

Introduction to Java Programming

Why Do We Need Programming Languages?

- Communication with Computers: Programming languages allow humans to
- communicate instructions to computers in a way they can understand.

Java History

Home: SUN Microsystems (Oracle Corporation)

Author: James Gosling

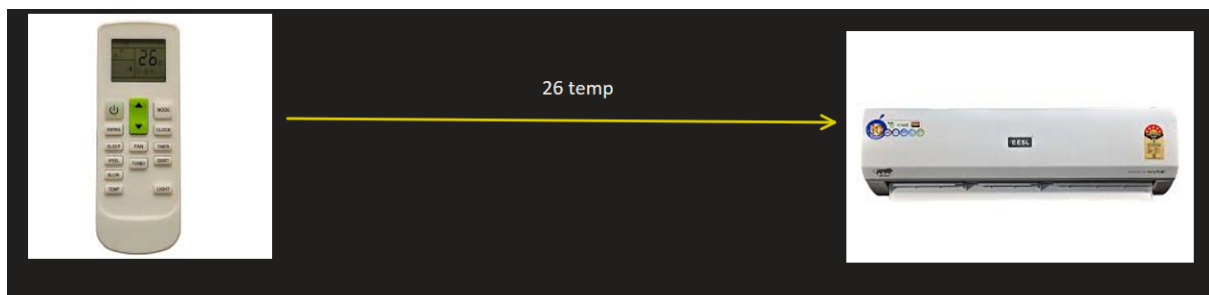
Objective: To prepare simple electronic consumer goods.

Project: Green

First Version: JDK 1.0 (1996, Jan-23rd)

Type of Software: Open-Source Software

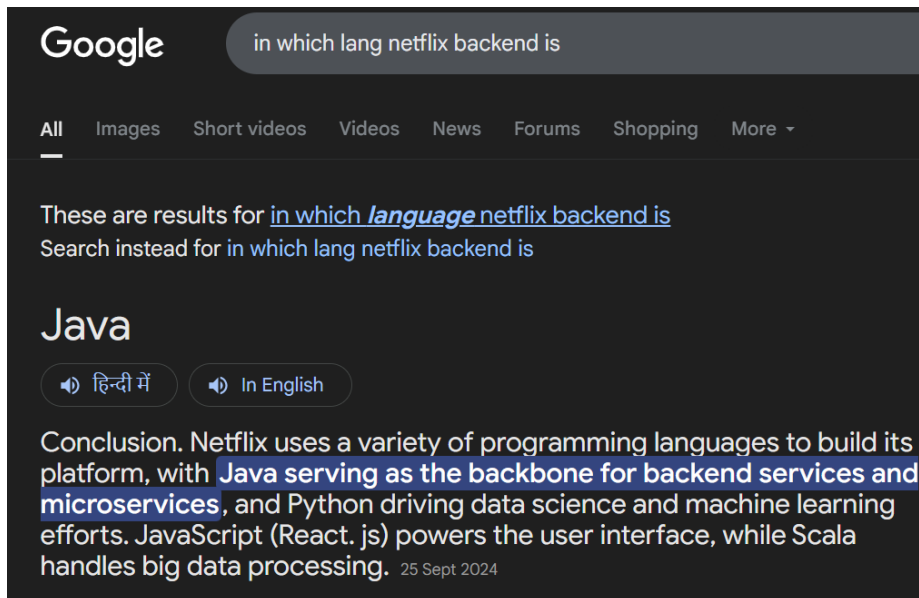
purpose:



Originally made for devices like TV, remotes etc.

Why we learn java in 2025?

1. 90% 500 fortune companies used in for their BE dev
2. Amazon, Uber, Netflix use Java for their Backend



Java still is best choice for

1. Android
2. Banking and Fintech
3. Big data - Hadoop (java based)
4. Games
5. Cloud, devops

Why we learn java in 2025?

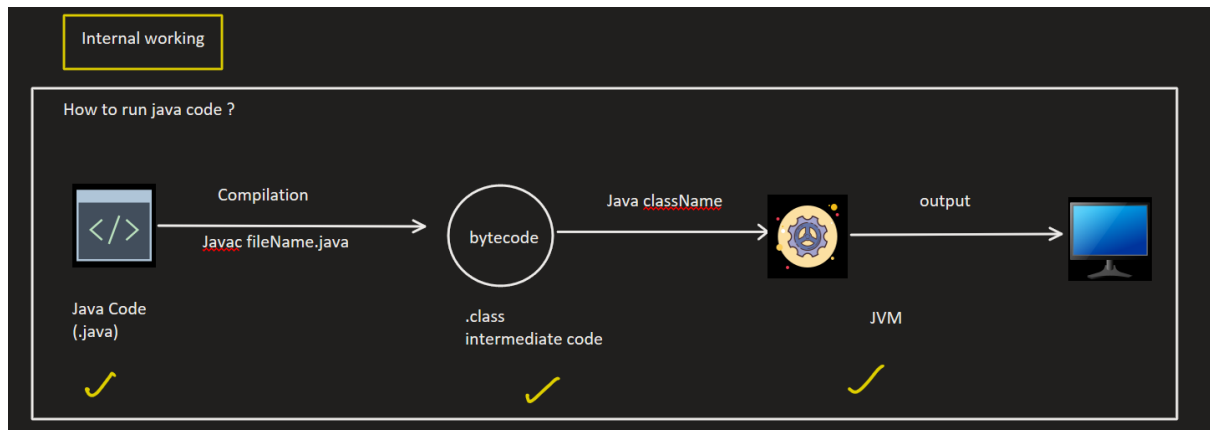
1. Secure and scalable (agar main abhi 10 logo k liy use kr raha hu to main ise 100 logo k liy bhi kr sakta)
2. Most in demand --> high salary
3. BE systems ---> 90-95%
4. Modern tech --> kafka, docker, kubernetes, AWS etc
5. Easy to learn

