Advanced Object-Oriented Design

Builder API variations

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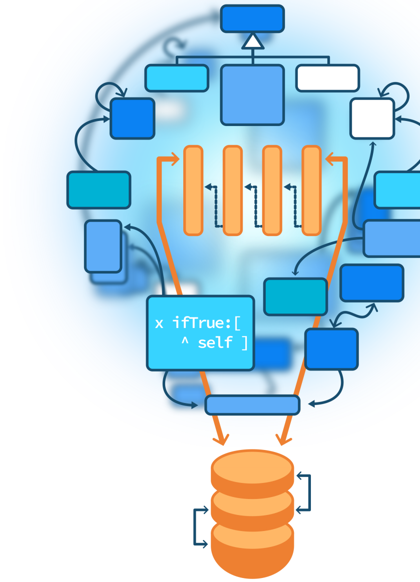


http://www.pharo.org

Goal

- Discuss about builder API
- Identify and understand variations

Microdown

A better markdown :)

- compact (a subset of markdown)
- more extensible (a superset of markdown)

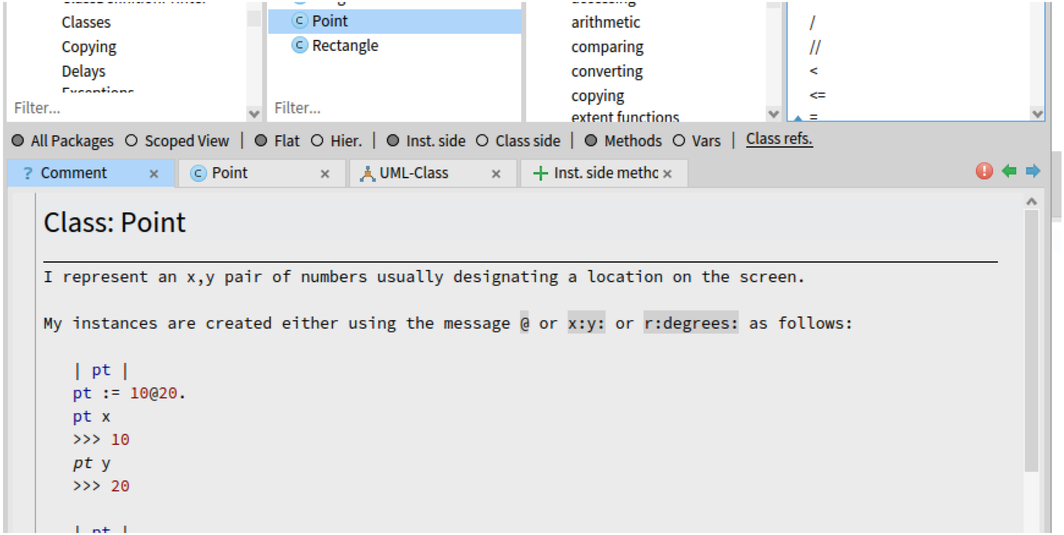
Used for:

- class comments
- slides, books, and documentation

Example

```
# Hello Pharo

Microdown is a cool markdown.
It is used to generate
- slides
- books
- class comments



<!slide|title=This is a cool title&tag=nh5p

- a list of bullet
- bullet 2
- bullet 3
!>
```

