

How to customize Pharo tools?

Extending Pharo with a Visualization

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WHO AM I?

- Milton Mamani Torres
- Bolivian
- Rmod Software Engineer
- Roassal developer for 7 years
- <https://github.com/akevalion>



Understanding code

In this case Baselines

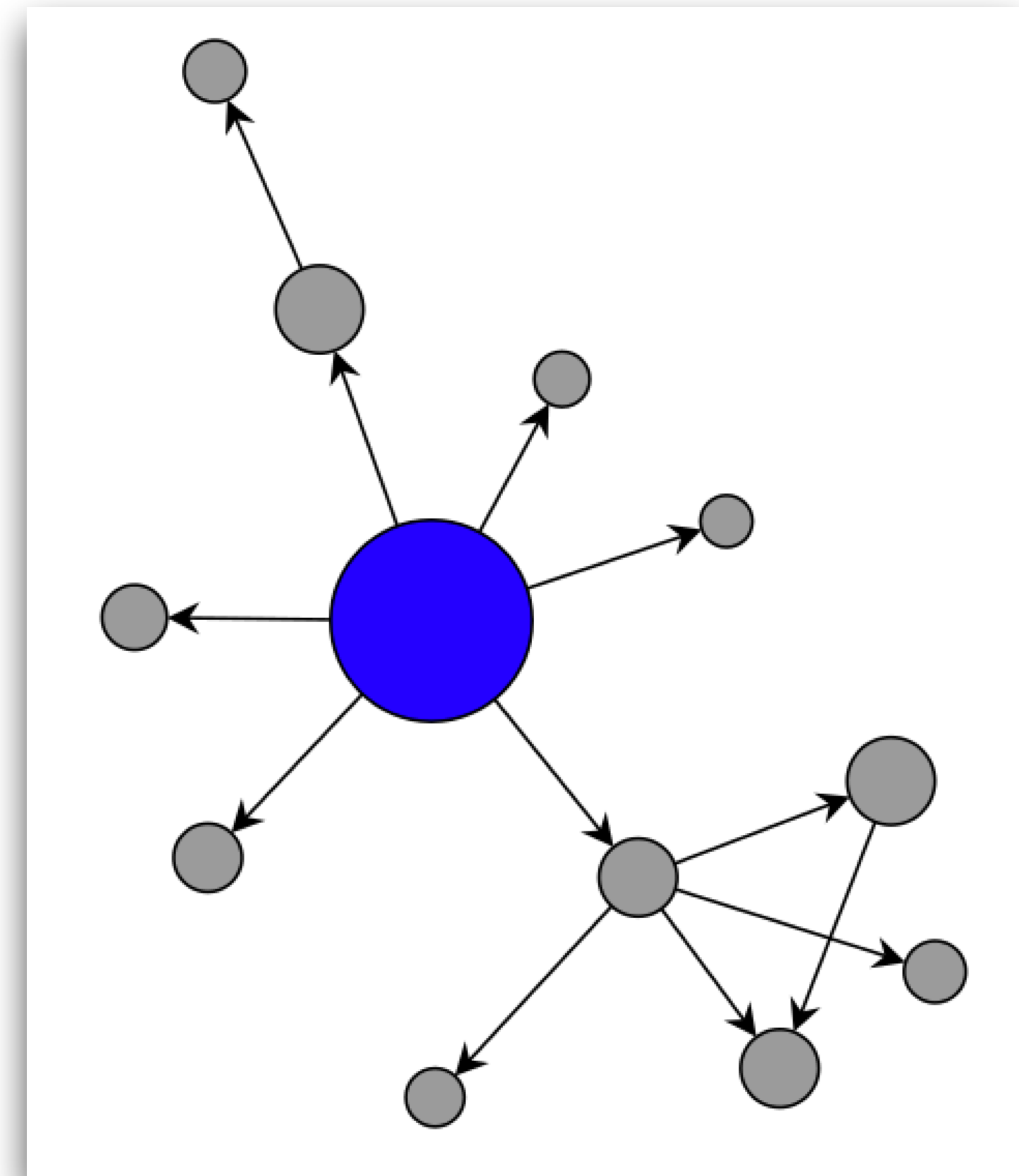
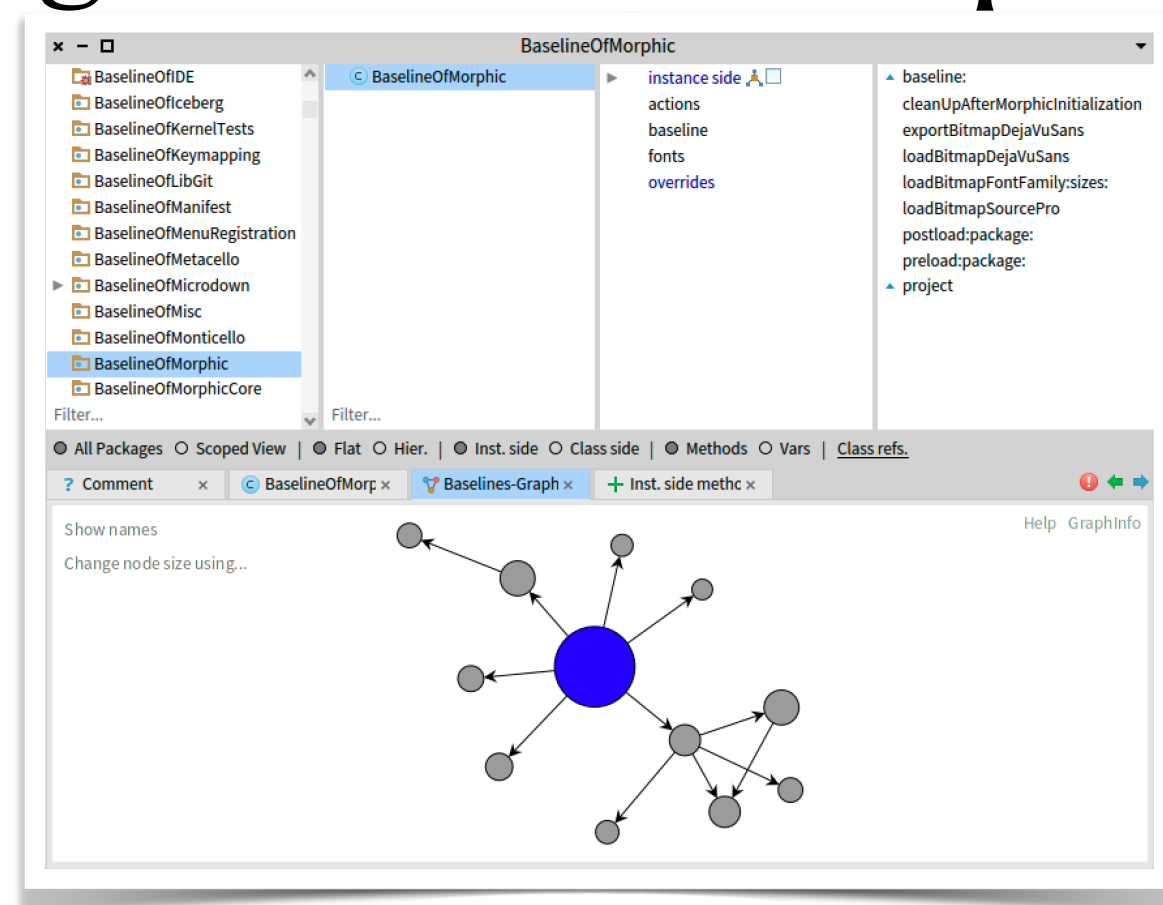
- Creating a project is fascinating. But it can be easy to lose yourself in the projects.
- Big projects are hard to understand, not for machine, for us.
- That's why we have structures, rules, tools to code, to explain the source code.

```
16 </script><script nonce="nco8wA9kfhTYPQJo7cMkKA">
17 (function(){try{var l="Edge",p="Opera",aa="client_error_page",ba="complete",t="error",u="function",w="object",x="string",ca:
18 c)&&(a[c]=d[c])},A=function(){var a=z.navigator;return a&&(a=a.userAgent)?a:""},B=function(a){return-1!=A().indexOf(a)},ka:
19 b}}||""}},pa=function(a){var b=A();if("Internet Explorer"===a){if(B("Trident"))|B("MSIE"))if((a=/rv: *([d\.]*)/).exec(b))&
20 e[2],e[3])|void 0));b=oa(c);switch(a){case p:if(B(p))return b(["Version",p]);if(B("OPR"))return b(["OPR"]);break;case "Micro
21 return ra.test(a)||sa.test(a)||ta.test(a)},Aa=function(a,b){var c=new C(z.location.href),d=ua(c),e=null===b.gapi_version?nu
