

INTRODUCTION TO JAVA

What is Java?

- **Definition:** Java is a high-level, object-oriented programming language developed by Sun Microsystems (now owned by Oracle Corporation). It is designed to be platform-independent with a key principle: "Write Once, Run Anywhere" (WORA).
- **History:** Created by James Gosling in 1995.
- **Versions:** Java has evolved over time, with the latest versions providing enhanced performance and security features.

2. Features of Java

- **Simple:** Java's syntax is based on C++ but with fewer low-level facilities.
- **Object-Oriented:** Everything in Java is an object (except for primitive data types).
- **Platform-Independent:** Java programs are compiled into bytecode, which can be run on any platform that has a Java Virtual Machine (JVM).
- **Secure:** Java provides built-in security features like bytecode verification, memory management, and access control mechanisms.
- **Robust:** It provides strong memory management, automatic garbage collection, exception handling, and type-checking.
- **Multithreaded:** Java supports multithreading, allowing concurrent execution of two or more parts of a program for maximum CPU utilization.
- **High Performance:** Java's bytecode can be optimized by the JVM for high performance.
- **Dynamic:** Java programs can dynamically link new class libraries, methods, and objects.

3. Java Architecture

- **Java Virtual Machine (JVM):** Responsible for running Java bytecode. It acts as an interpreter between the compiled Java code and the underlying platform.
- **Java Runtime Environment (JRE):** Provides the libraries, Java virtual machine, and other components required to run Java applications.
- **Java Development Kit (JDK):** Includes JRE along with development tools like the compiler, debugger, and other utilities.

4. Java Program Structure

- **Classes:** Java is purely class-based. Every piece of Java code must be part of a class.
- **Main Method:** The entry point of any Java program.

```
java
Copy code
public class Main {
    public static void main(String[] args) {
        System.out.println("Hello, World!");
    }
}
```

}

- **Package:** A package in Java is a namespace that organizes a set of related classes and interfaces.
- **Comments:** Java supports single-line (//) and multi-line comments (/*...*/).