# Data Types in C Language

A programming language is proposed to help programmer to process certain kinds of data and to provide useful output. The task of data processing is accomplished by executing series of commands called program. A program usually contains different types of data types (integer, float, character etc.) and need to store the values being used in the program. C language is rich of data types. A C programmer has to employ proper data type as per his requirements.

C has different data types for different types of data and can be broadly classified as:

1.   Primary Data Types

2.   Secondary Data Types
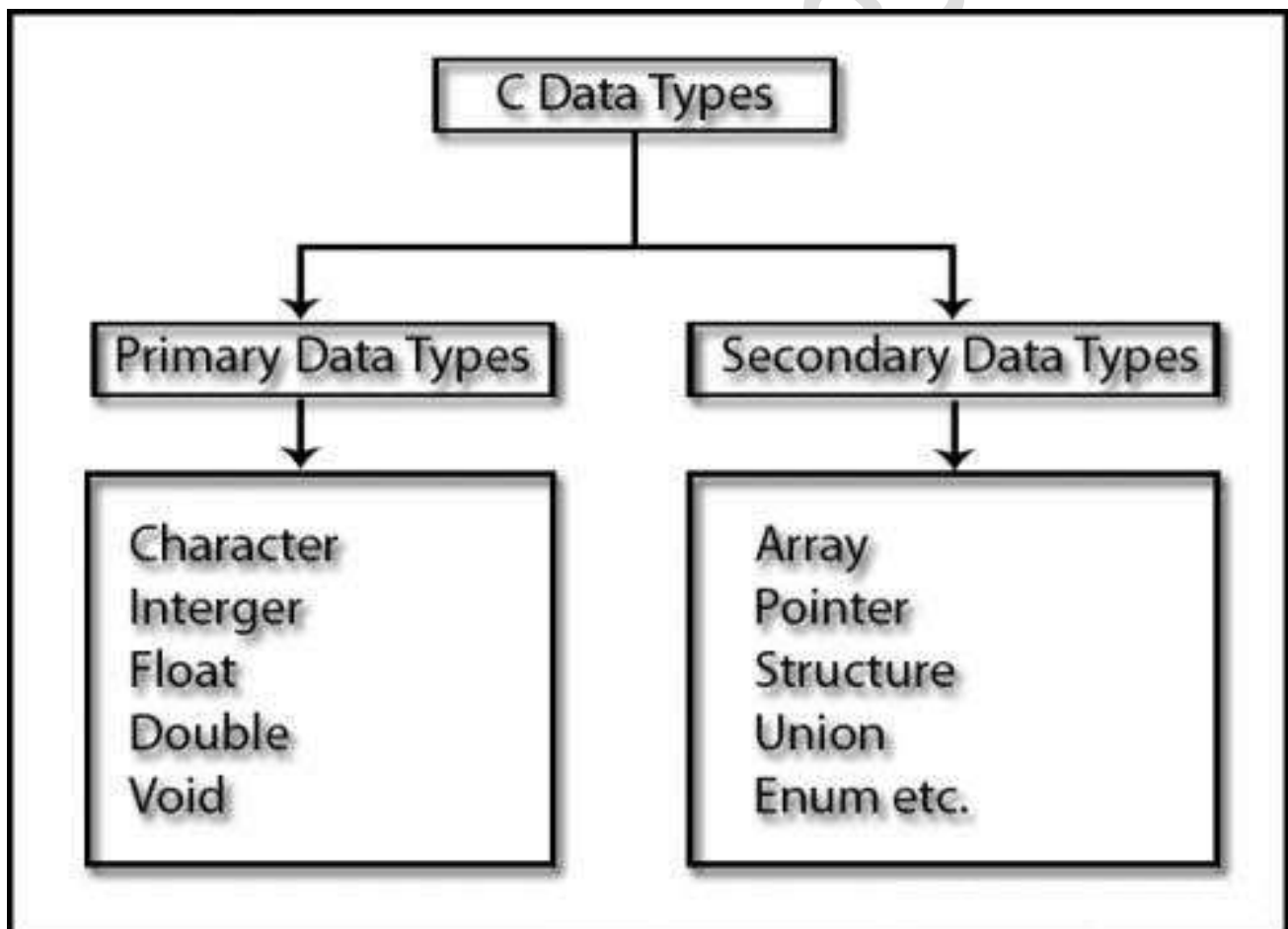
Primary Data Types:

Integer Data Types:

Integers are whole numbers with a range of values, range of values are machine dependent. Generally an integer occupies 2 bytes memory space and its value range limited to -32768 to +32767 (that is, -2^{15} to $+2^{15}-1$). A signed integer use one bit for storing sign and rest 15 bits for number.

To control the range of numbers and storage space, C has three classes of integer storage namely `short int`, `int` and `long int`. All three data types have signed and unsigned forms. A `short int` requires half the amount of storage than normal integer. Unlike signed integer, unsigned integers are always positive and use all the bits for the magnitude of the number. Therefore, the range of an unsigned integer will be from 0 to 65535. The `long` integers are used to declare a longer range of values and it occupies 4 bytes of storage space.

Syntax:

```
int <variable name>;
```

```
int num1;
short int num2;
long int num3;
```

Example: 5, 6, 100, 2500.

Integer Data Type Memory Allocation:

short int	int	long int
1 Byte	2 Bytes	4 Bytes

Floating Point Data Types:

The float data type is used to store fractional numbers (real numbers) with 6 digits of precision. Floating point numbers are denoted by the keyword `float`. When the accuracy of the floating point number is insufficient, we can use the `double` to define the number. The double is same as `float`

but with longer precision and takes double space (8 bytes) than `float`. To extend the precision further we can use `long double` which occupies 10 bytes of memory space.

Syntax:

```
float <variable name>;
```

```
float num1;
double num2;
long double num3;
```

Example: 9.125, 3.1254.

Floating Point Data Type Memory Allocation:

float	double	long double
4 Bytes	8 Bytes	10 Bytes

Character Data Type:

Character type variable can hold a single character and are declared by using the keyword `char`. As there are singed and unsigned `int` (either short or long), in the same way there are signed and unsigned chars; both occupy 1 byte each, but having different ranges. Unsigned characters have values between 0 and 255, signed characters have values from –128 to 127.

Syntax:

```
char <variable name>;
```

```
char ch = 'a';
```

Example: a, b, g, S, j.

Void Type:

The `void` type has no values therefore we cannot declare it as variable as we did in case of integer and float. The `void` data type is usually used with function to specify its type.