Default Microdown class comment



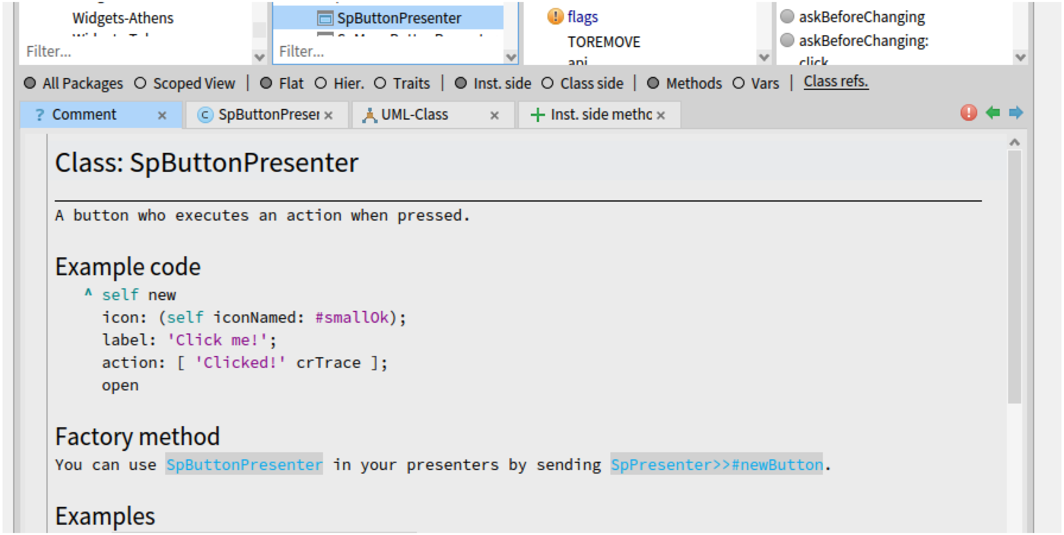
Class: Point

I represent an x,y pair of numbers usually designating a location on the screen.

My instances are created either using the message @ or x:y: or r:degrees: as follows:

```
| pt |
pt := 10@20.
pt x
>>> 10
pt y
>>> 20
```

Specialized Microdown class comment



Class: SpButtonPresenter

A button who executes an action when pressed.

Example code

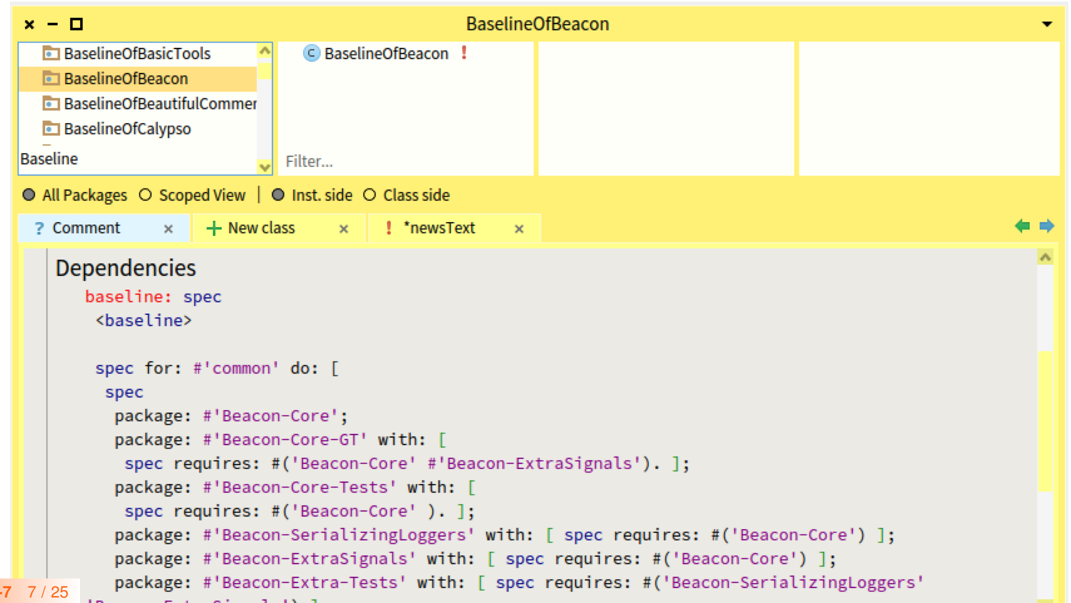
```
^ self new
  icon: (self iconNamed: #smallOk);
  label: 'Click me!';
  action: [ 'Clicked!' crTrace ];
  open
```

Factory method

You can use SpButtonPresenter in your presenters by sending SpPresenter>>#newButton.

Examples

Specialized Microdown class comment



Dependencies

```
baseline: spec
 <baseline>

 spec for: #'common' do: [
  spec
   package: #'Beacon-Core';
   package: #'Beacon-Core-GT' with: [
    spec requires: #('Beacon-Core' #'Beacon-ExtraSignals'). ];
   package: #'Beacon-Core-Tests' with: [
    spec requires: #('Beacon-Core' ). ];
   package: #'Beacon-SerializingLoggers' with: [ spec requires: #('Beacon-Core') ];
   package: #'Beacon-ExtraSignals' with: [ spec requires: #('Beacon-Core') ];
   package: #'Beacon-Extra-Tests' with: [ spec requires: #('Beacon-SerializingLoggers'
```

How to programmatically generate Microdown?

