Data Structures and Object Oriented Programming

Lecture 12

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Operator Overloading

Some More Binary Operators

Assignment (=) Operator

- **Consider this example:**

```
class myclass {
    int x, y;
public:
    myclass(int a, int b)
    {
        x = a;
        y = b;
    }

};
```

```
int main() {
    myclass foo(1, 1);
    myclass bar(0, 0);
    bar = foo;
    return 0;
}
```

Will it give me any error?

Assignment (=) Operator

- **Consider this example:**

```
class myclass {
    int x, y;
public:
    myclass(int a, int b)
    {
        x = a;
        y = b;
    }

};
```

```
int main() {
    myclass foo(1, 1);
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    bar = foo;
    return 0;
}
```

Will it give me any error?

Member-wise copy

Assignment (=) Operator

- **Consider this example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int a, int b)
    {
        x= new int
        x = a;
        y= new int;
        y = b;
    }

};
```

```
int main() {
    myclass foo(1, 1);
    myclass bar(0, 0);
    bar = foo;
    return 0;
}
```

Will it give me any error?

Assignment (=) Operator

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class myclass {
    int *x, *y;
public:
    myclass(int a, int b)
    {
        x= new int
        x = a;
        y= new int;
        y = b;
    }

};
```

```
int main() {
    myclass foo(1, 1);
    myclass bar(0, 0);
    bar = foo;
    return 0;
}
```

Will it give me any error?

Be careful with member-wise copy

- If member data is a pointer, the pointer address is copied
- this could be disastrous

Assignment (=) Operator

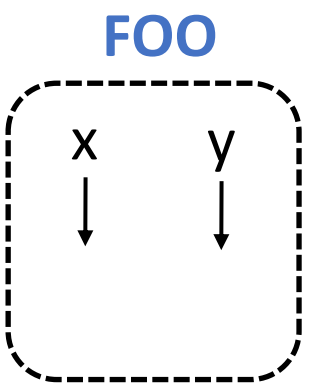
- **Consider this example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int a, int b)
    {
        x= new int
        x = a;
        y= new int;
        y = b;
    }

};
```

```
int main() {
    myclass foo(1, 1);
    myclass bar(0, 0);
    bar = foo;
    return 0;
}
```

Will it give me any error?



Assignment (=) Operator

- **Consider this example:**

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class myclass {
    int *x, *y;
public:
    myclass(int a, int b)
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        x = a;
        y= new int;
        y = b;
    }

};
```
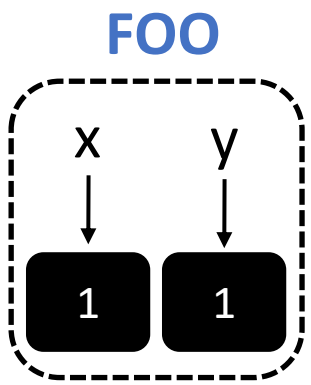

```
int main() {
    myclass foo(1, 1);
    myclass bar(0, 0);
    bar = foo;
    return 0;
}
```

Will it give me any error?



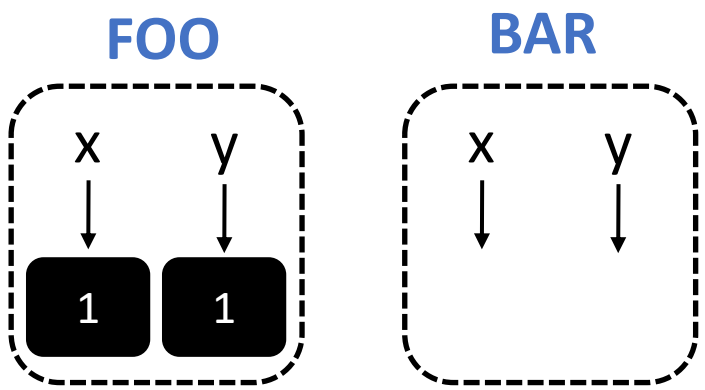
Assignment (=) Operator

- **Consider this example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int a, int b)
    {
        x= new int
        x = a;
        y= new int;
        y = b;
    }

