Introduction to java

24 May 2025 09:03

dev ⟶ 1990 ⟶ Sun mic

James Gosling ⟶ oak ⟶ tree

⟶ Oak

Java ⟶

⟶ ✗ ✓

Developed By : James gosling
When: 1995
purpose:

26 temp ⟶

Originally made for devices like TV, remotes etc

2023----------> stack over flow-----> doubts

2025---------->chatgpt/AI model ----------> change in system

In 2000s ------> bank, ecomm, andriod app etc

1. High security

2. Stability
3. Performance

Why we learn java in 2025 ?
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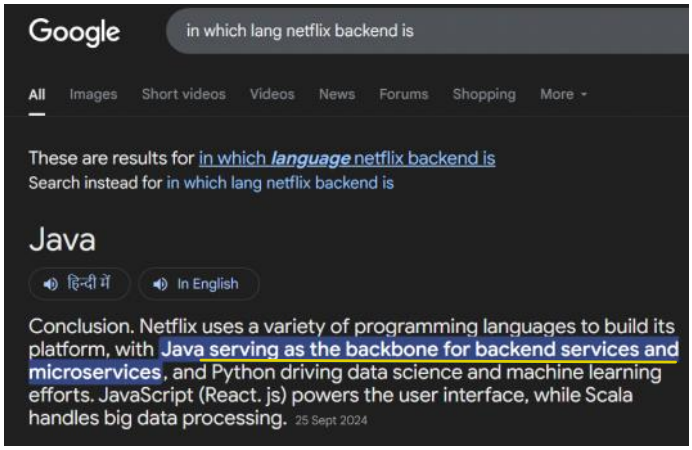
1. 90% 500 fortune companies used in for there BE dev
2. Amazon, Uber, Netflix -----> Java
3. 

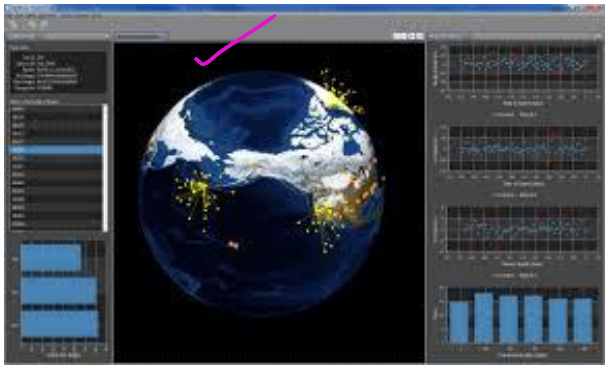
Java still is best choice for

1. Android
2. Banking and Fintech
3. Big data - Hadoop (java based)
4. Minecract ----> java
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. Morden tech --> kakfa, docker , kubernetes, AWS etc
5. Easy to learn

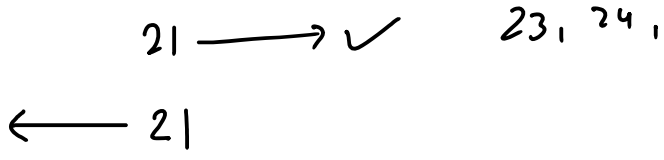
Domain	Java role
Banking	HDFC, ICICI core system
E-comm	Amazon, Flipkart
Android	70% app
Payments	Rozorpay, PhonePe backend in java
OTT platform	Neflix
Gamming	Minecraft
Space Tech	NASA uses java for simulations



Ok let's install java:

1. For Windows
Step 1: Download Java
1. Visit the java download page. :
https://www.oracle.com/in/java/technologies/downloads/
2. Select the latest Java Development Kit (JDK) [jdk 21] for Windows.
3. Download the installer (.exe file).
Step 2: Install Java
1. Run the downloaded .exe file.
2. Follow the installation wizard steps:
o Accept the license agreement.
o Choose an installation directory (default is usually fine).
3. Click Finish when the installation is complete.

Step 3: Set the PATH Environment Variable
1. Open the Start menu and search for Environment Variables.
2. Click Edit the system environment variables.
3. In the System Properties window, click the Environment Variables button.
4. Under System Variables, find and select the Path variable, then click Edit. If not available create one
5. Add the following to the list of paths:
o C:\Program Files\Java\jdk-<version>\bin (Replace <version> with the installed JDK version number).
6. Click OK to save changes



Java -version

Step 1: Download Java
1. Visit the Java Download page.
2. Select the latest JDK for macOS.
3. Download the .dmg file.

Step 2: Install Java
1. Open the downloaded .dmg file.
2. Follow the installation prompts:
o Drag the Java installer to the Applications folder.
3. Once the installation is complete, Java will be installed in /Library/Java/JavaVirtualMachines/.

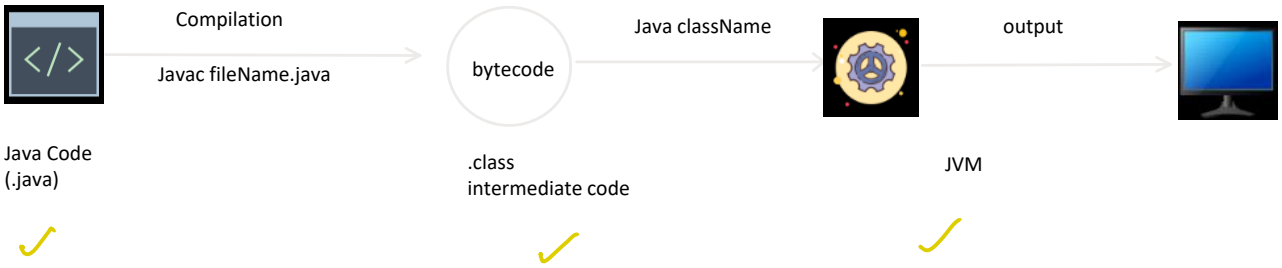
Step 3: Set the PATH Environment Variable
1. Open the Terminal application.
2. Edit the ~/.zshrc or ~/.bash_profile file (depending on your shell):
nano ~/.zshrc
3. Add the following line at the end of the file:
export PATH=$PATH:/Library/Java/JavaVirtualMachines/jdk-<version>/Contents/Home/bin
(Replace <version> with the installed JDK version).
4. Save the file and reload it:
source ~/.zshrc

Step 4: Verify Installation
1. Open the Terminal.
2. Run the command:
java -version
If Java is installed correctly, it will display the insta

Do not use any IDE ---->
EditPlus
sublime -- for mac and linux

Internal working

How to run java code ?



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

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

C/C++

Memory allocation

Difference between java and other lang
---

1. C And C++ -----> static programming language And java Is dynamic programming lang

Exp: if any prog lang allow memory allocation for primitive data types at compile time [static time] then the lang is called static prog lang
If any prog lang allow memory allocation for primitive data types at runtime, not at compile time then this lang is called dynamic prog lang

Pre-processor is required in c and c++ not in java
---

1. #include<stdio.h>
2. #include<math.h>

If we want to use predefined lin in C/C++ we have to include headers files

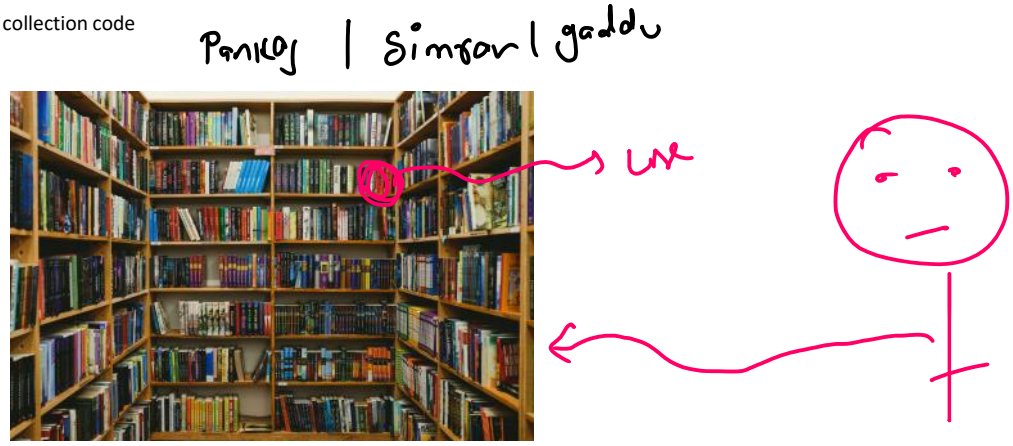
If we include header file then Pre-processor will load that specified header file into the memory. This type of loading happened at compilation time and it's called static loading

