

# C Data Types

In C programming, data types are declarations for variables. This determines the type and size of data associated with variables. For example,

```
int myVar;
```

Here, myVar is a variable of int (integer) type. The size of int is 4 bytes.

- Basic types

Here's a table containing commonly used types in C programming for quick access.

Type	Size (bytes)	Format Specifier
<code>int</code>	at least 2, usually 4	<code>%d</code>
<code>char</code>	1	<code>%c</code>
<code>float</code>	4	<code>%f</code>
<code>double</code>	8	<code>%lf</code>
<code>short int</code>	2 usually	<code>%hd</code>
<code>unsigned int</code>	at least 2, usually 4	<code>%u</code>
<code>long int</code>	at least 4, usually 8	<code>%li</code>

<code>long long int</code>	at least 8	<code>%lli</code>
<code>unsigned long int</code>	at least 4	<code>%lu</code>
<code>unsigned long long int</code>	at least 8	<code>%llu</code>
<code>signed char</code>	1	<code>%c</code>
<code>unsigned char</code>	1	<code>%c</code>
<code>long double</code>	at least 10, usually 12 or 16	<code>%Lf</code>

## int

Integers are whole numbers that can have both zero, positive and negative values but no decimal values. For example, 0, -5, 10

We can use int for declaring an integer variable.

```
int id;
```

Here, id is a variable of type integer.

You can declare multiple variables at once in C programming. For example,

```
int id, age;
```

The size of int is usually 4 bytes (32 bits). And, it can take 232 distinct states from -2147483648 to 2147483647.

## float and double

float and double are used to hold real numbers.

```
float salary;  
double price;
```

In C, floating-point numbers can also be represented in exponential. For example,

```
float normalizationFactor = 22.442e2;
```

What's the difference between float and double?

The size of float (single precision float data type) is 4 bytes. And the size of double (double precision float data type) is 8 bytes.

## **char**

Keyword char is used for declaring character type variables. For example,

```
char test = 'h';
```

The size of the character variable is 1 byte.

## **void**

void is an incomplete type. It means "nothing" or "no type". You can think of void as absent.

For example, if a function is not returning anything, its return type should be void.

Note that, you cannot create variables of void type.

## **short and long**

If you need to use a large number, you can use a type specifier long. Here's how:

```
long a;  
long long b;  
long double c;
```

Here variables a and b can store integer values. And, c can store a floating-point number.

If you are sure, only a small integer ( $[-32,767, +32,767]$  range) will be used, you can use short.

```
short d;
```

You can always check the size of a variable using the sizeof() operator.

```

#include <stdio.h>
int main() {
    short a;
    long b;
    long long c;
    long double d;

    printf("size of short = %d bytes\n", sizeof(a));
    printf("size of long = %d bytes\n", sizeof(b));
    printf("size of long long = %d bytes\n", sizeof(c));
    printf("size of long double= %d bytes\n", sizeof(d));
    return 0;
}

```

## signed and unsigned

In C, signed and unsigned are type modifiers. You can alter the data storage of a data type by using them. For example,

```

unsigned int x;
int y;

```

Here, the variable x can hold only zero and positive values because we have used the unsigned modifier.

Considering the size of int is 4 bytes, variable y can hold values from -231 to 231-1, whereas variable x can hold values from 0 to 232-1.

Other data types defined in C programming are:

- bool Type
- Enumerated type
- Complex types
- 

## Derived Data Types

Data types that are derived from fundamental data types are derived types. For example: arrays, pointers, function types, structures, etc.