

# Object

**Characteristics of objects are:**

1. State
2. Behaviour

**eg. Marker Pen**

**State**->what the objects have-> colour, size, price, weight

**Behaviour**->what the objects do -> write, throw

**eg. Car**

**State:** What the objects have: Speed, Gear, Direction, Fuel level, Engine temperature

**Behaviour:** Change Gear, Go faster/slower, Go in reverse, Stop, Shut-off

**Student:**

**State:** what the objects have, Student have a first name, last name, age, etc

**Behaviour:** what the objects do, Student attend a course "Software testing"

In the field of java each and everything is consider to be as object.

Object is copy of class or instance class which is having state & behaviour.

where state stands for variable(data member) & behaviour stands for methods(member functions).

# Inheritance

Object-Oriented Programming System(OOPS)

Java programming language is very popular in software industry because of OOPS concept.

**OOPS concept provides 5 important pillars/principles for the language they are**

1. Inheritance
  2. Polymorphism
  3. Encapsulation
  4. Interface
  5. Abstraction
- 

## **Inheritance:**

It is one of the OOPS principle where one class acquires properties of another class with the help of 'extends' keywords is called Inheritance.

The class from where properties are acquiring/inheriting is called super/base/parent class.  
The class too where properties are inherited/delivered is called sub/child class.

Inheritance takes place between 2 or more than 2 classes.

Inheritance is classified into 4 types:

1. Single level Inheritance
2. Multilevel Inheritance
3. Multiple Inheritance
4. hierarchical Inheritance

## **1. Single level Inheritance:**

It is a operation where inheritance takes place between only 2 classes.  
To perform singlelevel inheritance only 2 classes are mandatory.

## **2. Multilevel Inheritance:**

Multilevel Inheritance takes place between 3 or more than 3 classes.

In Multilevel Inheritance 1 sub class acquires properties of another super class & that class acquires properties of its another super class & phenomenon continuous.

Object class: Predefined/Readymade class.

**Note:** Object Class is super most class in java

## **3. Multiple Inheritance:**

1 subclass acquiring properties of 2 super classes at the same time is known as Multiple Inheritance.

Java does not support Multiple Inheritance using class because of "Diamond ambiguity" problem.

**Note:** object class is the super most class in java

By using interface we can achieve Multiple Inheritance.

#### 4. Hierarchical Inheritance:

multiple sub classes can acquire properties of 1 super class is known as hierarchical Inheritance.

```
package Inheritance;
//super/parent/base class
public class Father
{
    public void car()
    {
        System.out.println("Car: kia seltos");
    }

    public void money()
    {
        System.out.println("Money: 1L");
    }

    public void home()
    {
        System.out.println("home: 2 BHK");
    }
}

package Inheritance;
//sub/child class
public class Son extends Father
{
    public void mobile()
    {
        System.out.println("Mobile: Samsung S20");
    }

    // public void car()
    // {
    //     System.out.println("Car: kia seltos");
    // }
    //
    // public void money()
    // {
    //     System.out.println("Money: 1L");
    // }
    //
    // public void home()
    // {
    //     System.out.println("home: 2 BHK");
    // }
}
```

```

package Inheritance;
public class SingleLevelInheritance
{
    public static void main(String[] args)
    {
        Son s=new Son();
        s.mobile();
        s.car();
        s.money();
        s.home();
    }
}

```

## Example2: Multilevel Inheritance

```

package Inheritance;
public class WhatsAppV1
{
    public void textMsg()
    {
        System.out.println("text msg");
    }
}

```

```

package Inheritance;

public class WhatsAppV2 extends WhatsAppV1
{
    public void audioCalling()
    {
        System.out.println("audio calling");
    }

    // public void textMsg()
    // {
    //     System.out.println("text msg");
    // }
}

