DATA TYPE

A **data type** is an attribute of a variable which tells the compiler or interpreter how the programmer intends to use the variable. It defines the operations that can be done on the data and what type of values can be stored. In this article, I will give you a brief insight into the different data types in **Java**. According to the properties they possess, data types are divided into two groups:

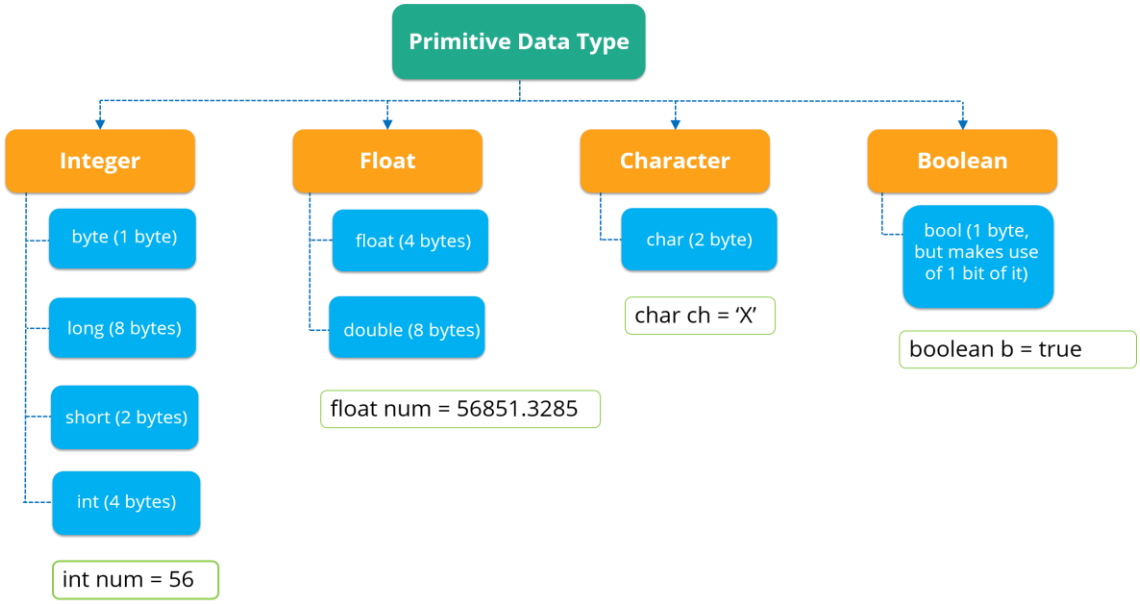
1. **Primitive Data Types**
2. **Non-Primitive Data Types**

Primitive Data Types: A primitive data type is pre-defined by the programming language. The size and type of variable values are specified, and it has no additional methods.

Non-Primitive Data Types: These data types are not actually defined by the programming language but are created by the programmer. They are also called "reference variables" or "object references" since they reference a memory location which stores the data.

Now, let's move further and get into the details of Primitive Data Types.

Primitive Data Types



Now let's understand each of these data types in depth. First I will tell you what is boolean data type.

boolean data type

A boolean data type comprises of a bit of information and can store only **true** or **false** values. This data type is used to track **true/false conditions**. Now let's write a small program and understand how it works.

```
class booleanDataType
{
public static void main(String args[])
{
// Setting the values for boolean data type

boolean Java = true;
boolean Python = false;
System.out.println(Java);   // Output will be
true
System.out.println(Python);  // Output will be
false
}
}
```

That was all about the boolean data type. I hope you understood it. Now let's move further and understand the next data type i.e. byte data type.

byte data type

This is an example of a primitive data type. It is an 8-bit signed two's complement integer. It stores whole numbers that lie between -128 to 127. A byte data type is helpful for saving memory in large amounts. Now let's write a small program and understand how it works.

```
class ByteExample
{
public static void main(String[] args)
{
byte n, a;
n = 127;
a=177;
System.out.println(n); // prints 127
System.out.println(a); // throws an error because it
cannot store more than 127 bits
}
}
```

That was all about the byte data type. Now let's move further and comprehend the following data type i.e. char.

char data type

This data type is used to store a **single** character. The character must be enclosed within single quotes, like 'E' or 'e'. Alternatively, you can also use ASCII values to display certain characters. Let's take a small example and see how it works.

```
char alpha = 'J';

char a = 65, b = 66, c = 67;
System.out.println(alpha); // prints J

System.out.println(a); // Displays 65
System.out.println(b); // Displays 66
System.out.println(c); // Displays 67
```

That was all about the char data type. I hope you understood it. Now let's move further and understand the next data type on the list i.e. short data type.

short data type

A short data type is greater than byte in terms of size and less than a integer. It stores the value that ranges from -32,768 to 32767. The default size of this data type: 2 bytes. Let's take an example and understand the short data type.

```
class ShortExample {
public static void main(String[] args) {
short n= 3435,
System.out.println(n); // prints the value
present in n i.e. 3435
}
}
```

int data type

This data type can store whole numbers from -2147483648 to 2147483647. Generally, int is the preferred data type when you create variables with a numeric value.

