Java week 7

**Inheritance in Java Programming**

**Inheritance is** the process by which one class acquires the properties(data members) and functionalities(methods) of another class.

The aim of inheritance is to provide the reusability of code so that a class has to write only the unique features and rest of the common properties and functionalities can be extended from the another class.

**The child Class.**

The class that extends the features of another class is known as child class, sub class or derived class.

**Parent Class:**  
The class whose properties and functionalities are used(inherited) by another class is known as parent class, super class or Base class.

**The data members(instance variables) and methods of the parent class can be used in the child class.**

## Types of inheritance

**Single Inheritance**: refers to a child and parent class relationship where a class extends the another class.

[Multilevel inheritance](https://beginnersbook.com/2013/12/multilevel-inheritance-in-java-with-example/): refers to a child and parent class relationship where a class extends the child class. For example class C extends class B and class B extends class A.

[Hierarchical inheritance](https://beginnersbook.com/2013/10/hierarchical-inheritance-java-program/): refers to a child and parent class relationship where more than one classes extends the same class. For example, classes B, C & D extends the same class A.

**Multiple Inheritance**: refers to the concept of one class extending more than one classes, which means a child class has two parent classes. For example class C extends both classes A and B. Java doesn’t support multiple inheritance, read more about it [here](https://beginnersbook.com/2013/05/java-multiple-inheritance/).

[Hybrid inheritance](https://beginnersbook.com/2013/10/hybrid-inheritance-java-program/): Combination of more than one types of inheritance in a single program. For example class A & B extends class C and another class D extends class A then this is a hybrid inheritance example because it is a combination of single and hierarchical inheritance

## Constructors and Inheritance

[constructor](https://beginnersbook.com/2013/03/constructors-in-java/) of sub class is invoked when we create the object of subclass, it by default invokes the default constructor of super class. Hence, in inheritance the objects are constructed top-down. The superclass constructor can be called explicitly using the [super keyword](https://beginnersbook.com/2014/07/super-keyword-in-java-with-example/), but it should be first statement in a constructor.

# Super keyword

The super keyword refers to the objects of immediate parent class.

## The use of super keyword

1) To access the data members of parent class when both parent and child class have member with same name  
2) To explicitly call the no-arg and parameterized constructor of parent class  
3) To access the method of parent class when child class has overridden that method.

### How to use super keyword to access the variables of parent class

When you have a variable in child class which is already present in the parent class then in order to access the variable of parent class, you need to use the super keyword.

When a child class declares a same method which is already present in the parent class then this is called [method overriding](https://beginnersbook.com/2014/01/method-overriding-in-java-with-example/).

When a child class overrides a method of parent class, then the call to the method from child class object always call the child class version of the method. However by using super keyword like this: super.method\_name you can call the method of parent class (the method which is overridden). In case of method overriding, these terminologies are used: Overridden method: The method of parent class Overriding method:

# What is Aggregation in java?

# Aggregation in Java is a relationship between two classes that is best described as a "has-a" and "whole/part" relationship. It is a more specialized version of the association relationship. The aggregate class contains a reference to another class and is said to have ownership of that class

# LAb

You are asked to design a program to help run a motorcycle race where pilote can choose the type of bikes they want.

Every Motorcycle has a Color and a speed. There are two types of motorcycles: mountain motorcycles and regular motorcycles each motor cycle must be assigned a Pilot.  
In addition to the gear and speed that regular motorcycles have, mountain motorcycles also have a minimum height where they become more powerful than the regular motorcycles.create a base class \*MotorCycle\* with fields : \*Color gear and int speed\* the MotorCycle class has one constructor to initialize Color and speed, also the MotorCycle class has two methods : \*void applyBrake(int decrement)\* to decrement speed and \*speedUp(int increment)\* to increment speed.