

Java Fundamental

CLASS- 3

Data Types- 1

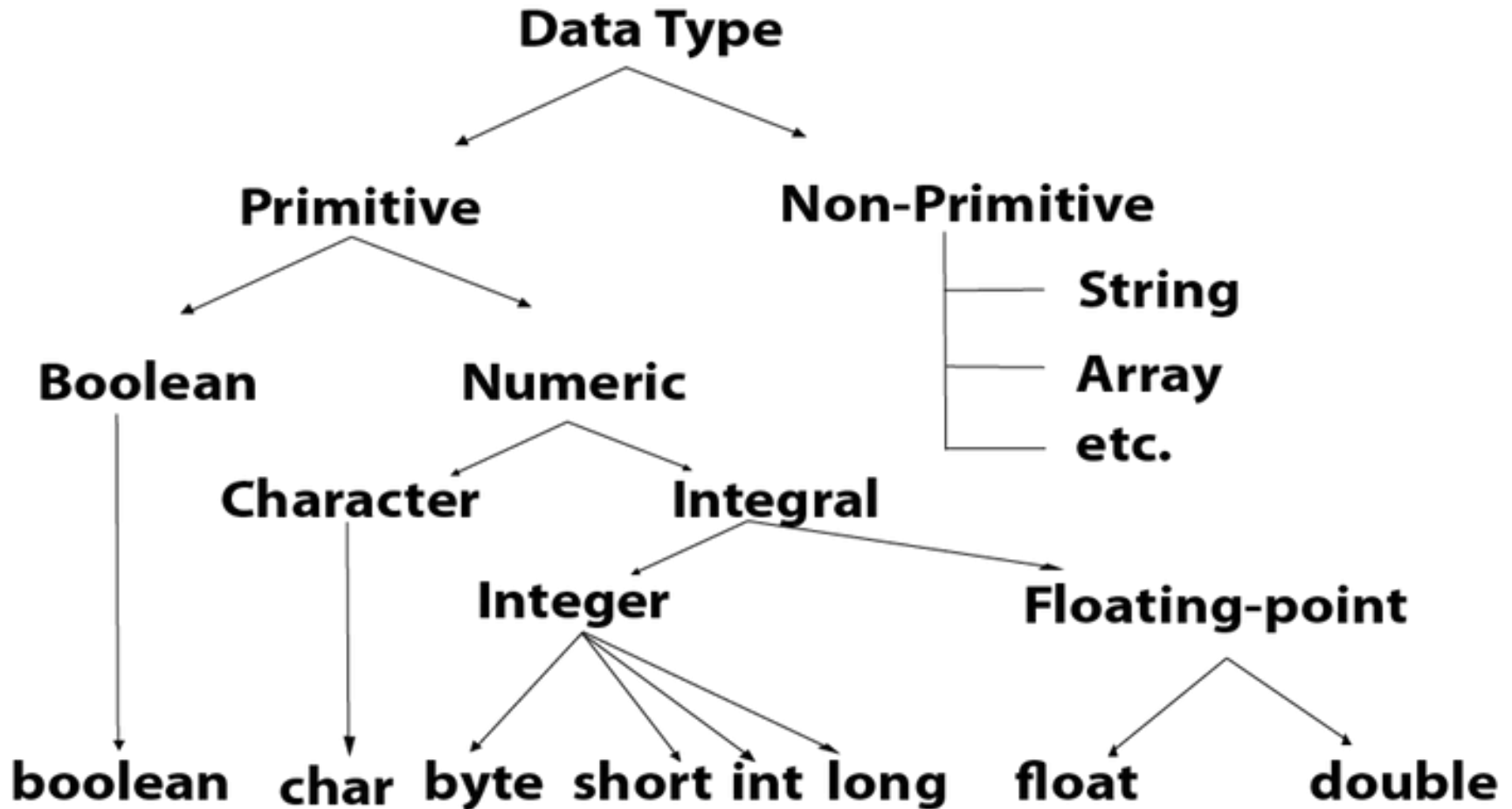
Data types in Java

In java, every variable should have some type, which is called data type, which specify the different sizes and values that can be stored in the variable.

There are two types of data types in Java:

- **Primitive data types:** The primitive data types include boolean, char, byte, short, int, long, float and double.
- **Non-primitive data types:** The non-primitive data types include Classes, Interfaces, and Arrays.