Domain	Java role
Banking	HDFC, ICICI core system
E-comm	Amazon, Flipkart
Android	70% app
Payments	Rozorpay, PhonePe backend in java
OTT platform	Neflix
Gamming	Minecraft
Space Tech	NASA uses java for simulations

simulations



How Java Works Internally?



1. Create java file with extension .java
2. Name class and file also as per class name
3. Compile this using command `Javac filename.java`
4. Run this file java class name
5. output

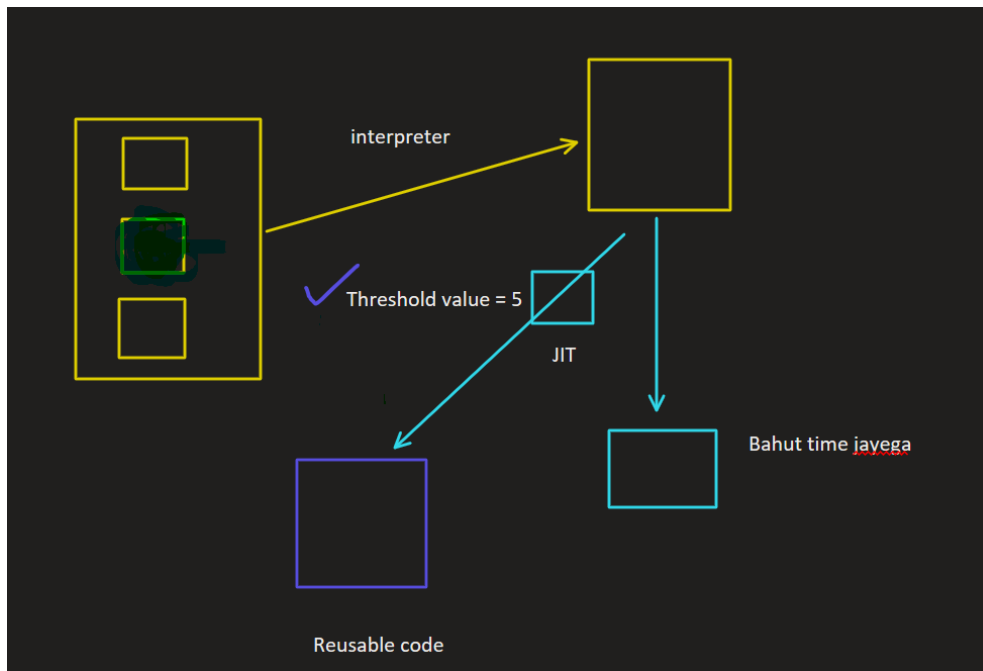
Internal of code execution

Case 1: Without JIT

Use interpreter and each instruction converted line by line

Case 2: With JIT

Code is compiled once and resumed



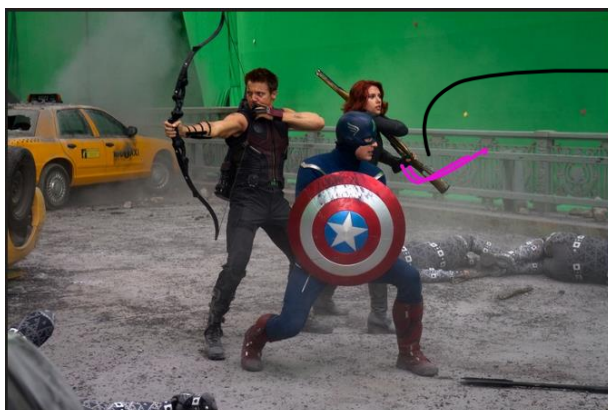
What is JVM ?

