Data types

- Primitive
  - boolean (1 bit)
  - Numerical
    - character
      - character (2 byte)
    - integral
      - integer
        - byte (1 byte)
        - short (2 byte)
        - ~~long~~ int (4 byte)
        - long (8 byte)
      - Floating point
        - float (4 byte)
        - double (8 byte)
- Non Primitive
  - class
  - object
  - string
  - Array
  - Interface
  - array
  - Linklist
  - stack
  - queue
  - tree
  - graph.

1) boolean
2) character
3) byte
4) ~~byt~~ short
5) int
6) long
7) float
8) double.

1) Garbage Value

i) when we declare any variable but does not initialize and
System.out.println(a); // a declare but not initializ

This statement in java does not produce any garbage value

It will give compile time error.

Compile time error means after given command javac Hello.java it will produce/give error that error is compile time error.

2) Char

char store only single character

(Char is data type that is used to store single character.)

char value must be store in single quotes like 'A' OR 'V'

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Global declaration

If we store multiple characters in char and Ex. char a = '\abcd';
system.out.println (a);

It will give compile time error.

③ Default Value

default value in java of boolean is false OR zero

byte defaul value 0.
Global ~~byte~~ static byte.
byte -128 to 127

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Data Types (Integer)

1) Byte :

- Byte variable can be declared in 2 Types
  1) Globaly
  2) Local in main funition.

when byte is declared globaly but does not initialize and this global variable call in system.out.println(—);
Then it will produce zero default value

Range of Byte.

- Memory size of byte is 1 byte = 8 bit

- Range of byte is calculate on the basis of memory size.

1) Take memory size in bits form.

- for byte is 1 byte = 8 bit

$\therefore -(2^{8-1})$ to $2^{8-1} - 1 = -128$ to 127

1 byte = 8 bit Default value of byte short int long is zero

long = 8 byte

2^{64-1} to $2^{64-1} - 1$

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Float defaul value is 0.0

For int,

memory size is 4 byte = 32 bit

Range is $-(2^{32-1})$ to $2^{32-1} - 1$

For short,

Memory size is 2 byte = 16 bit

Range is $-(2^{16-1})$ to $2^{16-1} - 1$

For Long,

memory size is 8 byte = 64 bit

Range is $-(2^{64-1})$ to $2^{64-1} - 1$

For Float memory size is 4 byte = 32 bit

Range is $-(2^{32-1})$ to $2^{32-1} - 1$

For Double memory size is 8 byte = 64 bit

Range is $-(2^{64-1})$ to $2^{64-1} - 1$

1) Default value of boolean is false

2) Default value of all integer is 0 (zero)

3) Default value of all floating is 0.0

1) long
2) float
3) Double

when we declare and initialize ~~this above~~ any variable by using above 3 datatype then at the end we have to add l, f, d at the end of a number.

1) Variable Types.
   1) local variable
   2) static variable
   3) Instance of variable.

- Local Variable
  A variable which is declared inside main method.

- static Variable:
  A variable which is declared with static keyword is called as static ~~keywo~~ variable.

- static variable no need to initilize by default the value of static variable is 0 (zero)

Variable : it is also called
Data member of class
Instance of class = Object of class.

- Instance Variable
  A variable which will be access by creating instance of class. (object of class) called as ~~int~~ instance variable

- What is class ?
  A collection of data member and member function is called class.

- What is object ?
  Instance of class is called as object it is used access data member and member function.

How to create Object ?

ClassName objname = new ClassName();

*** We can not access not static variable in method. [we try to access it gives compile time error.

*** If we have to access the non static variable in main method then we have to create in object of that class.

1) type casting. 2) Implicite & Internal type Casting

3) Explicit & external typecasting.

User Input ~~from~~ / Console
~~/ Us~~

User Input / Console.

There are four types of method in which we can take user input.

i) Scanner Class
ii) Buffer reader
iii) Argument
iv) Console input.

iii) Argument.

```
class Main {
    public static void main (String args[]) {
    ~~int~~
    System.out.println (args [0]);
    System.out.println (args [1]);
    }
}
```

```
>> javac Main.java
>> java Main 90 99
```

This is user input in the form of string.

* We have one parseInt() method to convert string into Integer.

```
int b = Integer.parseInt(args[0]);
```

Program:

```
class Input{
  public static void main(String args[]){
  int a = Integer.parseInt(args[0]);
  int b = Integer.parseInt(args[1]);
  if (a > b){
    System.out.println("Greater no is :"+ a);
  } else{
    System.out.println("Greater no is : "+ b);
  }
}
}
```

Package : Package is a collection of classes

import : import is a keyword that is used to import package, class and interface.

class : class is always start with capital letter.

