

CSE 165/ENGR 140

Intro to Object Orient

Program

Lecture 9 – Inheritance/Derivation



Annoucement

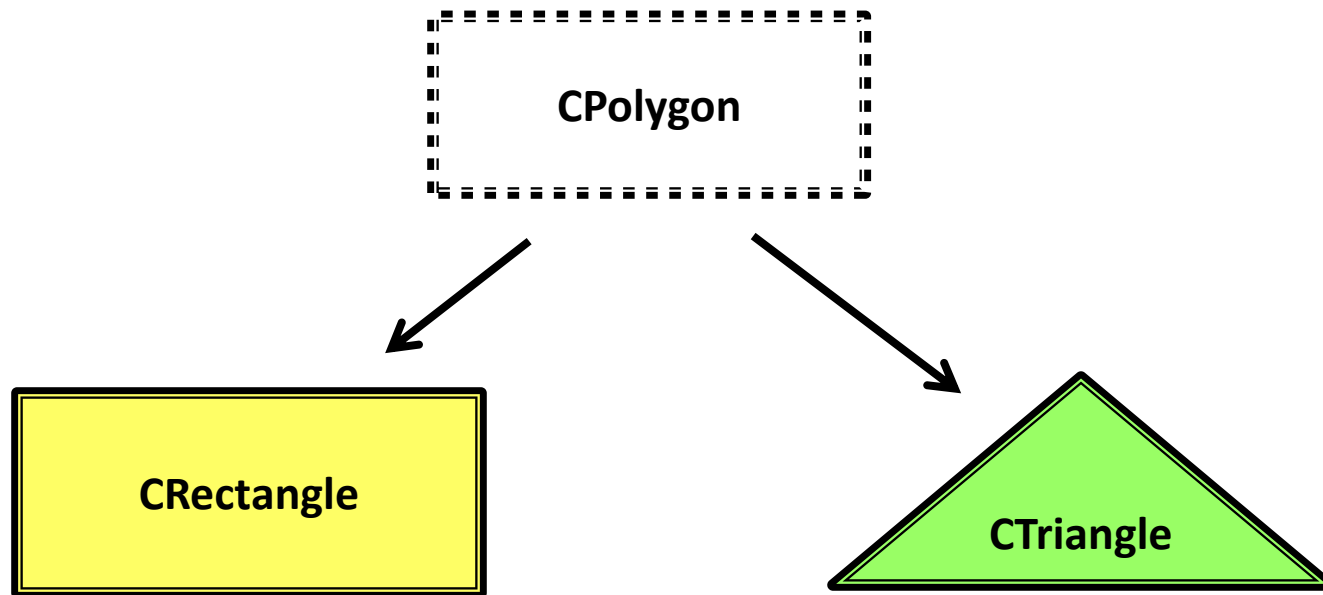
- ▶ Quiz next time

Inheritance

- ▶ Imagine you need an Object that is slightly different from the existing one.
- ▶ Instead of re-designing an entire new object from scratch, you can **inherit** (or **derive**) the existing object and just “add” the needed modifications.
- ▶ If Apple inherits Fruit, then
 - Apple is also Fruit.
 - Apple contains all members of Fruit, plus its own members.

Inheritance

- ▶ Class derived from another class
 - Base class (or parent class, or superclass)
 - Derived class (or child class, or subclass)



Inheritance

```
class derived_class_name: public base_class_name
{
    ...
};
```

```
class CRectangle: public CPolygon
{
    ...
};
```

Inheritance Terminology

- ▶ Suppose **class B** inherits from **class A**
- ▶ The classes form a part of a **class hierarchy**.
 - B is a ***derived class (subclass, child class)*** of A, class B inherits from class A.
 - A is a ***base class (superclass, parent class)*** of B, class A derives class B.
 - The class immediately above a given class is known as its ***immediate superclass***.
- ▶ A class inherits all members of the base class (with exceptions).
 - Includes functions/variables inherited by that class.
 - It can add additional variables and functions.
 - It can override (change) the inherited functions.

What is inherited

- ▶ Derived classes inherit all accessible members of base class:
 - Base class **A** has member **a**.
 - Derived class **B** has own member **b**, and also member **a**.
- ▶ Derived class DOES NOT inherit these from base class:
 - Constructor and destructor
 - Overloaded operators
 - Friend functions

Inheritance versus composition

- ▶ A class can include members of another class in two ways:

```
class Rect
{ public :
    float xa, ya, xb, yb; // rectangle min/max coordinates
};

// 1) Example of composition:
class RoundedRect1
{ public :
    Rect r;           // rect is included as a member
    float cornerLen; // how much to round on each corner
};

// 2) Example of inheritance:
class RoundedRect2 : public Rect // members of Rect are inherited
{ public :
    float cornerLen; // how much to round on each corner
};

//=> In both examples, the members of RoundedRectX are the same.
```