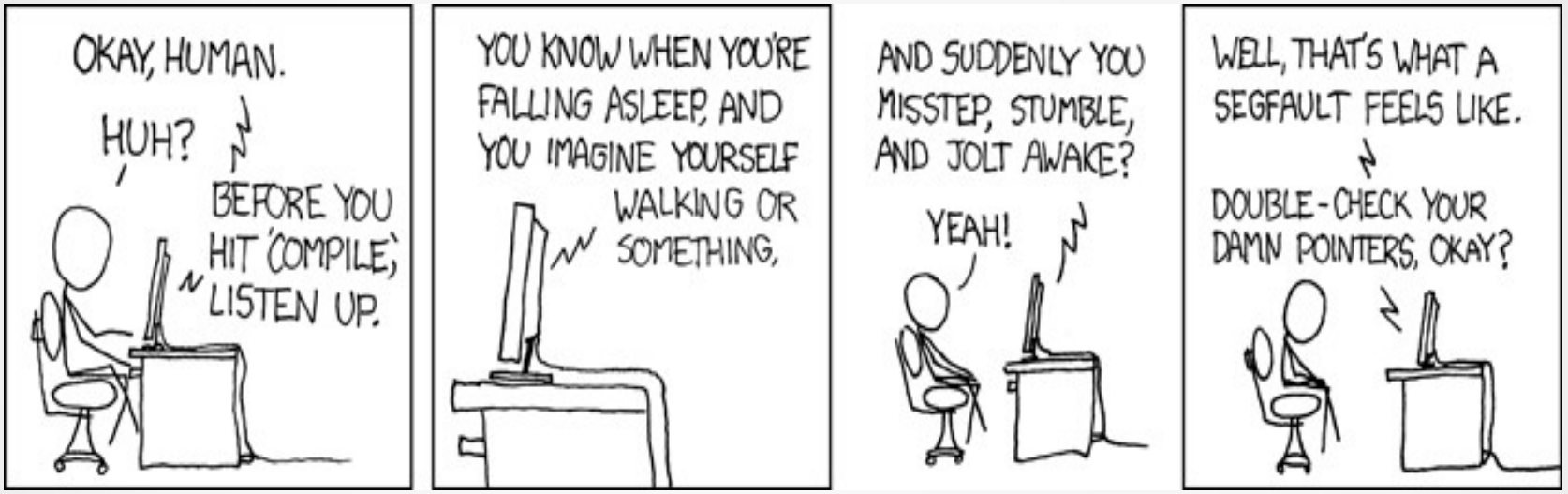
C++ Pointers (this->Part III)



(https://xkcd.com/371/)

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When a member function is called, how does C++ know which object it was called on?

```
// simple.h

class Simple {

private:

    int m_nid;

public:

    Simple(int nid) { //Ctor

        set_id(nid);

    }

    void set_id(int nid) { m_nid = nid; }

    int get_id() { return m_nid; }

};
```

```
int main() {

    Simple csimple(1);

    csimple.set_id(2);

    cout << csimple.get_id();

}
```

// How does a compiler know which object called set_id(2) when it only passes one input argument (int nid)?

What you see vs what the compiler sees

What you see

- set_id(2) takes one argument.
- csimple.set_id(2);
- void set_id(int nid) {

  m_nid = nid;

  }

What a compiler sees

- set_id(2) actually takes two arguments: (2 and address of the object &csimple).
- set_id(&csimple,2);
- void set_id(Simple* const this, int nid) {

  this->m_nid = nid;

  }

this->pointer

- The compiler has automatically converted the function's declaration and definition by adding a new parameter.
- The new hidden parameter 'this' points to the class object the member function is working with.
- Every object has a special pointer "this" which points to the object itself. 'this' is immutable. 'this' can't be zero or null or declared.
- This pointer is accessible to all members of the class but not to any static members of the class, global functions and friend functions.
- Presence of this pointer is not included in the sizeof calculations. As 'this' is not part of the object.

Uses of this pointer

- If you have a constructor (or member function) that has a parameter of the same name as a member variable, you can disambiguate them by using “this”:

```
class Something {
private:
    int id; //member variable
public:
    Something(int id) {
        this->id = id; //this->id member variable ; id - parameter
    }
};
```

Returning *this

- return a reference to the object that was implicitly passed to the function by C++

```
class Calc {
private:
    int m_nValue;
public:
    Calc() { m_nValue = 0; }
    void Add(int nValue) { m_nValue += nValue; }
    void Sub(int nValue) { m_nValue -= nValue; }
    void Mult(int nValue) { m_nValue *= nValue; }
    int GetValue() { return m_nValue; }
};
```

If you wanted to add 5, subtract 3, and multiply by 4, you'd have to do this:

```
Calc objcalc;
objcalc.Add(5);
objcalc.Sub(3);
objcalc.Mult(4);
objcalc.GetValue();
```

Returning *this

```
class Calc {
private:
    int m_nValue;
public:
    Calc() { m_nValue = 0; }
    Calc& Add(int nValue) {  m_nValue += nValue; return *this; }
    Calc& Sub(int nValue) {  m_nValue -= nValue; return *this; }
    Calc& Mult(int nValue) { m_nValue *= nValue; return *this; }
    int GetValue() { return m_nValue; }
};
```

```
Calc obj_calc;
obj_calc.Add(5).Sub(3).Mult(4);
```

In assignment operators to reduce memory usage

```
class MyClass {
        int data1;
        int data2;
    public:
        MyClass(int data1, int data2) {
            this->data1 = data1;
            this->data2 = data2;
        }
      // Return by reference. Less memory usage
    MyClass& operator = ( MyClass& c ) {
        this->data1 = c.data1;
        this->data2 = c.data2;
        return *this;
    }
};
```

```
int main() {
    MyClass obj1(10, 20);
    MyClass obj2 = obj1;
}
```