Method : Method always start with small letter and second letter must be capital.
Ex. nextLine ().

Constructer : Constructor is special method that is used to initialized the object.

Id of Constructor :
Constructor is same as class with parameter.

ii) Scanner Class input:

```
import java.util.Scanner;
class constructor {
    public static void main (String args[]) {
    Scanner a = new Scanner(System.in)
    System.out.println("Enter Your Name :");
    String b = a.nextLine();
    System.out.println("You are Enter :" + b);
}
}
```

iii) Console input

```
class usepin {
    public static void main (String args[]) {
    System.out.println(" Enter Nam :") ;
    String a = System.console().readline();
    System.out.println(" you Enter Name is :"+a)
    }
}
```

throws and try catch are Exception handling.

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ii) Buffer Reader.

```
import java.io.*;
class Buffer1{
  public static void main(String args[]) throws Exception{
   InputStreamReader s1 = new InputStreamReader(System.in);
   System.out.println("Enter the name");
   String a = obj.readline();
   System.out.println("You Entered :" + a);
  }
}
```

```
import java.io.*;
class Buffer11{
  public static void main(String args[]) throws Exception{
   InputStreamReader s1 = New InputStreamReader(System.in);
   BufferedReader obj = new BufferedReader(s1);
   System.out.println("Enter the name");
   String a = obj.readline();
   System.out.println("You Enter:" + a);
  }
}
```

1) What is object ?
→ Instance of class is called object.

2) What is need of object ?
→ To access the data member and member function of ~~class~~ another class into main class.

3) How to create object ?
→ classname objectname = new classname () ;
[classname () is default Constructor]

4) What is Constructor ?
→ Constructor is special function which is used to initialize object.

i) It is ~~similar to~~ same name as class.
2) It is ~~it~~ similar to function of method but is has no any return type.

5) what is function ?
→ function is a method in which it contain instruction which is used to perform particular task.

returntype functionname () { }

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* We can access another function into main class with the reference of object of main class.

* Except main class Another any function / method we can access in another function / method.

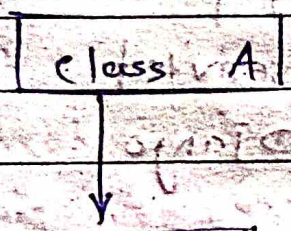
OOP's Principles.

1) Class
2) object
3) inheritance
4) polymorphism
5) abstraction
6) encapsulation.

3) Inheritance

1) simple Inheritance
2) multiple Inheritance —— Java Does not support.
3) Multilevel
4) Hierarchical
5) Hybrid

1) Simple Inheritance



← Parent Class

← child class.

```
class B extends A {   }
```

2) Multiple Inheritance

we can not perform multiple Inheritance because java does not support multiple inheritance.

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JAVA

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

1. Public : Public is a keyword it means that class can be accessed by any where.

2. class : class is a collection of data members and member function.

3. Main : Main is a just name of java file
   Ex. Main.java
   * Name of class and Name of class must be same.

* 4. main : Main is keyword that is the main function where compiler starts the execution.

(5) public : with out public key word compiler will not allow to run the code.

(6) static : static is a keyword
The static is used for we have to run the main function in Main class without creating objects of Main class

(7) void : void is the keyword
void is return type of main function.

(8) String [] args : It is command line arguments.

* String [] : It is array.

(9) System.out.println ("_____");
This is output statment.

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(1) What is Java ?

1) Java is high level general purpose programming language.
2) Created in 1995 by James Gosling
3) Now owed by oracle
4) Java is one of the popular language in the world
5) It is secured, fast and powerful
6) It supports multi-paradigm such as object oriented functions, threads etc.
7) Huge community support behind it.
8) It is used to develop mobile applications, desktop applications, web applications, web servers, games, data connections.
9) It runs more than 3 billion devices around the world.

