

OOP :- OOP stands for Object-Oriented Programming. As the name suggests uses objects in Programming. Object-Oriented programming aims to implement real world entities like inheritance, Polymorphism etc in Programming.

The Primary Purpose of C++ Programming was to add object orientation to the C Programming language which is in itself one of the most powerful Programming languages.

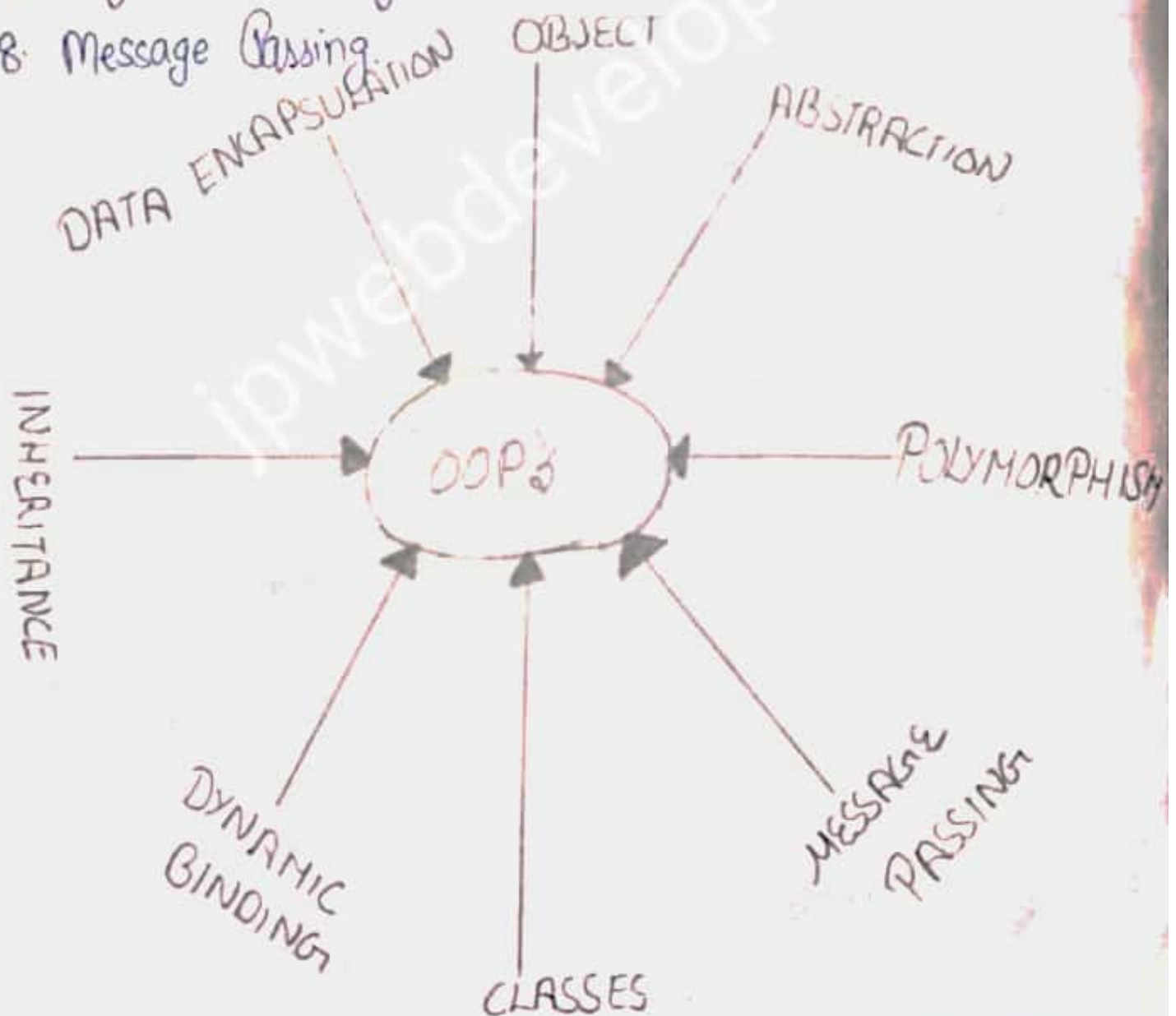
Features of Object Oriented Programming:-

