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Fifth Day

Topics to be Covered -

OOPs - Polymorphism
- Runtime Polymorphism
- Compile Time Polymorphism.

Polymorphism

Polymorphism in Java is a concept that allows objects of different classes to be treated as objects of a common superclass or interface.

↳ It enables flexibility and extensibility in programming by allowing methods to be defined in a general way in superclass and overridden or implemented differently in the subclass.

- There are two types of polymorphism :

1. Compile Time Polymorphism (Method Overloading)
2. RunTime Polymorphism (Method overriding)

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1. Compile Time Polymorphism (Static Polymorphism) :

- Known as - Method Overloading or static binding.
- Occurs when the compiler determines the appropiate method or operation to be executed based on the method signature during the compilation phase.

- The decision is made at compile-time based on number, types and order of Arguments.

- Example include having multiple methods with the same name but different parameters in a class.

* Rules of Method Overloading :

- **Method Name** : overloaded methods must have the same name

- **Parameter List** : > Overloaded methods must have diff. parameter lists.
  > parameters can be diff. in terms of parameters, their types and/or both.
  > The order of the parameters can also be different.

- **Return Type** : > The return type of the method does not play a role in method overloading.

  > overloaded methods can have the same or different return types.

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- Access Modifier : The access modifier (public, private, protected) can be same or different for overloaded methods.

- Exceptions : > Overloaded methods can declare the same or different checked or unchecked exceptions.

> If a method throws a checked exception, an overloaded method in the same class or its subclasses can throw the same exception or its subclass.

- Method Signature :

> Overloaded/method signature consist of the method name and the parameter list.

> Overloaded methods must have a diff. method signature, means parameter list must be different.

- Inheritance : Overloading methods can exist in the same class or different classes within the same hierarchy of inheritance.

- Overriding : > Overloaded methods are not related to method Overriding.

> Overloaded methods exist within the same class or its subclasses, while overridden methods exist b/w a superclass and its subclasses.

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2. Runtime Polymorphism (Dynamic polymorphism) :

- Also known as method overriding or dynamic binding.
- Occurs when the appropiate method or operation to be executed is determined at runtime based on the actual object type.
- The decision is made dynamically at runtime based on the object's actual class.
- Examples include having a superclass reference pointing to a subclass object and invoking overridden methods.

★ NOTE

Polymorphism allows for code reusability, abstraction, and the ability to write generic code that can work with objects of different types without knowing their specific implementation.

↳ It promotes loose coupling between classes and enhances code flexibility and maintainability.