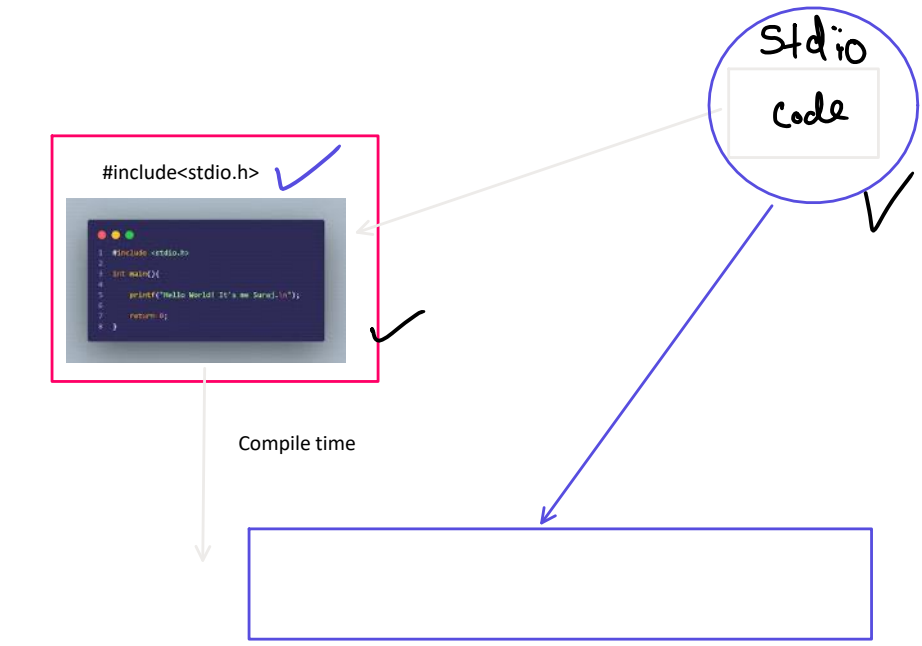
Lib : collection of something

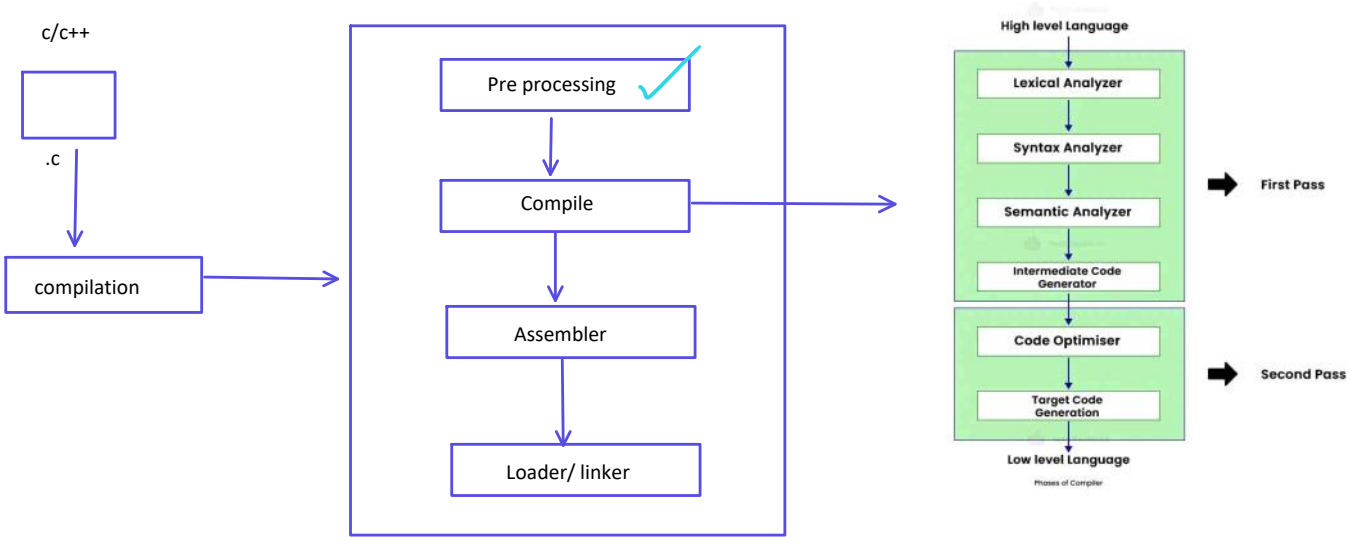
Books
---
lib : collections books

Programming

Lib: collection code







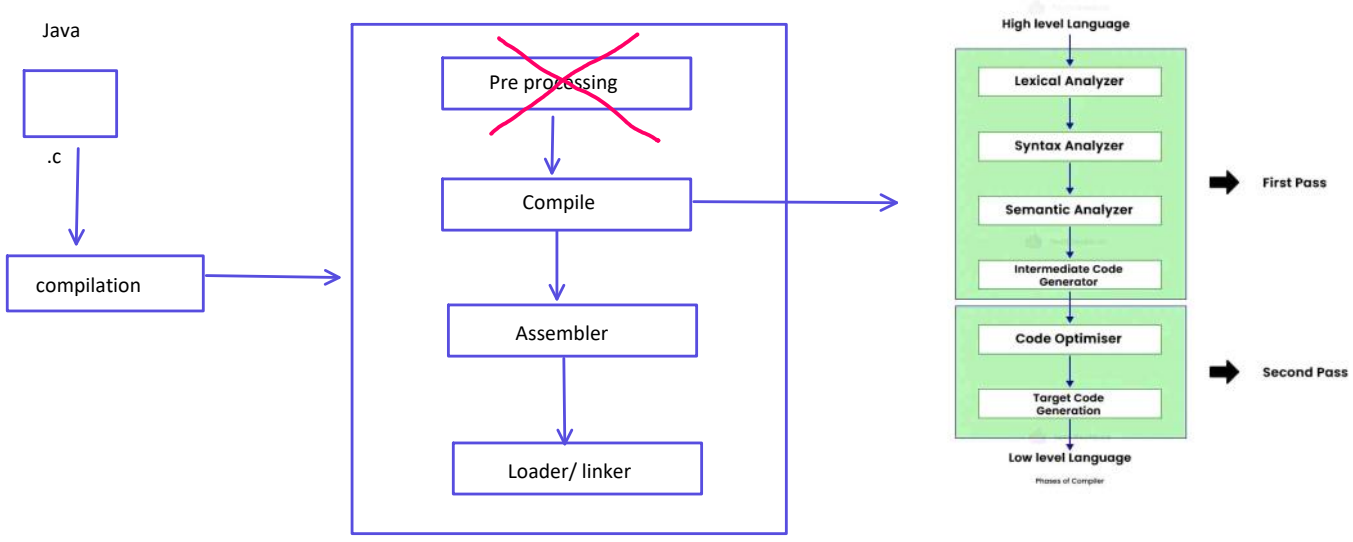
If we want to use predefined lib in java, then we have to include package in java

Eg:

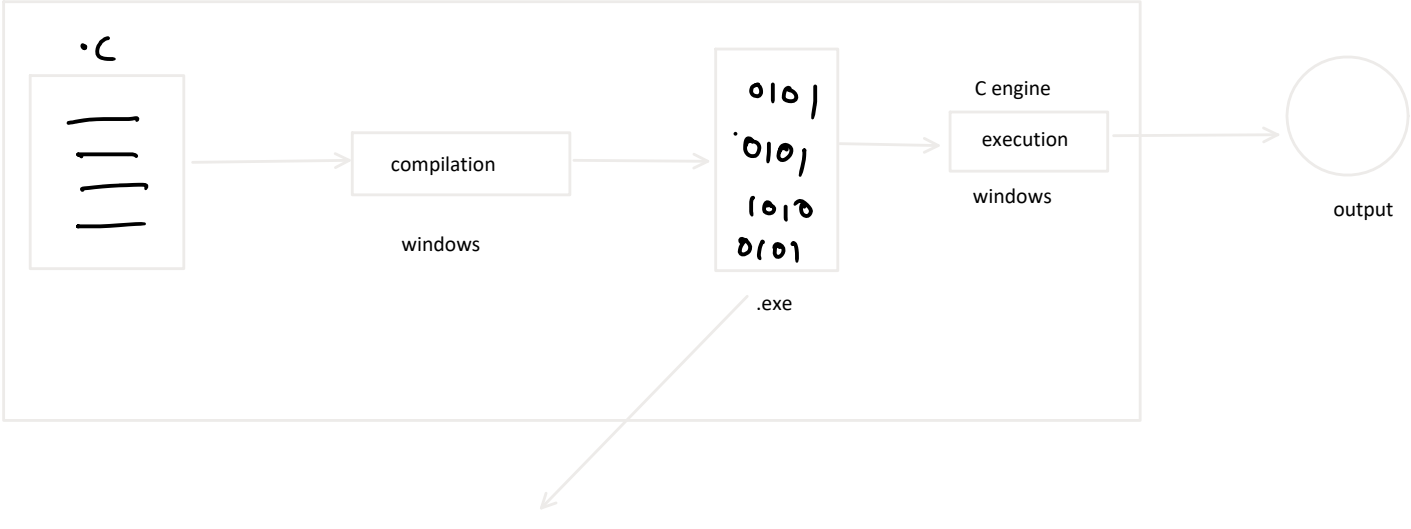
1. Import java.io*
2. Import java.util.*
3. Import java.sql.*

While executing java prog, JVM encounter any class or any interface from the specified package JVM will load required class and interface in to the memory at RUNTIME, loading predefined lib at runtime is called as Dynamic loading

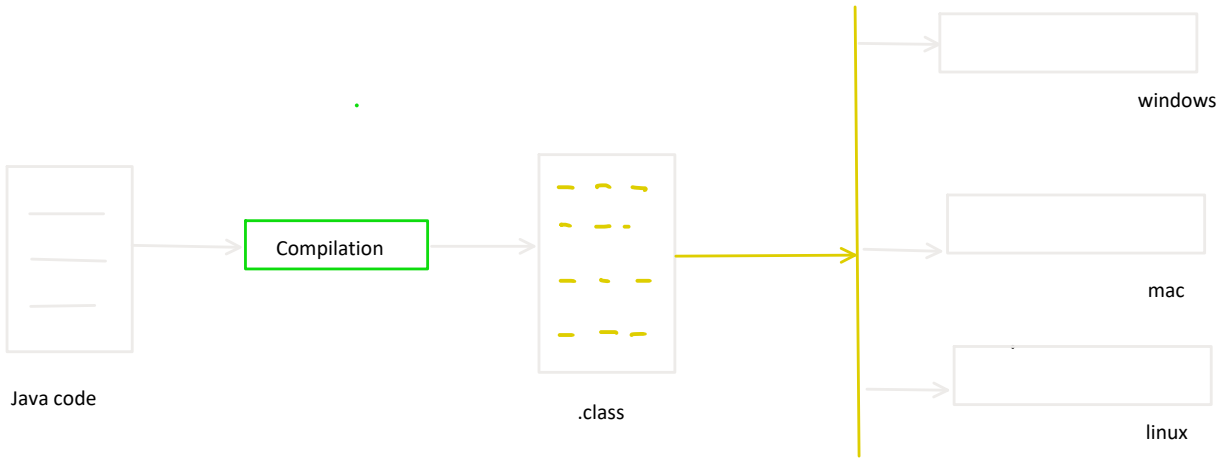
1. Ane se pahle sara saman le ayo ----------> C/c++ ----------> pre-processing [loading at compile time]--------> static prog lang
2. Bad me saman le jaye ----------> Java -------[loading at runtime]---------> Dynamic prog lang



