

Day 2: Data Types and Variables in Java

What is a Variable?

A variable is a named memory location used to store data that can be changed during program execution.

Syntax

```
datatype variableName = value;
```

Example

```
int age = 25;  
String name = "Sanket";
```

What is a Data Type?

A data type defines the type of data a variable can store.
Every variable must be declared with a data type before it is used.

Types of Data Types in Java

1. Primitive Data Types

These are the built-in data types in Java.

Data Type	Size	Example Value	byte	8-bit
short	16-bit	32000	int	32-bit
long	64-bit	100000	long	64-bit
float	32-bit	3.14f	double	64-bit
double	64-bit	3.14159265359	char	16-bit
boolean	1-bit	true/false		

Example

```
int number = 10;  
double price = 99.99;  
char grade = 'A';  
boolean isJavaFun = true;
```

2. Non-Primitive Data Types

Non-primitive types store references to objects and can hold multiple values.
Examples: String, Arrays, Classes, Interfaces

Example

```
String city = "Bangalore";  
int[] marks = {90, 85, 70};
```

Rules for Naming Variables

- Must begin with a letter, underscore `_`, or dollar `$`.
- Cannot begin with a digit.
- Cannot be a reserved keyword.
- Case-sensitive (age and Age are different).
- Should be meaningful and follow camelCase convention.

Valid Examples

```
int age;  
String studentName;  
double accountBalance;
```

Invalid Examples

```
int lnumber;  
String class;  
double acc-balance;
```

Example Program

```
public class VariablesDemo {  
    public static void main(String[] args) {  
        int age = 22;  
        double salary = 55000.75;  
        char grade = 'A';  
        boolean isPassed = true;  
        String name = "Sanket";  
  
        System.out.println("Name: " + name);  
        System.out.println("Age: " + age);  
        System.out.println("Salary: " + salary);  
        System.out.println("Grade: " + grade);  
        System.out.println("Passed: " + isPassed);  
    }  
}
```

Output

```
Name: Sanket  
Age: 22  
Salary: 55000.75  
Grade: A  
Passed: true
```

Practice Questions

Theory Questions

1. What is a variable in Java? Explain with syntax and example.
2. Differentiate between primitive and non-primitive data types.
3. List all 8 primitive data types in Java with their sizes and examples.
4. What are the rules for naming variables in Java? Give valid and invalid examples.
5. Why can't we use Java keywords as variable names?

Programming Questions

1. Write a program to declare and print variables of all primitive data types.
2. Write a program to swap two integer values using a third variable.
3. Write a program to calculate the area of a circle. Formula: $\text{area} = \pi * \text{radius} * \text{radius}$.
4. Write a program with different variable names, some valid and some invalid. Try compiling and note the errors.
5. Write a program that takes your name and age as variables and prints:

Hello, my name is <name> and I am <age> years old.

Summary

- A variable is a container for data.
- Java has 8 primitive data types and many non-primitive types.
- Variables must follow strict naming rules.
- Data types define the kind and size of data a variable can hold.
- Practice questions strengthen both theory and coding understanding.