

## **1. Advantages of Polymorphism**

- Flexibility: Polymorphism allows objects of different types to be treated uniformly, providing flexibility in design and implementation.
- Extensibility: It facilitates adding new classes and types without modifying existing code, promoting code reuse and scalability.
- Encapsulation: Polymorphism promotes encapsulation by hiding the implementation details of objects behind their interfaces, enhancing modularity and maintainability.
- Readability: It improves code readability by allowing more intuitive and natural representations of object behavior, making the code easier to understand and maintain.

## **2. How Inheritance achieves Polymorphism in Java**

- Inheritance allows a subclass to inherit properties and behaviors from its superclass. By leveraging inheritance, a subclass can override methods inherited from its superclass, providing its own implementation.
- Through method overriding, where a subclass provides a specific implementation of a method that is already defined in its superclass, Java achieves runtime polymorphism. This means that the JVM determines at runtime which method to invoke based on the actual type of the object.

## **3. Differences between Polymorphism and Inheritance in Java**

- Polymorphism: Refers to the ability of objects of different classes to be treated as objects of a common superclass. It allows a single interface to represent different types of objects. Polymorphism can be achieved through method overriding and method overloading.
- Inheritance: Is a mechanism in Java where a class (subclass) inherits properties and behaviors (methods) from another class (superclass). It promotes code reuse and establishes an "is-a" relationship between classes. Inheritance allows subclasses to access superclass members and override methods to provide specialized implementations.
- In summary, polymorphism is more about how objects interact with methods, allowing different implementations of methods to be called through a common interface, while inheritance is about the relationships between classes, where one class inherits from another to reuse code and extend functionality.