Assignment No: 2

① Explain the components of the JDK.

Ans: JDK is an acronym for java Development kit. The JDK is a SW development environment which is used to develop environment which is used to develop java applications & applets. It physically exists. It contains JRE + development tools.

* Components of JDK:

① appletviewer: This tool is used to run & debug java applets without a web browser.

② apt: It is an annotation-processing tool.

③ extcheck: It is a utility that detects JAR file conflicts.

④ idlj: An IDL-to-Java Compiler. This utility generates java bindings from a given java IDL file.

⑤ jabswitch: It is a java Access Bridge. Exposes assistive technologies on Microsoft Windows systems.

⑥ java: The loader for java applications. This tool is an interpreter and can interpret the class files generated by the javac Compiler.

⑦ javac: It Specifies the java Compiler, which Converts Source code into java bytecode.

Q.2 Differentiate betn JDK, JVM & JRE.

Ans: JVM

- JVM (Java Virtual Machine) is an abstract m/c. It is called a virtual m/c because it doesn't physically exist. It is a specification that provides a runtime environment in which java bytecode can be executed. It can also run those programs which are written in other languages & compiled to java bytecode.
- JVM are available for many H/W & S/W platforms.

JRE

- JRE is an acronym for java Runtime Environment.
- It is also written as Java RTE.
- The java Runtime Environment is a set of S/W tools which are used for developing java applications.
- It is used to provide the runtime Environment.
- It is the implementation of JVM.

JDK -

- JDK is an acronym for java Development kit.
- The JDK is a S/W development environment which is used to develop environment which is used to develop java applications which is used to develop java applications & applets.
- It physically exists.
- It contains JRE + development tools.

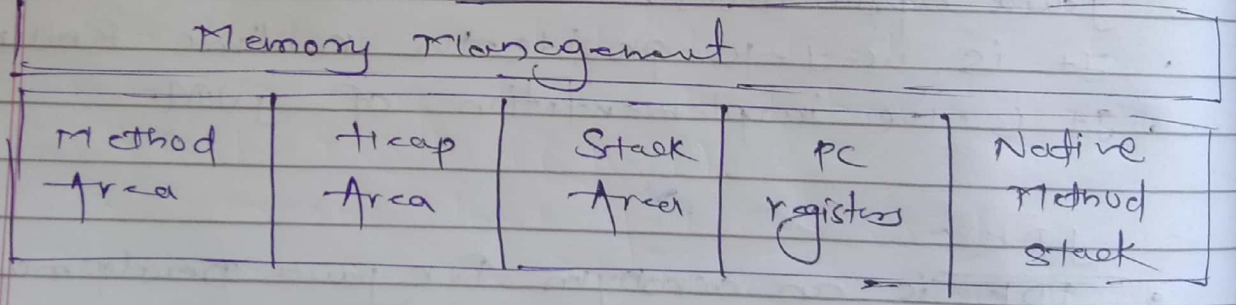
Q.3. What is the role of the JVM in Java? & How does the JVM execute Java code?

Ans:
- A JVM is a virtual m/c that enables a Computer to run Java Programs as well as programs written in other languages that are also Compiled to Java bytecode.
- How the Java Program run inside the JVM.

① The execution process mainly includes:
② The Java Source code is compiled into bytecode.
③ Verify the bytecode & load the java program through the class loader in JVM Memory.

Q.4 Explain the Memory Management System of the JVM.

Ans



- In Java, M/m mgmt is an automatic process that is managed by the Java Virtual Machine (JVM) & done one that does not need explicit intervention.
- Java, being a block-Structured language, uses a model where its memory is divided into 2 main types: Stack & heap.

Q.5 What are the JIT Compiler & its role in the JVM? What is the bytecode & why is it important for Java?