No string concatenation:

- Expose users to possible syntax changes
- Tool builders do not have to learn syntactic quirks

Better provide a **scripting API**

- **Abstract away** details
- Support **future changes**

Hooks/Extensibility

- Every single class can **customize** ‘buildMicroDownUsing: aBuilder withComment: aString‘ hook

Microdown class comment hook

```
renderComment: aString of: aClassOrPackage
  "Return aString as part of the templated class comment, when rendering is on.
  Else aString."

  | builder |
  builder := Microdown builder.
  aClassOrPackage buildMicroDownUsing: builder withComment: aString.
  ^ self render: builder contents
```

Default class comments

```
Class >> buildMicroDownUsing: aBuilder withComment: aString

  aBuilder
    header: [
        aBuilder text: 'Class: '.
        aBuilder text: self name ]
    withLevel: 1;
      horizontalLine;
      text: aString
```

Hook for widgets

```
SpAbstractWidget >> buildMicroDownUsing: aBuilder withComment: aString

  super buildMicroDownUsing: aBuilder withComment: aString.
  self addDocumentSectionExampleCode: aBuilder.
  self addDocumentSectionFactoryMethod: aBuilder.
  self documentSections keysAndValuesDo: [ :label :methods |
      self addDocumentSection: aBuilder label: label methods: methods ].
  self addDocumentExtraSections: aBuilder.
  self addDocumentSectionHierarchy: aBuilder.
  self addDocumentSectionTransmissions: aBuilder.
```

Hook for widgets (2)

```
BaselineOf >> addDocumentSection: aBuilder label: label methods: methods

 methods ifEmpty: [ ^ self ].
 aBuilder newLine.
 aBuilder header: [ :builder | builder text: label ] withLevel: 2.
 aBuilder unorderedListDuring: [
   (methods sorted: #selector ascending) do: [ :each |
     aBuilder item: [
       aBuilder monospace: (each methodClass name, '>>#', each selector) ] ] ]
```

About builder API

All microdown elements and their parametrization

- text:, bold:, anchor:, codeblock:,
- comment:
- item...

About generation of leaf elements

For leaves, i.e., unstructured text or elements

- Just pass the argument
- Give simple order

```
builder text: 'Bold'
```

```
aBuilder newLine
```

Codeblock is also a leaf element

```
  aBuilder codeblock:
'this is the contents
of a code block.
It will be displayed with ``` around.'
```

About generation of composite/nested elements

- Should provide a way to let the user defines the **inner** part
- Use blocks as a way to support element wrapping

```
builder bold: [ builder text: 'This is a text in bold' ]
```

```
builder bold: [ builder italic: [ builder text: 'This is a text in bold and italic' ]]
```

```
builder
  header: [
    builder bold: [ builder text: 'Very'].
    builder text: 'Important' ]
  withLevel: 2.
```

Composite example: Cell

```
testCell

  self
    assert: (builder
      cell: [
        builder text: 'this is '.
        builder bold: [ builder text: 'bold' ] ]) contents
    equals: '| this is **bold** '
```

Comparing alternate designs

What is the difference between

```
aBuilder header: [ :builder | builder text: 'Factory method' ] withLevel: 2.
```

And

```
aBuilder header: [ aBuilder text: 'Factory method' ] withLevel: 2.
```

No parameter design

```
aBuilder header: [ aBuilder text: 'Factory method' ] withLevel: 2.
```

- Only one builder for all the messages
- More compact

No parameter implementation

```
MicrodownTextualBuilder >> bold: aBlock
  self raw: BoldMarkup.
  aBlock value.
  self raw: BoldMarkup.
```

- The builder executes the block `aBlock value`
- Implications: there is only one builder (the message receiver/method argument)

With block parameter design

```
aBuilder header: [ :builder | builder text: 'Factory method' ] withLevel: 2.
```

- Each API can have its owns builder
- We can have a hierarchy of builders, each one representing a finer context
- More verbose

With block parameter implementation

```
rawHeader: aBloc withLevel: anInteger
  self raw: (HeaderMarkup repeat: anInteger).
  self raw: String space.
  aBloc value: SpecialMicrodownBuilder new
```

Each subclass can specialize `rawHeader: aBloc withLevel: anInteger`

- or any other equivalent hook to use a specific builder. It is passed as argument of `value:`

Analysis

Pros:

- With an explicit argument builder, we can also subclass the builder and modify partially the builder behavior
  - We could have a specialisation builder that produces the table of contents
- It feels like visitor hooks

Cons:

- You have to define an extra parameter for all the wrapping APIs

Conclusion

- Design is about tradeoffs
- Extensibility can be designed

Advanced Object-Oriented Design and Development with Pharo

A course by

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