

Hands-on lab

Lab: Design Patterns

September 2019

Exercise 1: Strategy

Study the code at <https://github.com/jkhines/hfpatternsincsharp/tree/master/Strategy>

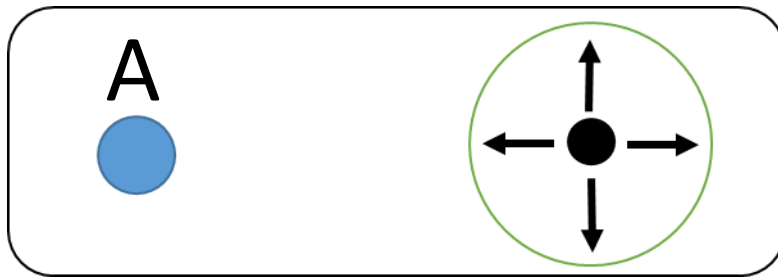
Create a new Duck: SuperDuperDuck

This duck can fly with rockets, but quacks like an ordinary duck.

Write a unit test to verify that your duck does the right things.

Exercise 2: use Strategy on a new problem

You have to write the logic for a robot controller. This controller moves a robot and should adhere to the following interface:



Robot interface

```
public interface IRemote
{
    void JoystickUp();
    void JoystickDown();
    void JoystickLeft();
    void JoystickRight();
    void ButtonA_Click();
}
```

The A-Button always does the same thing: it lets the robot sing (it plays an mp3 downloaded to the robot). But the Joystick behaves differently depending on how you hold it:

Righthanded people will hold it like this:



Lefthanded people will hold it like this:



Create a program where you illustrate how you can easily change the behavior of the joystick.

Exercise 3: Observer

Study the following implementations:

<https://github.com/jkhines/hfpatternsincsharp/tree/master/Observer.Explicit>

<https://github.com/jkhines/hfpatternsincsharp/tree/master/Observer.Net>

What's the difference?

Extra: pianos should be placed in a room with humidity around 50%. Create a special display that shows the following info:

between 45% and 55%: "Music Maestro"

below 45%: "Too Dry in here!"

above 55%: "Too Wet in here!"

Exercise 4: State

You have to write the software for a Christmas Light set. The set contains 100 LEDs and a controller with a push button (mode) and a switch (on/off).

When you turn on the set, all lights go on (ALL_ON). When you push the mode button, you can select different lightning patterns: BLINKING → STARTLIGHT → WAVE → ALL_ON → ...

When you turn the set off and on again, the set does not remember its last state, so you start with ALL_ON again.

Questions:

- Write classes and unit tests that simulate this behavior
- New requirement: let the set remember its state when you turn it on and off
- New requirement: add a new lightning pattern (DISCO)