};
```

```
int main() {
    myclass foo(1, 1);
    myclass bar(0, 0);
    bar = foo;
    return 0;
}
```

Will it give me any error?



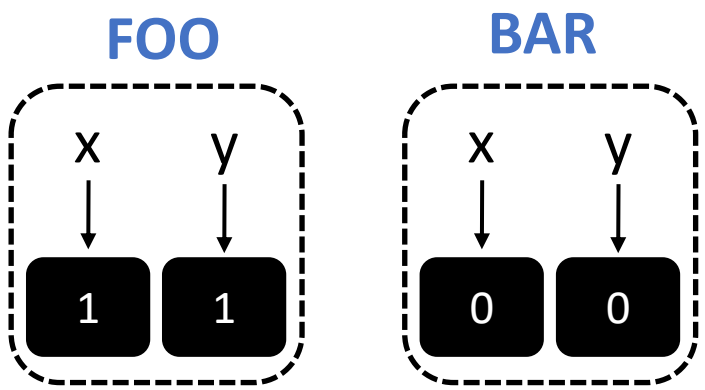
Assignment (=) Operator

- **Consider this example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int a, int b)
    {
        x= new int
        x = a;
        y= new int;
        y = b;
    }

};
```

```
int main() {
    myclass foo(1, 1);
    myclass bar(0, 0);
    bar = foo;
    return 0;
}
```

Will it give me any error?



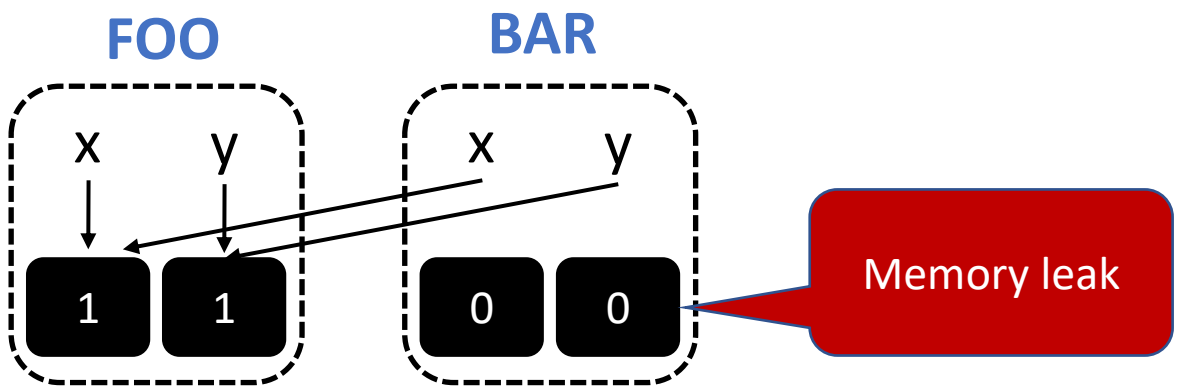
Assignment (=) Operator

- **Consider this example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int a, int b)
    {
        x= new int
        x = a;
        y= new int;
        y = b;
    }

};
```

```
int main() {
    myclass foo(1, 1);
    myclass bar(0, 0);
    bar = foo;
    return 0;
}
```

Will it give me any error?



Solution = Assignment Operator Overloading

- **Consider this example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int a, int b)
    {
        x= new int
        x = a;
        y= new int;
        y = b;
    }

friend myclass& operator= (myclass&
param1, myclass& param2);

 };
```

```
myclass& operator= (myclass& param1, myclass&
param2)
{
    *(param1.x) = *(param2.x);
    *(param1.y) = *(param2.y);
    return param1;
}


 int main() {
     myclass foo(1, 1);
     myclass bar(0, 0);
     bar = foo;
     return 0;
 }
```

Solution = Assignment Operator Overloading

- **Consider this example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int a, int b)
    {
        x= new int
        x = a;
        y= new int;
        y = b;
    }

friend myclass& operator= (myclass&
param1, myclass& param2);

 };
```

```
myclass& operator= (myclass& param1, myclass&
param2)
{
    *(param1.x) = *(param2.x);
    *(param1.y) = *(param2.y);
    return param1;
}


 int main() {
     myclass foo(1, 1);
     myclass bar(0, 0);
     bar = foo;
     return 0;
 }
```

If your object has a pointer to memory that was dynamically allocated previously, e.g., in the constructor, you will need an overloaded assignment operator

Solution = Assignment Operator Overloading

- **Consider this example:**

Why taking reference parameters?