- ⇒ Programs are divided into units called "Objects".
- ⇒ Emphasis on data rather procedure.
- ⇒ Objects used to Communicate with each other through functions.
- ⇒ New functionality can be easily added whenever necessary.
- ⇒ follows bottom-up design in Program design.
- ⇒ Data is hidden and cannot be accessed by external functions.

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Basic Concepts or elements or Components of OOP:-

1. Object
2. Classes
3. Inheritance
4. Polymorphism
5. Data Encapsulation
6. Abstraction
7. Dynamic Binding.
8. Message Passing



Notes by:- ipwebdevelopers.in

2 Classes

Notes by - jprabdevlop012-in

- * Collection of Objects is called class. It has no Physical Collection and Occupy no memory.
- * A class is way to bind ^{the} data and its associated functions together.
- * Once a class defined, we can create any number of objects belonging to that class.
- * A Class can defined unlimited number of Objects.
- * for example:- apple, mango and Orange members of class fruit.
- * It can be represented as:-

class name obj1, obj2 objn;

→ here obj1, obj2 ... objn are different objects of similar class.

⇒ If fruit has been defines as a class, then the statement

Fruit Mango;
↑ ↑
class object

Create an object Mango, belonging to class fruit.

3. Inheritance

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To derive a new class from existing one is called Inheritance.

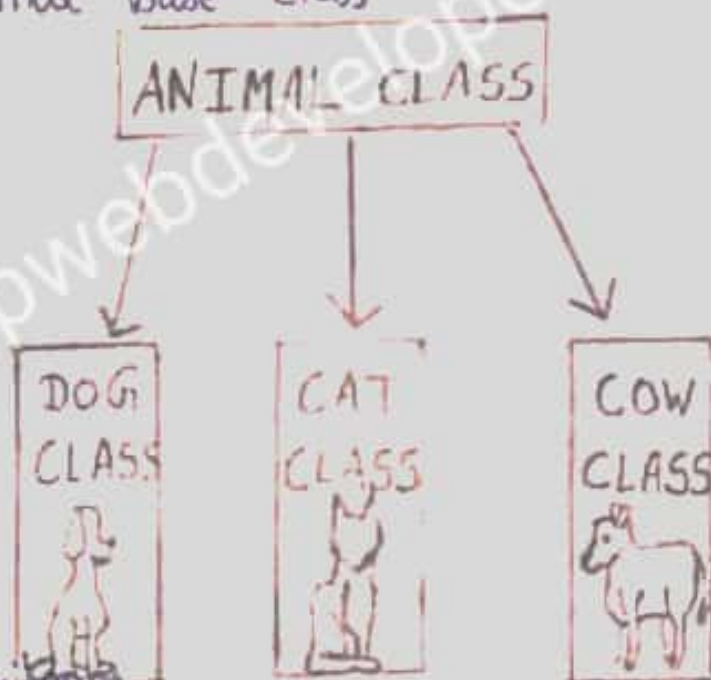
→ New class is also known as sub class or derive class.

→ Old class is also known as ~~super~~ class or base class.

It is in hierarchical Order.

Inheritance is one of the most important features of Object-Oriented Programming.

