List of Concepts Involved:

- Inheritance introduction
- extends keyword
- Types of Inheritance
- Important key points (5 key points)
- Types of methods Inherited, overridden, specialised
- Rules to override method
- Constructor execution in case of Inheritance

Inheritance Introduction

- It is one of the pillars of Object Orientation.
- It always speaks about reusability.
- Using inheritance productivity of the code can be improved.
- If we use inheritance, lines of code can be reduced in the application.
- In java inheritance is achieved through the "extends" keyword.

Extends keyword

If we use extends keyword, then we can take the properties and behaviours from parent class to child class.

Example

```
class Parent{
    public void methodOne(){System.out.println("methodOne from parent");}
}
class Child extends Parent{
    public void methodTwo(){System.out.println("methodTwo from child");}
 }
 public class TestApp{
        public static void main(String... args){
               Parent p=new Parent();
                p.methodOne();

               Child c=new Child();
                c.methodOne();
                  c.methodTwo();

        }
 }
```

Output

```
methodOne from parent
methodOne from parent
methodOne from child
```

Note:

- Whatever is there in the Parent class by default would be available to the Child class.
- Whatever is there in the Child class by default won't be available to the Parent class.
- On Child reference we can call both Parent class and Child class methods whereas using Parent reference we can call only Parent class methods.

Loan activities

The common methods which are required for HousingLoan,EducationLoan,VehicleLoan are defined in separate class Loan class and it can be reused so that production cost can be increased effectively and time consumption for building projects can be reduced.

Example

```
class Loan{
     //common methods for every type of  loan is written here
}
class VehicleLoan extends Loan{
    //specific methods for VehicleLoan is written here
}
class EducationLoan extends Loan{
   //specific methods for EducationLoan is written here
}
class HomeLoan extends Loan{
   //specific methods for EducationLoan is written here
}
```

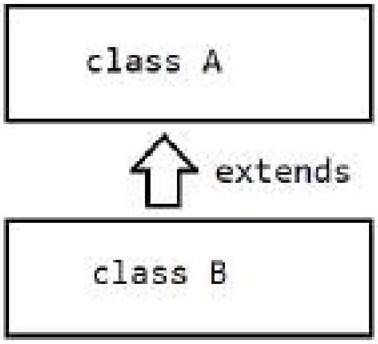
Types of inheritance in java

- Single-level inheritance
- Multi-level Inheritance
- Hierarchical Inheritance
- Multiple Inheritance
- Hybrid Inheritance

Single-Level Inheritance

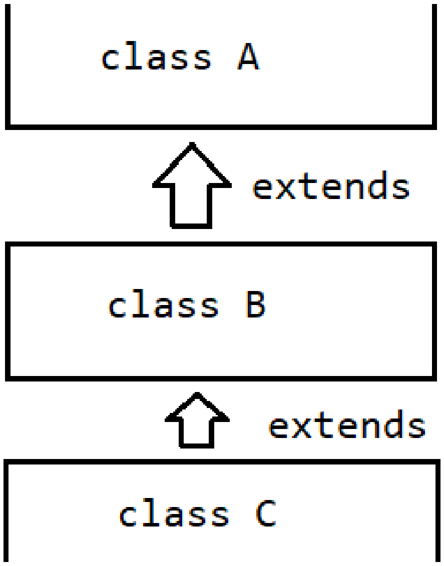
As the name suggests, this type of inheritance occurs for only a single class. Only one class is derived from the parent class. In this type of inheritance, the properties are derived from a single parent class and not more than that. As the properties are derived from only a single base class the reusability of a code is facilitated along with the addition of new features.

The flow diagram of a single inheritance is shown below:



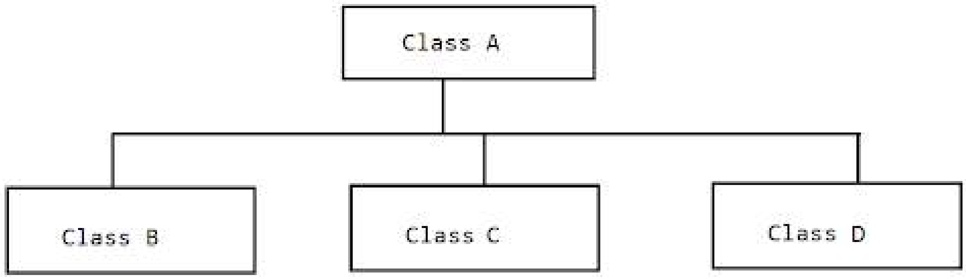
MultiLevel Inheritance

- The multi-level inheritance includes the involvement of at least two or more than two classes.
- One class inherits the features from a parent class and the newly created sub-class becomes the base class for another new class.
- As the name suggests, in the multi-level inheritance the involvement of multiple base classes is there.
- In the multilevel inheritance in java, the inherited features are also from the multiple base classes as the newly derived class from the parent class becomes the base class for another newly derived class.



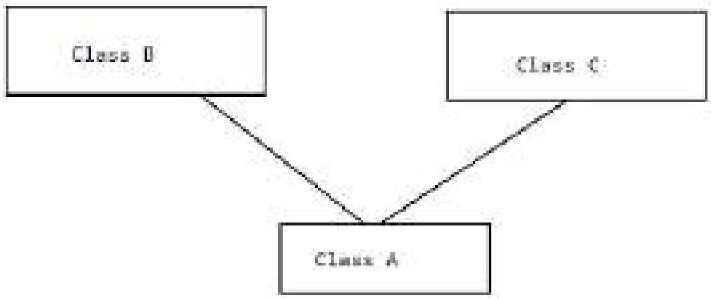
Hierarchical Inheritance

- The type of inheritance where many subclasses inherit from one single class is known as Hierarchical Inheritance.
- Hierarchical Inheritance a combination of more than one type of inheritance.
- It is different from the multilevel inheritance, as the multiple classes are being derived from one superclass.
- These newly derived classes inherit the features, methods, etc, from this one superclass.
- This process facilitates the reusability of a code and dynamic polymorphism (method overriding).



Multiple inheritance

- Multiple inheritance is a type of inheritance where a subclass can inherit features from more than one parent class.
- Multiple inheritances should not be confused with multi-level inheritance, in multiple inheritances the newly derived class can have more than one superclass.
- And this newly derived class can inherit the features from these superclasses it has inherited from, so there are no restrictions.
- In java, multiple inheritance can be achieved through interfaces.



Hybrid Inheritance

- Hybrid inheritance is a combination of more than two types of inheritances, single and multiple.
- It can be achieved through interfaces only as multiple inheritance is not supported by Java.
- It is basically the combination of simple, multiple, hierarchical inheritances.

Note

- All the common methods which every java class needs is a part of the Object class, because the Object class is the parent class for all the inbuilt classes in java.
- For all Exception and Error commonly required methods is a parent of "Throwable",hence Throwable is parent class for all "Exception and Error".

Types of Methods in Inheritance

1. Inherited
2. Overridden
3. Specialized