Java^{TM} Education & Technology Services

Object Oriented programming Using

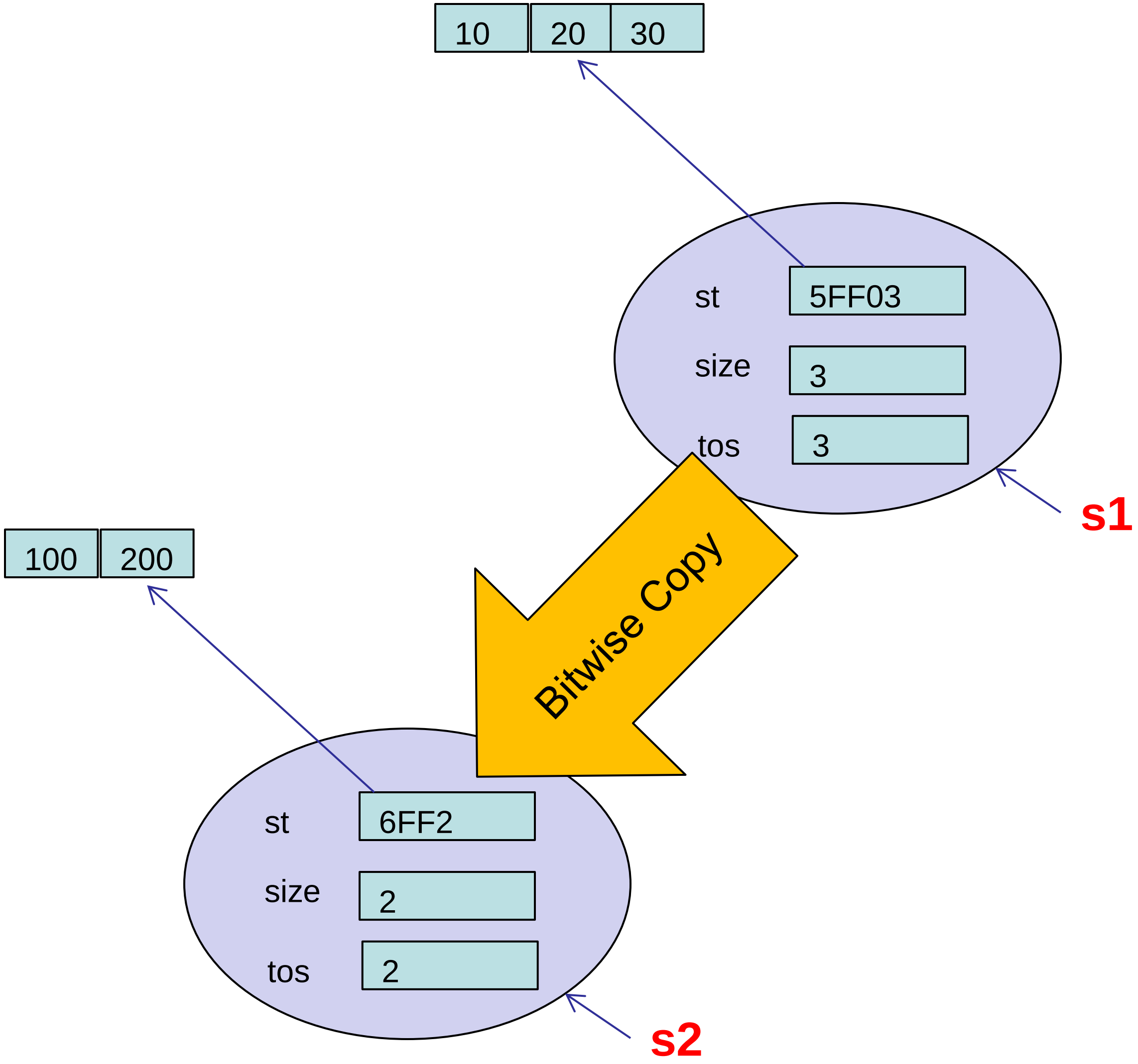
C++

Stack Example

```
int main() {
    int x = 5;
    :
    int y = 7;
    :
    y = x;
    cout << x ;     5
    cout << y;      5
    x= 3;
    cout << x;      3
    cout << y;      5
```

