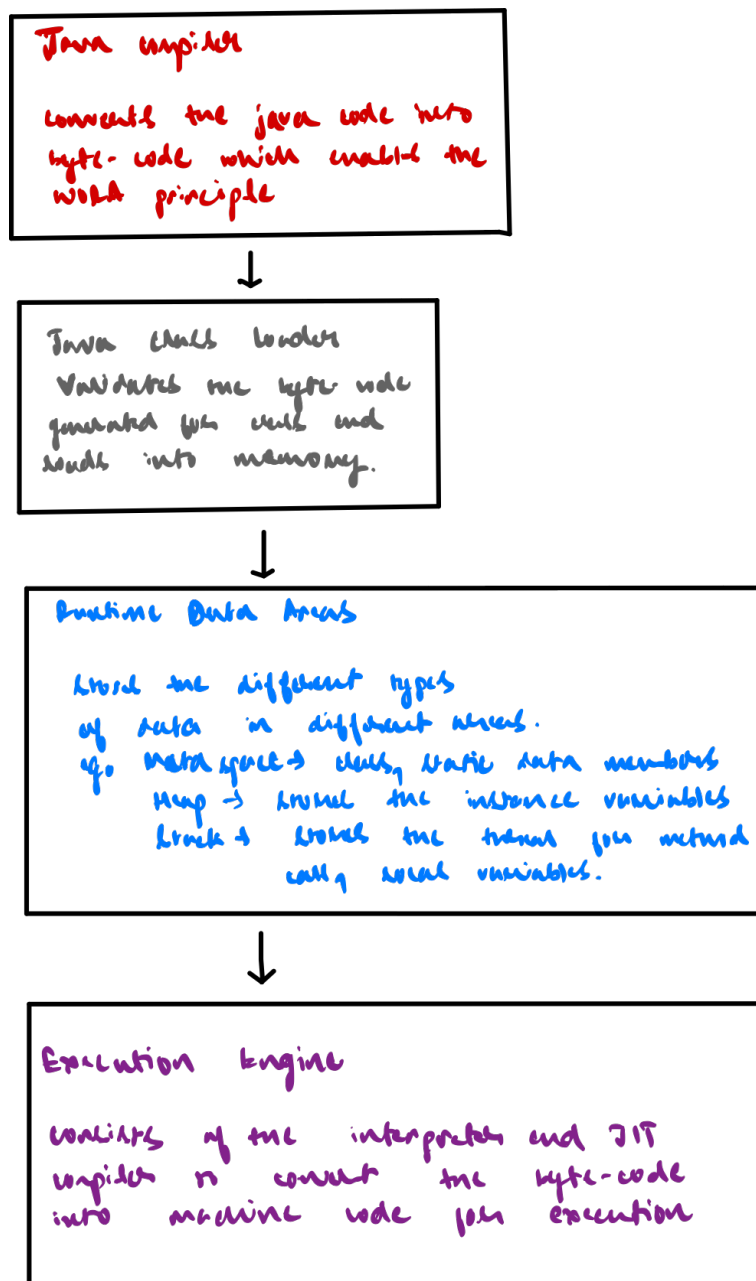


PROJECT-I

Installation And Set-UP

- Download the JDK-25 from Oracle for Mac, by using the ARM64 dmg version, and use the installer to install the JDK on the device. This adds the JDK but doesn't necessarily make it default
- To make it default, we need to update the environment variables. By adding the installation path to JAVA_HOME, we make it accessible to our IDEs and other tools to use. To make it accessible from any directory, we add it to PATH.
 - To do this, we run the command `/usr/libexec/java_home` on terminal, and the result is then added to the value of JAVA_HOME
 - This is done by `export JAVA_HOME = "result of prev command"`
 - For Path we do,
 - `export PATH="$JAVA_HOME/bin:$PATH"`. This command specifically cause it appends the rest of the path variables after this version. Since path is checked in order for executables which match, this helps run our current version eve if older version already exists.

Java Components Diagram



Difference Between JIT and Interpreter

Interpreter :

Goes through the code line by line and converts into machine code.

JIT (Just in Time Compiler) :

Identifies hot-spots within the code which are frequently used, and converts them to machine code and stores them for future uses, speeding up the process of conversion.

Java uses both of these together to achieve a faster rate of conversion and hence a faster Execution engine.

Execution Process for ByteCode

The Java-Compiler which is invoked with javac converts the file to byte-code. This is then validated by class-loader, and loaded into the memory where the Runtime Data Access area stores different kinds of entities. Eg. MetaSpace stores the byte code, the class definition, static variables etc. The Heap stores the instance variables, and the stack stores the methods calls, and local variables.

The Execution Engine which is a combination of interpreter and JIT Compiler then converts this byte-code to machine code to be able to be run on the machine.

Write Once Run Anywhere Principle

The JVM which has the java compiler, converts the class code to byte-code. This byte code is system independent and is the same everywhere. This can thus be shared between systems running different OS and still produce the same output. This is the Write Once Run Anywhere Principle. This is achieved as the common byte-code is then translated by a system specific JVM for converting it into the respective machine codes which are then run by the respective machines, making the byte-code achieve the Write Once Run Anywhere functionality.

Diamond Problem in Java

The diamond problem in Java refers to the inability of multiple inheritance in java, ie. One class cannot extend more than one class. The reason for this is ambiguity, as in, if both the parents has different behaviour for same function, the child class would not know what to do for the function unless overridden. Hence the problem is solved using interfaces. As there is no implementation, the problem of ambiguity doesn't arise. In case of default behaviours, the child class has to override the behaviour or else ability error is still encountered.