1. Load .class file
2. Verify bytecode
3. Heap stack memory
4. JIT

What is JRE(Java runtime environment)

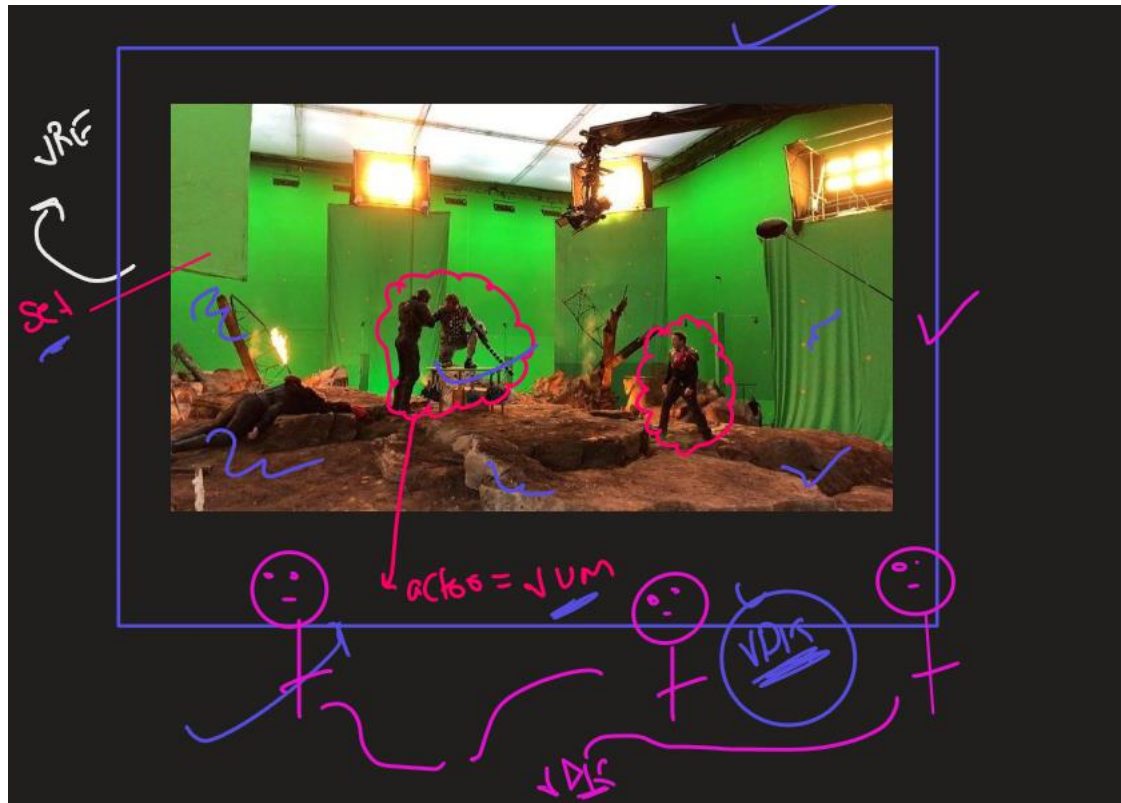
JRE = JVM + runtime lib

1. It provide necessary lib to run java app
2. Does not provide compilation (javac)



JDK: java development kit

1. JDK = JRE + Development tools (javac, javadoc, jar)
2. Needed to develop & run java prog
3. Contains everything in JRE + compiler , debugger



What is JIT ?

part of jvm

Convert frequently used bytecode into machine code

Note:

JVM read line by line (interpreter) but If you repeat a task again n again, JIT says , Bhai Main kr deta hu

and main ise yaad rakh lunga(cache) then if you call the same code (hotcode) again then JIT will if you mahine code from cache

Questions:

1. Is java is compiled lang or interpreted?
2. What is JVM and what it does?
3. Difference between JDK, JRE and JVM?
4. How JIT improve performance?
5. Can we run Java program with only JRE? Yes, if I have .class file

Differences between Java and Others

C and C++ are static programming languages but JAVA is dynamic programming language

- If any programming language allows memory allocation for primitive data types at compilation time [Static Time] then that programming language is called **as Static Programming language**

EX: C and C++.

- In C and C++ applications, memory will be allocated for primitive data types at compilation time only, not at runtime.
- If any programming language allows memory allocation for primitive data types at runtime, not at compilation time then that programming language is called as **Dynamic Programming Language.**

EX: JAVA

- In java applications, memory will be allocated for primitive data types at runtime only, not at compilation time.
- Note: In Java applications, memory will be allocated for primitive data types at the time of creating objects only, in java applications, objects are created at runtime only

Pre-Processor is required in C and C++, but Pre-Processor is not required in Java:

In case of C and C++, the complete predefined library is provided in the form of header files

If we want to use predefined library in C and C++ applications, we have to include header files in C and C++ applications, for this, we have to use `#include<>` statement.

