Data Types in Java

Introduction

Before we write programs in Java, we must understand something very important.

What type of data are we storing?

In programming, data types define:

- What kind of value a variable can store
- How much memory it uses
- What operations can be performed

Java is a **strongly typed language**.

That means:

You must declare the data type before using a variable.

Unlike Python, Java does not guess the type automatically.

What is a Data Type?

A data type tells the computer:

“What type of value am I storing?”

For example:

- 10 → integer
- 3.14 → decimal
- 'A' → character
- true → boolean
- "Hello" → string

In Java, we must clearly specify it.

Example:

```
int age = 20;
```

Here:

- int → data type

- age → variable name
- 20 → value

Types of Data Types in Java

Java has two main categories:

1□.Primitive Data Types
2□.Non-Primitive Data Types

Primitive → stores actual value
Non-Primitive → stores reference (memory address)

Now let us understand primitive types first.

Primitive Data Types

Java has **8 primitive data types**.

Let us learn them one by one.

byte

- Used to store small whole numbers
- Size: 1 byte
- Range: -128 to 127

Example:

```
byte number = 100;
```

Used when memory saving is important.

short

- Slightly larger than byte
- Size: 2 bytes

```
short value = 10000;
```

int (Most Common)

- Used for whole numbers
- Size: 4 bytes
- Most commonly used integer type

```
int age = 25;
```

Usually we use int for normal numbers.

long

- Used for very large numbers
- Size: 8 bytes

```
long population = 8000000000L;
```

Notice:
We add L at the end.

float

- Used for decimal numbers
- Size: 4 bytes

```
float price = 99.99f;
```

Important:
We must add f at the end.

double (Most Common for Decimals)

- Used for decimal numbers
- Size: 8 bytes
- More precise than float

```
double salary = 45678.89;
```

Most developers prefer double.

char

- Stores a single character
- Uses single quotes
- Size: 2 bytes

```
char grade = 'A';
```

Important:
Only one character allowed.

boolean

- Stores true or false
- Used for conditions

```
boolean isActive = true;
```

Non-Primitive Data Types

Non-primitive types include:

- String
- Arrays
- Classes
- Objects

Example:

```
String name = "Rakshitha";
```

Important:

Primitive types store actual value.
Non-primitive types store memory reference.

Type Casting

Sometimes we convert one data type to another.

There are two types:

Widening (Automatic)

Small type → Bigger type

```
int x = 10;
double y = x;
```

No data loss.

Narrowing (Manual)

Bigger type → Smaller type

```
double a = 10.5;
int b = (int) a;
```

Decimal part is removed.

Mini Practice Activity

Create a Java program with:

- int age
- double height
- char grade
- boolean isStudent
- String name

Print all values.

Example:

```
int age = 20;
double height = 5.8;
char grade = 'A';
boolean isStudent = true;
String name = "Ravi";

System.out.println("Name: " + name);
System.out.println("Age: " + age);
System.out.println("Height: " + height);
System.out.println("Grade: " + grade);
System.out.println("Student: " + isStudent);
```

Summary :

Today we learned:

- What is a data type
- Java is strongly typed
- 8 primitive data types
- Non-primitive types
- Type casting

Now you understand how Java stores data internally.

In the next lesson, we will learn about operators in Java.