```

```

package Inheritance;
//sub class
public class WhatsAppV3 extends WhatsAppV2
{
    public void videoCalling()
    {
        System.out.println("video calling");
    }

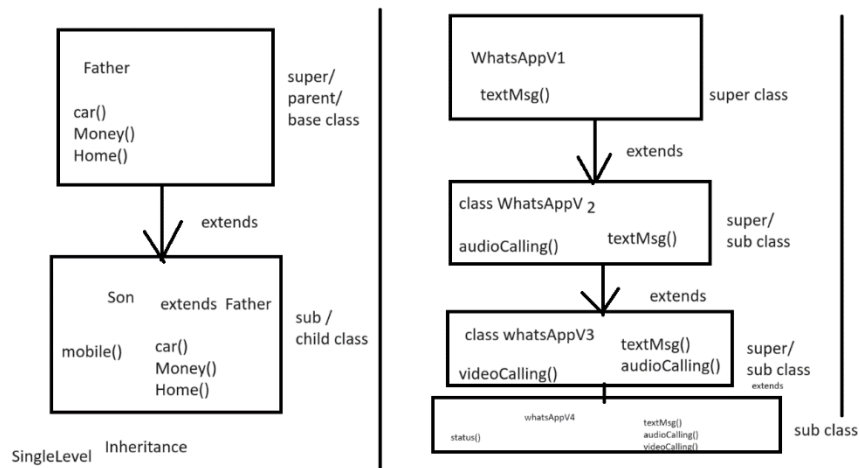
    // public void audioCalling()
    // {
    //     System.out.println("audio calling");
    // }
}

```

```
//      public void textMsg()
//      {
//          System.out.println("text msg");
//      }

}
```

```
package Inheritance;
public class MultiLevelInheritance
{
    public static void main(String[] args)
    {
        WhatsAppV3 v3=new WhatsAppV3();
        v3.textMsg();
        v3.audioCalling();
        v3.videoCalling();
    }
}
```



## Example4: Hierarchical inheritance

```
package Inheritance;
//super/parent/base class
public class Father
{
    public void car()
    {
        System.out.println("Car: kia seltos");
    }

    public void money()
    {
        System.out.println("Money: 1L");
    }

    public void home()
    {
        System.out.println("home: 2 BHK");
    }
}

package Inheritance;
//sub class 1
public class Son1 extends Father
{
    public void mobile()
    {
        System.out.println("Mobile: Samsung S20");
    }

    // public void car()
    // {
    //     System.out.println("Car: kia seltos");
    // }
    //
    // public void money()
    // {
    //     System.out.println("Money: 1L");
    // }
    //
    // public void home()
    // {
    //     System.out.println("home: 2 BHK");
    // }
}

package Inheritance;
//sub class 2
public class Son2 extends Father
{
    public void bike()
    {
        System.out.println("Bike: FZ V3");
    }
}
```

```

    }

    // public void car()
    // {
    //     System.out.println("Car: kia seltos");
    // }
    //
    // public void money()
    // {
    //     System.out.println("Money: 1L");
    // }
    //
    // public void home()
    // {
    //     System.out.println("home: 2 BHK");
    // }
}

```

```

package Inheritance;
//sub class 3
public class Son3 extends Father
{
    public void laptop()
    {
        System.out.println("Laptop: HP");
    }

    // public void car()
    // {
    //     System.out.println("Car: kia seltos");
    // }
    //
    // public void money()
    // {
    //     System.out.println("Money: 1L");
    // }
    //
    // public void home()
    // {
    //     System.out.println("home: 2 BHK");
    // }
}

```

```

package Inheritance;
public class Example4_HirarchicleInheritancer
{
    public static void main(String[] args)
    {
        System.out.println("----Features of Son1----");
        Son1 s1=new Son1();
        s1.mobile();
        s1.car();
        s1.money();
        s1.home();

        System.out.println("----Features of Son2----");
        Son2 s2=new Son2();
    }
}

```

```
s2.bike();
s2.car();
s2.money();
s2.home();

System.out.println("---Features of Son3---");
Son3 s3=new Son3();
s3.laptop();
s3.car();
s3.car();
s3.home();
    }
}
```