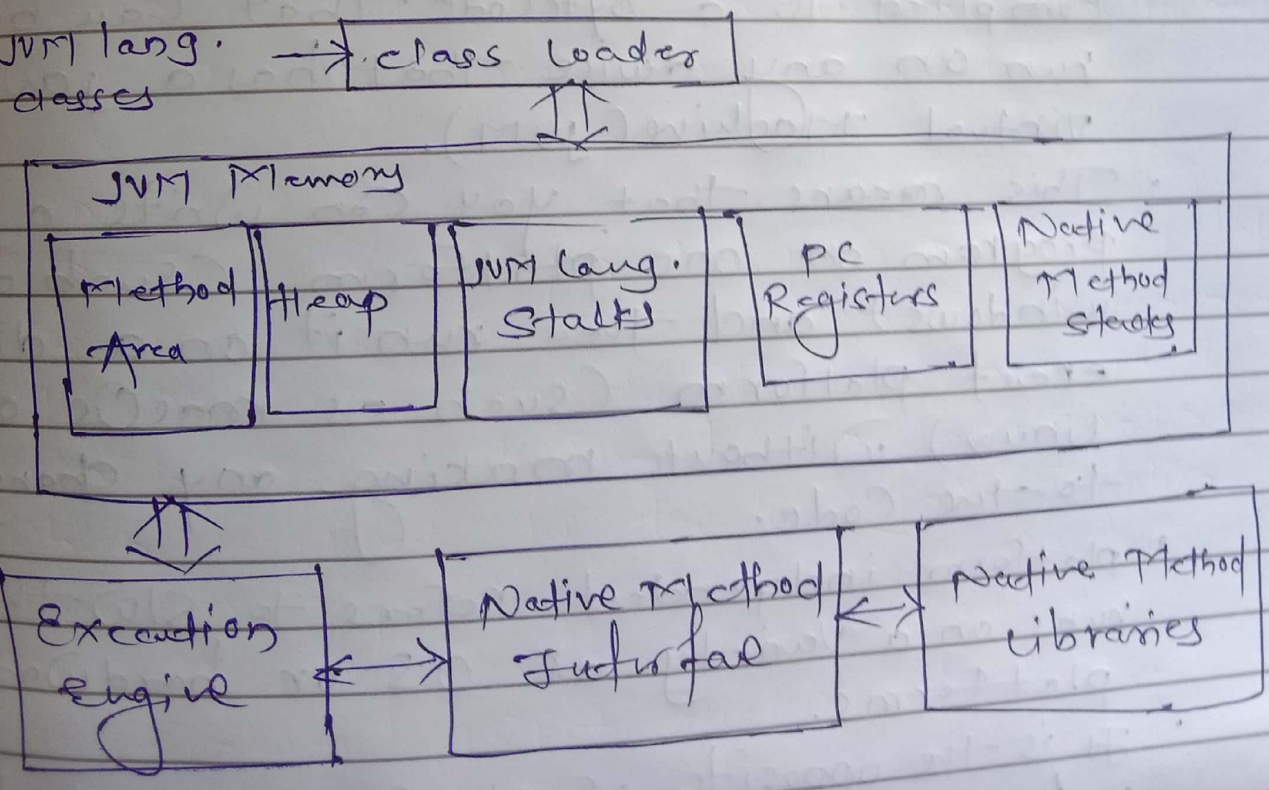
Ans: The JIT Compiler aids in improving the performance of java program by Compiling bytecode into native m/c code at runtime.

- The JIT Compiler is enabled by default.
- When a method has been Compiled, the JVM Calls the Compiled Code of that method directly instead of interpreting it.

- **Bytecode :-** Java Bytecode is the instⁿ set of the java virtual Machine. It acts similar to an assembler which is an alias representation of a C++ Code. As soon as a java program is compiled, java bytecode is generated.

Q.6 Describe the Architecture of the JVM.

Ans:



- JVM acts as a run-time engine to run java appl". JVM is the one that actually calls the main method present in a java code. JVM is a part of JRE.
- Class Loader Subsystem -
It is mainly responsible for 3 activities.
- Loading
- Linking
- Initialization.

* JVM Memory -
1. Method area
2. Heap area
3. Stack area
4. PC Registers
5. Native method Stacks.

Q.7 How does java achieve platform independence through the JVM?

Ans: Java is platform-independent because it is compiled to a bytecode that can be run on any device that has a java virtual machine (JVM).
- This means that you can write a java program on one platform (such as windows) and then run it on a different platform (such as macOS or Linux) without making any changes to the code.
- platform independent refers to S/W that runs on a variety of OS or hardware platforms.
- It is the opposite of platform dependent, which refers to S/W that is only to run on one

o.s. or h/w platform.

5.8 What is the significance of the class loader in java? What is the process of garbage collection in java.

Ans: Class loaders are responsible for loading java classes dynamically to the JVM during runtime.

- They're also part of the JRE.
- Therefore, the JVM doesn't need to know about the underlying file or file system in order to run java programs thanks to class loaders.
- Garbage Collection in java is the automated process of deleting code that's no longer needed or used.
- This automatically frees up m/m space & ideally makes coding java apps easier for developers.
- Java applications are compiled into byte code that may be executed by a JVM.
- Automatic garbage collection means you don't have control over whether & when objects are deleted.
- This is in contrast to language.
- To ensure that garbage collectors work efficiently, the JVM separates the heap into separate spaces, & the garbage collectors use a mark-and-sweep algorithm to traverse these spaces and clear out unused objects.