

Java Backend Development

Live-85

lecture-2

Class Agenda

- Interfaces
- Java OOPs Concepts: Polymorphism, Abstraction.
- Non-Access Modifiers
- Singleton Design Pattern
- Enumeration in Java

Interfaces in Java

Interface specify what a class must do. It does not specifies “How” to do it.

- Methods signature by default public
- Abstract method, default methods, and static methods

When a class implements an interface, it promises to provide the behavior published by that interface OR the class must declared as abstract.

Interface can extend multiple interfaces.

```
public interface A extends B, C {}
```

A class can implement multiple interfaces.

Multiple Inheritance Problem

Diamond Problem (Ambiguity)

Java forces the class implementing multiple interfaces to provide its own implementation to remove ambiguity.

Interfaces are used to achieve total abstraction and loose coupling.

Polymorphism

Polymorphism = “multiple forms”

Signature of a method:

The count of arguments, types of arguments and the order of arguments

Overloading: same name but different signature

Overriding: Child class proving method with same name and same signature

Runtime Polymorphism

Dynamic Binding (or late binding or run-time binding)

When a method is invoked, the code to be executed is only determined at run time.

The JVM calls the appropriate method for the **object** that is referred to in each reference variable. It does not call the method that is define by the reference variable's type.

Super- Accessing Superclass members.

Object class

The **Object** class, in the **java.lang** package, sits at the top of the class hierarchy tree. Every class is a descendant (direct or indirect) of the **Object** class. Every class you use or write inherits the instance methods of **Object**.

Methods of Object class.

Final Classes and Methods

- Final reference variables
- Final methods cannot be overridden by subclasses
- Final class cannot be extended (or inherited) by any class.

Abstraction

- Data(implementation) hiding to reduce complexity.
- We don't know how zoom is working, what is webRTC, We just want to use it.
- User focus on input and output not on implementation.
- Abstraction is achieved by abstract classes and interfaces.

Abstract classes cannot be instantiated, but they can be subclassed.

An abstract method is a method declared without implementation.

Subclass must implement all abstract methods of parent class.

Abstract classes vs. Interfaces

Abstract class can have fields that are not static and final, and define public, protected and private concrete methods.

In interfaces all fields are automatically public, static, and final and all methods that you declare or define (as default method) are public.

A class can extend only one class, whether or not it is abstract, whereas it can implements any number of interfaces

Non-Access Modifiers

- Final
- Abstract
- Static
- Transient : skipped when serializing the object containing them.
- Synchronized: Methods can only accessed by one thread at a time.
- Volatile: The value of an attribute is not cached thread-locally, and is always read from “main memory”.

Singleton Design Pattern

- Singleton pattern restricts the instantiation of a class and ensures that only one instance of the class exists in the Java Virtual Machine.
- The singleton class must provide a global access point to get the instance of the class.
- Singleton pattern is used for logging, drivers objects, caching, and thread pool.

Enumeration in Java

- The Enumeration in Java is a way of defining a class with fixed and named constants.
- Java Enums are classes that have a fixed set of constants or variables that do not tend to change.
- Enum can be easily used in the switch. enum can be traversed. enum can have fields, constructors and methods.
- Enum improves **type safety** at compile-time checking to avoid errors at run-time by avoiding boilerplate code.

Example:

```
enum Day{  
    SUNDAY, MONDAY, TUESDAY, WEDNESDAY, THURSDAY, FRIDAY, SATURDAY;  
}
```

- Enum constants cannot be overridden
- Enum does not support Creation of Objects
- Enum cannot extend other classes
- Enum can implement Interface