Object Oriented Programming

05/28/2020

Lab Assignment 10

Exercise 1 For the following main function to work, you are required to design classes for `Wizard, DeathEater, Wand, ElderWand,` and `OrdinaryWand`. Depending on what the type of `Wizard` and `Wand`, the spell casting behavior is different. You should consider a program design flexible enough to accommodate for new type of `Wizard` or new type of `Wand`. (**Hint**: the bridge pattern could be very useful)

```
int main() {
    ElderWand ewand;
    OrdinaryWand owand;

    Wizard wz1(ewand);
    DeathEater de(owand);
    Wizard wz2(owand);

    Wizard* wizards[3];
    wizards[0] = &wz1;
    wizards[1] = &de;
    wizards[2] = &wz2;

    for(auto w : wizards)
      w->castSpell();

    return 0;
}
```

The following is the output:

```
Wand()
ElderWand()
Wand()
OrdinaryWand()
Wizard(Wand&)
Wizard(Wand&)
DeathEater(Wand&)
Wizard(Wand&)
Casting spell using ElderWand
Casting dark magic spell using OrdinaryWand
Casting spell using OrdinaryWand
~Wizard()
~DeathEater()
~Wizard()
~Wizard()
~OrdinaryWand()
~Wand()
~ElderWand()
~Wand()
```

Exercise 2 (a) You have a base class `Shape` and need to implement two derived classes `Circle` and `Square`. However, the implementation of the `Draw` function is not trivial. Luckily,

someone provides you a useful class `Widget` which has the functions `drawCircle` and `drawSquare` you need. Use the Object Adapter pattern and the Class Adapter pattern to complete the `Circle` and `Square` classes, respectively.

```
class Shape
{
protected:
 int _x;
 int _y;
 int _width;
 int _height;
public:
 Shape(int x=0, int y=0, int width=0, int height=0):
 _x(x), _y(y), _width(width), _height(height){}
 virtual void Draw () = 0 ;
} ;
```

A sample run looks like:

```
Widge is drawing a Circle whose radius is 25 at (0, 0).
Widge is drawing a Square whose length is 50 at (100, 100).
```

(b) A new class `AWidget` is derived from the `Widget` class. Modify your code so it can use `AWidget`. A sample run looks like:

```
AWidge is drawing a Circle whose radius is 25 at (0, 0).
AWidge is drawing a Square whose length is 50 at (100, 100).
```