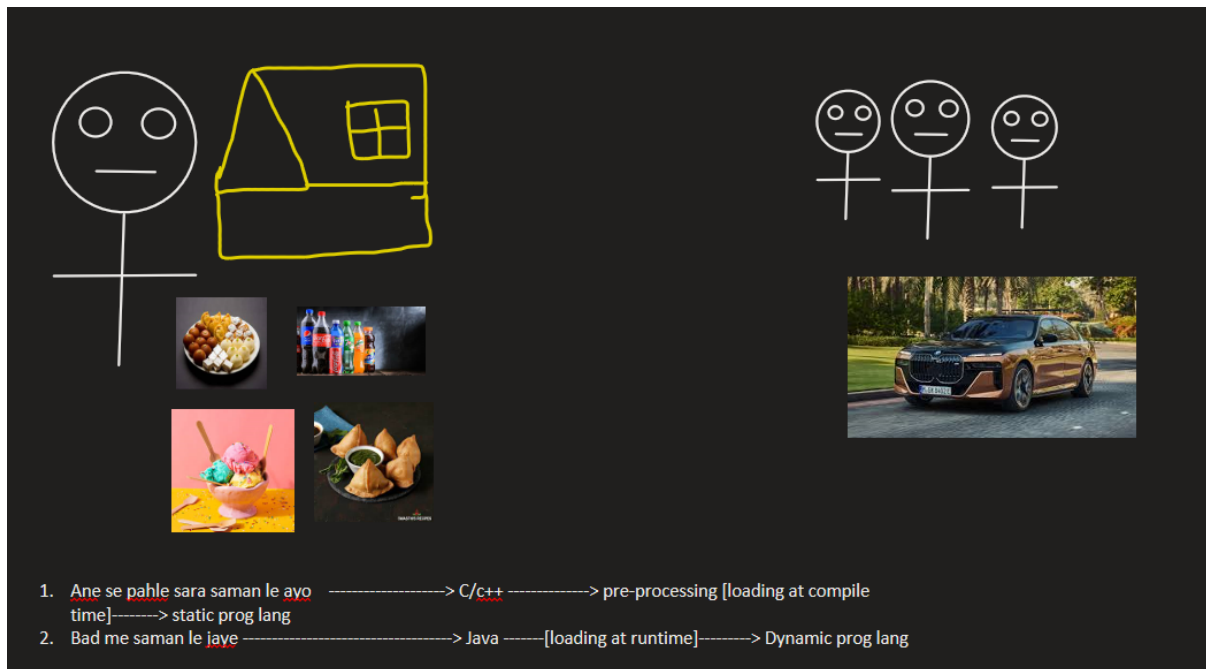
EX:

- `#include<stdio.h>`
- `#include<conio.h>`
- `#include<math.h>`

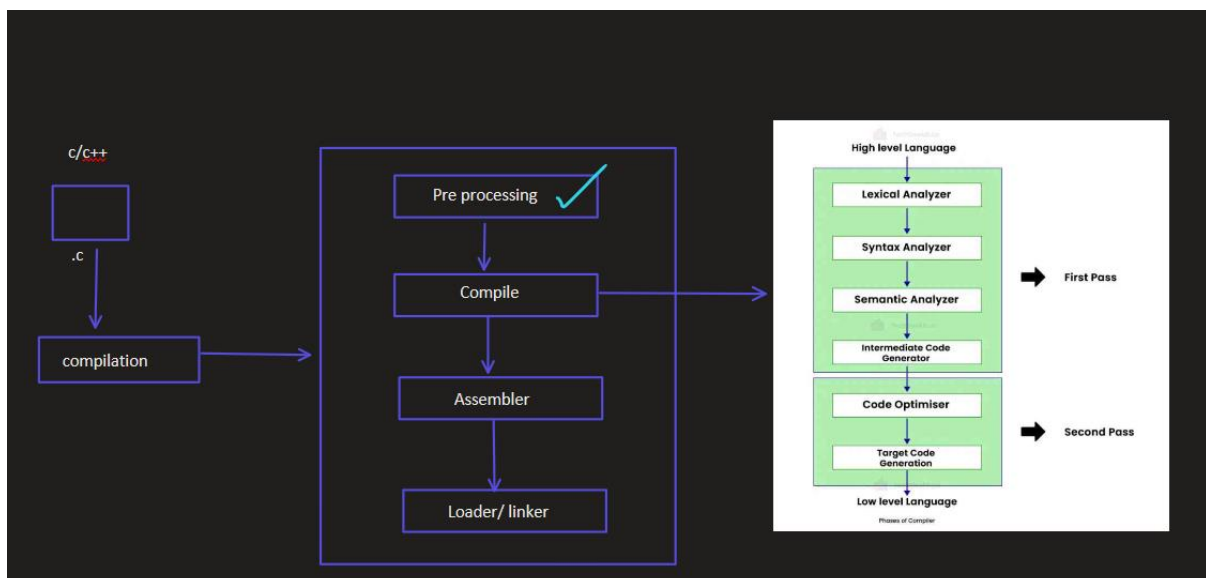
If we compile C and C++ applications then Pre-Processor will perform the following actions.

