FULL COURSE

Pranaya

JAVA

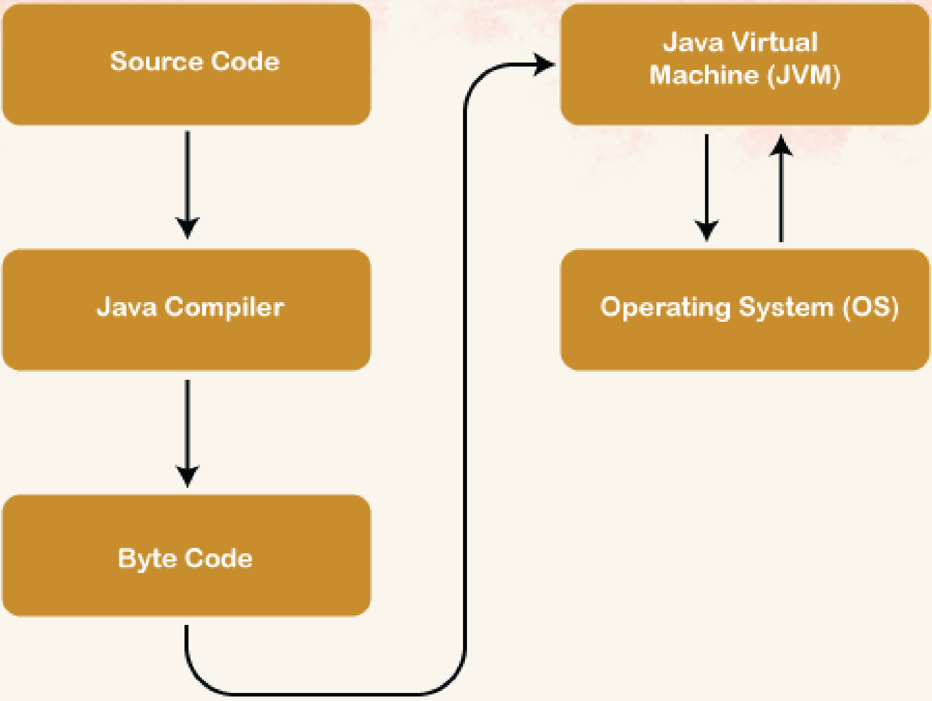
JAVA ARCHITECTURE

Java Architecture is a collection of components, i.e., JVM, JRE, and JDK. It integrates the process of interpretation and compilation. It defines all the processes involved in creating a Java program. Java Architecture explains each and every step of how a program is compiled and executed.

Java Architecture can be explained by using the following steps:

- There is a process of compilation and interpretation in Java.
- Java compiler converts the Java code into byte code.
- After that, the JVM converts the byte code into machine code.
- The machine code is then executed by the machine.

The following figure represents the Java Architecture in which each step is elaborate graphically.



Now let's dive deep to get more knowledge about Java Architecture. As we know that the Java architecture is a collection of components, so we will discuss each and every component into detail.

Components of Java Architecture

The Java architecture includes the three main components:

- Java Virtual Machine (JVM)
- Java Runtime Environment (JRE)
- Java Development Kit (JDK)

