JVM (Java Virtual Machine)

JVM (Java Virtual Machine) is an abstract machine. It is a specification that provides runtime environment in which java bytecode can be executed.

JVMs are available for many hardware and software platforms (i.e.JVM is plateform dependent).

What is JVM?

It is:

1. **A specification** where working of Java Virtual Machine is specified. But implementation provider is independent to choose the algorithm. Its implementation has been provided by Sun and other companies.
2. **An implementation** Its implementation is known as JRE (Java Runtime Environment).
3. **Runtime Instance** Whenever you write java command on the command prompt to run the java class, and instance of JVM is created.

What it does?

The JVM performs following operation:

* Loads code
* Verifies code
* Executes code
* Provides runtime environment

JVM provides definitions for the:

* Memory area
* Class file format
* Register set
* Garbage-collected heap
* Fatal error reporting etc.

Internal Architecture of JVM

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| Let's understand the internal architecture of JVM. It contains classloader, memory area, execution engine etc. |

 

1) Classloader:

Classloader is a subsystem of JVM that is used to load class files.

2) Class(Method) Area:

Class(Method) Area stores per-class structures such as the runtime constant pool, field and method data, the code for methods.

3) Heap:

It is the runtime data area in which objects are allocated.

4) Stack:

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| Java Stack stores frames.It holds local variables and partial results, and plays a part in method invocation and return. |
| Each thread has a private JVM stack, created at the same time as thread. |
| A new frame is created each time a method is invoked. A frame is destroyed when its method invocation completes. |

5) Program Counter Register:

PC (program counter) register. It contains the address of the Java virtual machine instruction currently being executed.

6) Native Method Stack:

It contains all the native methods used in the application.

7) Execution Engine:

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| It contains: |
| **1) A virtual processor** |
| **2) Interpreter:**Read bytecode stream then execute the instructions. |
| **3) Just-In-Time(JIT) compiler:**It is used to improve the performance.JIT compiles parts of the byte code that have similar functionality at the same time, and hence reduces the amount of time needed for compilation.Here the term ?compiler? refers to a translator from the instruction set of a Java virtual machine (JVM) to the instruction set of a specific CPU |
| Difference between JDK, JRE and JVM  Understanding the difference between JDK, JRE and JVM is important in Java. We are having brief overview of JVM here.  If you want to get the detailed knowledge of Java Virtural Machine, move to the next page. Firstly, let's see the basic differences between the JDK, JRE and JVM. |
| JVM   |  | | --- | | JVM (Java Virtual Machine) is an abstract machine. It is a specification that provides runtime environment in which java bytecode can be executed. | | JVMs are available for many hardware and software platforms. JVM, JRE and JDK are platform dependent because configuration of each OS differs. But, Java is platform independent. | | The JVM performs following main tasks:   * Loads code * Verifies code * Executes code * Provides runtime environment | |  |   JRE   |  | | --- | | JRE is an acronym for Java Runtime Environment.It is used to provide runtime environment.It is the implementation of JVM.It physically exists.It contains set of libraries + other files that JVM uses at runtime. | | Implementation of JVMs are also actively released by other companies besides Sun Micro Systems. | | jre |   JDK   |  | | --- | | JDK is an acronym for Java Development Kit.It physically exists.It contains JRE + development tools. | | jdk | |