- 1) Pre-Processor will recognize all `#include<>` statement

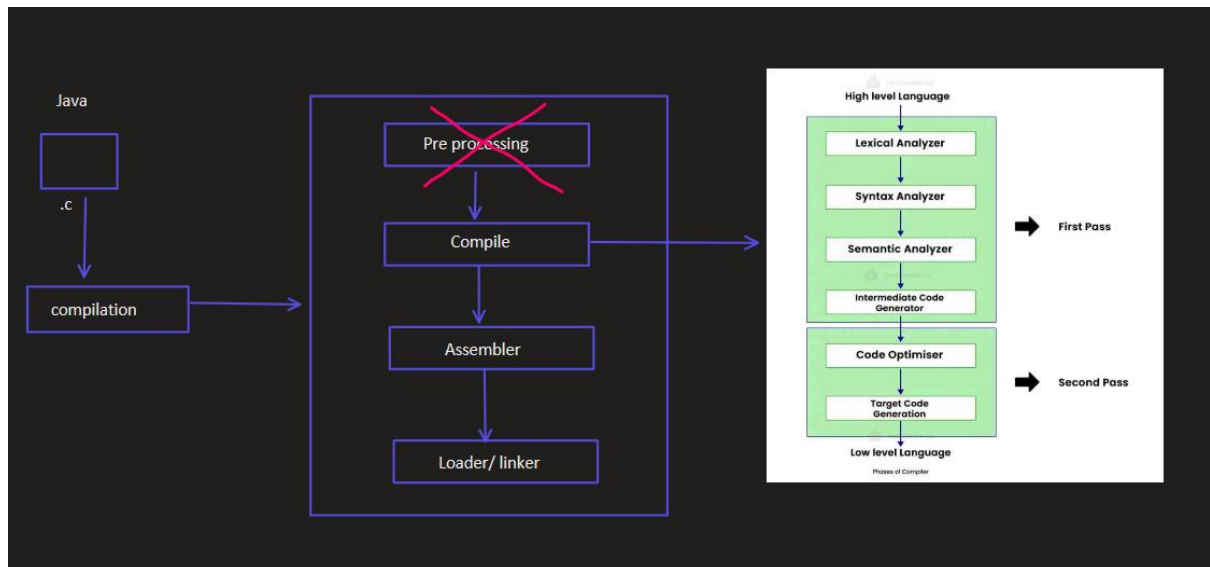
- 2) Pre-Processor will take all the specified header files from #include<> statements.
- 3) If the specified header files are existed then Pre-Processor will load the specified header files to the memory, this type of loading predefined library at compilation time is called as "Static Loading"



