



Variables and Datatypes

There are two kinds of data types in Java:

- Primitive / Standard data types
- Abstract / Derived data types

Objectives

Upon completion of this topic, we will be able to:

- Understand data types in Java

Data Types in Java

Primitive Data Types

Primitive data types (also known as standard data types) are the data types that are built into the Java language. The Java compiler holds detailed instructions on each of the legal operations the data type supports. There are eight primitive data types in Java as displayed in the table below.

Primitive / Standard Data Types

Data Type	Size/Form at (bits)	Description	Range
Byte	8	Byte-length integer	-128 to 128 (signed) 0 to 255 (unsigned)
Short	16	Short integer	-2^{15} to $2^{15} - 1$
int	32	Integer	-2^{31} to $2^{31} - 1$
long	64	Long integer	-2^{63} to $2^{63} - 1$
float	32	Single precision floating point	+/- about 10^{39}
double	64	Double precision floating point	+/- about 10^{317}
char	16	A single character	Any single character



boolean	1	A boolean value	true or false
---------	---	-----------------	----------------------

The data types – byte, short, int, long, float and double are numeric data types. The first four of these can hold only whole numbers whereas the last two (float and double) can hold decimal values like 5.05. All these data types can hold negative values. However, the keyword **unsigned** can be used to restrict the range of values to positive numbers. Amongst the others, boolean can hold only the value **true** or **false** and char can hold only a single character.

Abstract / Derived Data Types

Abstract data types are based on primitive data types and have more functionality than the primitive data types. For example, **String** is an abstract data type that can store alphabets, digits and other special characters like /, (); :\$#. You cannot perform calculations on a variable of the String data type even if the data stored in it has digits.

Variables in Java

When you learned algebraic equations in school, you used x and y to represent values in equations. Unlike π which has a constant value of 3.14, the values of x and y are not constant in equations. Java provides constants and variables to store data in programs.

Java allocates memory to each variable and constant you use in your program. Just like in algebra, the values of variables may change in a program, but the values of constants, as the name suggests, do not change. You must assign unique names to variables and constants. Variable names are used in a program in much the same way as they are used in ordinary algebra.

Each variable used in a program must be declared. The program must contain a statement specifying precisely what kind of information (data type) the variable will contain. This applies to every variable used in the program, regardless of the type.

Naming Variables

A program refers to a variable using its name. Certain rules and conventions govern the naming of variables. You must adhere to the rules. Conventions help improve the readability of the program, but following them is not mandatory.

Rules for Naming Variables in Java

A variable name:

- Must not be a keyword in Java
- Must not begin with a digit
- Must not contain embedded spaces
- Can contain characters from various alphabets, like Japanese, Greek, and Cyrillic



Syntax for Defining Variables

All the attributes of a class are defined as data members. The syntax used to declare a class variable is:

<data_type> <variable_name>;

As the brackets “{ }” are used to mark the beginning and end of a class, a semicolon “;” is used to mark the end of a statement.

Summary

Here are the key takeaways:

- Primitive data types are the data types that are built into the Java language.
- A variable name must not be a keyword in Java.