

Return by reference in C++ with Examples

Difficulty Level : Medium • Last Updated : 01 Aug, 2020

[Pointers](#) and [References](#) in C++ held close relation with one another. The major difference is that the pointers can be operated on like adding values whereas references are just an **alias** for another variable.

- [Functions in C++](#) can return a **reference** as it's returns a **pointer**.
- When function returns a **reference** it means it returns a **implicit** pointer.

Return by reference is very different from [Call by reference](#). Functions behaves a very important **role** when variable or pointers are returned as reference.

See this function signature of Return by Reference Below:

```
dataType& functionName(parameters);  
where,  
dataType is the return type of the function,  
and parameters are the passed arguments to it.
```

Below is the code to illustrate the Return by reference:

C++

```
// C++ program to illustrate return by reference  
#include <iostream>  
using namespace std;  
  
// Function to return as return by reference  
int& returnValue(int& x)  
{  
  
    // Print the address  
    cout << "x = " << x  
        << " The address of x is "  
        << &x << endl;  
  
    // Return reference  
    return x;  
}  
  
// Driver Code  
int main()  
{  
    int a = 20;  
    int& b = returnValue(a);  
  
    // Print a and its address  
    cout << "a = " << a  
        << " The address of a is "  
        << &a << endl;  
  
    // Print b and its address  
    cout << "b = " << b  
        << " The address of b is "  
        << &b << endl;  
  
    // We can also change the value of  
    // 'a' by using the address returned  
    // by returnValue function  
  
    // Since the function returns an alias  
    // of x, which is itself an alias of a,  
    // we can update the value of a  
    returnValue(a) = 13;  
  
    // The above expression assigns the  
    // value to the returned alias as 3.  
    cout << "a = " << a  
        << " The address of a is "  
        << &a << endl;  
    return 0;  
}
```

Output:

```
x = 20 The address of x is 0x7fff3025711c  
a = 20 The address of a is 0x7fff3025711c  
b = 20 The address of b is 0x7fff3025711c  
x = 20 The address of x is 0x7fff3025711c  
a = 13 The address of a is 0x7fff3025711c
```

Explanation:

Since **reference** is nothing but an **alias** (synonym) of another variable, the address of **a**, **b** and **x** never changes.

Note: We should never return a **local variable** as a **reference**, reason being, as soon as the functions returns, local variable will be **erased**, however, we still will be left with a **reference** which might be a **security bug** in the code.

Below is the code to illustrate the Return by reference:

C++

```
// C++ program to illustrate return  
// by reference  
#include <iostream>  
using namespace std;  
  
// Global variable  
int x;  
  
// Function returns as a return  
// by reference  
int& retByRef()  
{  
    return x;  
}  
  
// Driver Code  
int main()  
{  
    // Function Call for return  
    // by reference  
    retByRef() = 10;  
  
    // Print X  
    cout << x;  
    return 0;  
}
```

Output:

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