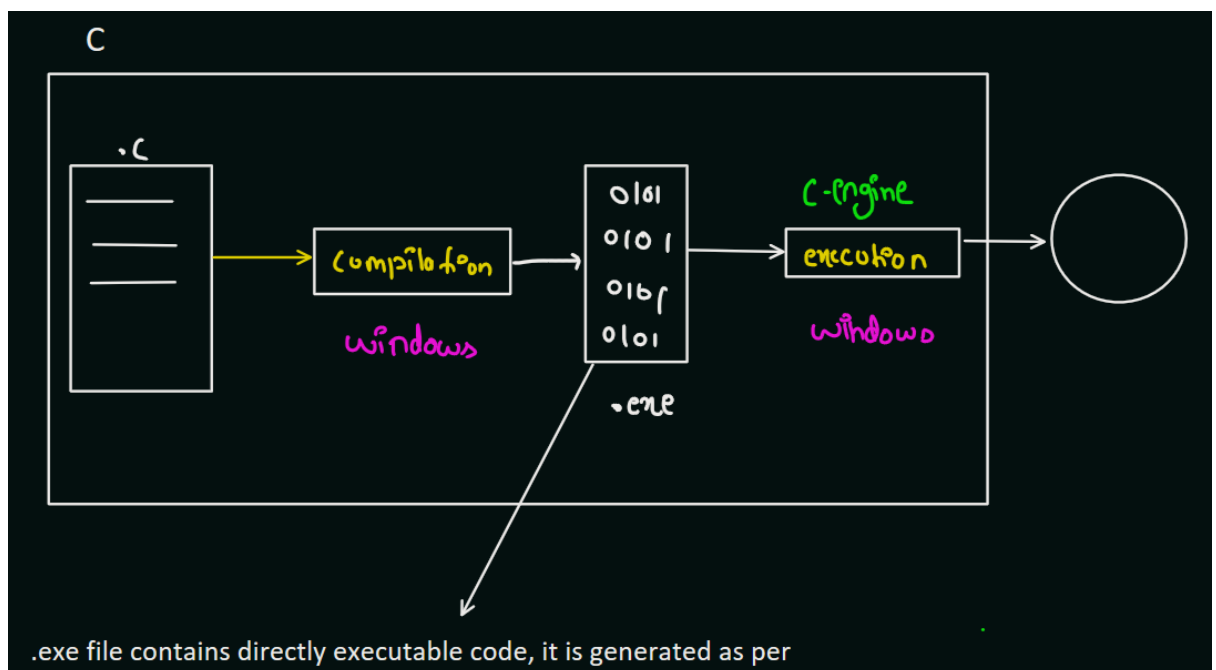
Code Execution in C/C++



Code Execution in Java



4. C and C++ are platform dependent programming languages, but JAVA is platform independent programming language



Platform Dependent vs. Platform Independent

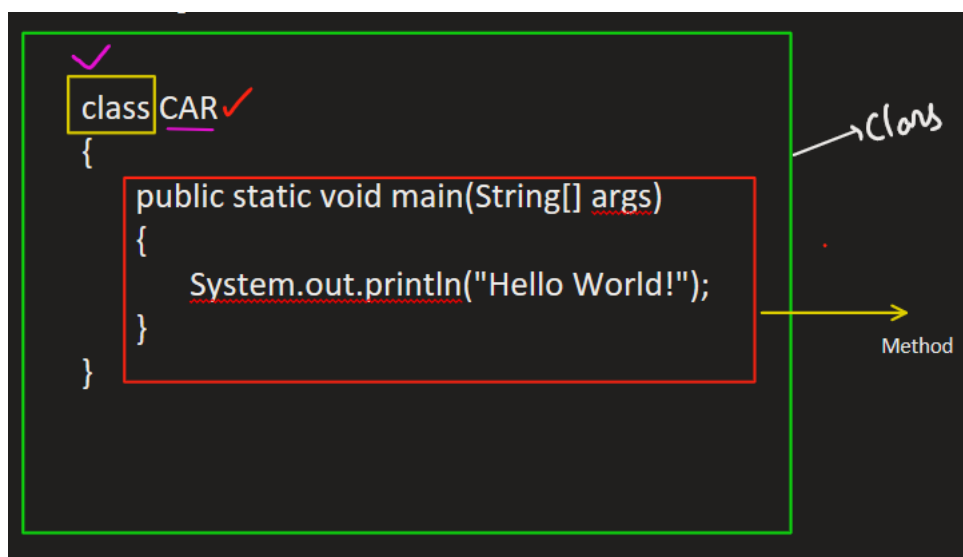
Platform Dependent: A programming language that allows its applications to be compiled and executed on the same operating system (e.g., C with .exe files).

Platform Independent: Java, with its .class files containing bytecode, can be executed on any operating system.

What are the differences between .exe file and .class file?

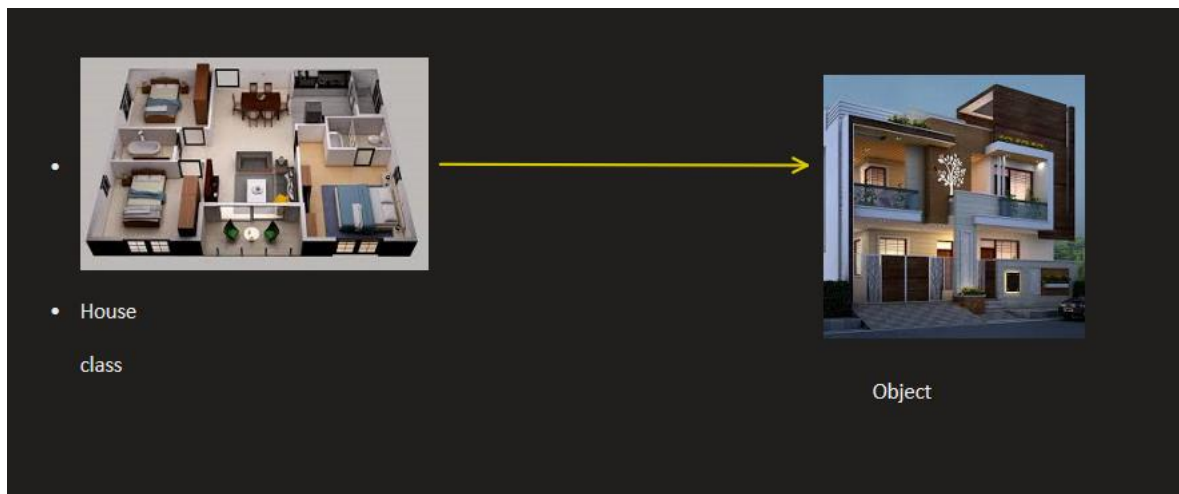
* .exe	* .class
C, C++	Java
<ol style="list-style-type: none">1. .exe file contains directly executable code2. .exe file is platform dependent3. .exe file is less secure	<ol style="list-style-type: none">1. .class file contains bytecode, it is not executable code directly2. It is an intermediate code3. .class file is platform independent4. .class file is more secure

Java Program Structure:



What is class?

A class is blueprint/template (CAR) from which individual object are created



Note : Why is everything in java inside class ?

