Variables & Data Types in Java

■ **Introduction** Variables are containers for storing data values. In Java, every variable has a specific **data type** that defines the kind of data it can hold, such as integers, decimals, characters, or logical values.

■ **Variable Declaration**

Syntax:

<datatype> <variableName> = <value>;

Example:

int age = 25;

■ **Types of Variables**

1. **Local Variable**: Declared inside methods, constructors, or blocks.
    - Example:
    - void method() {
    - int x = 10; // local variable
    - }
2. **Instance Variable**: Non-static variable declared inside a class but outside methods.
    - Example:
    - class Student {
    - int rollNo; // instance variable
    - }
3. **Static Variable**: Declared using the static keyword. Shared across all objects of a class.
    - Example:
    - static int count = 0; // static variable

■ **Java Data Types** Java has two types of data types:

1. Primitive Data Types

Data Type	Size	Description	Example
byte	1 byte	Stores small numbers (-128 to 127)	byte a = 100;
short	2 bytes	Stores numbers (-32K to 32K)	short s = 5000;
int	4 bytes	Default integer type	int i = 10000;
long	8 bytes	Large integer values	long l = 1234567890L;
float	4 bytes	Decimal with 6-7 digits precision	float f = 10.5f;
double	8 bytes	Decimal with 15 digits precision	double d = 99.99;
char	2 bytes	Stores a single character	char c = 'A';
boolean	1 bit	Stores true or false	boolean b = true;

2. Non-Primitive Data Types

- Examples: Arrays, Strings, Classes, Interfaces, etc.
- Example:

String name = "Tony";

■ **Type Casting** Converting one data type into another.

- **Implicit Casting (Widening):**

int x = 10;

double y = x; // automatic conversion

- **Explicit Casting (Narrowing):**

double x = 10.5;

int y = (int)x; // manual conversion

■ **Example Program Using Variables & Data Types**

```
public class DataTypeExample {
    public static void main(String[] args) {
        int age = 20;
        double percentage = 92.5;
        char grade = 'A';
```

```
        boolean passed = true;
        String name = "Tony Baskar";

        System.out.println("Name: " + name);
        System.out.println("Age: " + age);
        System.out.println("Percentage: " + percentage);
        System.out.println("Grade: " + grade);
        System.out.println("Passed: " + passed);
    }
}
```

■ Output

Name: Tony Baskar

Age: 20

Percentage: 92.5

Grade: A

Passed: true

■ Summary Table

Concept	Description
Variable	A named memory location to store data
Data Type	Defines the type of data a variable holds
Primitive	Basic types like int, float, char
Non-Primitive	Objects like String, Array
Type Casting	Convert one type into another