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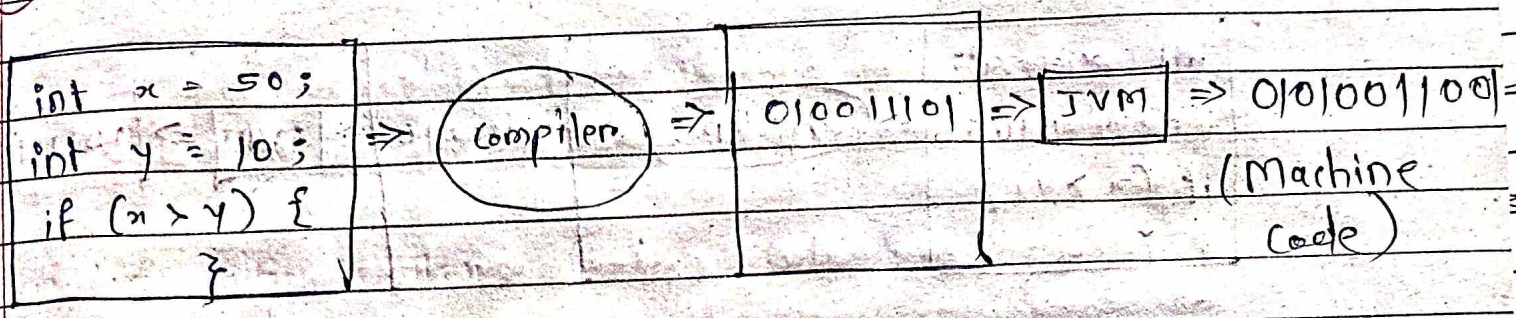
② How is a Java Program executed ?



Source Code (.java file) — byte code (.class file)

1) A java program is written in and save in .java file. Known as source code.
2) Source code passed to the compiler
3) Source code compiled into byte code
Now this byte code can not be executed by compiler
Then byte code translated into machine code first by the Java Virtual machine that is JVM

4) Now JVM is platform specific
Every platform is ~~platfor~~ its own JVM

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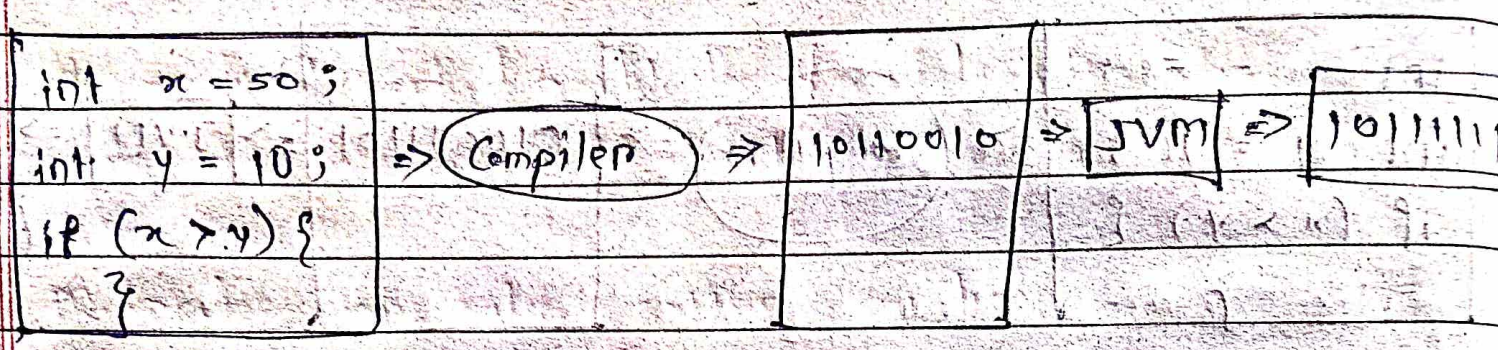
(5) How is Java Platform independent ?



Source Code (.java file) — byte Code (.class file)

- Java programming is platform independent code can be written once and runce anywhere this is achived by compiler that convert source code into byte code and this byte code is platform is independent and can be executed on any platform by Java Virtual Machine

Ex. Any Exe

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(4) what are the various Access specifiers in Java ?

1) Access specifiers define the scope or accessibility of classes, interfaces, variables and function etc.

2) It defines how other part of program is accessible.

And four access specifiers in java which are.
1) Private, 2) Default 3) Protected 4) Public.

More Restrictive	Private	
	Default	
	Protected	less Restrictive
	Public	

(1) Public: when data items and functions are defined as public then data items and functions are accessible from anywhere.

(2) Private: only Accessible from the class where they are defined.

(3) Protected: Accessible from the classes, package, subclass and from within the class

(4) Default: Accessible from all the classes.

(5) What is Method in java?

A method is a block of code that performs a specific task.

Methods are also called functions.

Methods can take input of data in the form of parameters.

Method must be declared in class and followed by parenthesis ()

There are pre defined methods in class which are.

System.out.println()

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(6) What is Java main() method ?

1) In java program where the main method is method where execution is starts or it is entry point of a java program Hence it is important method in the java

2) Java compiler and JVM looks for the main () method for the execution program

3)

(7) What is (String[] args) that always appeared on the Java main() method ?

