Blocks vs. Objects

Rethinking common abstractions

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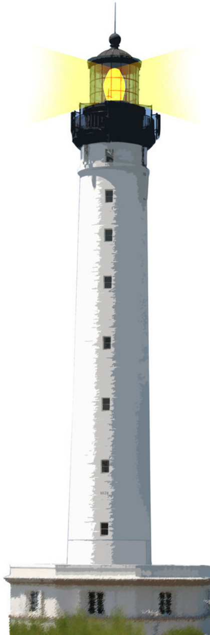

http://www.pharo.org

Goals

- Thinking about API
- Rethinking block usage
- Blocks are powerful and handy
- Small objects are better in the long run

Blocks are powerful

Blocks support

- Central to Pharo syntax
- Iterators
- New iterator definition
- DSL like APIs

Central to message based syntax

- Remember blocks freeze execution and give power to decide when to execute
- Block execution controlling behavior are key for Pharo compact syntax

```
False >> ifTrue: trueAlternativeBlock ifFalse: falseAlternativeBlock
  "Answer the value of falseAlternativeBlock. Execution does not
  actually reach here because the expression is compiled in—line."
  ^ falseAlternativeBlock value
```

```
True >> ifTrue: trueAlternativeBlock ifFalse: falseAlternativeBlock
  "Answer with the value of trueAlternativeBlock. Execution does not
  actually reach here because the expression is compiled in—line."

  ^ trueAlternativeBlock value
```

Iterators

Blocks are the cornerstone of iterators

```
#(1 2) allSatisfy: [ :each | each even ]
```

```
(String streamContents: [:s | #(1 2 3)
  do: [:each | s << each asString]
  separatedBy: [s << ', ']])
```

New iterator definition

Blocks support definition of **new** iterators

```
SequenceableCollection >> pairsDo: aBlock
  "Evaluate aBlock with my elements taken two at a time.  If there's an odd number of
      items, ignore the last one. Allow use of a flattened array for things that naturally
      group into pairs.  See also pairsCollect:"

  1
    to: self size // 2
    do: [ :index | aBlock
              value: (self at: 2 * index – 1)
              value: (self at: 2 * index) ]
```

DSL like APIs

```
GLMCompositePresentation new tabulator with: [ :t |
  t transmit from: #index; to: #details; andShow: [ :composite |
    composite text
      title: 'XML';
      display: [ :file | file contents ].
    composite list
      title: 'Targets';
      display: [ :file | (XMLDOMParser parse: file contents) // 'target' ];
      format: [ :xmlElement | xmlElement attributeAt: 'name' ].
    composite roassal2
      title: 'Dependencies';
      initializeView: [ RTMondrian new ];
      painting: [ :view :file |
        ...
        ] ].
```

Stepping back

Blocks are on the spot poor literal objects

- What is the difference between a block and a simple object understanding `value`?
- With a block, no need to create a class, no need to define a method

But...

Analysis

Blocks are nice but not a panacea:

- Storing and changing state is cumbersome
- One single message: `value`!
- They do not expose well the arguments they need
- It makes scripting easy but extension difficult
- Having richer API is impossible

Let us study the limits!

Blocks are black boxes

- You can only send the messages `value*` to a block.
- It is hard and cumbersome to store and access state in a block as in an object
  - imagine passing a block around and want to accumulate information
  - you can’t

Arguments?

- What if you want optional arguments?
  - then you are doomed to chose which arguments and which order
- cull: is reflective by nature

Argument order requires to know the block definition!

- Blocks do not expose well the arguments they need

```
aCol inject: default into: [:a :b | ... ]
```

What is a and b?

Block limits

- Saving blocks is a painful
- Adding behavior (i.e., offering another message) is impossible
- Extension via superclass / hook of block behavior is impossible

Long blocks are missed reuse opportunity

- Impossible to turn into a template and modify
    - Remember that sending a message is a plan for reuse
- Long blocks are a plague

Long blocks are missed reuse opportunity

Instead of

```
...  display: [:v |
     | tmp |
     tmp := v size + 100.
     v
       foo;
       bar;
       more ]
```

Prefer

```
method: v
  | tmp |
  tmp := v size + 100.
  v
    foo;
    bar;
    more

...  display: [:v | xxx method: v ]
```

This way you can override `method:` in subclasses.

Long blocks are missed reuse opportunity

```
... painting: [ :view :file |
  | tags |
  tags := XMLDOMParser parse: file.
  view shape label text: [:each | each
      stringValue].
  view nodes: tags.
  view shape line color: (Color gray alpha
      : 0.5).
  view edges connectFromAll:  [:aTag |
  ...   ]]
```

```
paintOnView: view file: file
  | tags |
  tags := XMLDOMParser parse: file.
  view shape label text: [:each | each
      stringValue].
  view nodes: tags.
  view shape line color: (Color gray alpha
      : 0.5).
  view edges connectFromAll:  [:aTag |
  ...   ]]

... painting: [ :view :file | self paintOnView
      : view file: file ]
```

Is not a little object more powerful than a block?

With an object you can

- Design an API
- Accumulate state
- Specify optional / obligatory inputs
- Support extension by construction

Conclusion

- When you use blocks, keep them as small as possible
- Use them to script DSLs but NOT to define your domain model
- Create classes and pass their instances around.

A course by

S. Ducasse, L. Fabresse, G. Polito, and Pablo Tesone