

C++ Programming

Inheritance Homework 1

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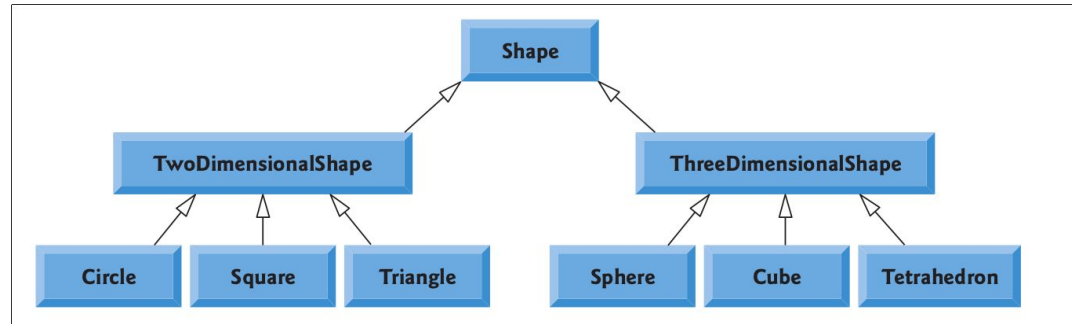
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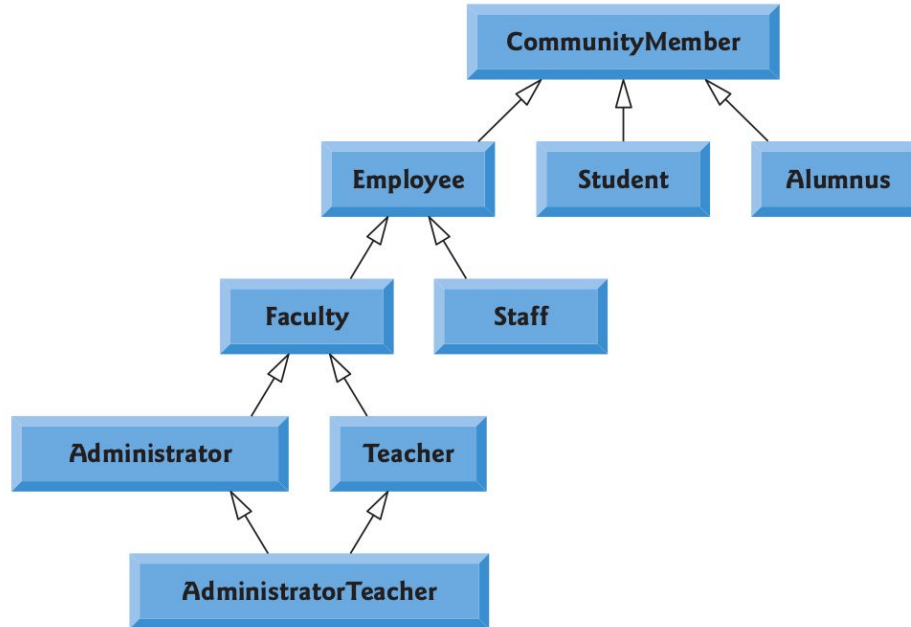
Homework 1: Build Hierarchy

- Design set of classes (no data/functions) to express this classes hierarchy



Homework 2: Build Hierarchy

- Design set of classes (no data/functions) to express this classes hierarchy

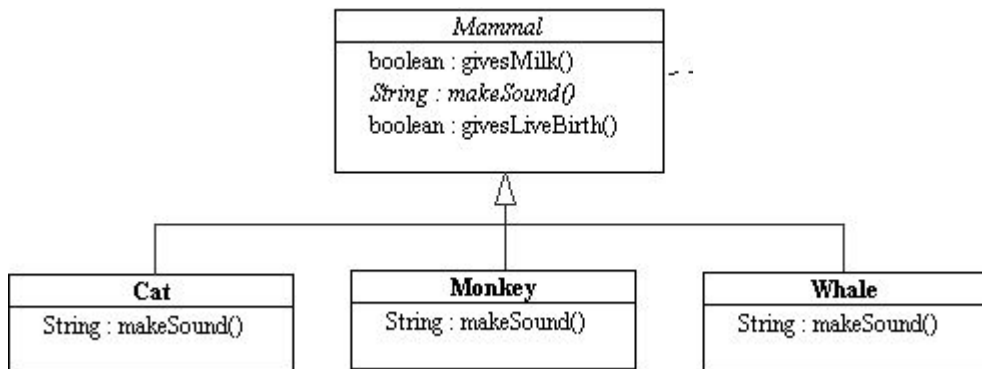


Homework 3: Design Review

```
6 class FourWheels {  
7     // Some variables and functions  
8 };  
9  
10 class Engine {  
11  
12 };  
13  
14 class Car : public Engine, public FourWheels {  
15  
16 };  
17  
--
```

- A fresh engineer implemented this system to express a car
 - Code wise: car has all functions it needs to provide
 - It passed system tests
- What is wrong?
 - Provide a tip

Homework 4: Future Prediction!



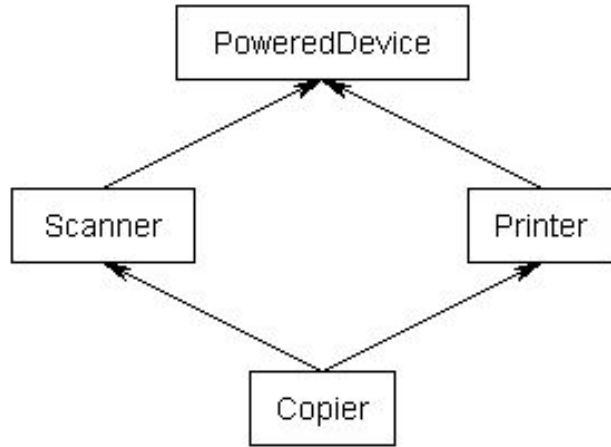
- What does this design for mammals imply?
- This design is correct for these 3 animals.
 - After a year, a new mammal was added to the system, but turned out this design is wrong
 - Find such a mammal
 - Think & Google

Homework 5: irrelevant!

```
18 class Robot {
19 public:
20     void drive();
21     void clean();
22     void do_funny_movies();
23 };
24
25 // Represent real animal
26 class Animal {
27 public:
28     void go_to_eilt();
29     void make_sound();
30 };
31
32 class Cat : public Animal {
33 public:
34     void make_sound();
35 };
36
37 class Dog : public Animal {
38 public:
39     void make_sound();
40 };
41
```

- Imagine we have 4 classes, each with 20 function
- There is a need for a new class that has a relationship of “has-a” with the 4 classes *to a good extent*
 - What is the problem we will face?
 - As more motivation, imagine we wanna Create a RobotDog from the classes on left
 - It is a robot, so it does what robots does
 - It looks like a dog and do its most of its functionalities
 - But it is not real dog, it is a made one

Homework 6: Diamond Hierarchy



- A fresh engineer proposed the following design to corresponds this All-in-one Machine
 - Assume we went to implement it, what is the potential issue in this inheritance?
 - What is a better design for this problem that:
 - Is semantically more valid?
 - Solves the above problem?



“Acquire knowledge and impart it to the people.”

“Seek knowledge from the Cradle to the Grave.”