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Copy Constructor in C++ | C++ Tutorials for Beginners #34

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In this tutorial, we will discuss copy constructor in C++

Copy Constructor in C++

A copy constructor is a type of constructor that creates a copy of another object. If we want one object to resemble another object we can use a copy constructor. If no copy constructor is written in the program compiler will supply its own copy constructor. An example program to demonstrate the concept of a Copy constructor in C++ is shown below.

```
#include<iostream>
using namespace std;
```

```
class Number{
    int a;
    public:
        Number(){
            a = 0;
        }

        Number(int num){
            a = num;
        }
        // When no copy constructor is found, compiler supplies its own copy constructor
        Number(Number &obj){
            cout<<"Copy constructor called!!!"<<endl;
            a = obj.a;
        }

        void display(){
            cout<<"The number for this object is "<< a <<endl;
        }
};
```

Code Snippet 1: Copy Constructor Example Program

As shown in Code Snippet 1,

- 1st we created a “number” class which consists of private data member “a”.
- 2nd default constructor of the “number” class is defined which has no parameters and assign “0” to the data members “a”.
- 3rd parameterized constructor of the “number” class is defined which takes one parameter and assigns values to the data members “a”.
- 4th copy constructor of the “number” class is defined which takes its own reference object as a parameter and assigns values to the data members “a”.
- 5th function “display” is defined which will print the values of the data members “a”.

The main program is shown in code snippet 2.

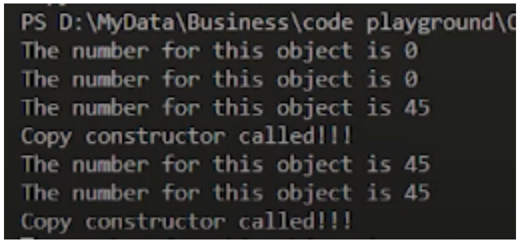
```
int main(){
    Number x, y, z(45), z2;
    x.display();
    y.display();
    z.display();

    Number z1(z); // Copy constructor invoked
    z1.display();

    z2 = z; // Copy constructor not called
    z2.display();

    Number z3 = z; // Copy constructor invoked
    z3.display();

    // z1 should exactly resemble z  or x or y
    return 0;
}
```

Code Snippet 2: Main Program

As shown in Code Snippet 2,

- 1st objects “x”, “y”, “z”, and “z1” are created of the “number” data type. The main thing to note here is that the object “z” has a value “45”.
- 2nd function “display” is called by the objects “x”, “y”, and “z”.
- 3rd copy constructor is invoked and the object “z” is passed to “z1”
- 4th function “display” is called by the object “z1”
- 5th the value of “z” is assigned to “z1”. The main thing to note here is that it will not invoke a copy constructor because the object “z” is already created.
- 6th function “display” is called by the object “z2”
- 7th the value of “z” is assigned to “z3”. The main thing to note here is that it will invoke a copy constructor because the object “z3” is being created.
- 8th function “display” is called by the object “z3”

The output for the following program is shown in figure 1.



```
PS D:\MyData\Business\code playground\C
The number for this object is 0
The number for this object is 0
The number for this object is 45
Copy constructor called!!!
The number for this object is 45
The number for this object is 45
Copy constructor called!!!
```

Figure 1: Program Output

As shown in figure 1, all the values which were passed and assigned through copy constructors are printed.

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