```
class myclass {
    int *x, *y;
public:
    myclass(int a, int b)
    {
        x= new int
        x = a;
        y= new int;
        y = b;
    }

friend myclass& operator+ (myclass&
param1, myclass& param2);

 };
```

```
myclass& operator+ (myclass& param1, myclass&
param2)
{
    *(param1.x) = *(param2.x);
    *(param1.y) = *(param2.y);
    return param1;
}


 int main() {
     myclass foo(1, 1);
     myclass bar(0, 0);
     bar = foo;
     return 0;
 }
```

Solution = Assignment Operator Overloading

- **Consider this example:**

Why taking reference parameters?

Avoid **Copy Constructor**

```
class myclass {
    int *x, *y;
public:
    myclass(int a, int b)
    {
        x= new int
        x = a;
        y= new int;
        y = b;
    }

friend myclass& operator+ (myclass&
param1, myclass& param2);

 };
```

```
myclass& operator+ (myclass& param1, myclass&
param2)
{
    *(param1.x) = *(param2.x);
    *(param1.y) = *(param2.y);
    return param1;
}


 int main() {
     myclass foo(1, 1);
     myclass bar(0, 0);
     bar = foo;
     return 0;
 }
```

Solution = Assignment Operator Overloading

- **Consider this example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int a, int b)
    {
        x= new int
        x = a;
        y= new int;
        y = b;
    }

friend myclass& operator+ (myclass&
param1, myclass& param2);

 };
```

```
myclass& operator+ (myclass& param1, myclass&
param2)
{
    *(param1.x) = *(param2.x);
    *(param1.y) = *(param2.y);
    return param1;
}
```

Why returning **param1**?

```
 int main() {
     myclass foo(1, 1);
     myclass bar(0, 0);
     bar = foo;
     return 0;
 }
```

Solution = Assignment Operator Overloading

- **Consider this example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int a, int b)
    {
        x= new int
        x = a;
        y= new int;
        y = b;
    }

friend myclass& operator+ (myclass&
param1, myclass& param2);

 };
```

```
myclass& operator+ (myclass& param1, myclass&
param2)
{
    *(param1.x) = *(param2.x);
    *(param1.y) = *(param2.y);
    return param1;
}
```

Why returning **param1**?

baz=bar=foo; **???**

```
 int main() {
     myclass foo(1, 1);
     myclass bar(0, 0);
     bar = foo;
     return 0;
 }
```

Solution = Assignment Operator Overloading

- **Another complex example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int size1, int size2)
    {
        x= new int [size1]
        y= new int [size2];
    }

friend myclass operator+ (myclass& p1,
myclass& p2);

};
```

```
myclass& operator+ (myclass& p1, myclass& p2)
{
    delete [] p1.x;
    delete [] p1.y;
    p1.x= new int [sizeof(p2.x)];
    p1.y= new int [sizeof(p2.y)];

    // Memberwise copy ///
    return p1;
}
int main()
{
    myclass foo(10, 10);
    myclass bar(5, 5);
    bar = foo;
    return 0;
}
```

Solution = Assignment Operator Overloading

- **Another complex example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int size1, int size2)
    {
        x= new int [size1]
        y= new int [size1];
    }

friend myclass operator+ (myclass& p1,
myclass& p2);

};
```

```
myclass& operator+ (myclass& p1, myclass& p2)
{
    delete [] p1.x;
    delete [] p1.y;
    p1.x= new int [sizeof(p2.x)];
    p1.y= new int [sizeof(p2.y)];

    return p1;
}

int main()
{
    myclass foo(10, 10);
    foo = foo;
    return 0;
}
```

Self Assignment

Solution = Assignment Operator Overloading

- **Another complex example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int size1, int size2)
    {
        x= new int [size1]
        y= new int [size1];
    }

friend myclass operator+ (myclass& p1,
myclass& p2);

};
```

```
myclass& operator+ (myclass& p1, myclass& p2)
{
    delete [] p1.x;
    delete [] p1.y;
    p1.x= new int [sizeof(p2.x)];
    p1.y= new int [sizeof(p2.y)];

    return p1;
}

int main()
{
    myclass foo(10, 10);
    foo = foo;
    return 0;
}
```

Self Assignment

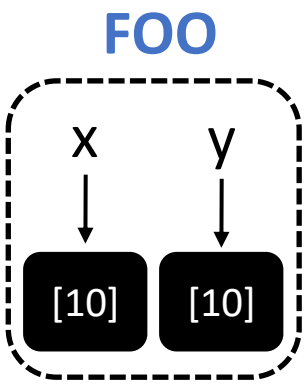
Any Problem???

