

CORE JAVA

What is Java?

Java is a high-level, object-oriented programming language developed by James Gosling at Sun Microsystems. The language was officially released by Sun Microsystems in 1995.

Java is known for its "write once, run anywhere" philosophy.

It is used in a variety of applications, including web development, mobile app development (Android applications are primarily written in Java), enterprise software, and more.

Features of Java-

1. **Simple-** Java is very easy to learn, and its syntax is simple, clean and easy to understand.
2. **Object-oriented-** Java is an object-oriented programming language. We cannot run a java program without creating a class. In java by using OOPS concepts we can achieve readability, security and reusability.
NOTE: We will discuss OOPS in depth later.
3. **Platform Independent-** Java code can be executed on multiple platforms, for example, Windows, Linux, Sun Solaris, Mac/OS, etc. Java code is compiled by the compiler and converted into bytecode. This bytecode is a platform-independent code because it can be run on multiple platforms, i.e., Write Once and Run Anywhere.
4. **Secure-** Java is best known for its security. Java provides various security features to the programmers to prevent their application from unauthorized access, threats and viruses.
5. **Robust-** The Java Programming language is robust, which means it is capable of handling unexpected termination of a program. There are 2 reasons behind this, first, it has a most important and helpful feature called Exception Handling. If an exception occurs in java code then no harm will happen whereas, in other low-level languages, the program will crash.

Another reason why Java is strong lies in its memory management features.

- 6. Interpreted-** In programming languages, you have learned that they use either the compiler or an interpreter, but Java programming language uses both a compiler and an interpreter. Java programs are compiled to generate bytecode files then JVM interprets the bytecode file during execution. Along with this JVM also uses a JIT compiler (it increases the speed of execution).

In which sector Java is used and which companies are using Java-

Java is widely used across various industries and by numerous companies for a wide range of applications. Here are some areas and examples of companies that use Java:

- 1. Enterprise Software:**

- Companies like Oracle, SAP, IBM, and Red Hat use Java for developing enterprise-level software solutions.

- 2. Web Development:**

- Java is commonly used for building large-scale web applications. Companies like LinkedIn, eBay, and Airbnb have used Java in their web development.

- 3. Financial Services:**

- Many financial institutions, including JPMorgan Chase, Citibank, and Goldman Sachs, use Java for developing financial applications and systems.

- 4. Telecommunications:**

- Companies in the telecommunications industry, such as Ericsson and Nokia, use Java for developing software for network management and communication systems.

- 5. Healthcare:**

- Healthcare organizations and companies, including Siemens Healthineers, use Java for developing healthcare information systems and medical software.

6. E-commerce:

- E-commerce platforms such as Amazon and Alibaba use Java for various components of their systems, including backend services and web applications.

7. Mobile App Development (Android):

- Java is the primary programming language for Android app development. Companies like Google, Snapchat, and WhatsApp use Java for developing Android applications.

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Difference between Java and C++

Java	C++
Java is platform independent	C++ is platform dependent.
Java doesn't support pointers	C++ supports pointers.
Java supports only call by value.	C++ supports call by value and call by reference.
Java doesn't support operator overloading, structures and unions.	C++ supports operator overloading, structures and unions.
Java provides automatic garbage collection.	C++ does not support automatic garbage collection.
Java is used to develop enterprise-level applications, web applications and mobile applications.	C++ is used to develop system software, game development, and more.
Java doesn't support goto statement.	C++ supports goto statement.

NOTE: Platform dependent: A C++ program compiled on one platform may not run directly on a different platform without recompilation.

Disadvantages of Java-

- Java is not as fast as native code. This is because Java has to go through the overhead of the Java Virtual Machine (JVM) to run.
- Java is not well suited for low-level programming. Java does not provide direct access to low-level memory or hardware.

What is JDK, JRE and JVM?

JVM (Java Virtual Machine):

- The core of the Java runtime environment.
- An abstract machine that doesn't physically exist.
- Provides a platform-independent execution environment for Java bytecode.
- Converts bytecode into instructions readable by your actual system.
- You cannot directly install or run JVM; it's included within JRE and JDK.

JRE (Java Runtime Environment):

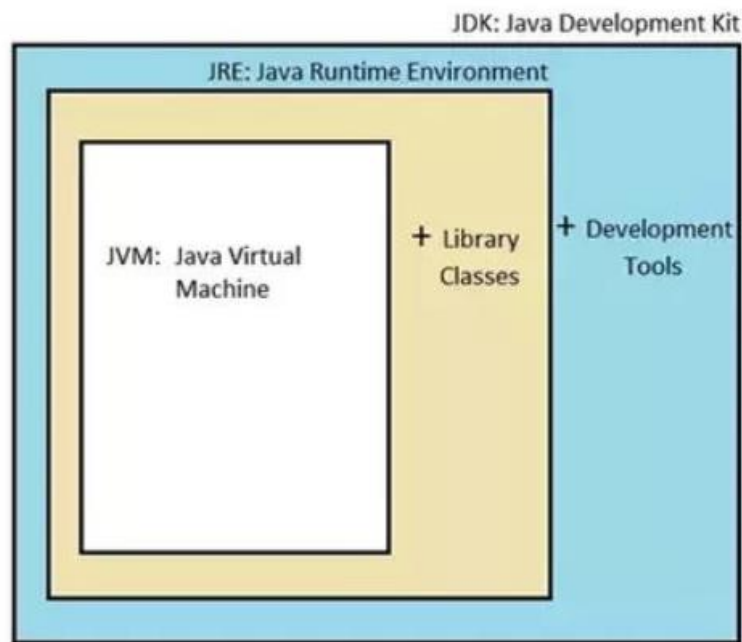
- A software package containing the JVM, class libraries, and other components needed to run Java applications.
- Doesn't include tools for development.
- Necessary for anyone who wants to run Java programs, like playing games or using software written in Java.
- Smaller and simpler than JDK.

JDK (Java Development Kit):

- A superset of JRE, including everything for both running and developing Java applications.
- Contains the JRE, plus tools like compilers, debugger, documentation generator, etc.
- Essential for programmers creating Java applications.
- Larger and more complex than JRE.

Understand with this example-

Think of JVM as the engine of a car, JRE as the engine and basic driving controls, and JDK as the engine, controls, plus tools for repair and customization.



JDK = JRE + Development Tools

JRE = JVM + Library Classes



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