Conversion Operators in C++

Difficulty Level : Medium   ●   Last Updated : 02 Nov, 2022

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In C++, the programmer abstracts real-world objects using classes as concrete types. Sometimes, it is required to convert one concrete type to another concrete type or primitive type implicitly. Conversion operators play an important role in such situations. It is similar to the operator overloading function in class.

For example consider the following class, here, we are making a class for complex numbers.

It has two data members:

- real
- imaginary

C++

```cpp
// CPP Program to demonstrate Conversion Operators
#include <cmath>
#include <iostream>
using namespace std;

class Complex {
private:
    double real;
    double imag;

public:
    // Default constructor
    Complex(double r = 0.0, double i = 0.0)
        : real(r)
```

```cpp
    // magnitude : usual function style
    double mag() { return getMag(); }

    // magnitude : conversion operator
    operator double() { return getMag(); }

private:
    // class helper to get magnitude
    double getMag()
    {
        return sqrt(real * real + imag * imag);
    }
};

int main()
{
    // a Complex object
    Complex com(3.0, 4.0);

    // print magnitude
    cout << com.mag() << endl;
    // same can be done like this
    cout << com << endl;
}
```

Output

5
5

If a class has a constructor which can be called with a single argument, then this constructor becomes a conversion constructor because such a constructor allows conversion of the single argument to the class being constructed.

Note: The compiler will have more control in calling an appropriate function based on type, rather than what the programmer expects. It will be good practice to use other techniques like class/object-specific member functions (or making use of C++ Variant class) to perform such conversions. In some places, for example in making compatible calls with the existing C library, these are unavoidable.

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