

Introduction to C Plus Plus

Module 1 - Procedure Oriented Programming and Object Oriented Programming



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POP (Procedure Oriented Programming)

COBOL, FORTRAN and C are such programming language which commonly called POP based languages.

Basic approach / concept of POP:

- In this approach for any requirement, sequence of reading, calculating and printing instructions are grouped in a unit called procedure (function or sub routine or method).
- For each requirement, a new procedure is created. In this way, a single program is oriented by a number of procedures.
- Such approach for designing program is called POP (Procedure Oriented Programming) and programming language that follow this approach called POP language like C.

Drawbacks of POP:

1. A procedure can also use global data that does not need and affect result of program.
2. For real world application, POP becomes fail. Because large scale program cannot be developed properly.

OOPs (Object Oriented Programming)

OOPs is a new approach to design a real world program and secure global data. C++, Java and C# are OOPs based languages.

Basic approach / concept of OOPs:

- Everything is considered in the form of object and they are identified on the basis of their properties.
- Objects of any class can be communicated to each other called message passing in OOPs.

Characteristics of OOPs:

1. Class
2. Objects
3. Data encapsulation
4. Data abstractions



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- 5. Inheritance
- 6. Polymorphism
- 7. Dynamic binding
- 8. Message passing

Any programming language that support all above properties called OOPs based language like C++, Java and C#.

1. Class

- A class is a blueprint or template for creating objects.
- User defined data type of object called class.
- It defines the structure (data) and behavior (functions) of an object.
- Think of it like a recipe for a cake: it tells you what ingredients (data) and steps (functions) to follow.

2. Objects

- An **object** is an instance of a class.
- It's like the actual cake made using the recipe (class). Each object has its own copy of the class's data.

3. Data Encapsulation

- Encapsulation means **hiding the internal details** of an object and only exposing what is necessary.
- The data (variables) inside a class can only be accessed through functions (methods).

Why it's important?

- It protects data from being accidentally modified.
- Think of it like a bank account: you can't access the database directly, but you can use an ATM to interact with it.

4. Data Abstraction

- Abstraction means **hiding unnecessary details** and showing only the essential features.
- It allows users to focus on what an object does, rather than how it does it.

Example:

When you drive a car, you don't need to know how the engine works. You just need to know how to start it and drive.

5. Inheritance

- **Inheritance** allows a class (child class) to use properties and methods of another class (parent class).
- It promotes code reuse and makes it easy to extend functionality.

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6. Polymorphism

- **Polymorphism** means "many forms."
- It allows one function, operator, or object to behave differently in different contexts.
- Think of a single word having different meanings based on context, like "run" (can mean jogging or running a program).

7. Dynamic Binding

- **Dynamic binding** means the code to be executed is decided at runtime.
- It's often used in polymorphism to determine which method to call based on the object type.

8. Message Passing

- Objects communicate with each other by **calling methods**.
- This is similar to sending a message where one object requests an action from another.

Advantages of OOPs:

1. **Data Hiding:** Private data of the class can't be accessed from outside.
2. **Security of data:** Data of the class can be accessed as a private, protected and public. Private for same class, protected for derived too and public for anywhere.
3. **Reusability:** Using inheritance, members of old class can be used into new class.
4. **Easy development:** Large size of real world application can be easily developed.
5. **Easy to debug:** All classes can be debugged separately



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