CS205 C/ C++ Programming Lab Assignment

Name: 何宜芮(He Yirui)

SID: 11811031

Part 1 –Analysis

This assignment requires us to design a class called “Box”.

1. The default constructor of the class should initialize l, b, and h to 0.
2. The parameterized constructor Box (int length, int breadth, int height) should initialize Box's l, b and h to length, breadth and height.
3. The copy constructor Box (const Box& b) should set l, b and h to B's l, b and h, respectively.
4. int getLength().
5. int getBreadth().
6. int getHeight().
7. long long CalculateVolume().
8. Overload the operator “<”.
9. Overload the operator “=”.

Part 2 – Code

```
    #ifndef BOX_HPP
#define BOX_HPP

#include <iostream>

class Box {
private:
    int l;
    int b;
    int h;
public:
    //Constructors:
    Box() {
        l = 0;
        b = 0;
        h = 0;
    }

    Box(int length, int breadth, int height) {
        l = length;
        b = breadth;
        h = height;
    }
```

```
    Box(const Box &B) {
        l = B.l;
        b = B.b;
        h = B.h;
    }

    //Get methods:
    int getLength() { return l; };

    int getBreadth() { return b; };

    int getHeight() { return h; };

    long long CalculateVolume() {
        long long v;
        v = ((long long) l * b * h);
        return v;
    };

    //Overloading methods:
    bool operator<(Box B) {
        if (this->l < B.l) { return true; }
        else if (this->b < B.b && this->l == B.l) { return true; }
        else if (this->h < B.h && this->b == B.b && this->l == B.l) { return true; }
        else return false;
    };

    friend std::ostream &operator<<(std::ostream &os, const Box &B) {
        return os << B.l << " " << B.b << " " << B.h << std::endl;
    };

};

#endif
```

Part 3 - Result & Verification

Case：

Test Code：

```
#include <iostream>
#include "box.hpp"

using namespace std;

int main() {
    Box b1;
    Box b2 = Box(100000, 100000, 100000);
    Box b3 = Box(100000, 100000, 999);
    cout << b1;
    cout << b1.getLength() << " " << b1.getBreadth() << " " << b1.getHeight()<<endl;
    cout << b2 << "Volume of b2 is:" << b2.CalculateVolume()<<endl;
    cout << b2 << b3 << "b2 is \"<\" b3:" << (bool) (b2 < b3)<<endl;
    cout << b2 << b3 << "b3 is \"<\" b2:" << (bool) (b3 < b2)<<endl;

    return 0;
}
```

result：

```
C:\Users\hyr\CLionProjects\Assignment_6\cmake-build-debug\Assignment_6.exe
0 0 0
0 0 0
100000 100000 100000
Volume of b2 is:1000000000000000
100000 100000 100000
100000 100000 999
b2 is "<" b3:0
100000 100000 100000
100000 100000 999
b3 is "<" b2:1

Process finished with exit code 0
```

The output is correct.

Part 4 - Difficulties & Solutions

I forget how to overload “<<”, so I saw out slides and get the right solution.