

## CS205 C/ C++ Programming Assignment 6

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### Part 1-Analysis

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The problem is to design a class named Box whose dimensions are integers and private to the class. We need to create 4 functions and overload 2 operators for the class Box. Since the template is given, so it is very easy to finish it.

### Part 2-Code

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box.hpp

```
#ifndef BOX_HPP
#define BOX_HPP
#include<iostream>
using namespace std;

class Box{
public:
    Box();
    Box(int length,int breadth,int height);
    Box(const Box&b);
    int getLength();
    int getBreadth();
    int getHeight();
    long long CalculateVolume();
    bool operator<(const Box&b)const;
    friend ostream& operator<<(ostream&os,const Box&b);
private:
    int l;
    int b;
    int h;
};

Box::Box(){
    l = 0;
    b = 0;
```

```

        h = 0;
    }

    Box::Box(int length,int breadth,int height):l(length),b(breadth),h(height){

    }

    Box::Box(const Box&b){
        this->l = b.l;
        this->b = b.b;
        this->h = b.h;
    }

    int Box::getLength(){
        return l;
    }

    int Box::getBreadth(){
        return b;
    }

    int Box::getHeight(){
        return h;
    }

    long long Box::CalculateVolume(){
        return (long long)l*(long long)b*(long long)h;
    }

    bool Box::operator<(const Box&b)const{
        if(l<b.l) return true;
        if(l==b.l&&this->b<b.b) return true;
        if(l==b.l&&this->b==b.b&&h<b.h) return true;
        return false;
    }

    ostream& operator<<(ostream &os,const Box&b){
        os<<"Length = "<<b.l<<"", Breadth = "<<b.b<<"", Height = "<<b.h<<endl;
        return os;
    }

#endif

```

## Part 3-Result & Verification

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### Test case #1

#### Test.cpp

```

#include<iostream>
#include"box.hpp"
using namespace std;
int main(){
    Box a;
    Box b(1,1,1);

```

```

    cout<<a.getLength()<<endl;
    cout<<a.getBreadth()<<endl;
    cout<<a.getHeight()<<endl;
    cout<<b.getLength()<<endl;
    cout<<b.getBreadth()<<endl;
    cout<<b.getHeight()<<endl;
    cout<<a<<b;
    return 0;
}

```

```

0
0
0
1
1
1
Length = 0, Breadth = 0, Height = 0
Length = 1, Breadth = 1, Height = 1
-----
Process exited after 0.3072 seconds with return value 0
请按任意键继续. . .

```

## Test case #2

### Test.cpp

```

#include<iostream>
#include"box.hpp"
using namespace std;
int main(){
    Box a(1,1,1);
    Box b(1,2,1);
    Box c(1,2,0);
    cout<<"Box a:"<<a;
    cout<<"Box b:"<<b;
    cout<<"Box c:"<<c;
    if(a<b) cout<<"True\n";
    else cout<<"False\n";
    if(a<c) cout<<"True\n";
    else cout<<"False\n";
    if(b<c) cout<<"True\n";
    else cout<<"False\n";
    return 0;
}

```

```
Box a:Length = 1, Breadth = 1, Height = 1
Box b:Length = 1, Breadth = 2, Height = 1
Box c:Length = 1, Breadth = 2, Height = 0
True
True
False
```

```
-----
Process exited after 0.2212 seconds with return value 0
请按任意键继续. . .
```

## Part 4-Difficulties & Solutions

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- 1.Since the Volume may exceed the range of int, so we need to use long long.
- 2.We need to set l,b,h private and set other function as public.
- 3.When we need to overload operator, we just need to overload it in normal way.