

FAST

National University of Computer and Emerging Sciences Peshawar

Lecture # 09

Software Construction and Development (Java Programming)

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Object Oriented Programming Concepts

Contents

- 1) Object Oriented Programming
- 2) Encapsulation
- 3) Data Hiding
- 4) Classes and objects
- 5) Inheritance
- 6) Polymorphism
- 7) Abstraction

Object Oriented Programming (OOP)

OOP is mythology or paradigm to design a program using class and object.

OOP is paradigm that provides many concepts such as:

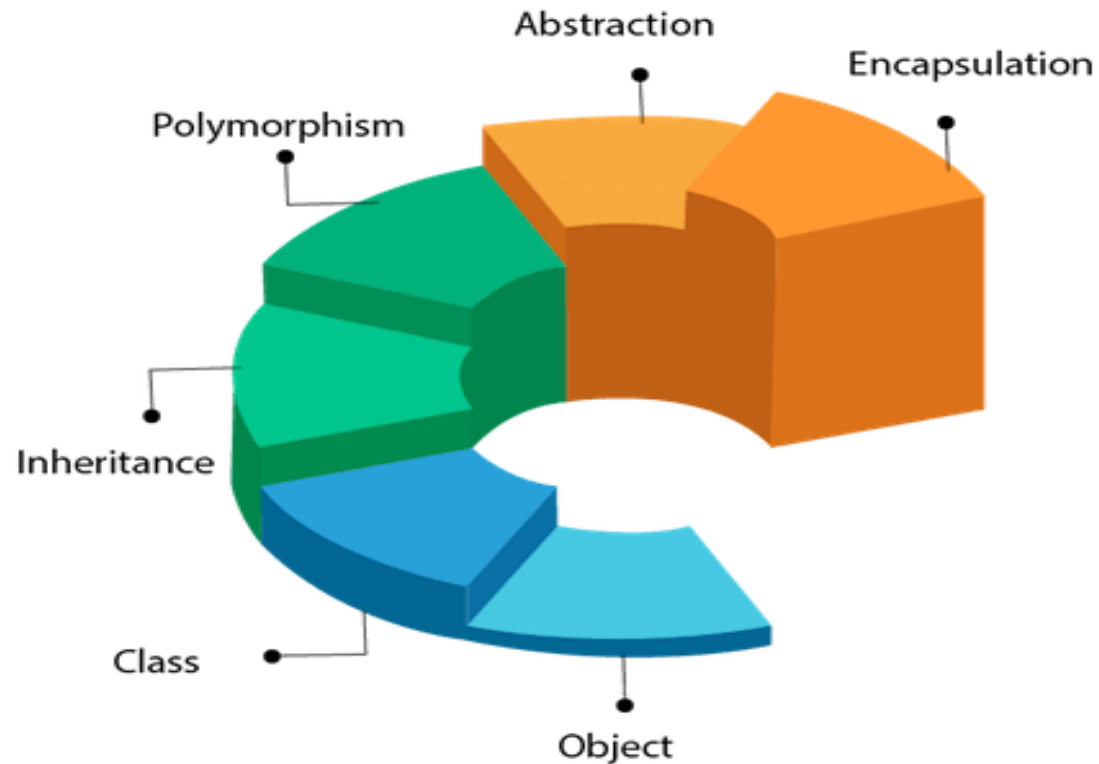
- Class and objects
- Inheritance
- Modularity
- Polymorphism
- Encapsulation (binding code and its data) etc.
- Paradigm نمونه

Object Oriented Programming (OOP)...

- ❖ OOP is used to reduce complexity.
- ❖ To divide large and complex program into chunks and modules.

Object Oriented Programming (OOP)...