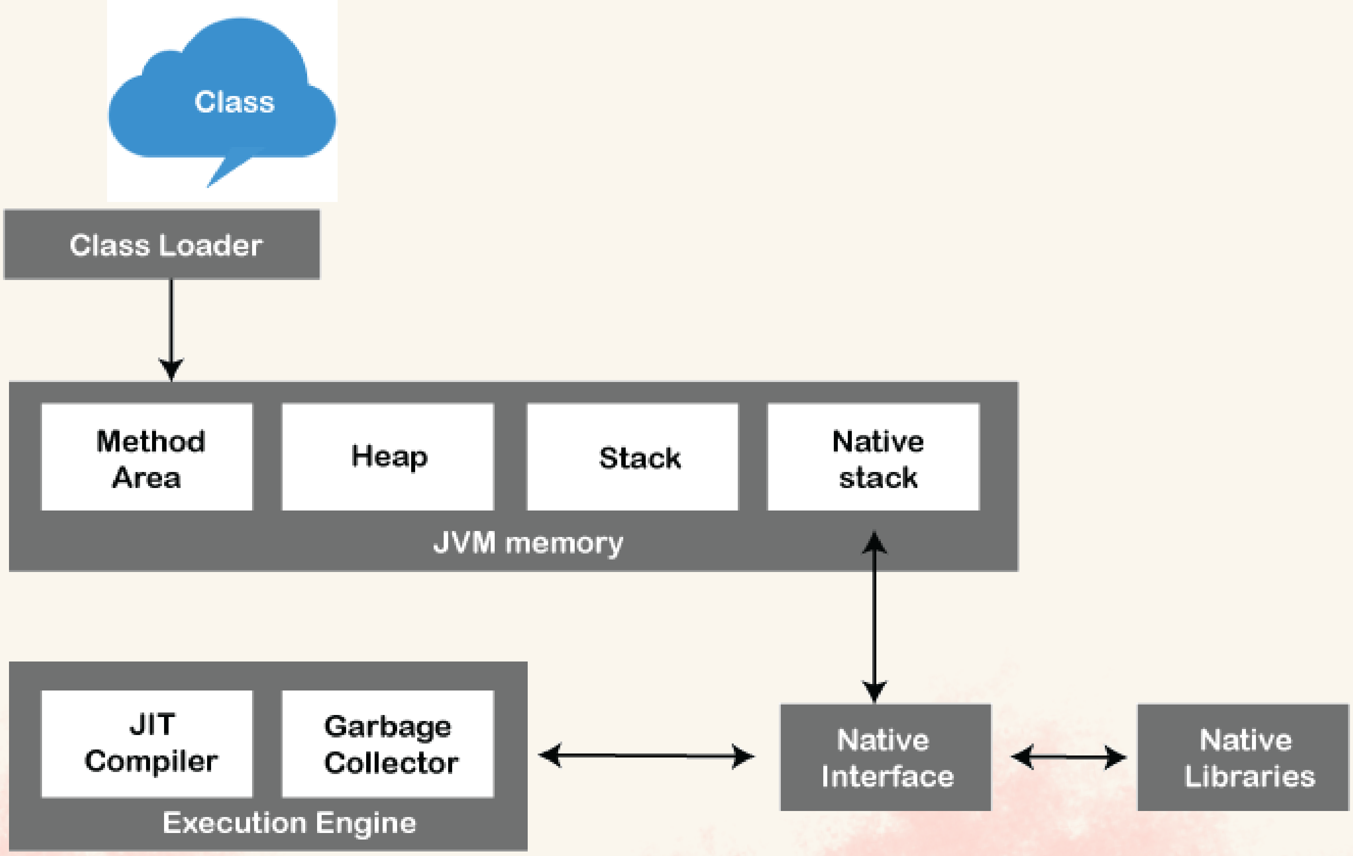
Java Virtual Machine

The main feature of Java is WORA. WORA stands for Write Once Run Anywhere. The feature states that we can write our code once and use it anywhere or on any operating system. Our Java program can run any of the platforms only because of the Java Virtual Machine.

It is a Java platform component that gives us an environment to execute java programs. JVM's main task is to convert byte code into machine code. JVM, first of all, loads the code into memory and verifies it. After that, it executes the code and provides a runtime environment. Java Virtual Machine (JVM) has its own architecture, which is given below:

It is a Java platform component that gives us an environment to execute java programs. JVM's main task is to convert byte code into machine code. JVM, first of all, loads the code into memory and verifies it. After that, it executes the code and provides a runtime environment.

Java Virtual Machine (JVM) has its own architecture, which is given below:



ClassLoader:

ClassLoader is a subsystem used to load class files. ClassLoader first loads the Java code whenever we run it.

Class Method Area: In the memory, there is an area where the class data is stored during the code's execution. Class method area holds the information of static variables, static methods, static blocks, and instance methods.

Heap:

The heap area is a part of the JVM memory and is created when the JVM starts up. Its size cannot be static because it increase or decrease during the application runs.

Stack:

It is also referred to as thread stack. It is created for a single execution thread. The thread uses this area to store the elements like the partial result, local variable, data used for calling method and returns etc.

Native Stack: It contains the information of all the native methods used in our application.

Execution Engine:

It is the central part of the JVM. Its main task is to execute the byte code and execute the Java classes. The execution engine has three main components used for executing Java classes.

Interpreter:

It converts the byte code into native code and executes. It sequentially executes the code. The interpreter interprets continuously and even the same method multiple times. This reduces the performance of the system, and to solve this, the JIT compiler is introduced.

JIT Compiler:

JIT compiler is introduced to remove the drawback of the interpreter. It increases the speed of execution and improves performance.

Garbage Collector:

The garbage collector is used to manage the memory, and it is a program written in Java. It works in two phases, i.e., Mark and Sweep. Mark is an area where the garbage collector identifies the used and unused chunks of memory. The Sweep removes the identified object from the Mark.

Java Native Interface

Java Native Interface works as a mediator between Java method calls and native libraries.

Java Runtime Environment

It provides an environment in which Java programs are executed. JRE takes our Java code, integrates it with the required libraries, and then starts the JVM to execute it.

Java Development Kit

It is a software development environment used in the development of Java applications and applets. Java Development Kit holds JRE, a compiler, an interpreter or loader, and several development tools in it.

Pranaya