Advanced Object-Oriented Design

Use vs. Inheritance

Basic but worth

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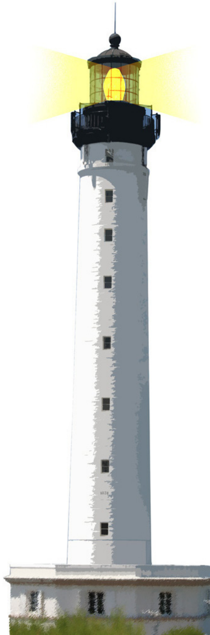


http://www.pharo.org

Goals

- Compare Use and Inheritance
- Some criteria/hints

Outline

- An exercise
- Some criteria
- Solutions
- Comparing solutions

Exercise setup

Imagine the class TextEditor and the definition of several algorithms:

- formatWithTeX(t) to color TeX
- formatFastColoring(t) to color text fast
- formatSlowButPreciseColoring(t) to color ...
- formatRTF(t)
- ...

How can we create an editor that will format differently different texts?

Next step

- Propose a solution with inheriting classes
- Propose a solution with one class and conditionals
- Define some criteria & compare
- Propose a solution with delegation
- Compare

With inheritance

```
TextEditor < #SlowFormatingTextEditor

SlowFormatingTextEditor >> format
   self formatSlowButPreciseColoring: text
```

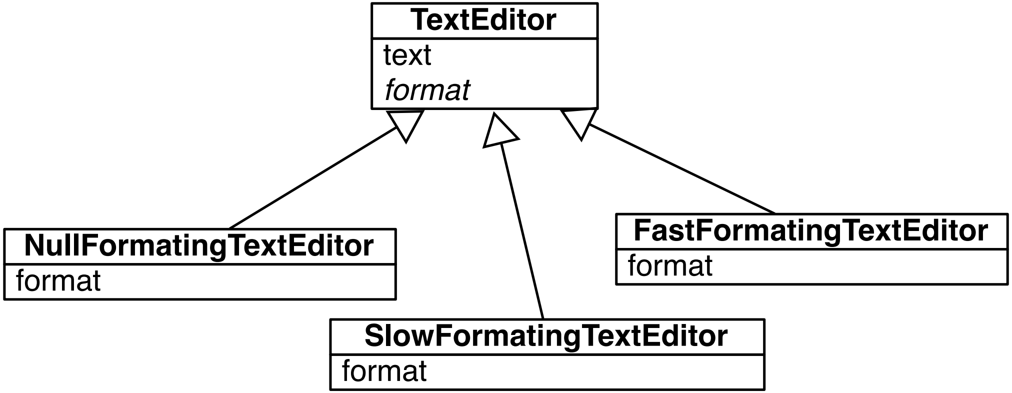
```
TextEditor < #FastFormatingTextEditor

FastFormatingTextEditor >> format
   self formatFastColoring: text
```

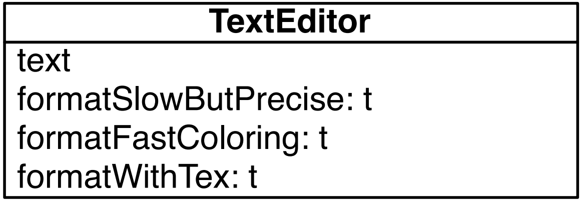
```
TextEditor < #NullFormatingTextEditor

NullFormatingTextEditor >> format
  ^ self "do nothing"
```

With inheritance



With conditionals



```
TextEditor >> format
  currentSelection = #slow
    ifTrue: [ self formatSlowButPreciseColoring: text]
    ifFalse: [ currentSelection = #fast
      ifTrue: [self formatFastColoring: text]
      ....]
```

With registry and meta programming

```
Object subclass: #TextEditor
  currentSelection formatters text
```

```
TextEditor class >> initialize
  self formatters
    at: #slow put: #slowFormat: ;
    at: #fast put: #fastFormat: ;
    at: #null put: #nullFormat: ;
    at: #tex put: #texFormat:
```

```
TextEditor >> format
  self perform: (formatters at: currentSelection) with: text
```

Criteria

- Yes what are they?