3. C and C++ platform dependent prog lang, but java is platform independent

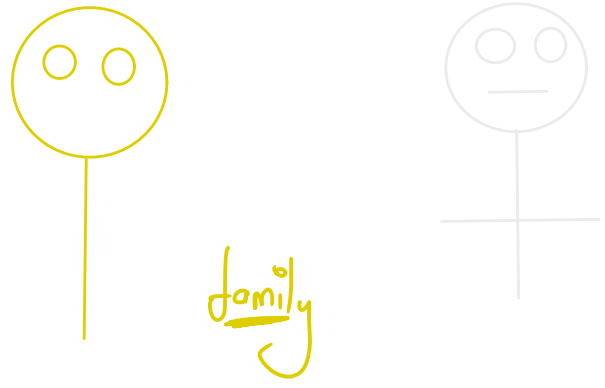


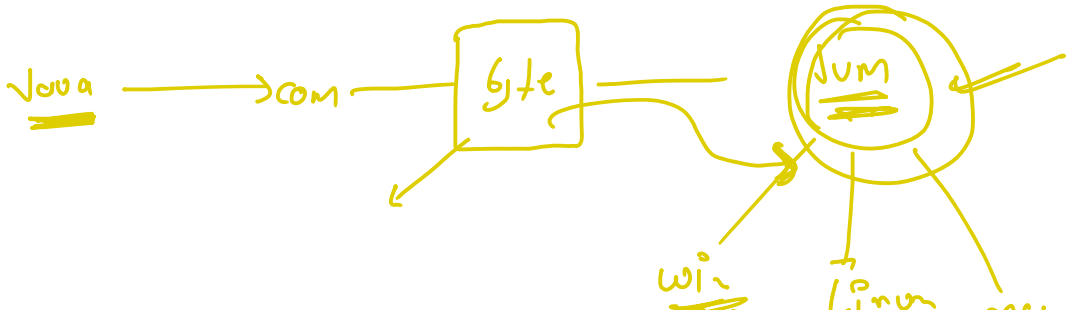
.exe file contains directly executable code, it is generated as per OS

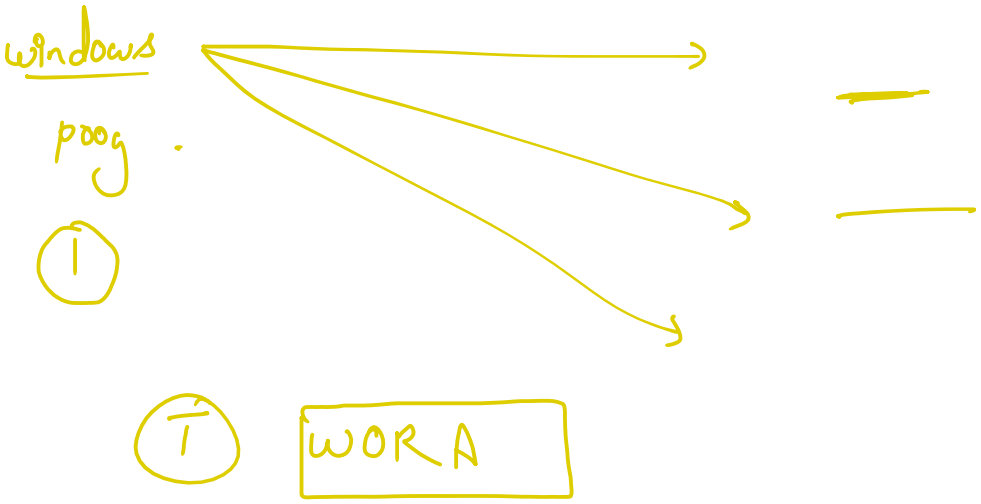


Linux ---> tar
Windows ---> exe
mac -dmg

this java software is platform dependent





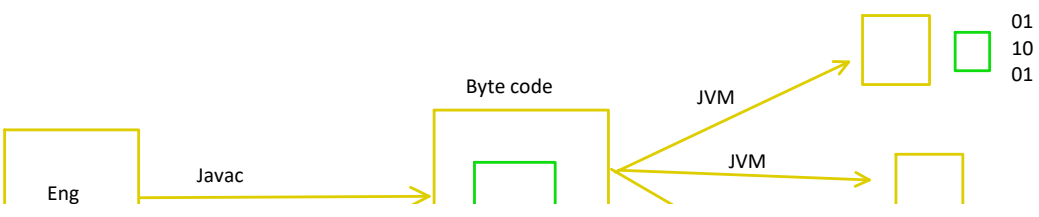


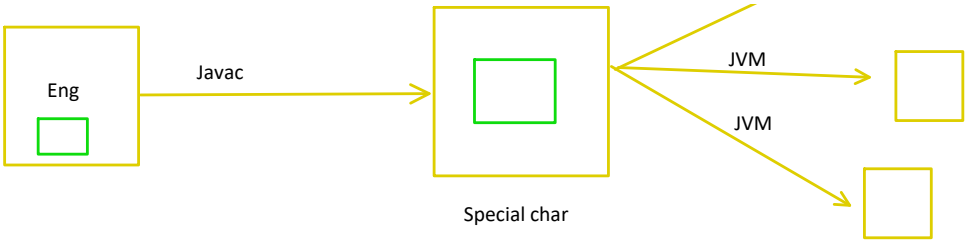
.exe

1. Executable code
2. Platform dependent
3. Less secure

.class

1. Byte code, it is not executable code
2. Platform independent
3. More secure





ByteCode

Not readable by human and not understand by machine

it is understandable by JVM only

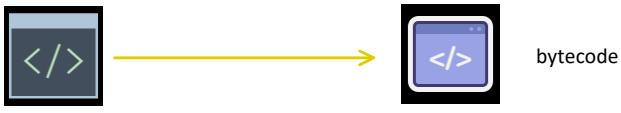
Machine Code

Generated by Bytecode by the JVM(using JIT compiler) specific to OS

Written in 1s and 0s

What is java ?

Java is compilation or interpreted lang ?
1. java is both compiled and interpreted lang ?



Java code(.java)

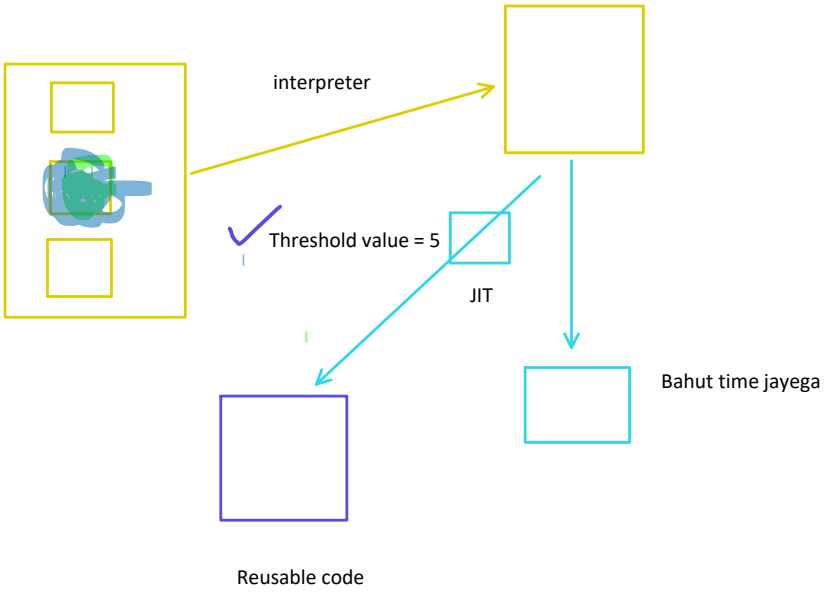
.class

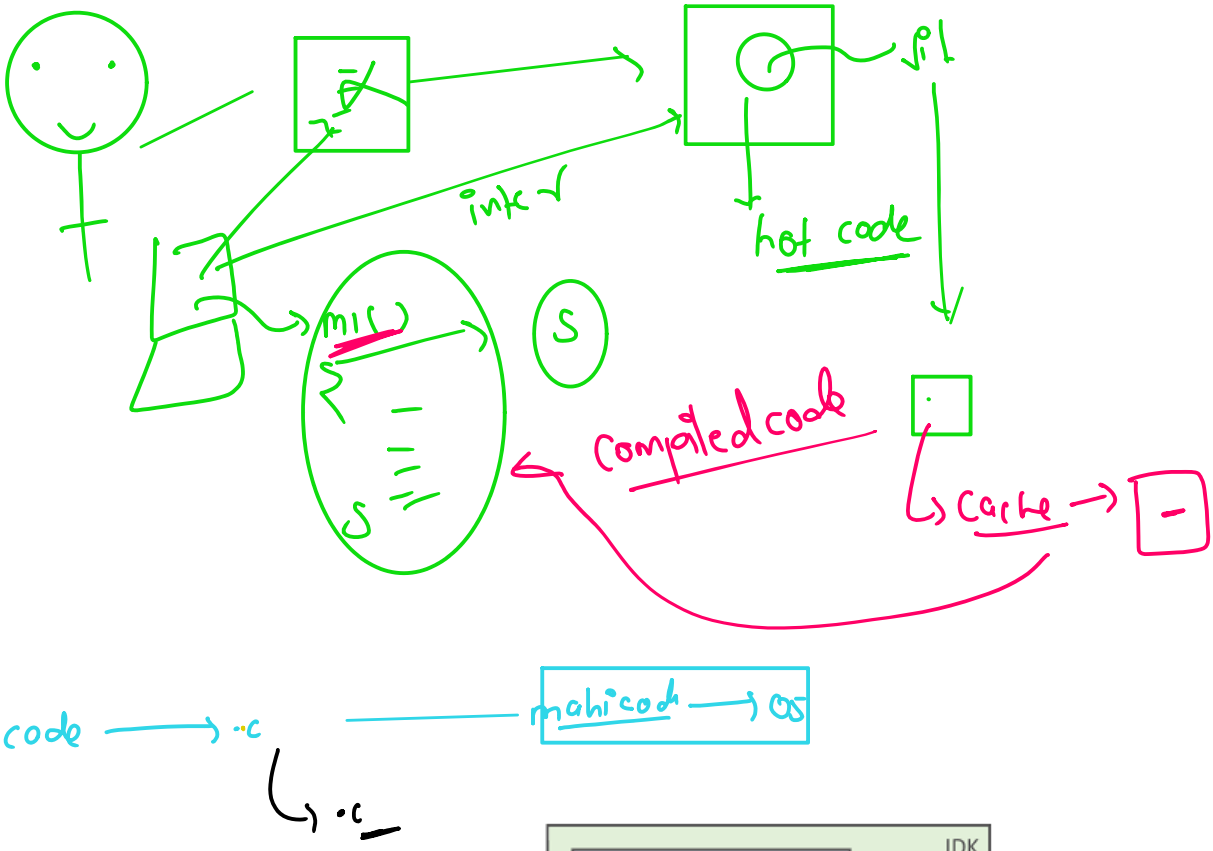
1. Bytecode is interpreted / executed by JVM at runtime
2. JIT[Just in time compiler] convert bytecode to machine code during execution for better performance

Internal of code execution

Case 1: Without JIT
Use interpreter and each instruction converted line by line

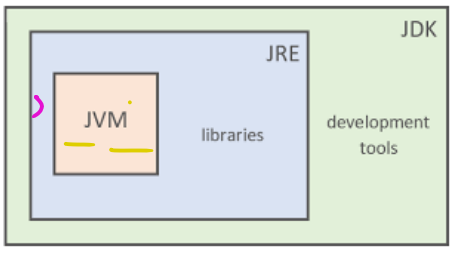
Case 2: With JIT
Code is compiled once and resued





What is JVM ?

