Agenda

- Overview of OOPs Principles
- Classes and Object
- Features of Object Orientation
    - Encapsulation
    - Inheritance
    - Polymorphism

Overview of OOPs Principles

- Object oriented programming is a method which holds the collection of objects having data field and member functions.
- Object oriented programming language can be easily upgraded.
- All object oriented programming languages provide mechanism that is used to implement the object oriented model. They are encapsulation, inheritance and polymorphism.

Class:A class is a template/blueprint for creating an object.

Object:

1. What is Object?
2. What is **NOT** Object?
3. **Definition:** An Object is an entity that has Properties for identifying its **State and for validations**, Methods for **Behavior / Functionality** and **Events** for **depicting** the **Change of State**.
4. Data associated at any given instance of time is the state of an object.
5. Every object will different from other objects either by state or behavior.
6. Object has a lifetime – It's created, used and destroyed.

Object Oriented Application: It's a collection of **related** objects, **communicating** with each other, exchanging **messages** with each other in a **controlled** environment as per the **rules** of the business.

Component:A ready to use third party object can be called as a Component. It can be replaced without any changes in the application. A component is generally used by a programmer as an object.

Loosely coupled objects are better than tightly coupled objects i.e. the lesser the information given to other objects the better it is as the objects are loosely coupled the dependencies are less and stronger security.

Every object oriented language should have three features:

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- Encapsulation
- Inheritance
- Polymorphism

Encapsulation:

- The process of binding data and behavior i.e. functionality of an object within a secured and controlled environment is called as encapsulation.
- It keeps the data safe from the outside code.
- This encapsulation principle is used to implement the information hiding i.e. Data abstraction.

Data abstraction: The process of exposing the essential data of an object to the outside of the world and hiding the low level data of that object is called as data abstraction.

- The principle of data hiding helps the programmer to build secure programs that do not disturb the code in other parts of program.

Inheritance:

- The process of acquiring the existing functionality of the parent and with new added features and functionality by a child object is called inheritance.
- Using inheritance redundant programs, programming codes can be eliminated and the use of previously defined classes may be continued.
- Inheritance decreases the coding part of the programmer.
- The advantages of inheritance are **Generalization**, **Extensibility** and Reusability.

Example: A calculator is a generalized form of mathematical operations where as a scientific calculator is an extended and specific form.

Some more examples of Inheritance

- Car **is a** Vehicle
- Faculty **is a** Person
- Student **is a** Person
- Mango **is a** Fruit
- Chair **is a** Furniture
- Scientific Calculator **is a** Calculator

Kinds of Relationship between objects:

a. **Is a** – Depicts Inheritance – Two Classes must be related.

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b. **Type Of / Instance Of –** A class and object is related.

c. **Has a – Depicts Containment – Two Classes must be related**

Polymorphism:

- "Poly" means "many" and "morph" means "form".
- An object in **different forms** and in each form it exhibits the same **functionality** but implemented in **different ways**.
- A parent class variable taking the form of child class objects and using this variable invoking the functionality of object this variable has actually taken the form (either of the child class object)

Examples:

- A **Teacher** can take a form of **Sport Teacher** or **Language Teacher** and in both the forms it has the functionality **Teach**, but the implementation of Teach varies in both the objects and depends.
- Vehicle – Car or Scooter – Drive
- Phone – Mobile Phone or Landline Phone – Speak
- Database – Oracle or SQL Server – Write
- Figure – Circle or Square - Area

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