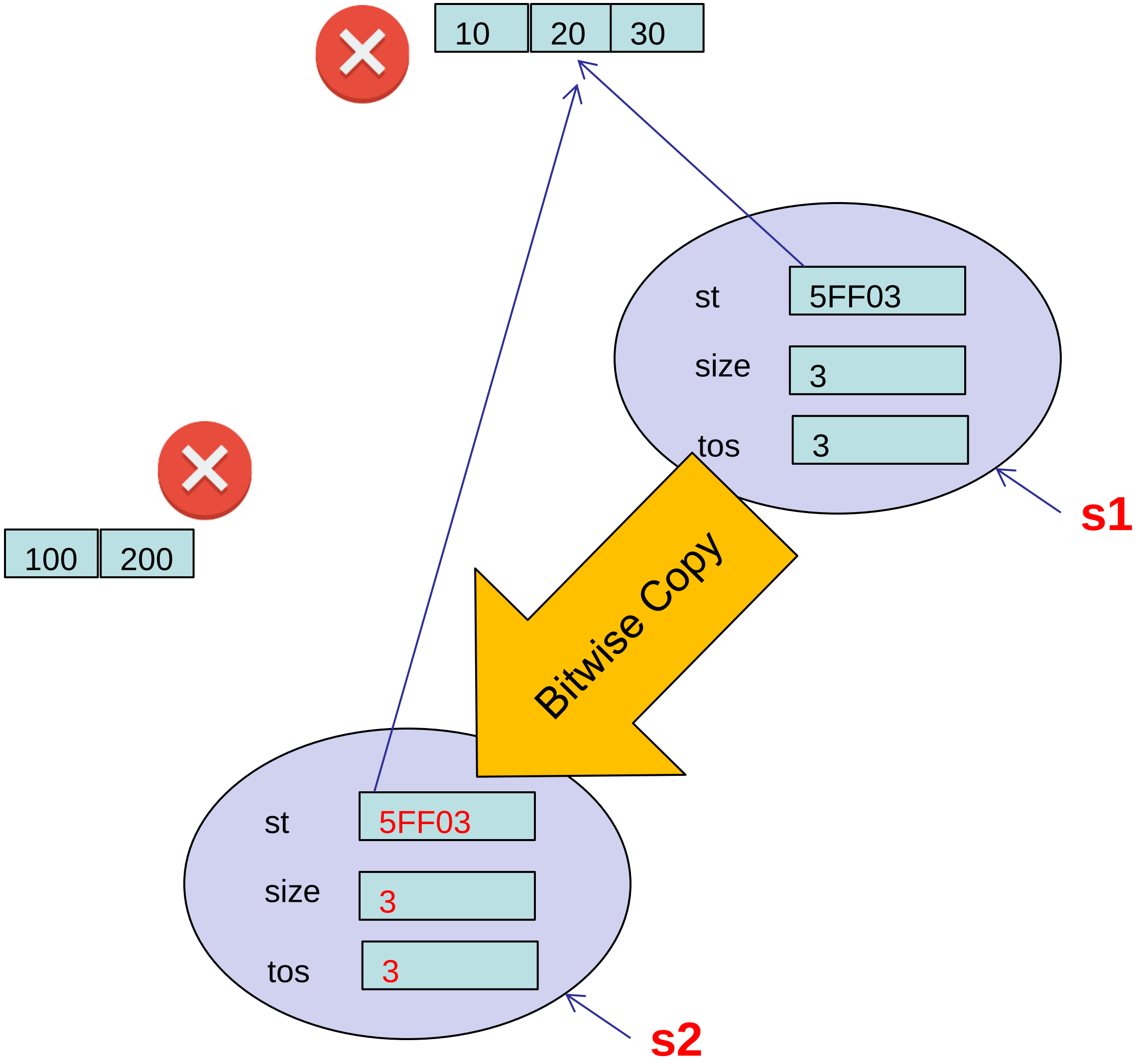
Stack Example

```
int main() {
        Stack s1(3);
        :
        Stack s2 (2);
        :
        s2=s1;
```



Stack Example

```
int main() {
    Stack s1(3);
    :
    Stack s2 (2);
    :
    s2=s1;
    s2.pop();
    s1.push(1);
```



Stack Example

Using the normal = operator

1. Bitwise copy between s1 and s2 (dynamic area problem)
2. s1 and s2 have one stack area.
3. this stack area will deleted twice when s1 and s2 destructed.