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



What is JRE(Java runtime environment)

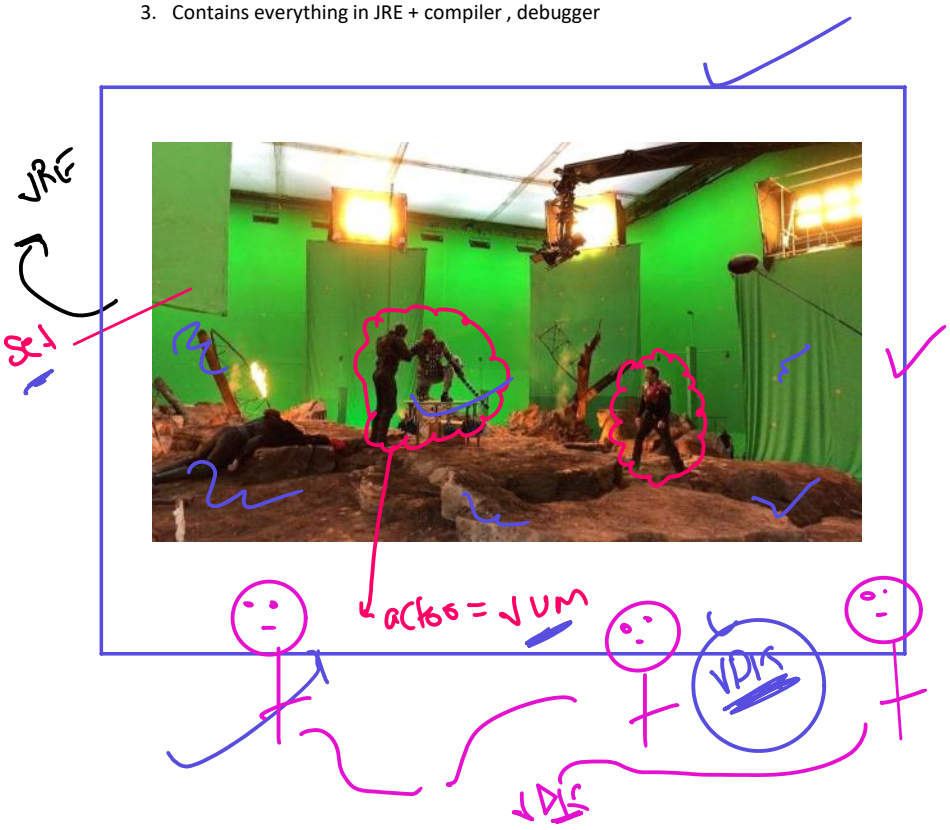
What is JRE(Java runtime environment)

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



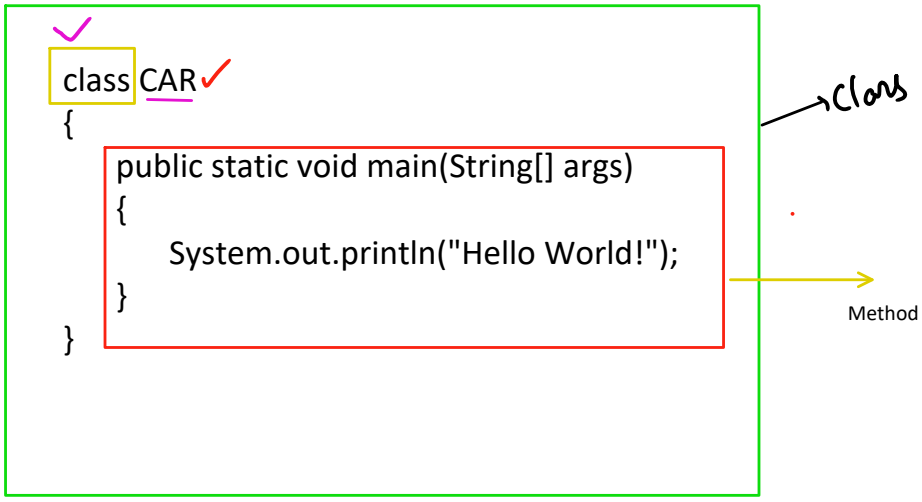
What is JIT ?
part of jvm
Convert frequently used bytecode into machine code

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

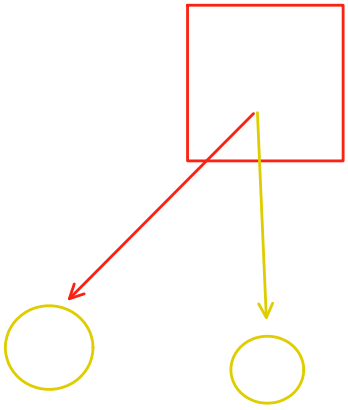
Questions :

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

Java Program Structure :



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



- 

- House

  class

Object

Note : Why is everything in java inside class ?
Java is pure object oriented programming lang that's why all thing wrap inside object

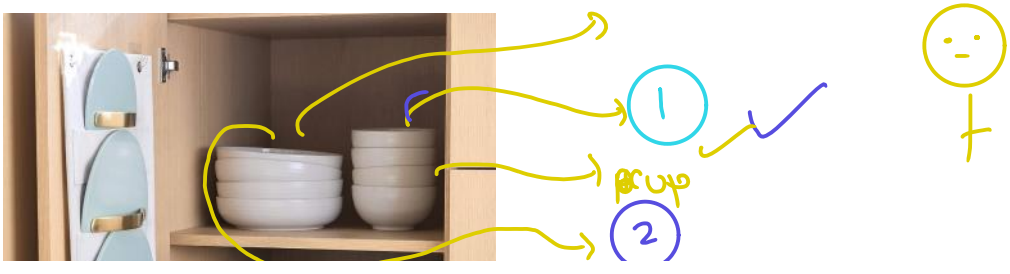
What is object ?
real world instance of class
running of instance of class

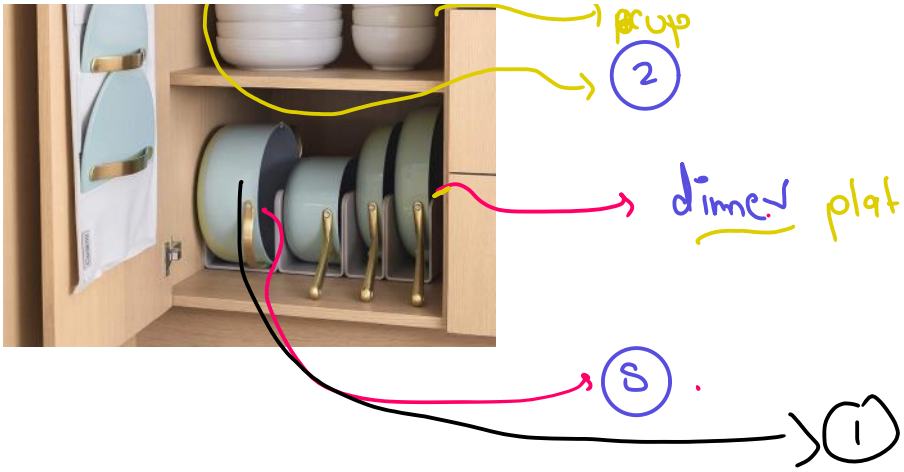
Class -> blue for CAR
Object -> Actual CAR built using the blueprint -> Harrier ,Brezza

Method:

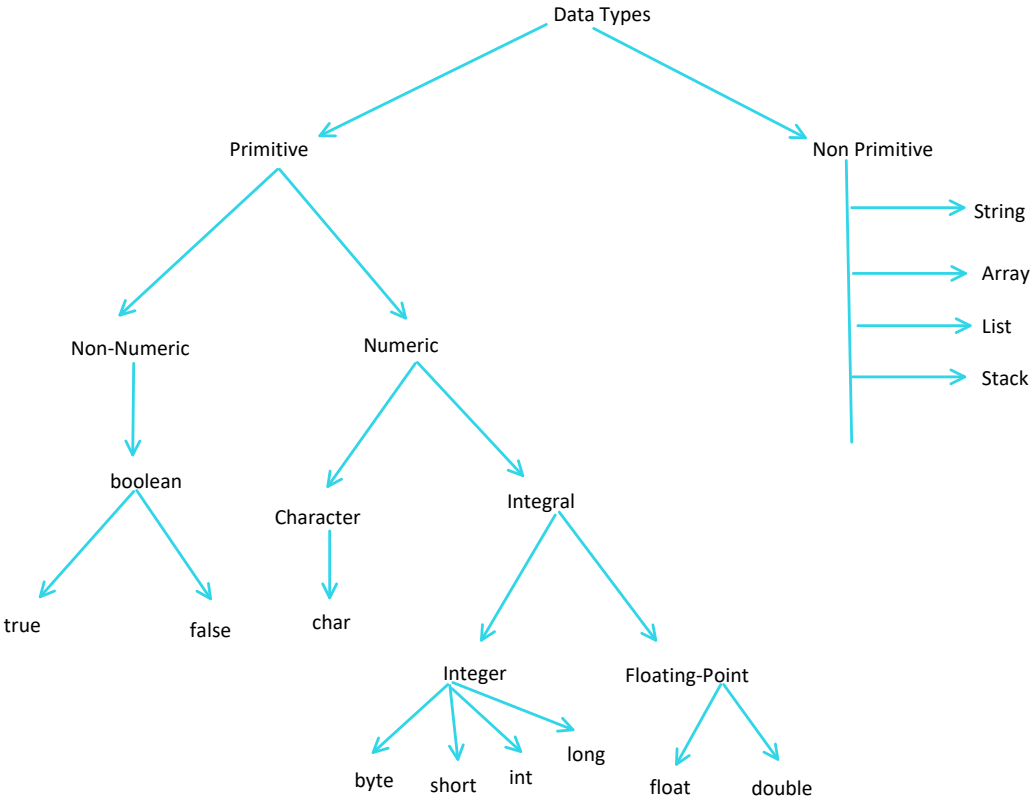
1. Block of code that perform specific task
2. Reusable code

