

## Chapter 3 : Datatypes &amp; Variables

- What are Datatypes?

Datatypes specify different sizes & values of a data. As the name suggests, Type of a Data is termed datatype.

There are 2 types of datatypes in Java →

① Primitive Datatypes : They include char, boolean, ~~char~~, Byte, int, long, short, float & double

② Non Primitive Datatypes : They include classes, Interfaces & Arrays

- What are variables?

Variable is a container which holds value while Java program is executed. A variable is assigned a datatype such that the variable can store value of assigned datatype only.

- There are 8 primitive Datatypes:

① Boolean      ⑤ int

② Byte      ⑥ long

③ Char      ⑦ float

④ Short      ⑧ double

Datatype	Def value	Def size
Boolean	false	1 bit
Char	'\u0000'	2 byte
Byte	0	1 byte
Short	0	2 byte
Int	0	4 byte
Long	0L	8 byte
Float	0.0f	4 byte
Double	0.0d	8 byte



Note : 1 byte = 8 bits

Minimum & Maximum value for datatypes can be found as follows

$$\text{min-value} = (-2^{n-1})$$

$$\text{max-value} = \cancel{(-2^{n-1})} (2^{n-1} - 1)$$

..... n is no. of bits

Example →

- Find the minimum & maximum value of datatype byte.

Sol<sup>n</sup> Size of byte = 1 byte = 8 bits  
∴ n = 8

$$\text{Min-value} = (-2^{n-1}) = -2^7 = \underline{\underline{-128}}$$

$$\text{Max-value} = (2^{n-1} - 1) = 2^7 - 1 = \underline{\underline{+127}}$$

- Note : Char datatype

Every character ('a', '@', '2', '1') is associated with ASCII value. 128 symbols were found & were named ASCII values.

In Java ASCII is not followed as ASCII has only english characters

ASCII → American Standard Code for Information Interchange

ASCII is a 8-bit binary representation hence its also ~~termed~~ termed as UTF-8 (1 byte)

Java follows UNICODE which provides binary representation for (65,536) symbols. It is 16-bit code & hence also known as (UTF-16) 2 bytes

UTF → Unicode Transformation format

- Boolean Datatypes -

They are used to store Yes/No type of data



- int, short, byte Datatypes -

They are used to store number values, All of them differ in sizes in order to store data.

long datatype also stores number type values.

- float & double Datatypes -

They are used to store decimal values. They both differ in sizes.

- How to declare a variable in Java?

Syntax : datatype var-name = value;

where datatype will be one of the Java's datatype like (int, char, long etc)

var-name is name of the variable like (a, name, newvariable etc)

value is the data assigned to the variable.

- Note : String Datatype → it stores text such as "Hello". String values are surrounded by " ". It is a non-primitive datatype.

- A variable name can consist of capital letters (A-Z), lower case letters (a-z), digits (0-9) & two special characters such as (-) underscore & (\$) dollar sign. First character must not be a digit. ~~Blank~~ ~~spaces~~ Blank spaces cannot be used in variable names.



# Data Types