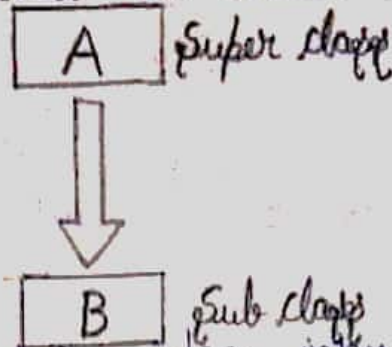
for example: Dog, Cat, Cow can be derived Class of Animal Base class



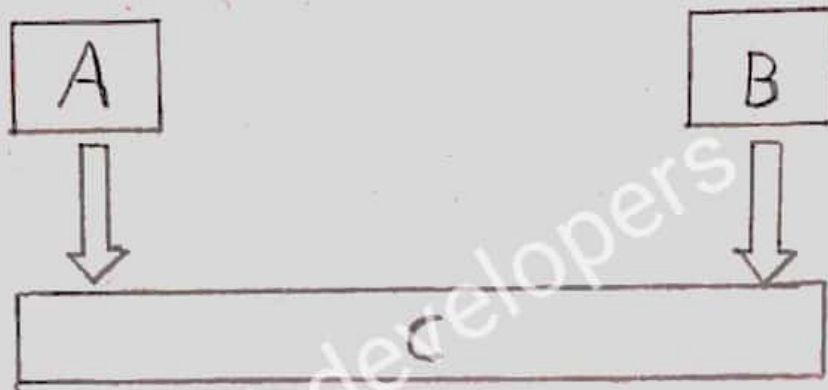
Types of Inheritance

1. Single Inheritance
2. Multiple Inheritance
3. Multilevel Inheritance.
4. Hybrid Inheritance.
5. Hierarchical Inheritance.

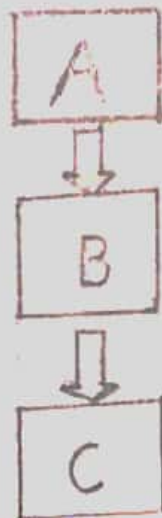
① Single Inheritance:- To derive a class from an existing base class is called Single Inheritance.



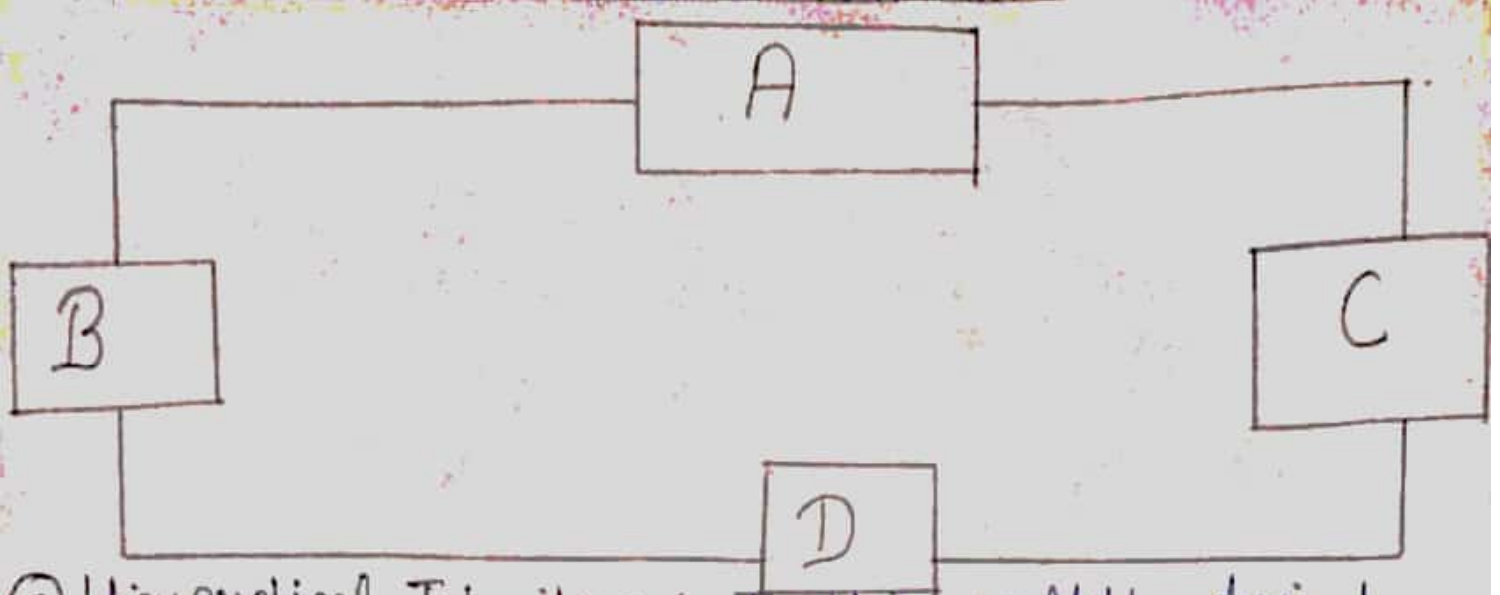
② Multiple Inheritance:- To derive class inheriting from multiple base class is called multiple Inheritance.