Variables :

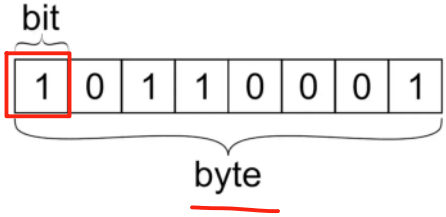




Variable are used to hold/share the used program execution
We need to specify that which type of variable we need
To specify type of variable we will use "Data type"



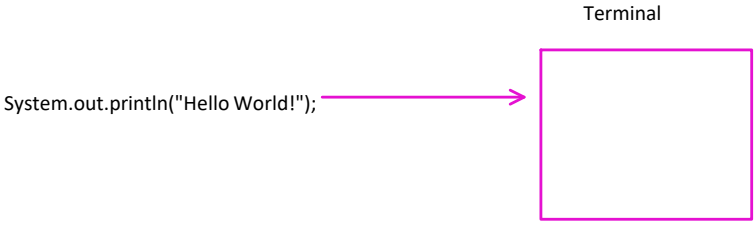
Bytes and bites
---
1 Byte => 8 bites



Syntax :

<Data type> <Name> = value;

Int salary = 10000;

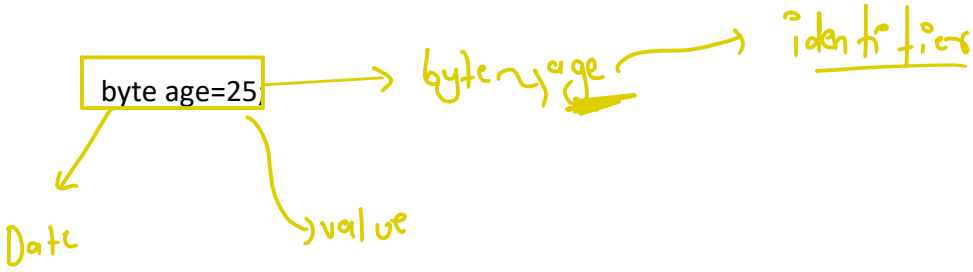


H.W

1. Storage for byte > start to end

Data types default values

S.No.	Data Type	Default Value
1.	Byte	0
2.	Short	0
3.	Int	0
4.	Long	0L
5.	Float	0.0f
6.	Double	0.0d
7.	Boolean	False
8.	Char	'\u0000'



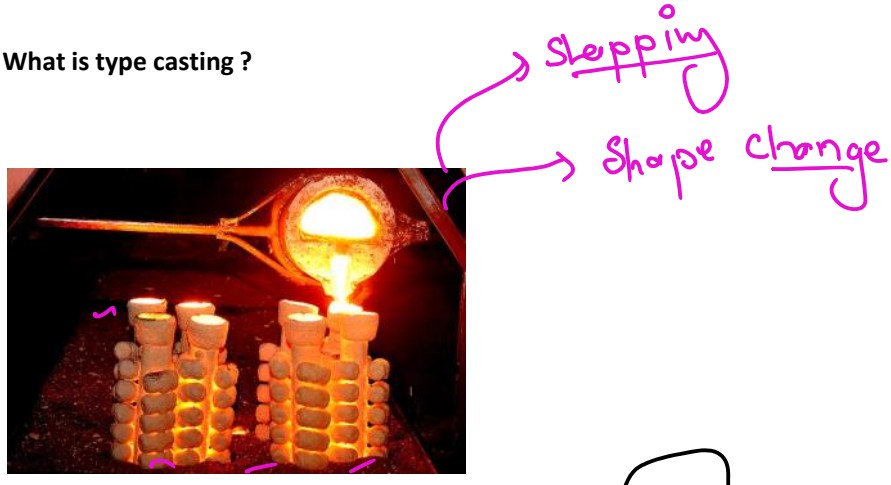
Identifiers

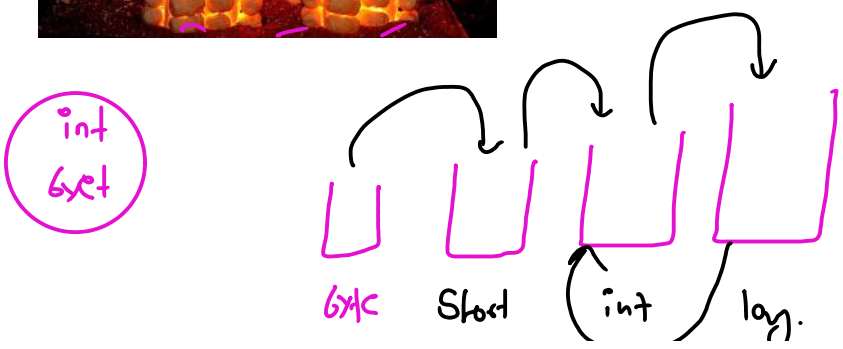
Are the names given to class, variable, method and interfaces

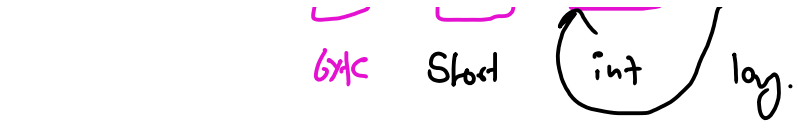
Rules for naming identifiers
---

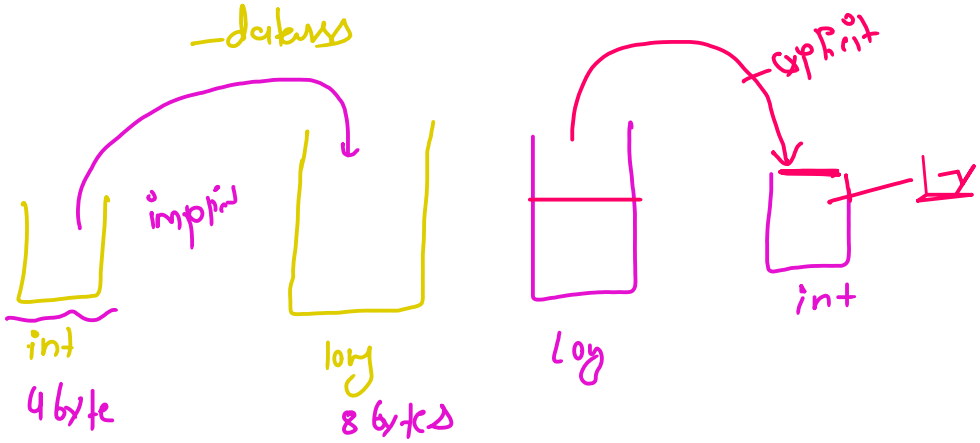
1. Valid char : lower case, Upper case , digit, _ , $
2. Start with : letter , _ , $ [it cannot start with digit]
3. Case sensitive : car, CAR, CaR
4. Reserved keyword : (int, for, if else)

What is type casting ?









char —ASCII→ rep

a —— 97 — 32
A —— 65
6 —— 58

H.W
A —— Z
a —— z
| —— ASCII

Can we run .java file using only JRE ?
No

Which of the following contains java compiler
1. Jre
2. Jdk --
3. Jvm

Which is the output of javac
1. Machine code
2. Bytecode --
3. Native code

What is the default value of boolean ?
1. True
2. False --

Identify the valid java variable name
1. 1age
2. total_marks --
3. @marks
4. string

What will be the output ?
Double d = 9.8;
Int i=(int) d;
SOP(i) //----> 9

Which type of casting it is ?
long l = 134;
Int x=(int) l; //explicit

Which one of the following give compile time error
int x=12.4;
Int y = (int) 19.2; //
double d=11;
Float f = 17.10f;

Chapter 2 : Operators

variables

int a = 10;

int b = 10;

Sum

sub

mul

div

Operators:

1. Is a symbol which tells compiler to perform some operation/task.

Types

1. Arithmetic operator = +, -, *, / , %
2. Relational operator =
3. Logical Operator
4. Assignment Operator
5. Unary Operators
6. Ternary Operators

Operators	Result
+	Addition of two numbers
-	Subtraction of two numbers
*	Multiplication of two numbers
/	Division of two numbers
%	(Modulus Operator)Divides two numbers and returns the remainder

Increment & decrement(unary)

++ ==>

-- ==>

```
int c= 6;
```

```
//mera 6 + 8 + 9 + 9 + 11 = 43
int res = c++ + ++c + ++c + c++ + ++c;

System.out.println(res); //14
```

Operations : + -

Post : first operation kro then increment kro
pre : first increment kro then operation

Relational operator

Used to test comparison between operands or values

A + b
Operands = A,B

Operator	Description
==	Equal to
>	Greater than
>=	Greater than or equal to
<	Less than
<=	Less than or equal to
!=	Not Equal to

Logical Operators

&& ---> AND -----> a && b --- if both true then only res will true
|| ----> OR ------> a || b --> if anyone is true then res will true
! ------> true --> false

Assignment Operator

Int a =10 =

1. =
2. +=
3. -=
4. *=
5. /=
6. %=

Int a=10
Int a=a+5; ------> int a+=5//

Ternary Operator

Int marks =32;
String res = (marks > 33) ? "Pass" : "Fail"

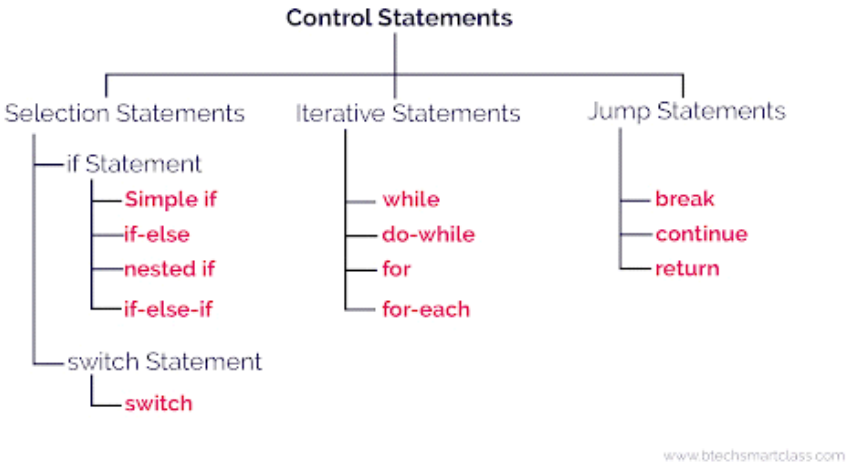
new
---

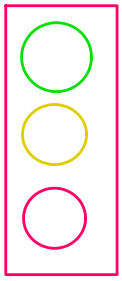
new is keyword or operator which is used to create the object

```
ClassName ref = new ClassName();
```