Try to Overload the = operator for class stack

To extend the functionality of the operator.

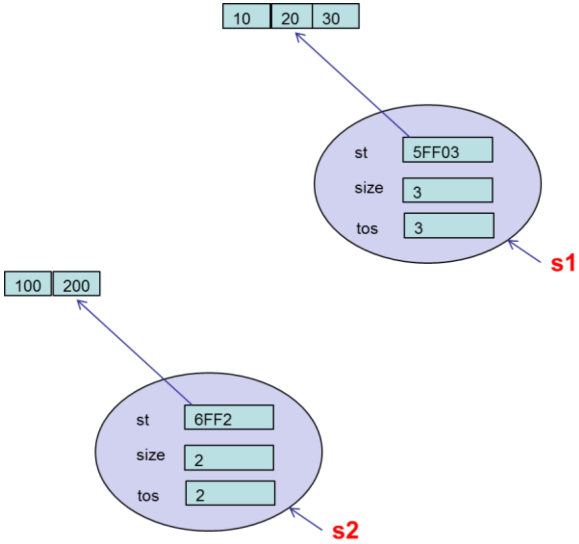
Most of operators can be overloaded except [. ?: :: *]

= for Stack

```
class Stack{
        :
        void operator = ( Stack s ) ;
        };
```

= overload function

```
void Stack :: operator = ( Stack s) {
        delete[] this->st; // for caller this
         this-> tos = s.tos;
         this-> size = s.size;
         this-> st = new int [size];
        for(int i=0; i< tos;i++)
                        this-> st[i] = s.st[i];
}
```



```
int main() {
            Stack s1(3);
            Stack s2 (2);
            s2=s1;
              // this : s2
             // s: s1
```

= for Stack

```
class Stack{
    :
    void operator = ( Stack s ) ;
    };
```

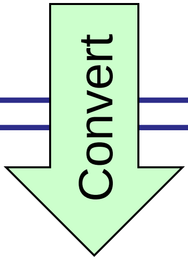
```
int main() {
        Stack s1(3);
        Stack s2 (2);
        s2=s1;
```

1. Object s1 send by value :
   - so the copy constructor will run to copy from s1 to s
2. we can call it by const reference to protect it from changing inside the function body.

```
class Stack{
    :
    void operator = (const  Stack &s ) ;
    };
```

= for Stack

```
class Stack{
        :
        void operator = (const  Stack &s ) ;
        };
```



```
class Stack{
        :
        stack& operator = (const  Stack &s ) ;
        };
```

```
int main() {
                Stack s1(3);
                Stack s2 (2);
                s2=s1;
                s3=s2=s1;
```

Operators overload for Complex

```
class Complex{
        :
        Complex operator + (Complex c ) ;
        };
```

```
Complex Complex :: operator + (Complex c )
{
Complex b;
b.real = real + c.real;
b.img = img + c.img;
return b;
}
```

```
int main() {
        Complex c1(10,3);
        Complex c2(5,2);
        Complex c3;
        c3 = c1 + c2;
        c3. print () ;
```

Test : c4 = c1 + c2 + c3

1. need to overload + operator for Class Complex
2. c1 is the caller of + operator and c2 is the parameter
3. No need to overload = operator for Class Complex

Operators overload for Complex

```
class Complex{
    Complex operator + (Complex c ) ;
    Complex operator + (float x ) ;
    };
```

```
Complex Complex :: operator + (float x)
{
Complex b;
b.real = real + x;
b.img = img;
return b;
}
```

```
int main() {
        Complex c1(10,3);
        Complex c2(5,2);
        Complex c3;
        c3 = c1 + 5;
        c3. print () ;
```