22 function(h){g(z.a(h.target)),f}}},Da=function(){switch((new C(z.location.href)).j.get("view")){case "cm":return 1;case "cv
23 function(){Ga(new Ha,a.toString());z.top.GM_SLF||y()}();var e=z.performance&&z.performance.getEntries().find(function(f){r
24 offlineEnabled:z.GLOBALS[61],reloadCount:z.sessionStorage.getItem("reload_count"),isCacheableHtml:z.GLOBALS[57],dataIframe:
25 e){var f=Ka(a,b);f.async=!1;f.addEventListener("load",function(){La(b);d(c)});f.addEventListener(t,function(g){e(g.error);Ma
26 Pa[g]],g++,!0):!1},k=function(q){h()}|(f(q.error),Ma(q,r)),m=function(q){h()}|(f(q),Ia(4,"Script "+r.id+" loaded but did no
27 a+"_PARSE_DONE"]=z.performance?z.performance.now():null},Ma=function(a,b){var c=b.src,d=Qa(c);Ia(4,"Failed to load script ".
28 b.responseEnd].map(function(e){if(!e)return"";var f=Math.round(e-c);c=e;return f}).join("-");return"size: "+b.transferSize+"
29 Wa=typeof Object.create==u?Object.create:function(a){var b=y();b.prototype=a;return new b},Xa=typeof Object.defineProperty:
30 for(var d=0;d<a.length-1;d++){var e=a[d];if(!(e in c))break a;c[c[e]]=a[a.length-1];d=c[a];b=b(d);b!=d&&null!=b&&Xa(c,a,{c
31 {configurable:!0,writable:!0,value:g}});b.prototype.toString=function(){return this.g;var c="jscomp_symbol_"+(1E9*Math.rand
32 u&&Xa(d.prototype,a,{configurable:!0,writable:!0,value:function(){return db(Va(this))}})}return a});var db=function(a){a={no
