

## Lab Assignment 10

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**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;

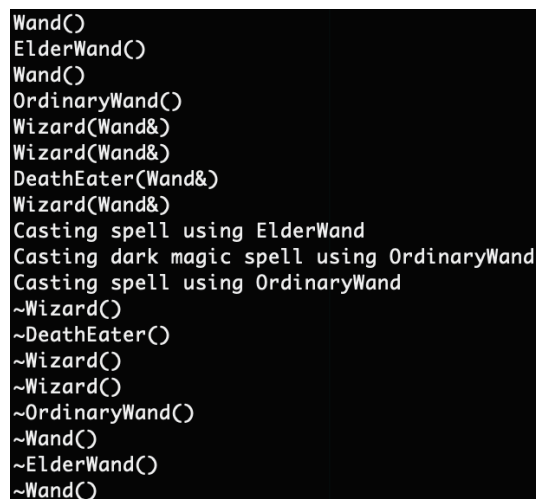
    Wizard wz1(ewand);
    DeathEater de(owand);
    Wizard wz2(owand);

    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>.
```