Test : c2 = 5 + c1 ;

1. need to overload extra + operator for Class Complex
2. c1 is the caller of + operator and 5 is the parameter

Operators overload for Complex

```
class Complex{
        Complex operator + (Complex c ) ;
        Complex operator + (float x ) ;
        friend Complex operator + (float x ,Complex c ) ;
        };
```

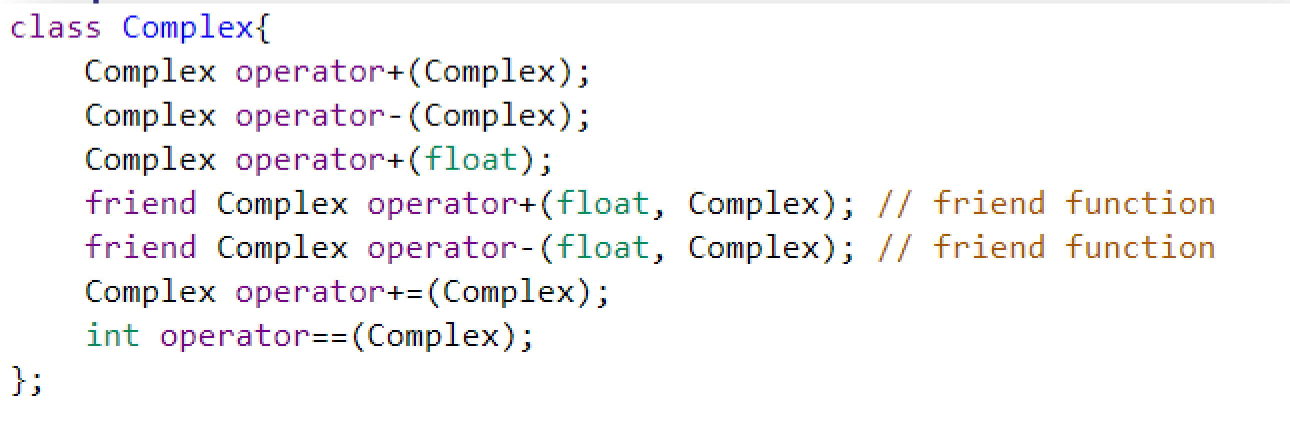
```
int main() {
        Complex c1(10,3);
        Complex c2(5,2);
        Complex c3;
        c3 = c1 + 5;
        c3 = 5+c1;
        c3. print () ;
```

```
Complex operator + (float x , Complex c )
{
Complex b;
b.real = c.real + x;
b.img = c.img;
return b;
}
```

1. need to overload extra + operator as a friend function to Class Complex.
2. + operator parameters are 5 and c1

Operators overload for Complex

```
int main() {
        Complex c1(10,3);
        Complex c2(5,2);
        Complex c3;
        c3 = c1 + c2;
        c3 = c1 -  c2;
        c3 = c1 + 5;
        c3 = c1 - 5;
        c3 = 5 + c1;
        c3 = 5 - c1;
        c1 == c2;
        c1 += c2;
```