Java is pure object-oriented programming lang that's why all thing wrap inside object

What is object ?

real world instance of class
running of instance of class

Class -> blue for CAR

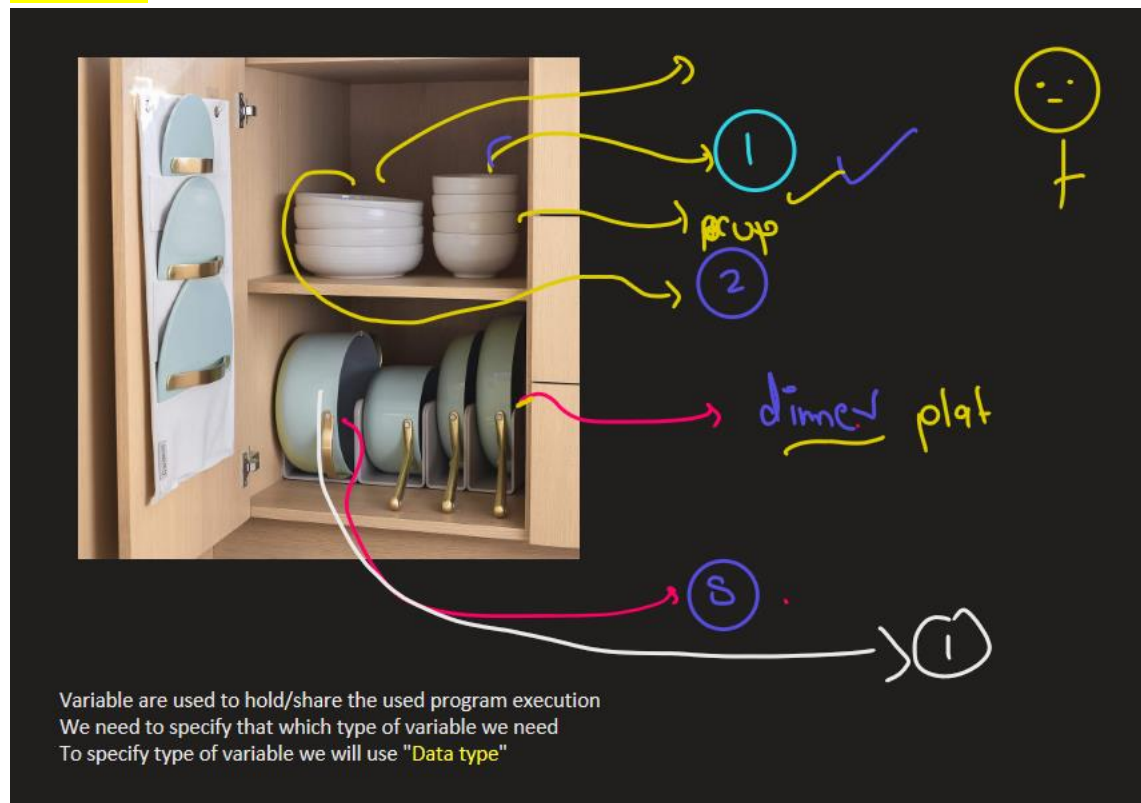
Object -> Actual CAR built using the blueprint -> Harrier ,Brezza

Methods

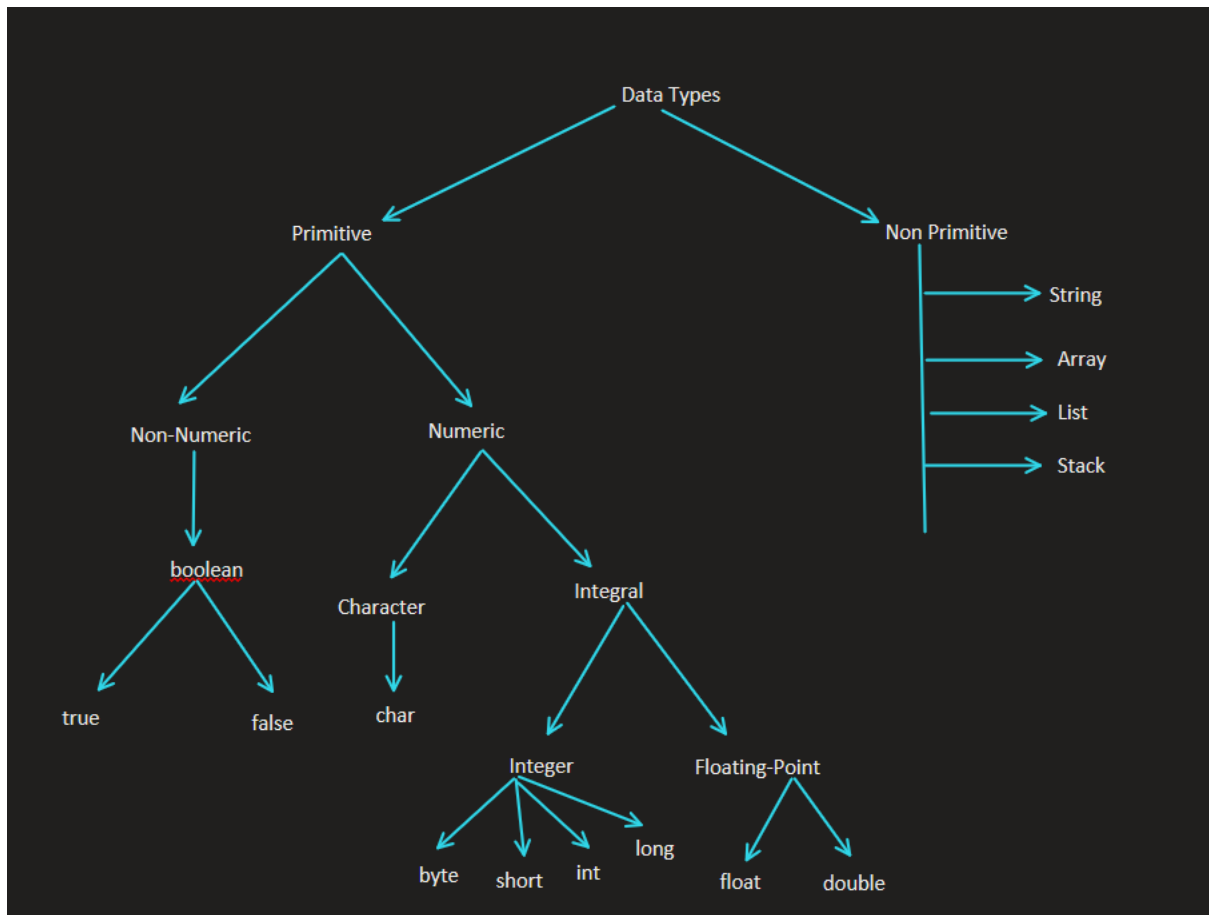
- What It Is: Blocks of code that perform specific tasks.
- Why It's Used: Helps to organize code into reusable chunks.
- Note: The main method is the entry point of any Java program

```
public class Car
{
    public static void main(String[] args)
    {
        System.out.println("Hello World");
    }
}
```