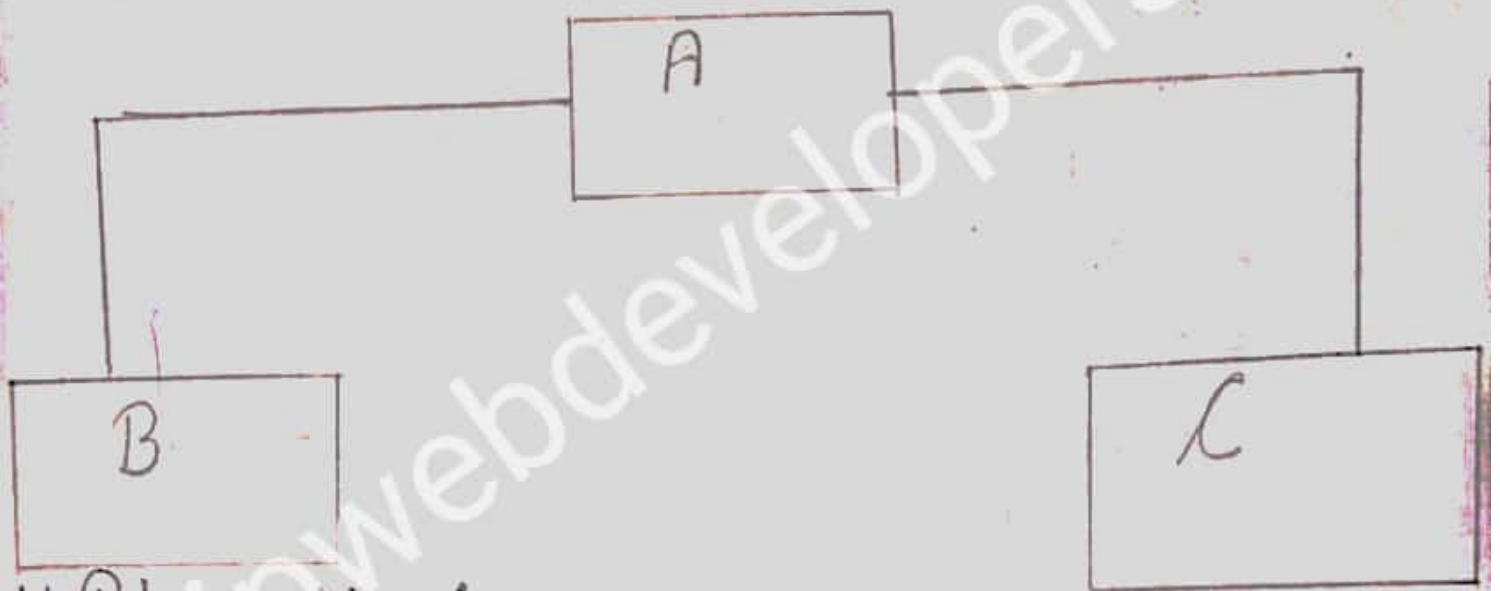
③ Multilevel Inheritance:- To derived class inheriting from a class that inherits from another class is called multilevel Inheritance.