OOPs (Object-Oriented Programming System)

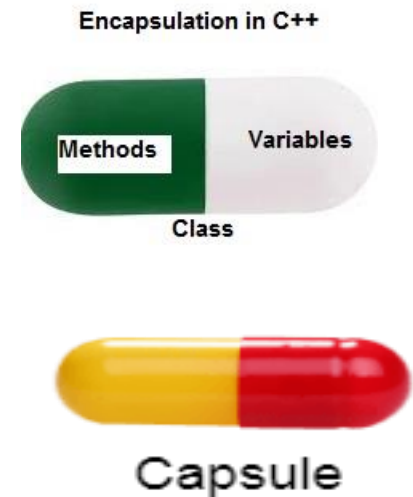


Why OOP ?

Real world implementation.

Encapsulation

- Data and behaviour (function) are tightly coupled inside an object.
- Combine data (variables) and functions in a single container.
- The combining of both data and functions into a single unit.
- To combine code functions and data (variables) in a single box or wrapper.
- In java class is the example of encapsulation.
- **Capsule:** It is wrapped with different medicines.



Data Hiding

- ❖ Means you cannot access data.
- ❖ Making data to be accessed from within the class.

Access Specifier

- ❖ It specifies that member of a class is accessible outside or not.
- ❖ It may be public, protected or private or default.

Class

- ❖ Class is blue print or map for object.
- ❖ Class is the logical construct of object.
- ❖ Class is the description of object.
- ❖ Class is a template which contains behaviour (member functions) and attributes/properties (data/variables) of object.

Class...

- ❖ Means data members and member functions are defined within a class.
- ❖ Class is user defined data type because user defined it (non primitive data type).
- ❖ **Attribute:** Properties object has.
- ❖ **Methods:** Actions that an object can perform.

Object

- ❖ An entity that has state and behaviour.
- ❖ An actual existence of a class is called object.
- ❖ Object encapsulates data and behaviour.
- ❖ When a class template is implemented in real world then it becomes an object.

Object

- ❖ Object is the instance of the class.
- ❖ Class is the template or blue print from which objects are created, so object is the **instance (result) of the class**.
- ❖ The space reserved in memory for class is called an object. Instance of a class. (Instance---→ Single occurrence)

Object...

- ❖ Object is used to perform responsibility of communication between different classes.
- ❖ 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.

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.

Object...



Class VS Object

❖ **Class:** No data

❖ **Object:** Having Data

Member data and member function

Member data or data members: The data or the attributes defined within a class is called member data.

Member Function: The functions that are used to work on the data items are called member functions.

Member functions are used to process and access data members of an object.

Member functions are functions that are included within the class.

Inheritance

- ❖ The mechanism in which one class acquires all the properties and behavior of another class is called inheritance.
- ❖ Including features of one class into another class is called inheritance.
- ❖ *When one object acquires all the properties and behaviors of a parent object, it is known as inheritance.*

Inheritance...

- ❖ It provides code reusability.
- ❖ It is used to achieve runtime polymorphism.

Polymorphism

- ❖ When one task is performed by different ways.
- ❖ Poly means many and morphs means shapes.
- ❖ **E.g.** to convince customer differently, to draw something e.g. shape or rectangle.

Polymorphism...

- ❖ Another example can be to sound/speak something i.e. cat speaks meaw, dog barks woof etc.
- ❖ **Note:** In java we use method overloading and method overriding to achieve polymorphism.
- ❖ It may be compile time polymorphism and run time polymorphism.

Polymorphism...



Abstraction

- ❖ Hiding internal details and showing functionality is known as abstraction.
- ❖ **For example** phone call, we do not know the internal processing.
- ❖ **Note:** In java we use abstract class and interface to achieve abstraction.

Instance variable in java

- ❖ A variable that is created inside a class but outside a method is called instance variable.
- ❖ Instance variable does not get memory at compile time.
- ❖ It gets memory at runtime when an object (instance) is created. That is why it called instance variable.

Static Data Members

Is shared by all objects of a class.

Data Members

- ❖ Are variables of any primitive data types.
- ❖ It can be any type of array.

THANK YOU

