

Object-Oriented Programming (OOP)

Object-Oriented Programming (OOP) Concepts

1. Objects:

- Objects are the basic building blocks of OOP.
- They encapsulate data (attributes) and behaviors (methods).
- Objects are instances of classes.

2. Classes:

- Classes serve as blueprints for creating objects.
- They define the properties and behaviors that objects of that class will have.
- Classes promote code reusability and organization.

3. Encapsulation:

- Encapsulation is the bundling of data and methods that operate on the data within a class.
- It hides the internal state of an object and only exposes the necessary functionalities to interact with it.
- Encapsulation helps in achieving data abstraction and information hiding.

4. Inheritance:

- Inheritance allows a class to inherit properties and behaviors from another class (superclass or base class).
- It promotes code reusability and establishes a hierarchical relationship between classes.
- The subclass (derived class) can extend or override the functionalities of the superclass.

5. Polymorphism:

- Polymorphism allows objects to be treated as instances of their superclass.
- It enables a single interface to represent different data types or objects.
- Polymorphism can be achieved through method overriding and method overloading.

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6. Abstraction:

Concepts

- Abstraction focuses on showing only essential features of an object while hiding unnecessary details.
- It allows programmers to work with high-level concepts without worrying about implementation complexities.
- Abstraction helps in managing program complexity and improving code maintainability.

7. Association:

- Association represents a relationship between two or more classes where each class is independent of the other.
- It can be one-to-one, one-to-many, or many-to-many.
- Association is a fundamental concept in OOP modeling.

8. Encapsulation:

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Understanding these core Object-Oriented Programming concepts is essential for designing robust, scalable, and maintainable software applications.