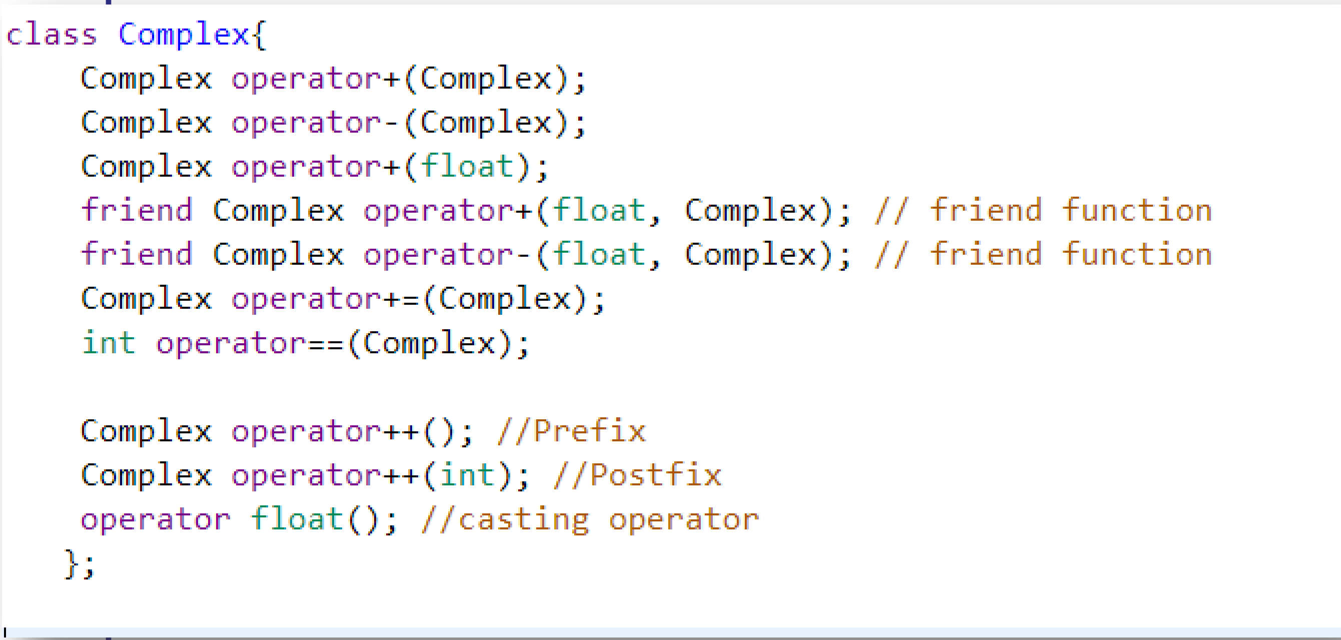


```
class Complex{
    Complex operator+(Complex);
    Complex operator-(Complex);
    Complex operator+(float);
    friend Complex operator+(float, Complex); // friend function
    friend Complex operator-(float, Complex); // friend function
    Complex operator+=(Complex);
    int operator==(Complex);
};
```

Operators overload for Complex

```
int main() {
        :
        c3 = c1 + c2;
        c3 = c1 -  c2;
        c3 = c1 + 5;
        c3 = c1 - 5;
        c3 = 5 + c1;
        c3 = 5 - c1;
        c1 == c2;
        c1 += c2;


        ++c1;
        c1 ++ ;
        (float) c1;
```

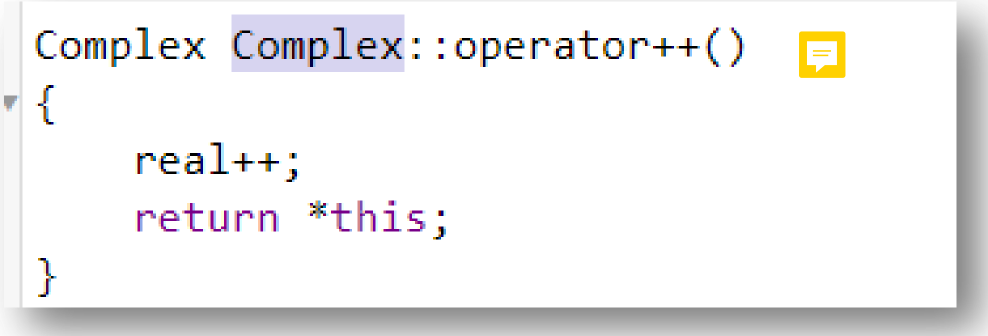


```
class Complex{
    Complex operator+(Complex);
    Complex operator-(Complex);
    Complex operator+(float);
    friend Complex operator+(float, Complex); // friend function
    friend Complex operator-(float, Complex); // friend function
    Complex operator+=(Complex);
    int operator==(Complex);

    Complex operator++(); //Prefix
    Complex operator++(int); //Postfix
    operator float(); //casting operator
   };
```

