How Java code executes

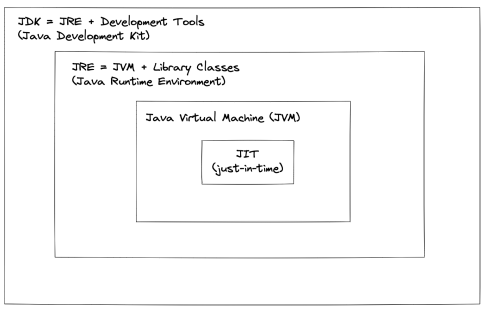
this is the source code

- this code will not directly run on a system
- we need JVM to run this
- Reason why Java is platform independent

More about platform independence

- It means that byte code can run on all operating systems.
- We need to convert source code to machine code so computer can understand
- Compiler helps in doing this by turning it into executable code
- this executable code is a set of instructions for the computer
- After compiling C/C++ code we get .exe file which is platform dependent
- In Java we get bytecode, JVM converts this to machine code
- Java is platform-independent but JVM is platform dependent

JDK vs JRE vs JVM vs JIT

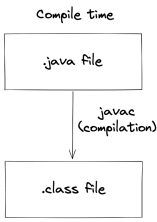


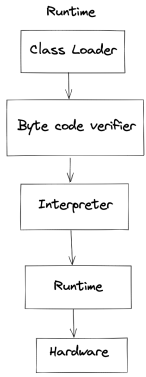
JDK

- Provides environment to develop and run the Java program
- It is a package that includes:
  1. development tools - to provide an environment to develop your program
  2. JRE - to execute your program
  3. a compiler - javac
  4. archiver - jar
  5. docs generator - javadoc
  6. interpreter / loader

JRE

- It is an installation package that provides environment to only run the program
- It consists of:
  1. Deployment technologies
  2. User interface toolkits
  3. Integration libraries
  4. Base libraries
  5. JVM
- After we get the .class file, the next things happen at runtime:
  1. Class loader loads all classes needed to execute the program.
  2. JVM sends code to Byte code verifier to check the format of code





(How JVM works) Class Loader
- Loading:
  - reads .class file and generate binary data
  - an object of this class is created in heap
- Linking
  - JVM verifies the .class file
  - allocates memory for class variables & default values
  - replace symbolic references from the type with direct references
- Initialization
  all static variables are assigned with their values defined in the code and static block

JVM contains the Stack and Heap memory allocations.

JVM Execution
Interpreter:
- Line by line execution
- when one method is called many times, it will interpret again and again

JIT:
- those methods that are repeated, JIT provides direct machine code so re-interpretation is not required.
- makes execution faster

Garbage collector