④ Hybrid inheritance:- Hybrid inheritance is Combination of Hierarchical and Multilevel Inheritance.



⑤ Hierarchical Inheritance :- In this, multiple derived classes inherits from a single base class.



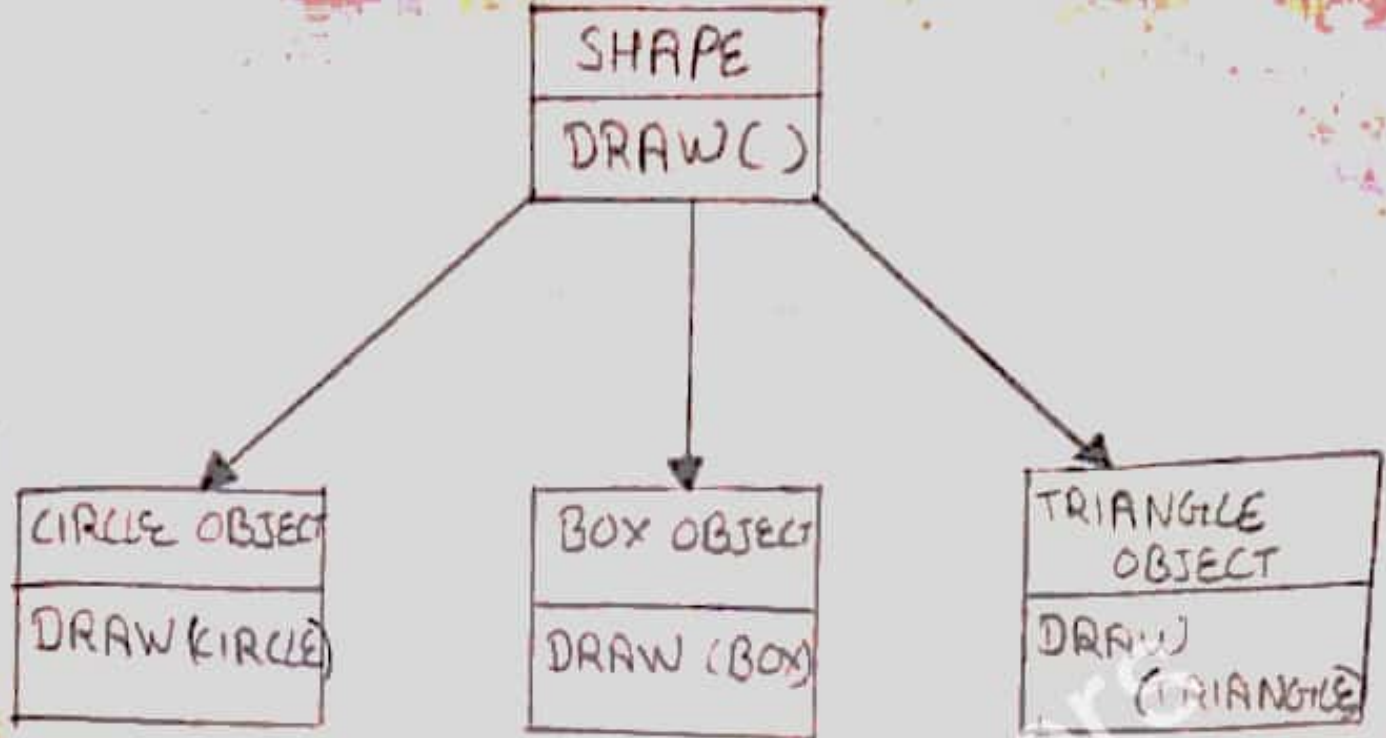
④ Polymorphism :-

* Polymorphism is another important OOP concept.