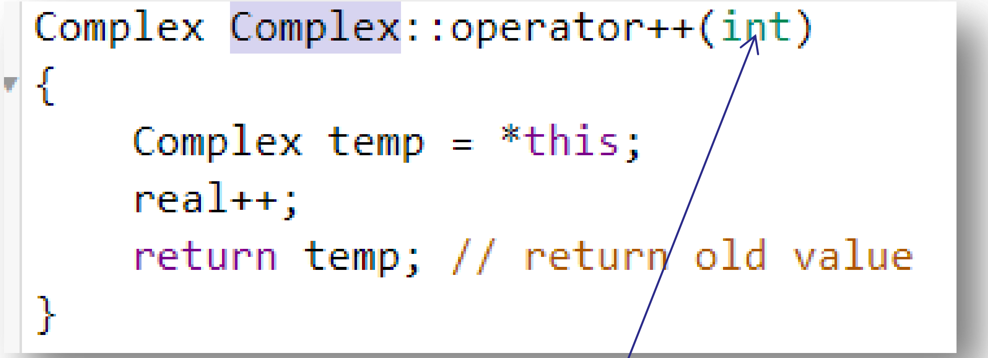
Operators overload for Complex

```
int main() {
        :
        ++c1; //prefix
    // increment the real part
        c2 = ++c1;
```



```
Complex Complex::operator++()
{
    real++;
    return *this;
}
```

```
int main() {
        :
        c1++; //postfix
    // increment the real part
        c2 = c1 ++;
```



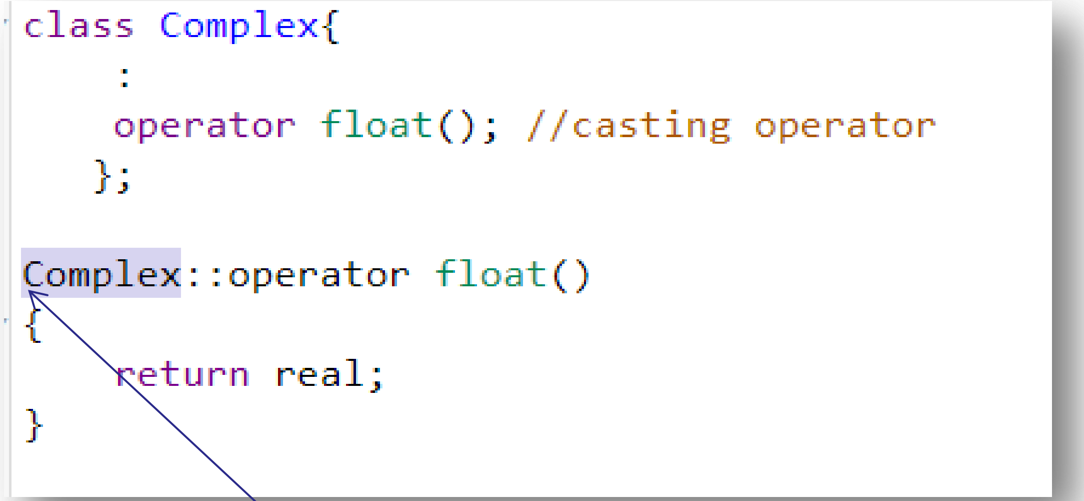
```
Complex Complex::operator++(int)
{
    Complex temp = *this;
    real++;
    return temp; // return old value
}
```

the compiler uses this int parameter to distinguish between the prefix and post fix

Operators overload for Complex

```
int main() {
        :
        cout<< (float) c1;


        float x = (float) c1;
```



```
class Complex{
    :
    operator float(); //casting operator
   };

Complex::operator float()
{
    return real;
}
```

No return type for casting operator as it automatically returns the type casting to.

Lab Exercise

Lab Exercise

- ## 1st Assignment :

1. **Complete Stack Class:**
    1. = operator overload.

2. **Complete Complex Class for:**

```
c3 = c1 + c2;
c3 = c1 -  c2;
c3 = c1 + 5;
c3 = c1 - 5;
c3 = 5 + c1;
c3 = 5 - c1;
c1 == c2;
c1 += c2;

++c1; //--c1;
c1 ++ ; // c1--;
(float) c1;
```