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Chapter 1 - Variables and datatypes

Just like we have some rules that we follow to speak english (the grammar), we have some rules to follow while writing a Java program. The set of these rules is called syntax.

↳ Vocabulary & Grammar of Java.

Variables

A variable is a container that stores a value. This value can be changed during the execution of the program.

Example:

```
int number = 8;
```

int → Data type; number → variable name; 8 → Value it stores!

Rules for declaring a variable name

We can choose a name while declaring a Java variable if the following rules are followed:

1. Must not begin with a digit → int 1arry; is invalid!
2. Name is case sensitive → harry and Harry are different!
3. Should not be a keyword (like Void)
4. White Space not allowed. → int Code With Harry; is invalid
5. Can contain alphabets, $ character, _ character and digits if the other conditions are met.

Data Types

Data types in Java fall under the following categories

1. Primitive Data Types (Intrinsic)
2. Non-Primitive Data Types (Derived)

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Primitive Data Types

Java is Statically typed. → variables must be declared before use!

There are 8 primitive data types supported by Java:

1) byte →
- Value ranges from -128 to 127
- Takes 1 byte
- Default value is 0

2) Short →
- Value ranges from $-(2^{16})/2$ to $(2^{16})/2 - 1$
- Takes 2 bytes
- Default value is 0

3) int →
- Value ranges from $-(2^{32})/2$ to $(2^{32})/2 - 1$
- Takes 4 bytes
- Default value is 0

4) float →
- Value ranges from (See Docs)
- Takes 4 bytes
- Default value is 0.0f

5) long →
- Value ranges from $-(2^{64})/2$ to $(2^{64})/2 - 1$
- Takes 8 bytes
- Default value is 0

6) double →
- Value ranges from (see docs)
- Takes 8 bytes
- Default value is 0.0d

7) char →
- Value ranges from 0 to 65535 ($2^{16}-1$)
- Takes 2 bytes → because it supports unicode
- Default value is '\u0000'

※Unicode is different value for all available language in world such as Hindi & Chinese and ASCII Value is subset of Unicode (i.e. ASCII Value come under Unicode).

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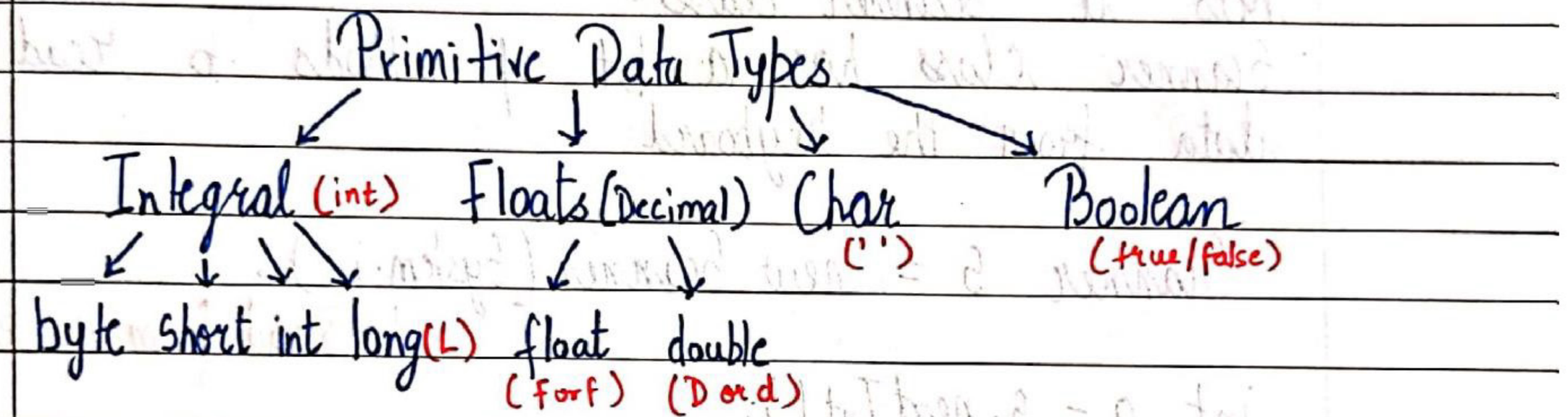
8. boolean → • Value can be true or false
• Size depends on JVM
• Default value is false

Quick Quiz: Write a Java program to add three numbers.

How to choose data types for our Variables



In order to choose the data type we first need to find the type of data we want to store. After that we need to analyze the Min & Max value we might use

Literals
A Constant value which can be assigned to the variable is called as a literal

101 → Integer literal
10.1f → Float literal
10.1 → double Literal (default type for decimals)
'A' → character literal
true → boolean Literal
"Harry" → String Literal

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Keywords

Words which are reserved and used by the Java Compiler. They cannot be used as an Identifier.

↓↓

Go to docs.oracle.com for a comprehensive list!

Reading data from the Keyboard

In order to read data from the Keyboard, Java has a Scanner class.

Scanner class has a lot of methods to read the data from the Keyboard

```
Scanner s = new Scanner(System.in);
```
↳ Read from the Keyboard

```
int a = s.nextInt();
```
↳ Method to read from the Keyboard (Integer in this case)

Exercise 1.1

Write a Program to Calculate percentage of a given student in CBSE board exam. His marks from 5 subjects must be taken as input from the keyboard. (Marks are out of 100).

literals refer to the fixed values or constants that are directly used in the programs.

Literals

Type

int value;

```
z = 5 * x + 7 * y
```

5 ← int, 7 ← int

```
int value=25;
```

25 ← int

```
double price = 153.75;
```

153.75 ← double.

```
area = 3.1425 * radius *radius;
```

3.1425 ← double

```
char c='A';
```

```
String str="Java";
```

"Java" ← object

str ← String

Literals

Data Types

byte	int
short	int
int	int
long	L or l
float	F or f
double	D or d
char	''
boolean	true/false

byte b = 5;
short s = 25;

5L 5l

2.5F

2.5D 2.5

' '

true false

By default jab ham java mai point mai koi value likhta hai to wo as double consider hota ha iseliya hama jab float use karna hota ha then ham digit ka baad 'f' lihta hai (i.e. 2.5f).

10 Decimal — 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

2 Binary — 0, 1

8 octal — 0, 1, 2, 3, 4, 5, 6, 7, 10, 11, 12

16 Hexadecimal — 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F

Ham literals ki value likhna ka liya kisi bhi method ka use kar sakta hai.

Note: jo orange sa underline hai wo denote karna ka liya use hota ha use data type koi.

```
byte b = 10;
byte b = 0b1010;
byte b = 012;
byte b = 0xA;
```