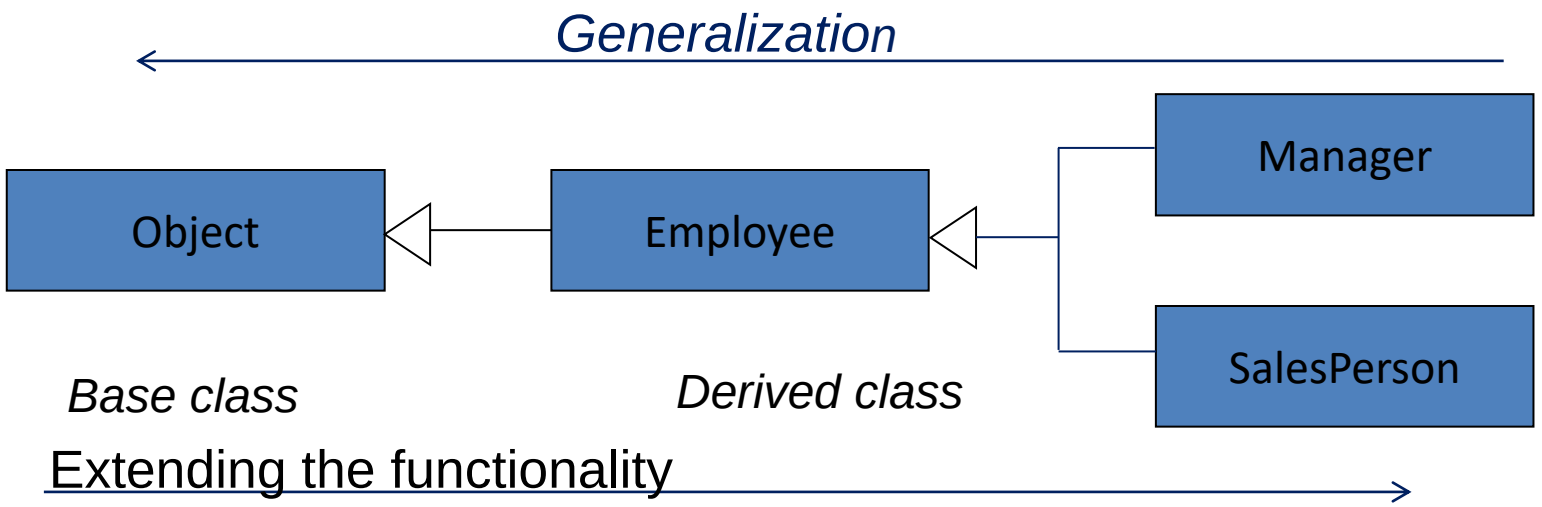
Defining inheritance

- Inheritance is an one of the three foundational features of Object Oriented Programming.
- Inheritance allows to deriving features from one class into another class.
- Inheritance leads to code reusability[write once use many times]
- The class that is inherited is called super class or base class or parent class and the class that is inheriting is called a subclass or derived class or child class.

Syntax

- By default all the C# classes automatically inherit from **`System.Object`** class.
- Syntax: **`class DerivedClass: Base class {.. }`**
- The **`private`** members of base class is not accessible by the inherited class.
- Base class should not be less accessible than derived class.



Order of constructor and destructor call

- The simple example demonstrates the order of constructor and destructor call when creating derived class object.

```
using System;
public class Base{
    static  Base() {
        Console.WriteLine("Base Static Constructor.");
    }
    public Base() {
        Console.WriteLine("Base Constructor.");    }
     ~Base()    {
        Console.WriteLine("Base destroyed");
    }
}
```

```
public class Der : Base{
    static  Der() {
        Console.WriteLine("Der Static Constructor.");
    }
    public Der()   {
        Console.WriteLine("Der Constructor.");
    }
    ~Der()   {
        Console.WriteLine("Der  destroyed");
    }

    public static void Main()   {
        Der child = new Der();
    }
}
```

```
Der Static Constructor.
Base Static Constructor.
Base Constructor.
Der Constructor.
Der  destroyed
Base destroyed
Press any key to continue . . .
```

Calling base class methods

- The **base** keyword can be used to call base class methods from derived class.

```
public class Employee{
….
 public void print()     {
        Console.WriteLine("ID:" + ID + " Name :" +
Name);
     }
}

 class Manager: Employee {
 public void print()
        {
            base.print();
            Console.WriteLine("Level " + level);
```

Protected members

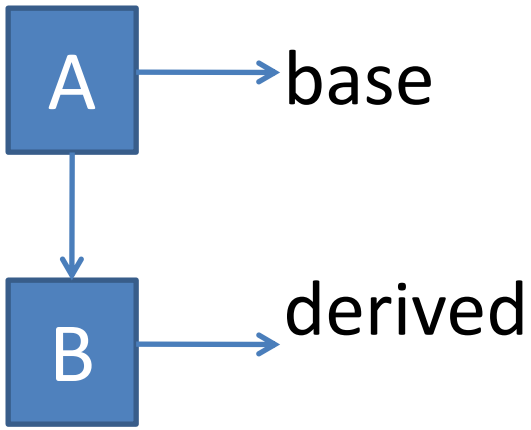
- The protected members of the base class can be accessed only by the base class members as well as the derived class members.

```
public class Employee{
…
    protected void print() {
    Console.WriteLine("ID:"+ id+" Name :"+name);
}}
```