For example:

```
int num = 5464564;
System.out.println(num); // prints 5464564
```

long data type

This data type is a 64-bit two's complement integer. By default, the size of a long data type is 64 bit and its value ranges from -2^{63} to $2^{63}-1$.

For example:

```
long num = 15000000000L;
System.out.println(num); // prints 15000000000
```

Floating Datatypes

You should use a floating point type whenever you need a number with a decimal, such as 8.88 or 3.14515.

float data type

This data type can store fractional numbers from 3.4e−038 to 3.4e+038. Note that you should end the value with an “f”. Let’s take a small example and understand this data type in a detailed manner.

```
float num =67;
System.out.println(num); // prints the floating number value
```

So this is how you can use the float data type. Now let’s see one more floating data type i.e. double.

double data type

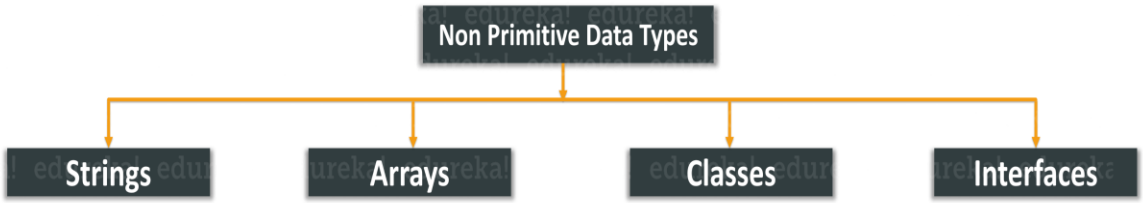
The double data type can store fractional numbers from 1.7e−308 to 1.7e+308. Note that you should end the value with a “d”:

```
double num = 79.678d;
System.out.println(num); // prints double value
```

That was all about Double data type and this brings us to the end of Primitive Datatypes. Now let’s figure out the difference between primitive and non-primitive data types.

Non-Primitive Datatypes

Non-Primitive data types refer to objects and hence they are called **reference types.** Examples of non-primitive types include Strings, Arrays, Classes, Interface, etc. Below image depicts various non-primitive data types.



Strings: String is a sequence of characters. But in Java, a string is an object that represents a sequence of characters. The *java.lang.String* class is used to create a string object. If you wish to know more about Java Strings, you can refer to this article on Strings in Java.

Arrays: Arrays in Java are homogeneous data structures implemented in Java as objects. Arrays store one or more values of a specific data type and provide indexed access to store the same. A specific element in an array is accessed by its index. If you wish to learn Arrays in detail, then kindly check out this article on Java Arrays.

Classes: A class in Java is a blueprint which includes all your data. A class contains fields(variables) and methods to describe the behavior of an object.

Interface: Like a class, an *interface* can have methods and variables, but the methods declared in *interface* are by default abstract (only method signature, no body).
So that was all about the non-primitive data types. Now let's understand the difference between primitive and non-primitive data types.

Literals in Java

Literal : Any constant value which can be assigned to the variable is called as literal/constant.

```
// Here 100 is a constant/literal.

int x = 100;
```

Integral literals
For Integral data types (byte, short, int, long), we can specify literals in 4 ways:-

1. **Decimal literals (Base 10) :** In this form the allowed digits are 0-9.

```
int x = 101;
```

3. **Octal literals (Base 8) :** In this form the allowed digits are 0-7.

```
// The octal number should be prefix with 0.

int x = 0146;
```

6. **Hexa-decimal literals (Base 16) :** In this form the allowed digits are 0-9 and characters are a-f. We can use both uppercase and lowercase characters. As we know that java is a case-sensitive programming language but here java is not case-sensitive.

```
// The hexa-decimal number should be prefix

// with 0X or 0x.

int x = 0X123Face;
```

10. **Binary literals :** From 1.7 onward we can specify literals value even in binary form also, allowed digits are 0 and 1. Literals value should be prefixed with 0b or 0B.

```
int x = 0b1111;
```

Example :

```
// Java program to illustrate the application of Integer literals
public class Test {
    public static void main(String[] args)
    {
        int a = 101; // decimal-form literal
        int b = 0100; // octal-form literal
        int c = 0xFace; // Hexa-decimal form literal
        int d = 0b1111; // Binary literal
        System.out.println(a);
        System.out.println(b);
        System.out.println(c);
        System.out.println(d);
    }
}
```