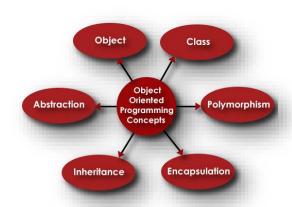
OOP'S CONCEPT IN JAVA

- Object-oriented programming System(OOPs) is a programming concept that is based on "objects".
- It allows users to create objects they want and create methods to handle those objects.
- The basic concept of OOPs is to create objects, re-use them throughout the program, and manipulate these objects to get results.
- The main principles of object-oriented programming are abstraction, encapsulation, inheritance, and polymorphism. These concepts aim to implement real-world entities in programs.

OOPs (Object-Oriented Programming System)

It simplifies software development and maintenance by providing some concepts:

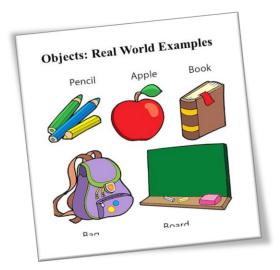
- 4 Object
- 📤 Class
- Inheritance
- Polymorphism
- Abstraction
- Encapsulation



Object

- Any entity that has state and behavior is known as an object.
- For example, a chair, pen, table, keyboard, bike, etc. It can be physical or logical.
- An Object can be defined as an instance of a class.
- An object contains an address and takes up some space in memory.
- Objects can communicate without knowing the details of each other's data or code.
- The only necessary thing is the type of message accepted and the type of response returned by the objects.

Example: A dog is an object because it has states like color, name, breed, etc. as well as behaviors like wagging the tail, barking, eating, etc.



Class

- Collection of objects is called class. It is a logical entity.
- A class can also be defined as a blueprint from which you can create an individual object. Class doesn't consume any space.

❖ Inheritance

- When one object acquires all the properties and behaviors of a parent object, it is known as inheritance.
- It provides code reusability.
- It is used to achieve runtime polymorphism.

Polymorphism

- If one task is performed in different ways, it is known as polymorphism.
 For example: to convince the customer differently, to draw something,
 for example, shape, triangle, rectangle, etc.
- In Java, we use method overloading and method overriding to achieve polymorphism.
- Another example can be to speak something; for example, a cat speaks meow, dog barks woof, etc.

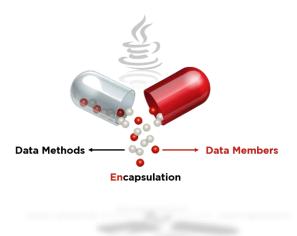


Abstraction

- Hiding internal details and showing functionality is known as abstraction. For example phone call, we don't know the internal processing.
- In Java, we use abstract class and interface to achieve abstraction.

Encapsulation

- Binding (or wrapping) code and data together into a single unit are known as encapsulation. For example, a capsule, it is wrapped with different medicines.
- A java class is the example of encapsulation. Java bean is the fully encapsulated class because all the data members are private here.



Coupling

- Coupling refers to the knowledge or information or dependency of another class.
- It arises when classes are aware of each other.
- If a class has the details information of another class, there is strong coupling. In Java, we use private, protected, and public modifiers to display the visibility level of a class, method, and field.
- You can use interfaces for the weaker coupling because there is no concrete implementation.

Cohesion

- Cohesion refers to the level of a component which performs a single well-defined task.
- A single well-defined task is done by a highly cohesive method.
- The weakly cohesive method will split the task into separate parts.
- The java.io package is a highly cohesive package because it has I/O related classes and interface.
- However, the java.util package is a weakly cohesive package because it has unrelated classes and interfaces.

Association

Association represents the relationship between the objects. Here, one object can be associated with one object or many objects. There can be **four types** of association between the objects:

- One to One
- One to Many
- Many to One, and
- Many to Many

Aggregation

- Aggregation is a way to achieve Association.
- Aggregation represents the relationship where one object contains other objects as a part of its state.
- It represents the weak relationship between objects.
- It is also termed as a has-a relationship in Java.
- Like, inheritance represents the is-a relationship. It is another way to reuse objects.