Advanced Object-Oriented Design

# A variation on sharing

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http://www.pharo.org

## Remember

We saw:

- Shared variables to share info between **all instances** of a class and instances of subclasses
- Mixing an instance variable and a shared variable: **sharing by default and instance-based** customization
- Flyweigth

Here is another variation on that theme taken from Bloc graphical framework

## BlElement

BlElement is the basic graphical element

- It has many properties:
- background, border, clipChildren, elevation, geometry, compositingMode, effect, focusability, focused, mouseCursor, opacity, outskirts, visibility

## BlElement property example

Properties are managed via an instance of BlElementVisuals

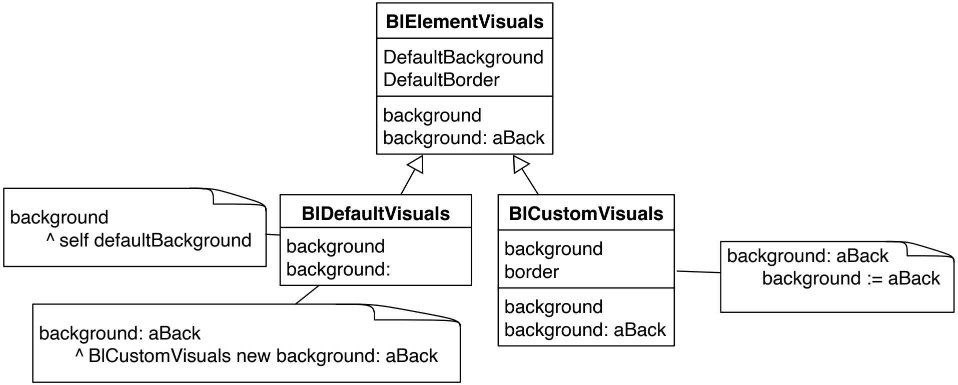
```
BlElement >> border
  ^ visuals border
```

```
BlElement >> clipChildren
  ^ visuals clipChildren
```

## The objectives

- Default visuals are shared
- A property can be modified
- How to support property modification **without paying** an instance variable for all the shared default?

## Overview



- Make sure that many default values are shared by default
- Modifications to these defaults is possible on a per instance level
- **But** without one instance variable per property

## BlElementVisuals

BlElementVisuals defines API and default values

```
Object << #BlElementVisuals
  sharedVariables: { #DefaultBorder . #DefaultBackground . #DefaultGeometry .
      #DefaultVisibility };
  package: 'Bloc'
```

```
BlElementVisuals >> defaultBackground
  ^ DefaultBackground
```

```
BlElementVisuals >> background: aBlBackground
  ^ self subclassResponsibility
```

## BlDefaultVisuals

- A subclass of BlElementVisuals
- BlDefaultVisuals a kind of singleton that holds many default values to be shared between multiples elements.

```
BlElement >> initialize
  ...
  visuals := BlDefaultVisuals uniqueInstance.
  ...
```

## BlDefaultVisuals getters

Getters access default shared values

```
BlDefaultVisuals >> background
  ^ self defaultBackground
```

```
BlDefaultVisuals >> defaultBackground
  ^ DefaultBackground
```

# BlDefaultVisuals: setters are key

- BlDefaultVisuals is kind of read only, when setters are executed,
- they do not modify but create and return a **new** instance of BlCustomVisuals

```
BlDefaultVisuals >> background: aBlBackground
  "Change the background and return new visuals to be used instead of previous one"

  ^ BlCustomVisuals new background: aBlBackground
```

## BlCustomVisuals

Support for instance specific property modification

```
BlElementVisuals << #BlCustomVisuals
  slots: { #geometry . #border . #background . #outskirts .  #effect ... };
  package: 'Bloc'
```

```
BlCustomVisuals >> background: aBlBackground
  background := aBlBackground
```

- BlCustomVisuals stored in place of BlDefaultVisuals singleton to keep modifications
- BlCustomVisuals accumulates modifications because contrary to BlDefaultVisuals its setters modify the receiver

## There is a catch - Property modification

Users should always store the result of the setters sent to a visuals

```
BlElement >> background: aBlBackground
  "Change my background to a given one.
  Raises BlElementBackgroundChangedEvent."

  ...

  visuals := visuals background: aNewBackground.

  ...
```

- It is not really nice to hijack setter semantics this way

## What is the difference with the TypeTable/typeTable

- Group different values in a single object
- Avoid to have one instance variable per customisation point
- But still we have instance-based and sharing

## Analysis/Conclusion

- Is all the complexity needed?
    - Hijack default setter patterns
- Requires some memory analysis:
    - empty instance variables per instance that shared a default
- How many objects?

# Advanced Object-Oriented Design and Development with Pharo

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