Control Statement
---

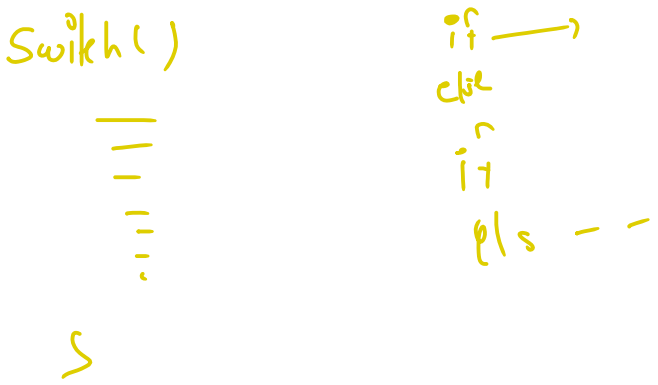
1. these are used to control program flow
2. These are used to execute group of statement based on condition





Type of control :

1. Decision Making : if , if-else, if-else-if, switch
2. Loop : for , while, do-while
3. Jump : break, continue, return



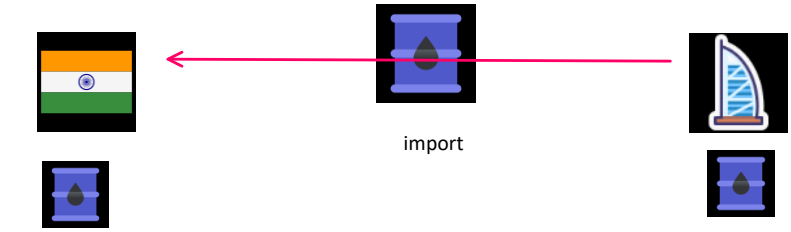

```
class SwitchDemo
{
    public static void main(String[] args)
    {
        int n=2;
        switch(n)
        {
            case 1:
                System.out.println("value is 1");
            case 2:
                System.out.println("value is 2");
            case 3:
                System.out.println("value is 3");
            default:
                System.out.println("not Exist");
        }
    }
}
```

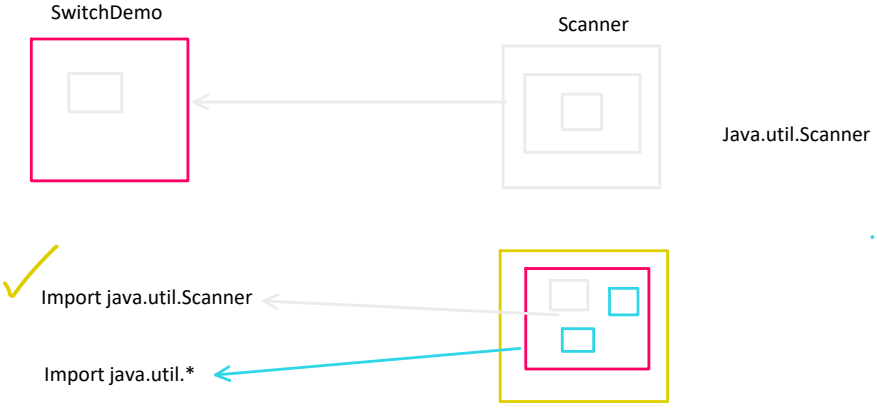
```java
class SwitchDemo
{
    public static void main(String[] args)
    {
        int n=1;
        switch(n)
        {
            case 1:
                System.out.println("value is 1");
                break;
            case 2:
                System.out.println("value is 2");
                break;
            case 3:
                System.out.println("value is 3");
                break;
            default:
                System.out.println("not Exist");
        }
    }
}
```

How to take input from user

Scanner

Import in java





Homework :

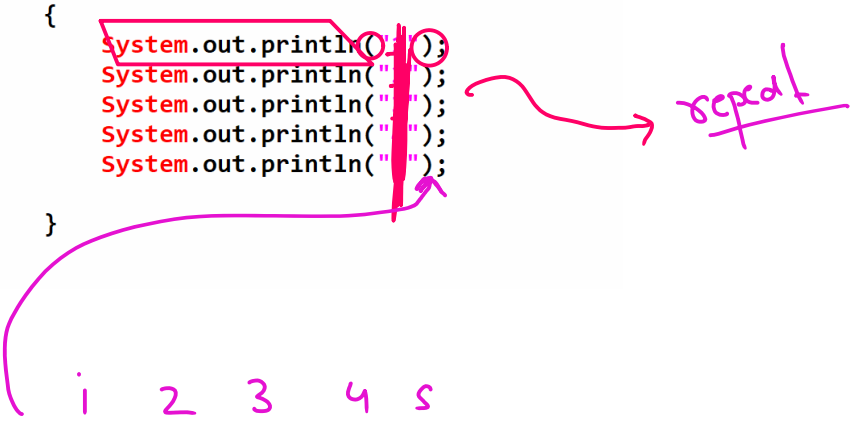
1. Take string value
2. Ask user which subject we want to choose eg: choice 2
   Case 1: math
   Case 2 : eng
   SOP(english)

3. Home work
   a. 1 --- one
   b. 2 --- two
   c. 9 ---

Loop:

Why we need loops ?

```
1  class LoopDemo
2  {
3      public static void main(String[] args)
4      {
5          System.out.println("");
6          System.out.println("");
7          System.out.println("");
8          System.out.println("");
9          System.out.println("");
10
11     }
12 }
13
```




```
class LoopDemo
{
    public static void main(String[] args)
    {
        int i=1;
        System.out.println(i);
        i++;
        System.out.println(i);
        i++;
        System.out.println(i);
        i++;
        System.out.println(i);
        i++;
        System.out.println(i);

    }
}
```

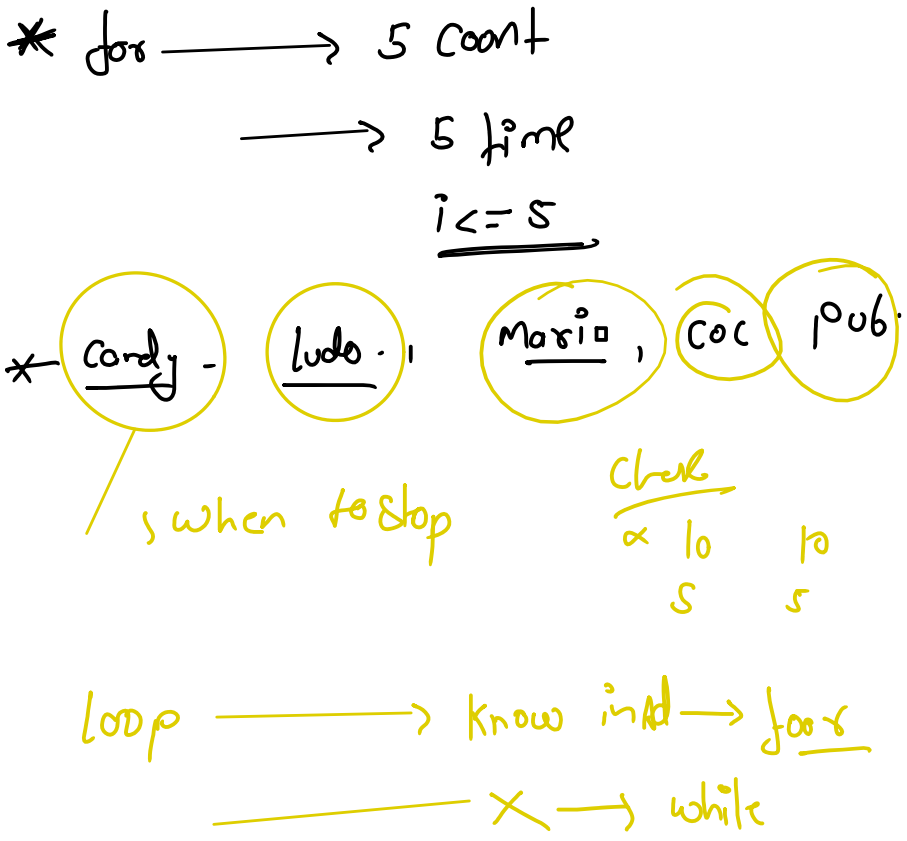
Do while

Jab ek bar loop chalana ho

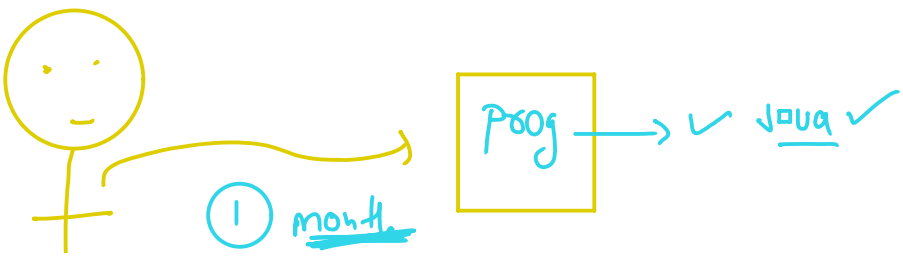
For loop -----> condition check
While ----> condition check