Solution = Assignment Operator Overloading

- **Another complex example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int size1, int size2)
    {
        x= new int [size1]
        y= new int [size1];
    }

friend myclass operator+ (myclass& p1,
myclass& p2);

};
```

```
myclass& operator+ (myclass& p1, myclass& p2)
{
    delete [] p1.x;
    delete [] p1.y;
    p1.x= new int [sizeof(p2.x)];
    p1.y= new int [sizeof(p2.y)];

    return p1;
}

int main()
{
    myclass foo(10, 10);
    foo = foo;
    return 0;
}
```

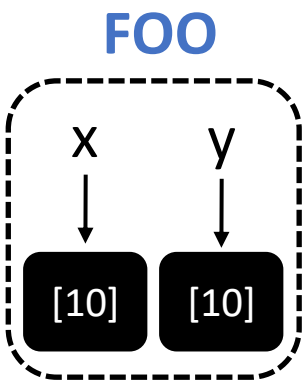


Solution = Assignment Operator Overloading

- **Another complex example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int size1, int size2)
    {
        x= new int [size1]
        y= new int [size1];
    }

friend myclass operator+ (myclass& p1,
myclass& p2);

};
```

```
myclass& operator+ (myclass& p1, myclass& p2)
{
    delete [] p1.x;
    delete [] p1.y;
    p1.x= new int [sizeof(p2.x)];
    p1.y= new int [sizeof(p2.y)];

    return p1;
}

int main()
{
    myclass foo(10, 10);
    foo = foo;
    return 0;
}
```



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    int *x, *y;
public:
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    }

friend myclass operator+ (myclass& p1,
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};
```

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myclass& operator+ (myclass& p1, myclass& p2)
{
    delete [] p1.x;
    delete [] p1.y;
    p1.x= new int [sizeof(p2.x)];
    p1.y= new int [sizeof(p2.y)];

    return p1;
}

int main()
{
    myclass foo(10, 10);
    foo = foo;
    return 0;
}
```

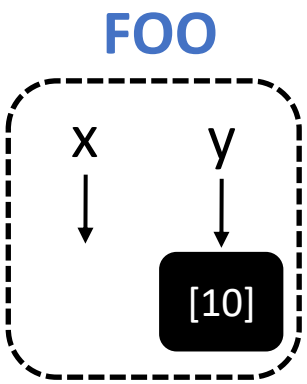

Solution = Assignment Operator Overloading

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```
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    int *x, *y;
public:
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    {
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        y= new int [size1];
    }

friend myclass operator+ (myclass& p1,
myclass& p2);

};
```
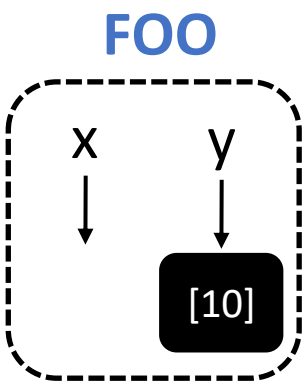

```
myclass& operator+ (myclass& p1, myclass& p2)
{
    delete [] p1.x;
    delete [] p1.y;
    p1.x= new int [sizeof(p2.x)];
    p1.y= new int [sizeof(p2.y)];

    return p1;
}

int main()
{
    myclass foo(10, 10);
    foo = foo;
    return 0;
}
```

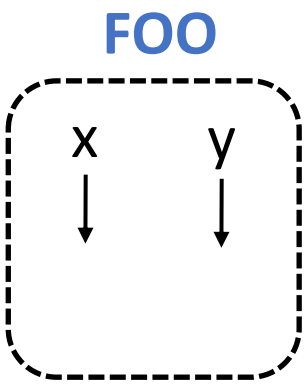


Solution = Assignment Operator Overloading

- **Another complex example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int size1, int size2)
    {
        x= new int [size1]
        y= new int [size1];
    }

friend myclass operator+ (myclass& p1,
myclass& p2);

};
```

```
myclass& operator+ (myclass& p1, myclass& p2)
{
    delete [] p1.x;
    delete [] p1.y;
    p1.x= new int [sizeof(p2.x)];
    p1.y= new int [sizeof(p2.y)];

    return p1;
}

int main()
{
    myclass foo(10, 10);
    foo = foo;
    return 0;
}
```