Criteria

- **Adding a new formatting algo** - what is the cost to define a new formatting algorithm?
- **Dynamically use a formatter** - can I switch dynamically to a new formatting algorithm?
- **Packaging** - can I deploy a new formatting algorithm separately from others?

Inheritance?

Addition:

- we can add a new formatter

Packaging:

- we can package a new formatter

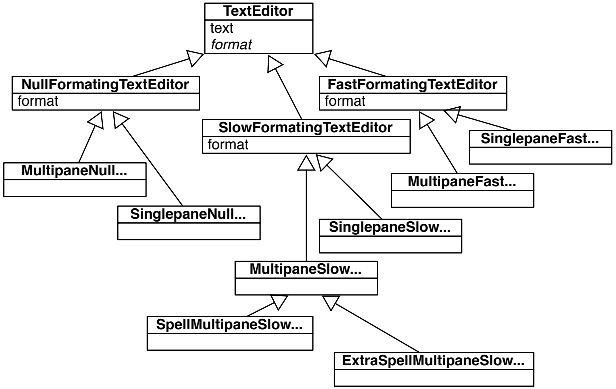
Not the best solution since:

- you have to create objects of the right class
- it is difficult to **change** the policy dynamically.
    - we do not want to have and reopen the texteditor

Inheritance?

You can get an explosion of classes

- we do not want a hierarchy for each text editor features to be **multiplied** with previous ones (imagine completion, grammatical verification, compilation,....)
- API of TextEditor can get large: no clear identification of responsibilities



Conditionals?

Dynamic use: we can use a different formatter dynamically.
But **Addition:**

- adding a version requires to edit and **recompile** the conditionals

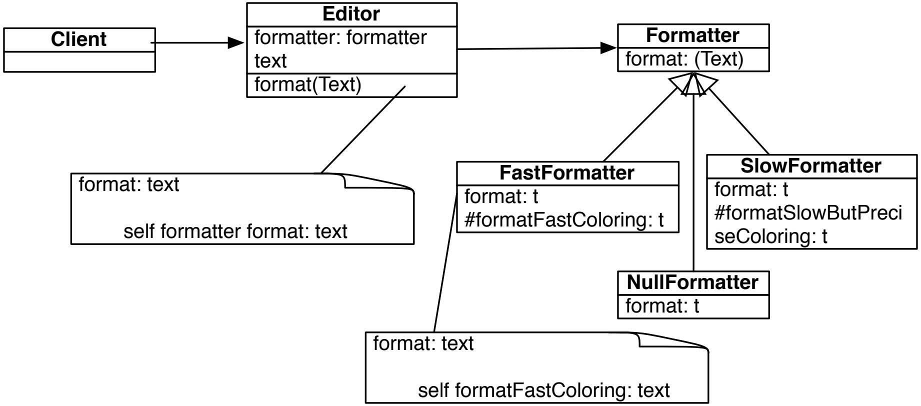
Packaging:

- we cannot package a new algorithm separately

With delegation

Propose a solution using delegation to another object (a formatter)

Delegating to a formatter



```
myEditor formatter: FastFormatter new.
myEditor format.
myEditor formatter: SlowFormatter new.
```

Delegating to a formatter

Dynamic use:

- we can use a different formatter dynamically. Just create a new instance and set it.

Addition:

- adding a version is just adding a new class

Packaging:

- we package a new algorithm separately

Strategy Design Pattern

- Uniformize the communication (API) between the Editor and the Formatter
  - all formatters should understand `format:`
- Modular
- Incremental

There is nothing like a free lunch

- The formatter should access the state of the text (i.e. the text, positions... contained in the text editor)
- Information should **flow** between the textEditor and the formatter
- API of textEditor should be opened to support it

Conclusion

Inheritance

- is about **incremental static** definition
- It can lead of static design
- It help defining **abstractions**

Delegation

- can bring runtime **flexibility** and modularity

A course by

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