Variables :



Data Types:



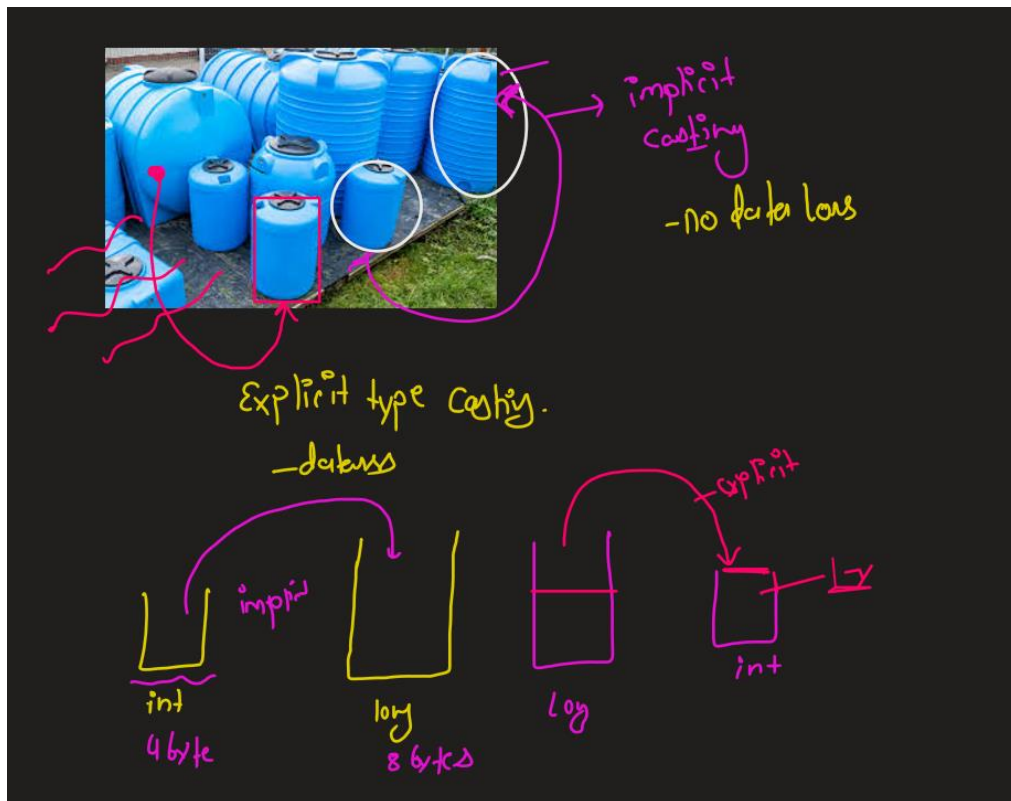
Identifiers:

Are the names given to class, variable, method and interfaces

Rules for naming identifiers

1. Valid char : lower case, Upper case , digit, _ , \$
2. Start with : letter , _ , \$ [it cannot start with digit]
3. Case sensitive : car, CAR, CaR
4. Reserved keyword : (int, for, if else)

What is type casting?



There are two type of casting:

Implicit casting: cast data type from lower to upper

Explicit casting: upper data type into lower, chances of losing data