Solution = Assignment Operator Overloading

- **Another complex example:**

```
class myclass {
    int *x, *y;
public:
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        x= new int [size1]
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    }

friend myclass operator+ (myclass& p1,
myclass& p2);

};
```
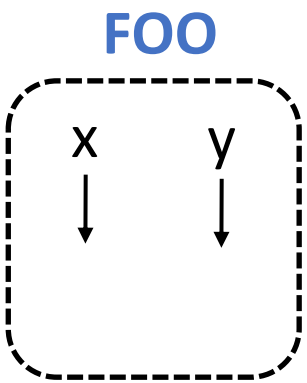

```
myclass& operator+ (myclass& p1, myclass& p2)
{
    delete [] p1.x;
    delete [] p1.y;
    p1.x= new int [sizeof(p2.x)];
    p1.y= new int [sizeof(p2.y)];

    return p1;
}

int main()
{
    myclass foo(10, 10);
    foo = foo;
    return 0;
}
```

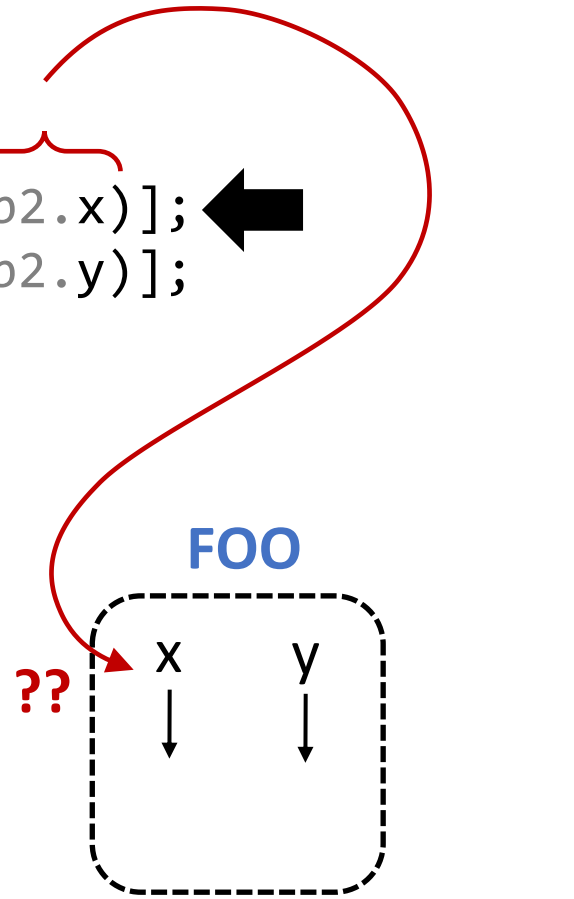


Solution = Assignment Operator Overloading

- **Another complex example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int size1, int size2)
    {
        x= new int [size1]
        y= new int [size1];
    }

friend myclass operator+ (myclass& p1,
myclass& p2);

};
```

```
myclass& operator+ (myclass& p1, myclass& p2)
{
    delete [] p1.x;
    delete [] p1.y;
    p1.x= new int [sizeof(p2.x)];
    p1.y= new int [sizeof(p2.y)];

    return p1;
}

int main()
{
    myclass foo(10, 10);
    foo = foo;
    return 0;
}
```



Solution = Assignment Operator Overloading

- **Another complex example:**

```
class myclass {
    int *x, *y;
public:
    myclass(int size1, int size2)
    {
        x= new int [size1]
        y= new int [size1];
    }

friend myclass operator+ (myclass& p1,
myclass& p2);

};
```

```
myclass& operator+ (myclass& p1, myclass& p2)
{
    if(&p1 =! &p2)
    {
        delete [] p1.x;
        delete [] p1.y;
        p1.x= new int [sizeof(p2.x)];
        p1.y= new int [sizeof(p2.y)];
    }
    return p1;
}
int main()
{
    myclass foo(10, 10);
    foo = foo;
    return 0;
}
```

Overloading “+=” operator

- **Example:**

