

C++: Object-Oriented Programming

- Classes and Objects
- Template classes
- Operator Overloading
- Inheritance
- Polymorphism

The Evolution of The Notion of Object

- In C, a **struct** models what a thing has/is (i.e., the data, also called the *characteristics*), but not what it does (its *behavior*, represented by functions).
- The functions are outside and separate from structs.
- In C++, the characteristics and behavior are integrated into a single structure, called *object*.
- The data type of an object is *the class* of the object
- The packaging of the data and the functions into a class type is called *data encapsulation*.

Example: A Basic Stack

(Using C **structs**)

```
struct stack {  
    int data[100];  
    int top;  
} S;
```

```
int isEmpty(stack S){  
    return S.top==0?1:0;  
}
```

```
int pop(stack S){  
    assert(top>0);  
    return S.data[--S.top];  
}
```

```
void push(stack S, int a){  
    assert(top<100);  
    S.data[top]=a; S.top++;  
}
```