Understanding Java Architecture

An Overview of the Java Platform

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Introduction to Java

- Java is a high-level, object-oriented programming language.

- It is platform-independent due to the Java Virtual Machine (JVM).

- Key Features:

  - Write Once, Run Anywhere (WORA)

  - Strongly typed language

  - Automatic memory management with Garbage Collection

Java Architecture Overview

- Main Components:

  - Java Development Kit (JDK)

  - Java Runtime Environment (JRE)

  - Java Virtual Machine (JVM)

- Layered Architecture:

  - Application Layer

  - Java API Layer

Java Development Kit (JDK)

- JDK is a software development kit used to develop Java applications.

- Components:

  - Compiler (javac)

  - Java Runtime Environment (JRE)

  - Development Tools (e.g., javadoc, jar, etc.)

- Used for writing, compiling, and debugging Java programs.

Java Runtime Environment (JRE)

- JRE provides the environment to run Java applications.

- Components:

  - JVM (Java Virtual Machine)

  - Core Libraries (Java API)

- JRE is for running Java programs, without development tools.

Java Virtual Machine (JVM)

- JVM is the runtime engine that executes Java bytecode.

- Key Functions:

  - Converts bytecode to machine code

  - Provides memory management

  - Handles garbage collection

- Enables platform independence for Java applications.

Java API

- A collection of classes and interfaces providing functionality for Java applications.- Key Packages

:

  - java.lang (core classes)

  - java.util (utilities)

  - java.io (input/output)

  - java.net (networking)

- Simplifies development with ready-to-use functionality.

Java Architecture Diagram

- Visual representation of the relationship between JDK, JRE, and JVM.

- Layers: Application Layer, API Layer, JVM Layer.

Compilation and Execution Process

- Steps:

  1. Write Java code (source file).

  2. Compile to bytecode using javac.

  3. Execute bytecode on the JVM.

- Flowchart illustrating the compilation and execution process.

Conclusion

- Java's architecture enables platform independence and ease of development.

- Understanding JDK, JRE, and JVM is crucial for Java developers.

- Java continues to evolve with regular updates and strong community and support.