

C++ Classes odds and Ends

Some content adapted from 'Absolute C++' by Walter Savitch

Outline

- The 'this' pointer
- Static Members
- Operator overloading

The this Pointer

- Member function definitions might need to refer to calling object
- Use predefined *this* pointer

- Automatically points to calling object:

```
Class Simple
```

```
{
```

```
public:
```

```
    void showStuff() const;
```

```
private:
```

```
    int stuff;
```

```
};
```

- Two ways for member functions to access:

```
cout << stuff;
```

```
cout << this->stuff;
```

Static Members

```
#pragma once
class staticDemo
{
public:
    staticDemo(void);
    virtual ~staticDemo(void);
    static int getNumberInstances(); ←
private:
    static int numberInstances; ←
};
```

This object used to track number of active Instances of staticDemo object

Static members

Do not need instance of class

Cannot access non static member variables

Static functions

Can only access static mem vars and other static functions

```
#include "stdafx.h"
#include "staticDemo.h"

staticDemo::staticDemo(void)
{
    staticDemo::numberInstances++; ←

staticDemo::~~staticDemo(void)
{
    staticDemo::numberInstances--; ←

int staticDemo::getNumberInstances(){
    //since this object is static only
    //static objects can be referenced
    return staticDemo::numberInstances; ←
}

//initialize static var
int staticDemo::numberInstances=0; ←
```

Operator Overloading Introduction

- Operators <, +, -, %, ==, etc.
 - Really just functions!
- Simply "called" with different syntax:
`x < 7`
 - "<" is binary operator with x & 7 as operands
 - We "like" this notation as humans
- Think of it as:
`<(x, 7)`
 - "<" is the function name
 - x, 7 are the arguments
 - Function "<" returns bool of it's arguments
- Can be done 2 ways
 - Overload as an object member function
 - Overload as a non member function

Operator Overloading Why

- Already work for C++ built-in types (int, double, etc.)
- Our types get same built in behavior. But we can (and usually need to) customize it programmatically.

Did this already for objects with dynamic data

```
//assignment operator  
HoldsDynamicData & operator= (const HoldsDynamicData & other);
```

Overloadable operators												
+	-	*	/	=	<	>	+=	-=	*=	/=	<<	>>
<<=	>>=	==	!=	<=	>=	++	--	%	&	^	!	
~	&=	^=	=	&&		%=	[]	()	,	->*	->	new
delete	new[]		delete[]									

Implement this one to simplify
sorting using `std::sort`

Sorting – what < overload buys you

- Remember using a get function or a friend function to help with sorting?
- Implement < operator. Then the object knows how to sort itself

```
#pragma once
class sortable
{
public:
    sortable();
    ~sortable(void);
    void setValue(int value);
    bool operator< (const sortable& param);
private:
    int value;
};
```

```
vector<sortable> myVector;
//sort using sortables operator <
//no more custom sort functions needed
//its all encapsulated, the object knows
//how to sort itself
sort(myVector.begin(),myVector.end());
```

```
bool sortable::operator< (const sortable& param)
{
    return value<param.value;
}
```

Just 2 arguments

implementation

Sorting— as opposed to using getters

- Remember using a get function to help with sorting?

```
#pragma once
class sortable
{
public:
    sortable();
    ~sortable(void);
    void setValue(int value);
    int getValue();
private:
    int value;
};
```

← Exposed data here

```
vector<sortable> myVector;
std::sort(myVector.begin(), myVector.end(), compareVal);
```

```
bool compareVal(const sortable &l, const sortable &r){
    return l.getValue() < r.getValue();
}
```


Sorting— as opposed to using friends

- Remember using a friend function to help with sorting?

```
class sortable
{
public:
    sortable();
    ~sortable(void);
    void setValue(int value);
    friend bool compare(const sortable& param1, const sortable& param2);
private:
    int value;
};
```

Break encapsulation
here



```
vector<sortable> myVector;
std::sort(myVector.begin(), myVector.end(), compare);
```

```
bool compare(const sortable &l, const sortable &r){
    return l.value < r.value
}
```

Summary

- this
- Static Members
- C++ built-in operators can be overloaded
 - To work with objects of your class
- Operators are really just functions