Types of Data Types in Java

Variable?

A variable is a storage container for storing the data.

- A **variable** is like a **jar** in your kitchen.
- You **write a name** on the jar (like *Sugar*).
- You **put something inside** (like *2 kg sugar*).
- Later, you can **change it** (remove sugar and put *rice*).

Example:

int sugar = 2

int = in there represent type of jar (it can hold only sugar/rice/pulse).

sugar = label of the jar.

2 = thing stored inside the jar (now it sugar).

Bit?

A bit is like a tiny light bulb.

It can only be either OFF (0) or ON (1).

That's 1 bit.

If we put 8 bulbs (bits) together, that becomes 1 byte.

Example: 1 0 1 0 1 0 1 0

→ this is 8 bits = 1 bytes .

Data Type?

Data types are the kinds of containers for storing different kinds of things.




Glass **Jar** **Bucket** **Container**

Data type tells the kind of data we can store in a variable.

Similarly in java we have these kinds of container to hold the value.

Java, there are 8 primitive data types

Java has two main types:

1. **Primitive Data Types → small, basic types (like int, float, char).**
2. **Non-Primitive Data Types → bigger/custom types (like String, Arrays).**

Primitive Data Types

byte, sort, int, long, float, double, char and boolean

String

- If you want to store whole numbers → use int.
- If you want to store decimals → use float or double.
- If you want to store letters → use char.
- If you want to store yes/no → use boolean.
- If you want to store words or sentences → use String.

- **byte** → very tiny jar (only holds small numbers).
- **int** → medium jar (big numbers like population).
- **long** → huge jar (very big numbers like stars).
- **float/double** → liquid jar (can hold numbers with decimals).
- **char** → jar for a **single alphabet**.
- **boolean** → a jar with only two options → Yes/No (True/False).
- **String** → a jar full of words/sentences.

- **Data type = type of jar**
- **Variable = jar's name**
- **Value = what's inside**

Primitive Data Types with Size & Range

Data Type	Size (Memory)	Range (Values It Can Hold)	Example
byte	1 byte (8 bits)	-128 to 127	`byte age = 12;`
short	2 bytes (16 bits)	-32,768 to 32,767	`short rooms = 500;`
int	4 bytes (32 bits)	-2,147,483,648 to 2,147,483,647	`int population = 1400000000;`
long	8 bytes (64 bits)	very large numbers	`long stars = 9223372036854775807L;`
float	4 bytes	Stores up to 6–7 decimal digits	`float price = 99.99f;`
double	8 bytes	Stores up to 15–16 decimal digits	`double pi = 3.141592653589793;`
char	2 bytes	Stores single letter/character	`char grade = 'A';`
boolean	1 bit	Only `true` or `false`	`boolean isOn = true;`

Formula for Range (Applicable only for byte, sort, int , long , char)

For a box with **n** bits, the computer can count numbers in this way:

$$\text{Range} = -2^{(n-1)} \ \textit{to}\ 2^{(n-1)} - 1$$

byte (8 bits) → 1 byte

Formula:

$= -2^{(8-1)}$ to $2^{(8-1)} - 1$ ➔ -2^7 to $2^7 - 1$ ➔ –128 to 127

Why char data type has 0 to 65,535 range even though it used to contain only one character?

Mini Quiz

- Can byte store your age? (Yes, because age < 127)
- Can int store India's population? (No, need long)
- What data type should I use for your exam grade 'A'? (char)
- What data type should I use for petrol price 98.56? (float/double)
- If I want to store the number of your toys, which box should I use? (byte or short)
- If I want to check if you are wearing a school uniform, which data type? (boolean)
- If I want to store your name? (String – non-primitive)

Thankyou!