```
class myclass {
    int x, y;
public:
    myclass(int a, int b)
    {
        x= a;
        y= b;
    }

friend myclass operator+= (myclass& p1,
myclass& p2);

};
```

```
myclass& operator+= (myclass& p1, myclass&
p2)
{
    p1.x= p1.x + p2.x;
    p1.y= p1.y + p2.y;

    return p1;
}

int main()
{
    myclass foo(10, 10);
    foo += foo;
    return 0;
}
```

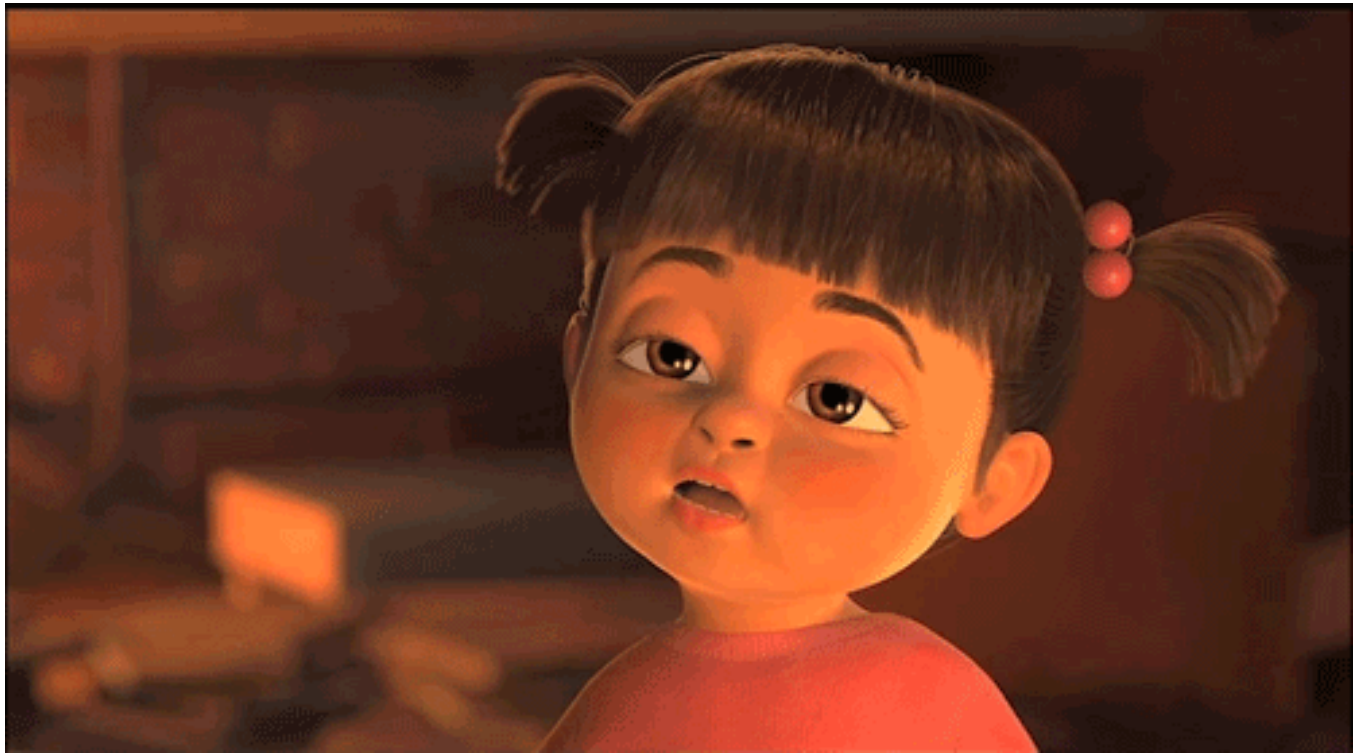
Other binary operators

- **The operators**

  `-=, /=, *=, |=, %=, &=, ^=, <<=, >>=, !=`

  can be overloaded in a very similar fashion

Thanks a lot



If you are taking a Nap, **wake up**.....Lecture Over