* In Greek term, Poly means 'many' and 'morphism' means 'forms'. and thus Polymorphism means 'many forms'.

* It is ability to take many shapes or forms.

* It is very close to Inheritance.



* Polymorphism has overloading and virtual function classifications

⇒ Virtual function can be simple virtual function and pure virtual function.

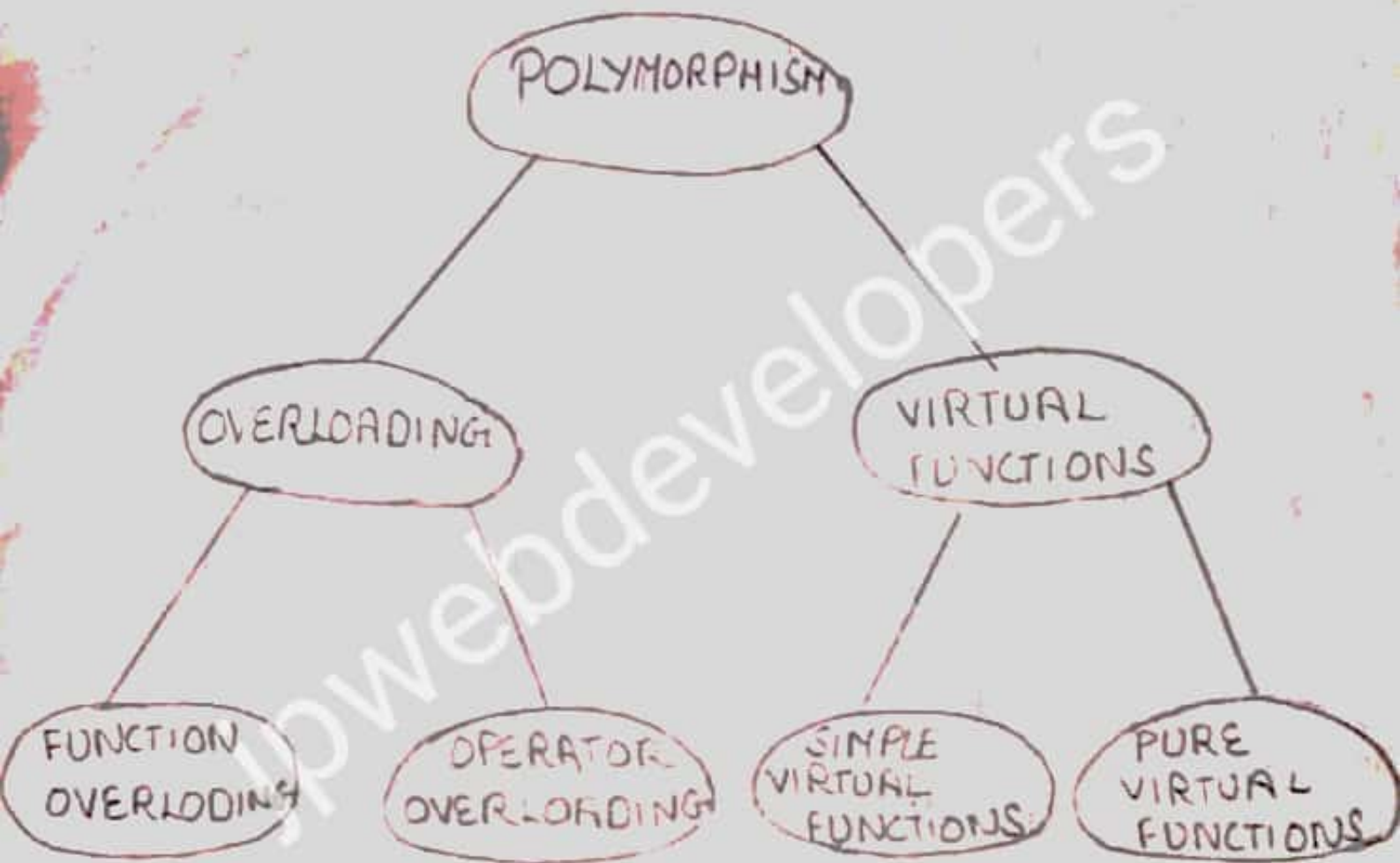
⇒ Overloading is of two types:- function overloading and operator overloading. Like unary operator overloading, arithmetic operator overloading, assignment operator overloading and binary operator overloading.