- A protected member of a base class is accessible in a derived class only if the access takes place through the derived class type.

```
class  Manager : Employee{
void f(){
   Employee e= new Employee(1,"ABC");
   e.print();// error
   Manager m = new Manager();
   m.print(); //ok
   print(); //ok
   }
```

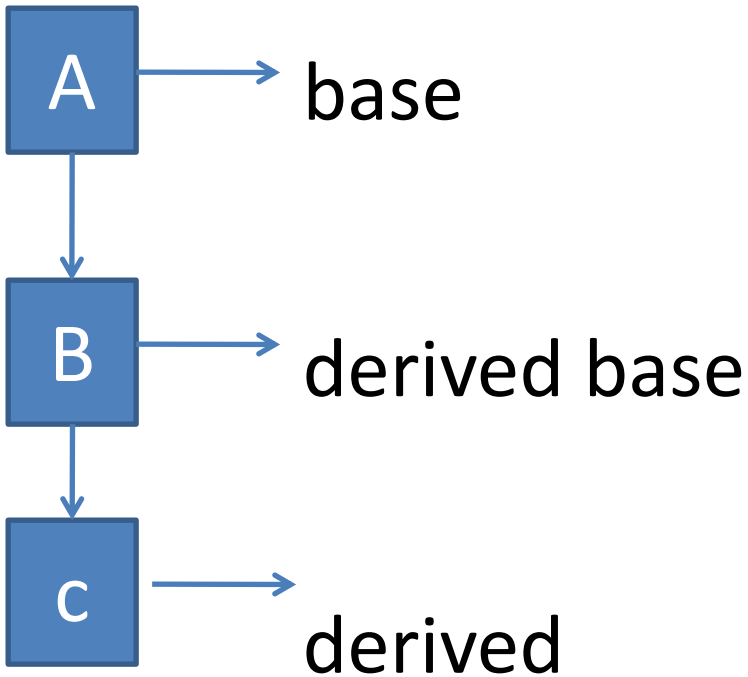
- Types:
- Single Inheritance:




```
Class A
{
}
Class B:A
{
}
```

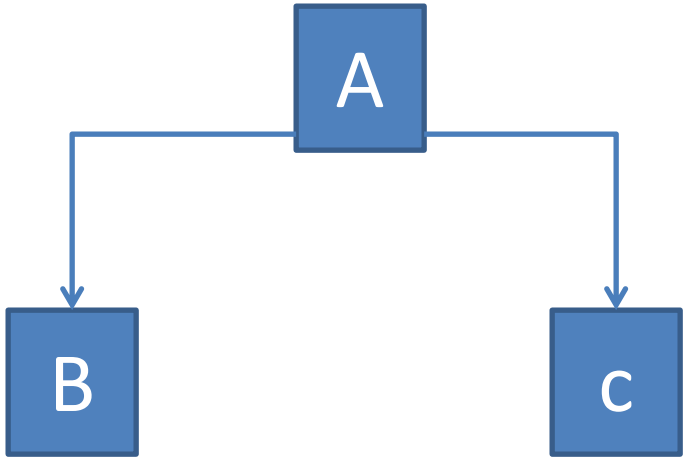
Note: In Inheritance A derived class object Can Access the members of base and derived class

Multilevel Inheritance:



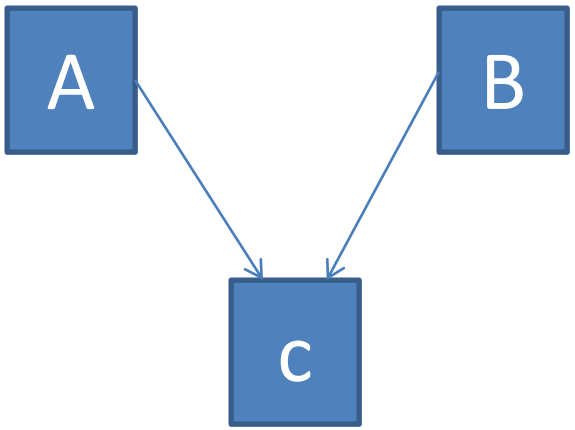

```
Class A
{
}
Class B:A
{
}
Class C:B
{
}
```

Hierarchical Inheritance:




```
Class A
{
}
Class B:A
{
}
Class C:A
{
}
```

Multiple Inheritance:




```
Class A
{
}
Class B
{
}
Class C:A,B
{
}
```

C# does not support Multiple Inheritance