Structs and Classes

10 17 2001

Opening Discussion

- What did we talk about last class?
- When you want to operate on every element of a two dimensional array, you will typically need to have a doubly nested loop.
- From the reading in chapter 7, who can tell me what a struct is? What about a class?

Grouping Data struct

- It is often useful to be able to group together separate data elements under a single type and name. In C/C++ this is done with a struct.
- Using structs gives us the ability to do things like make a Student that has two strings and a double in it instead of keeping multiple parallel arrays.

```
struct Student {
     string first,last;
     double grade;
};
```

New Types

- When you define a struct (or a class) you are creating a new type. You can declare variables of that type and pass them in exactly the same way you would the primitive types that we have discussed previously.

```
    Student student1,student2;
    Student PAD[25];
```

Using structs

- Accessing elements

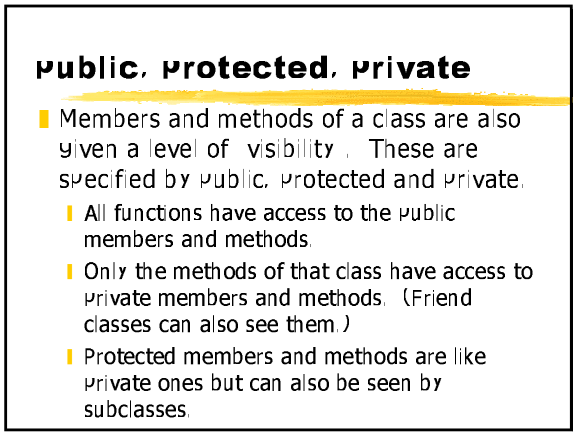
```
     Student1.last="Lewis";
     cin >> PAD[i].grade;
```

- Passing as arguments of a function. You should typically pass by reference for efficiency. Use const if appropriate.

```
void readStudent(Student &s);
void printStudent(const Student &s);
```

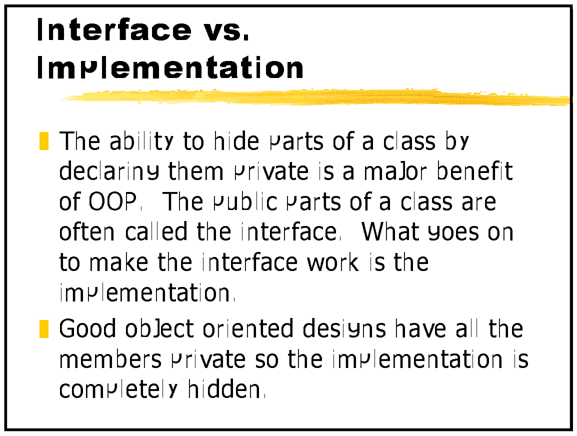
Grouping Data and Functions class

- Objects group both data and functions to operate on them into a single unit called a class. In a class they are called by different terms: members/properties and methods.
- When a method is invoked for an object it automatically as access to all of the members and methods of that object as if it had been passed as an argument.



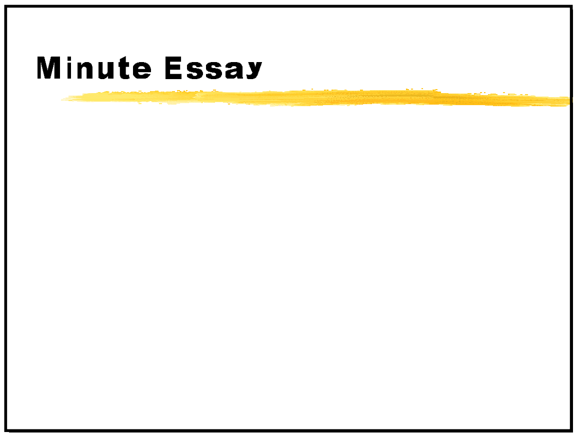
public, protected, private

- Members and methods of a class are also given a level of visibility. These are specified by public, protected and private.
  - All functions have access to the public members and methods.
  - Only the methods of that class have access to private members and methods. (Friend classes can also see them.)
  - Protected members and methods are like private ones but can also be seen by subclasses.



Interface vs. Implementation

- The ability to hide parts of a class by declaring them private is a major benefit of OOP. The public parts of a class are often called the interface. What goes on to make the interface work is the implementation.
- Good object oriented designs have all the members private so the implementation is completely hidden.



Minute Essay