String[] is used to declared a simple string array

args is the name of the string array

args is stores the command line arguments.

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(8) What is a static method?

A method which is declared as static can be accessed directly by specifying its name.

it can be called without creating an object of class

where as method declared as public without static can be access. with help of creation of object of class

static method belongs to the class not to the object

A static method doesn't requires any object state.

```
Class test {
    static void myStaticMethod () {
        System.out.println("Hello");
    }

    public void myPublicMethod () {
        System.out.println("Hello");
    }

    public static void main (String [] args) {
        myStaticMethod ();
        test myObj = new test ();
        myObj.myPublicMethod ();
    }
}
```

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(9) What is Method Overloading ?

In method overloading multiple method can have same name with different parameters

Method overloading can be achived in two ways by changing the number of arguments and by changing data type of arguments.

Ex

```
class Main {
    static void myMethod (int x, int y) {
        return x+y;
    }

    static double myMethod ( double x , double y) {
        return x + y;
    }

    public static void main ( String [] args) {
        int myNum1 = myMethod (3, 4);
        int myNum2 = myMethod (3.4, 6.7);
    }
}
```

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(10) Can we overload the main() method ?

yes, we can overload the main method
we can have any number of main method

And the question arises that how does the main() method knows for the start of execution ?
which is the entry point for the execution of program.

* The compiler will check for the parameters (string [] args) in the main method and will recognize it as the entry point into the program.

JVM always calls the original main() method

It does not call the overloaded main() method

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(11) What is constructor in Java ?

Constructor in java is a special method that is used to initialized the object

Constructor must have the same name as that of the class
It doesn't have return type

Every time an object is created using the new keyword,
the default constructor is called

(12) How many types of Constructors are used in java ?

→ Now based on Arguments accepted by constructor Constructor divided into three types.

i) No Argument Constructor
ii) Parameterized Constructor
iii) Default Constructor

i) No Argument Constructor

It is constructor it doesn't have any arguments or parameters

The values are defined within the constructor by it self.

ii) Parameterized

It is constructor it have any arguments and parameters.

iii) Default Constructor

It is constructor that is created by the compiler when when we do not define any constructor in program.

* A Default constructor may not confuse with No argument Constructor they are not same java

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(15) Difference between Java Constructor & Java Method.

★ Java Constructor.	Java Method
(1) A constructor is a special method used to initialized an object	(1) A method is a block of code that performs a certain task.
(2) It must not have return type	(2) It must have return type
(3) Constructor name must be the same as the class name	(3) The method name may or may not be the same as class name
(4) Constructor is invoked implicitly	(4) A method is invoked explicitly.

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(14) what is inheritance in Java?

Inheritance is the process where a class acquires the attributes and methods of another class.

when we inherits the attributes and methods of existing class we can access all attributes and methods of that existing class in the program

This promotes code reusability

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(15) What is subclass and Super class?

i) Subclass is the class that inherits from another class.
It is also known as child class.
It derived from super class and also inherites the properties of super class.

ii) Super class is the class that is being inherited from also known as parant class
~~It is class which in can creat~~
It is class from which many sub class can be created
sub class also can be inherits the properties of super class.

(16) How is inheritance implemented in java program ?

In Java, to inherit from a class, we use the extends keyword.

Ex:

```
public class Arithmetic {
    static int x = 5;
    static int y = 6;
    protected static int sum() {
        return x + y;
    }

    protected static int mul() {
        return x*y;
    }
}

Public class Main extents Arithmetic {

}
}
```

Now Main class can access all attributes and methods of Arithmetic class they were own

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(17) What is a final variable?

A variable declared with the final variable

It use to prevent from overriding and modifying final variable once assigned a value can never be changed

If we assigned any value to ~~fin~~ variable then we can not modify its value

* If we declare a method as final then it can be overridden by any subclasses

(18) What is package in Java?

A package in java is used to group related classes or it is a collection of related classes.

Packages are used to avoid name conflicts between classes and it allows to write a better maintainable code

(19) What are the different types of packages?

Packages are divided into two Categories
i) Built in Packages
ii) User defined packages

(i) Built in Packages

Built in packages are pre written and stored in java api that are free to use.
They consists of packags that are managing input, output, data programing and many more.

Now some ex of built in packages.
java.lang
java.io
java.applet
java.awt
java.net

(ii) User defined packages

Now this packages are created by user

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(20) What is abstract class?

An abstract class is a restricted class where we can not create objects of the class.

To access the members of the abstract class, it must be inherited to a class where we can then access the members of the abstract class through the object of the subclass.

An abstract class can have both regular methods and abstract methods without body.