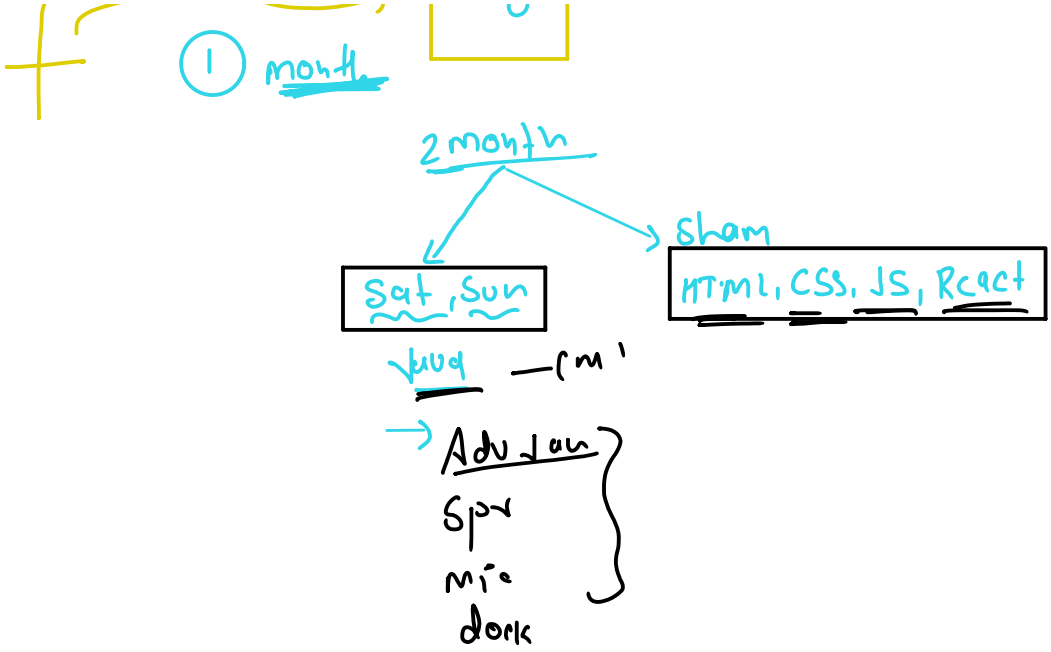
Syntax

```
Do {
        SOP()
}
While(condition);
```

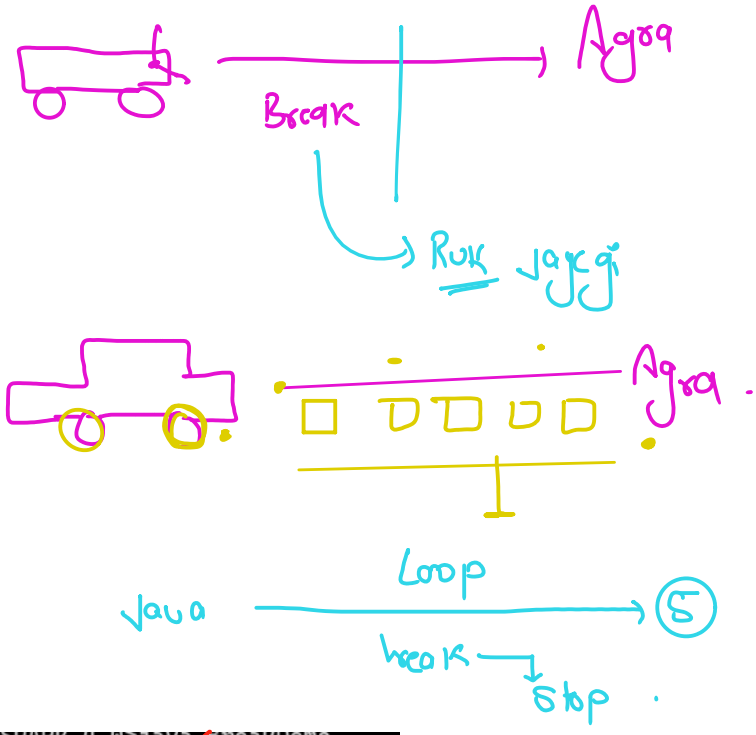


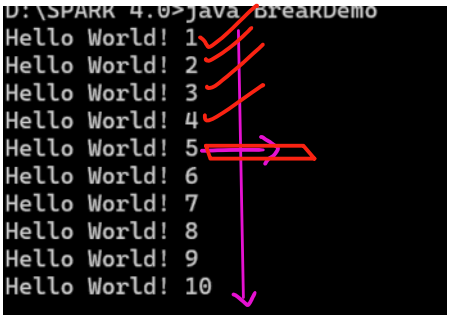
Kya 4-5 month complete ho payega ?



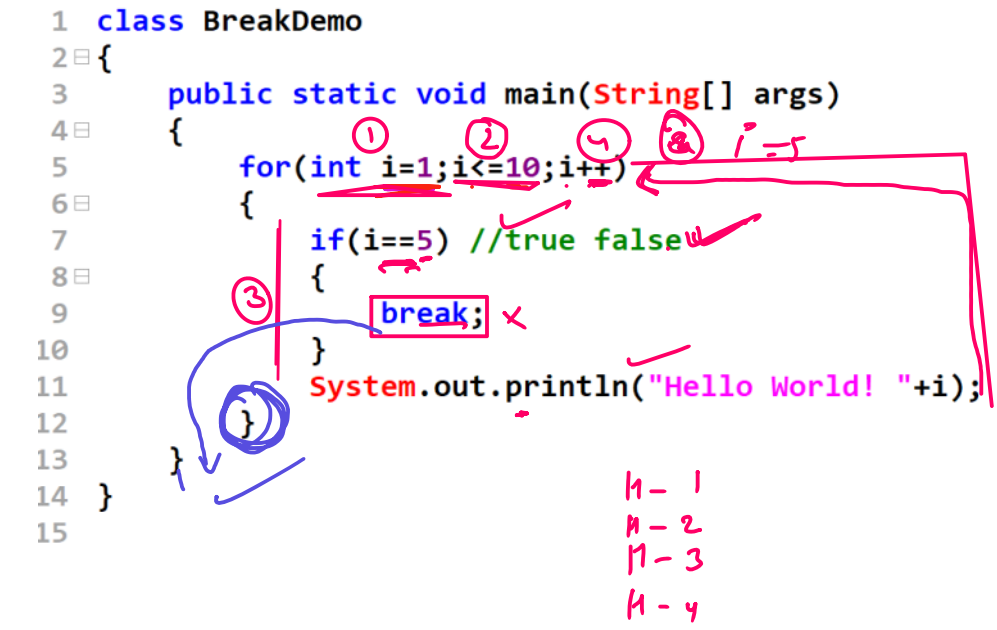


1. break
2. continue
3. return

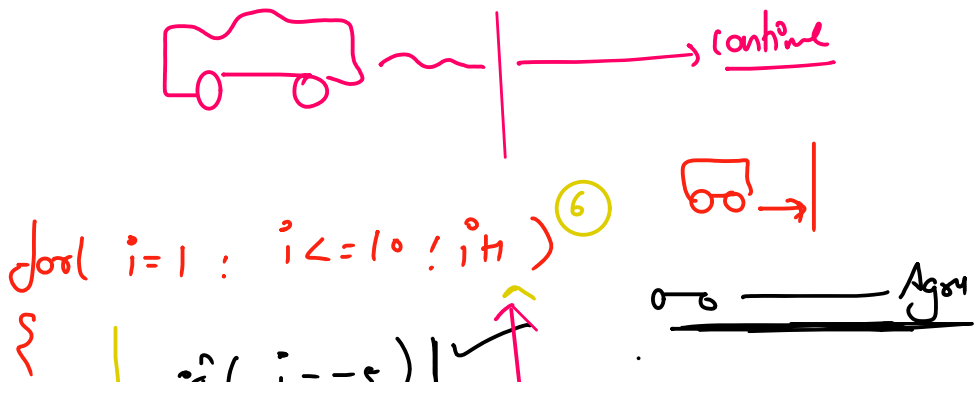


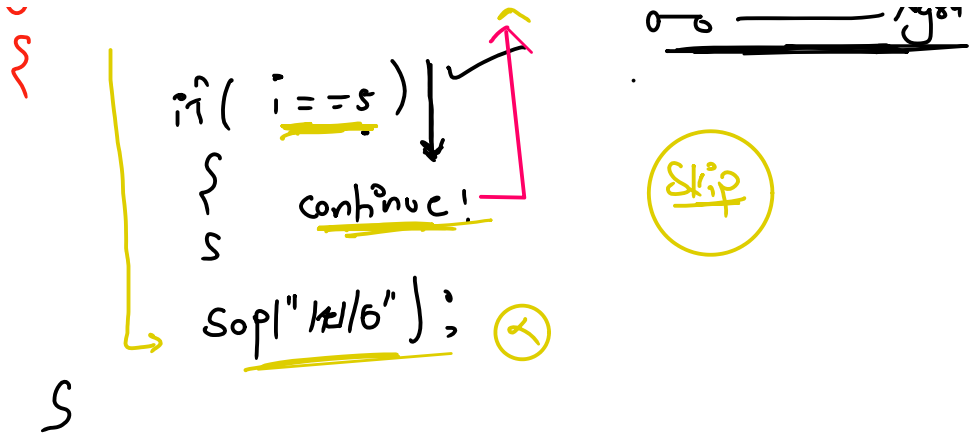


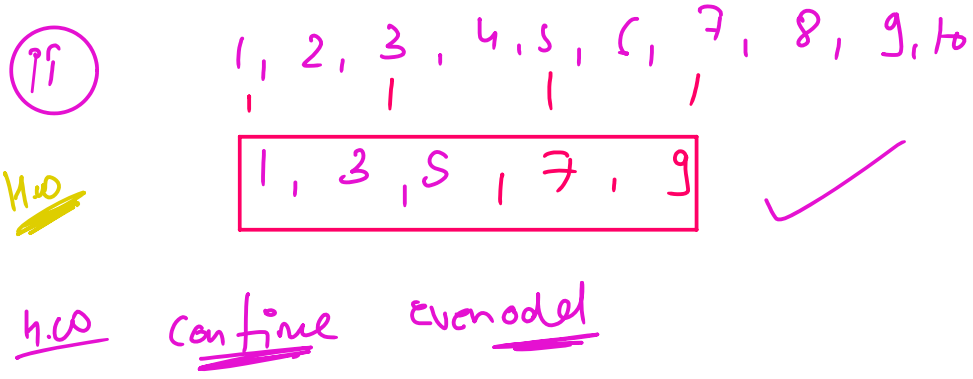
```
1  class BreakDemo
2  {
3      public static void main(String[] args)
4      {
5          for(int i=1;i<=10;i++)
6          {
7              if(i==5) //true false
8              {
9                  break;
10             }
11             System.out.println("Hello World! "+i);
12         }
13     }
14 }
15
```