Data types in Java



Primitive data types

There are 8 types of primitive data types:

- boolean data type
 - char data type
 - short data type
 - int data type
 - long data type
 - byte data type
 - float data type
 - double data type
-
- The diagram uses three right-facing curly braces to group the data types. The first brace groups 'boolean data type' and 'char data type' under the label 'non-numeric'. The second brace groups 'short data type', 'int data type', 'long data type', and 'byte data type' under the label 'integral'. The third brace groups 'float data type' and 'double data type' under the label 'floating point'.
- non-numeric
- integral
- floating point

Primitive data types

Data Type	Default size
boolean	1 bit
char	2 byte
byte	1 byte
short	2 byte
int	4 byte
long	8 byte
float	4 byte
double	8 byte

Boolean data type

The Boolean data type is used to store only two possible values: true and false. This data type is used for simple flags that track true/false conditions.

The Boolean data type specifies one bit of information, but its "size" can't be defined precisely.

- **Example:** Boolean one = false/true

Char Data Type

The char data type is a single 16-bit Unicode character. Its value-range lies between '\u0000' (or 0) to '\uffff' (or 65,535 inclusive). The char data type is used to store characters.

Example: char letterA = 'A'

Short Data Type

The short data type is a 16-bit signed two's complement integer. **Its value-range lies between -32,768 to 32,767 (inclusive)**. Its minimum value is -32,768 and maximum value is 32,767. Its default value is 0.

The short data type can also be used to save memory just like byte data type. A short data type is 2 times smaller than an integer.

Example: short s = 10000, short r = -5000

Int Data Type

The int data type is a 32-bit signed two's complement integer. **Its value-range lies between - 2,147,483,648 (-2^{31}) to 2,147,483,647 ($2^{31} - 1$) (inclusive)**. Its minimum value is - 2,147,483,648 and maximum value is 2,147,483,647. Its default value is 0.

The int data type is generally used as a default data type for integral values unless if there is no problem about memory.

Example: `int a = 100000, int b = -200000`

Long Data Type

The long data type is a 64-bit two's complement integer. **Its value-range lies between -9,223,372,036,854,775,808(-2⁶³) to 9,223,372,036,854,775,807(2⁶³ - 1)(inclusive).** Its minimum value is -9,223,372,036,854,775,808 and maximum value is 9,223,372,036,854,775,807. Its default value is 0. The long data type is used when you need a range of values more than those provided by int.

Example: long a = 100000L, long b = -200000L

Byte Data Type

The byte data type is an example of primitive data type. It is a 8-bit signed two's complement integer. **Its value-range lies between -128 to 127 (inclusive)**. Its minimum value is -128 and maximum value is 127. Its default value is 0.

The byte data type is used to save memory in large arrays where the memory savings is most required. It saves space because a byte is 4 times smaller than an integer. It can also be used in place of "int" data type.

Example: byte a = 10, byte b = -20

Float Data Type

The float data type is a single-precision 32-bit floating point. Its value range is unlimited. It is recommended to use a float (instead of double) if you need to save memory in large arrays of floating point numbers. The float data type should never be used for precise values, such as currency. Its default value is 0.0F.

- **Example:** float f1 = 234.5

Double data type

The double data type is a double-precision 64-bit floating point.

Its value range is unlimited. The double data type is generally used for decimal values just like float.

The double data type also should never be used for precise values, such as currency. Its default value is 0.0d.

Example: double d1 = 12.3

Pay attention !!

Why char uses 2 byte in java and what is `\u0000` ?

It is because java uses Unicode system not ASCII code system. The `\u0000` is the lowest range of Unicode system.

Unicode is a universal international standard character encoding that is capable of representing most of the world's written languages.

Pay attention !!

Why java uses Unicode System?

Before Unicode, there were many language standards:

- **ASCII** (American Standard Code for Information Interchange) for the United States.
- **ISO 8859-1** for Western European Language.
- **KOI-8** for Russian.
- **GB18030** and **BIG-5** for Chinese, and so on.

This caused two problems :

- A particular code value corresponds to different letters in the various language standards.
- The encodings for languages with large character sets have variable length. Some common characters are encoded as single bytes, other require two or more byte.

Pay attention !!

Solution

To solve these problems, a new language standard was developed i.e. Unicode System.

In Unicode, character holds 2 byte, so java also uses 2 byte for characters.

lowest value: \u0000

highest value: \uFFFF



- More about data types

