

C++ Modifier Types

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[< Previous](#)
Page[Next Page >](#)

C++ allows the **char**, **int**, and **double** data types to have modifiers preceding them. A modifier is used to alter the meaning of the base type so that it more precisely fits the needs of various situations.

The data type modifiers are listed here –

- signed
- unsigned
- long
- short

The modifiers **signed**, **unsigned**, **long**, and **short** can be applied to integer base types. In addition, **signed** and **unsigned** can be applied to **char**, and **long** can be applied to **double**.

The modifiers **signed** and **unsigned** can also be used as prefix to **long** or **short** modifiers. For example, **unsigned long int**.

C++ allows a shorthand notation for declaring **unsigned**, **short**, or **long** integers. You can simply use the word **unsigned**, **short**, or **long**, without **int**. It automatically implies **int**. For example, the following two statements both declare unsigned integer variables.

```
unsigned x;  
unsigned int y;
```

To understand the difference between the way signed and unsigned integer modifiers are interpreted by C++, you should run the following short program –

```
#include <iostream>  
using namespace std;  
  
/* This program shows the difference between  
 * signed and unsigned integers.  
 */  
int main() {  
    short int i;           // a signed short integer  
    short unsigned int j;  // an unsigned short integer  
  
    j = 50000;  
  
    i = j;  
    cout << i << " " << j;  
  
    return 0;  
}
```

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When this program is run, following is the output –

-15536 50000

The above result is because the bit pattern that represents 50,000 as a short unsigned integer is interpreted as -15,536 by a short.

Type Qualifiers in C++

The type qualifiers provide additional information about the variables they precede.

Sr.No	Qualifier & Meaning
1	const Objects of type const cannot be changed by your program during execution.
2	volatile The modifier volatile tells the compiler that a variable's value may be changed in ways not explicitly specified by the program.
3	restrict A pointer qualified by restrict is initially the only means by which the object it points to can be accessed. Only C99 adds a new type qualifier called restrict.

[< Previous](#)
Page

Next Page [>](#)

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