Continue



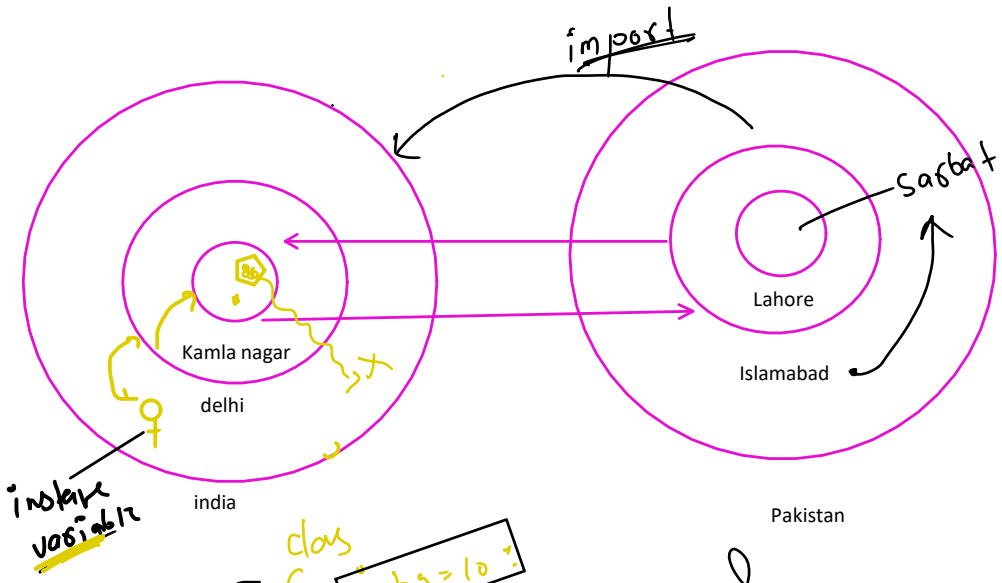


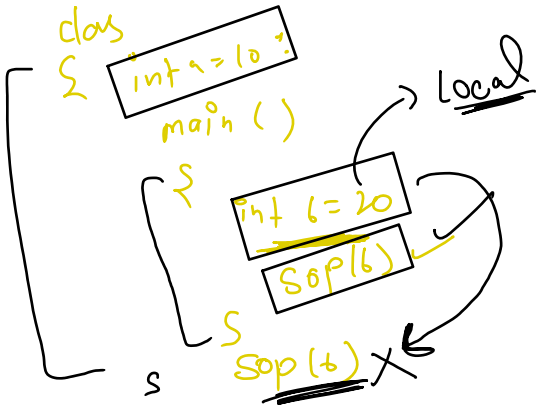


Type of variables (based on scoop)

Java has 3 type of scope

Instance	local	static
Ese varaibles jo class k under or Main method k bahar		



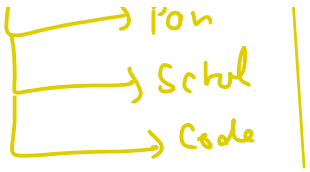


Class Student
{
int a ;
main ( )
{
}

Student s1 = new Student();

}

Student — name age
→ addar
→ Pan
→ Schul




```
D:\SPARK 4.0>javac Student.java
Student.java:9: error: non-static variable name cannot be referenced
 from a static context
                System.out.println("Name "+ name);
                                           ^
Student.java:10: error: non-static variable age cannot be referenced
 from a static context
                System.out.println("age "+ age);
                                           ^
```

```java
class Student
{
    //instance
    String name="Nazia";
    int age =24;

    public static void main(String[] args)
    {
        System.out.println("Name "+ name);
        System.out.println("age "+ age);
    }
}
```

Instance : class k under or method k bahar
Local : method k ander can't use outside of moethod

Static : in static areas only static variable will be used, static variable can be used in instance or local area

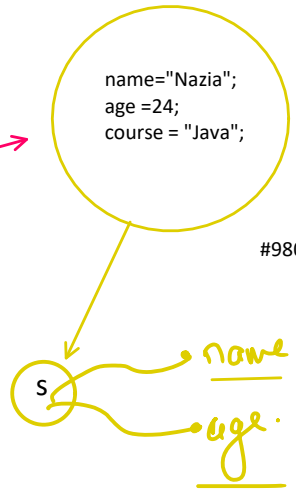
Note: If we want to use instance variable inside static block/area we have to use object

Note : if we want to access static instance varaible in static area then no need to create object also we have call using classname

Student s = new Student();

```
class Student
{
    //instance
    String name="Nazia";
    int age =24;
    static String course = "Java";

    public static void main(String[] args)
    {
        /*
        System.out.println("Name "+ name);
        System.out.println("age "+ age);
        */
        Student s=new Student();
        System.out.println("Name "+ s.name);
        System.out.println("age "+ s.age);
        System.out.println("course "+ Student.course);
    }
}
```



Int a =10

instance local static

Ashwani
name="Nazia";
age =24;
course = "Java";
s

Himadri
name="Nazia";
age =24;
course = "Java";
S1

Ashwani
name="Nazia";
age =24;
course = "Java";
s

Himadri
name="Nazia";
age =24;
course = "Java";
S1

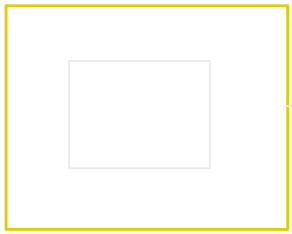
S

Student.course

Har object k liy humne instance variable ki alag copy milti ha

For static instance variable only single will shared across the object, if we change in one place then change will reflect in all object because of single copy

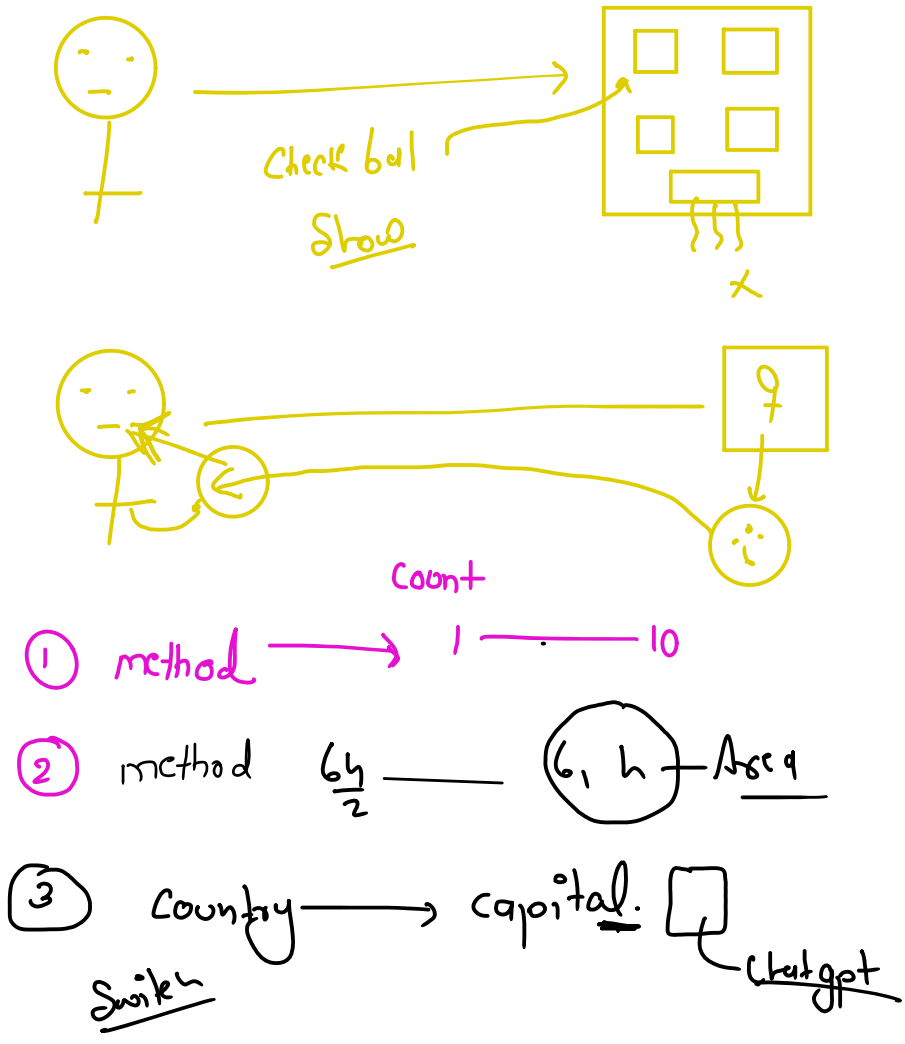
Methods in java



Obj.methodName
ClassName.methodName

Types of method in java

Type:
1. No Parameter, No Return



↳ Call — ggg

Mr. Ashu your call : ggg

(S) Call ——— enter.1 ⟶ Addition

↓

enter 1

enter 2

res =

enter 2 = Sum

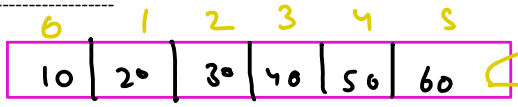
type = div

type = mul.

.

Why ?
Int a=10
Int b=20
Int c=19

Array In java

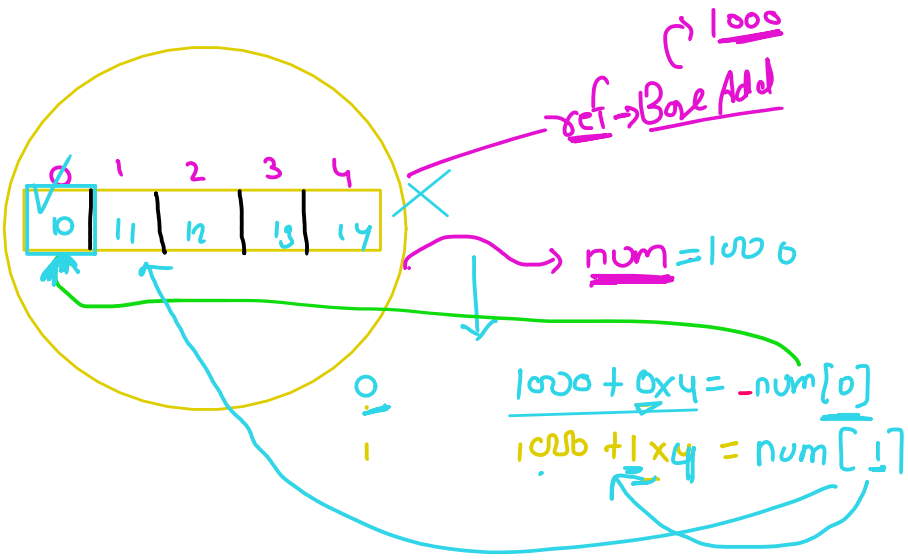


primitive X

non-primitive

↓

Class


1000
ref → Base Add
0 1 2 3 4
10 11 12 13 14
num = 1000
0
1
1000 + 0x4 = num[0]
1000 + 1x4 = num[1]