* For Example:- if '+' is an operator, then it can be used for two different forms.

⇒ firstly it can concatenate two different strings "Palvi" and "Arora" as "Palvi" + "Arora" and create a string "Palvi Arora".

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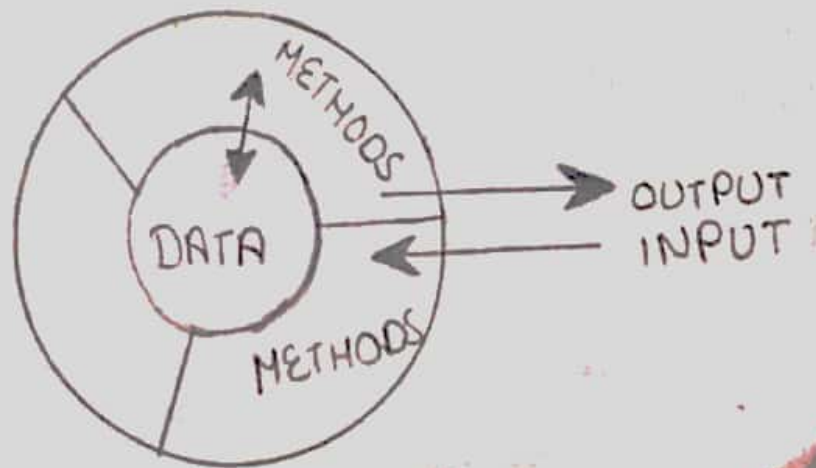
⇒ Second, "+" operator can be used to find the sum of two different integer values.
4+3 result is 7.



The keyword "Virtual" is used to polymorphism concept in C++.

5. Encapsulation (Data Encapsulation):

- * The Wrapping up of data and functions into a single unit known as encapsulation.
- * The data is not accessible to the outside world and only those functions which are wrapped in the class can access it.
- * These functions provide the interface between the Object's data and Program.
- * Encapsulation is used to apply the Principle of data hiding.
- * It is also known as data hiding or Information hiding.
- * With encapsulation, all of methods in an object can get the data, and Protected from outside access.



6. Abstraction and Data Abstraction

* Abstraction is one of the Powerful Concept of OOPs.

It is very close to Encapsulation.

* Abstraction refers to the act of representing essential features without including the background details and explanations.

⇒ It means displaying only essential information and hiding the details.

* For Example: Phone call, we don't know the internal processing.

* There are two types of Abstraction:-

1. Procedural Abstraction.
2. Data Abstraction.

7. Binding:- Binding means linking. There are two types of Binding.

(i) Static Binding.

(ii) Dynamic Binding.

(i) Static Binding:- The Code associated with a given procedure is known at compile time.

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It is also known as early Binding.

- ⇒ Static Binding is less reliable.
- ⇒ In this, Program execution is fast.
- ⇒ Example: function Overloading, Operator Overloading.
- ⇒ Events Occurs at Compile time are "Static Binding".

(ii) Dynamic Binding:-

In dynamic Binding, the code associate with a given procedure is known at run time.

- ⇒ It is also known as Late Binding.
- ⇒ Program execution is little slow.
- ⇒ Dynamic Binding is more reliable.
- ⇒ Example: Virtual function.

(8) Message Passing:-

Message Passing is nothing but sending and receiving of information by the objects same as people exchange information.

* It is a method by which an objects sends data to another object or requests other objects to invoke (call) method. This is also known as Interfacing.

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