33 this.g.length;var g=this.g;this.g=[];for(var h=0;h<g.length;++h){var k=g[h];g[h]=null;try{k()}catch(m){this.l(m)}}this.g:
34 else if(g instanceof e)this.I(g);else{a:switch(typeof g){case w:var h=null!g;break a;case u:h=!0;break a;default:h=!1}h?th
35 E.console;"undefined"!=typeof h&&h.error(g.j)}},1));e.prototype.D=function(){if(this.u)return!1;var g=E.CustomEvent,h=E.Ev
36 function(g){var h=this.l();g.K(h.resolve,h.reject)};e.prototype.J=function(g,h){var k=this.l();try{g.call(h,k.resolve,k.rej
37 m.g)};var m=this,null==this.i?f.i(k):this.i.push(k);this.u=!0;e.resolve=c;e.reject=function(g){return new e(function(h,k):
38 b){return Object.prototype.hasOwnProperty.call(a,b)};F("WeakMap",function(a){function b(k){function c(k){var m=typeof k;ret
39 return!n.has(k)&&4==n.get(m)}catch(r){return!1}}())return a;var f="$jscomp_hidden_"+Math.random();e("freeze");e("preventExt
40 G(k,f)&&G(k[f],this.g)};h.prototype.delete=function(k){return c(k)&&G(k,f)&&G(k[f],this.g)?delete k[f][this.g]:!1;return h
41 !m.next().done?!1:!0}catch(r){return!1}}())return a;var b=new WeakMap,c=function(h){this.i={};this.g=f();this.size=0;if(h){f
42 1),h.list.length||delete this.i[h.id],h.A.B.next=h.A.next,h.A.next.B=h.A.B,h.A.head=null,this.size--,!0):!1};c.prototype.cl
```

Current state

Baseline = project configuration

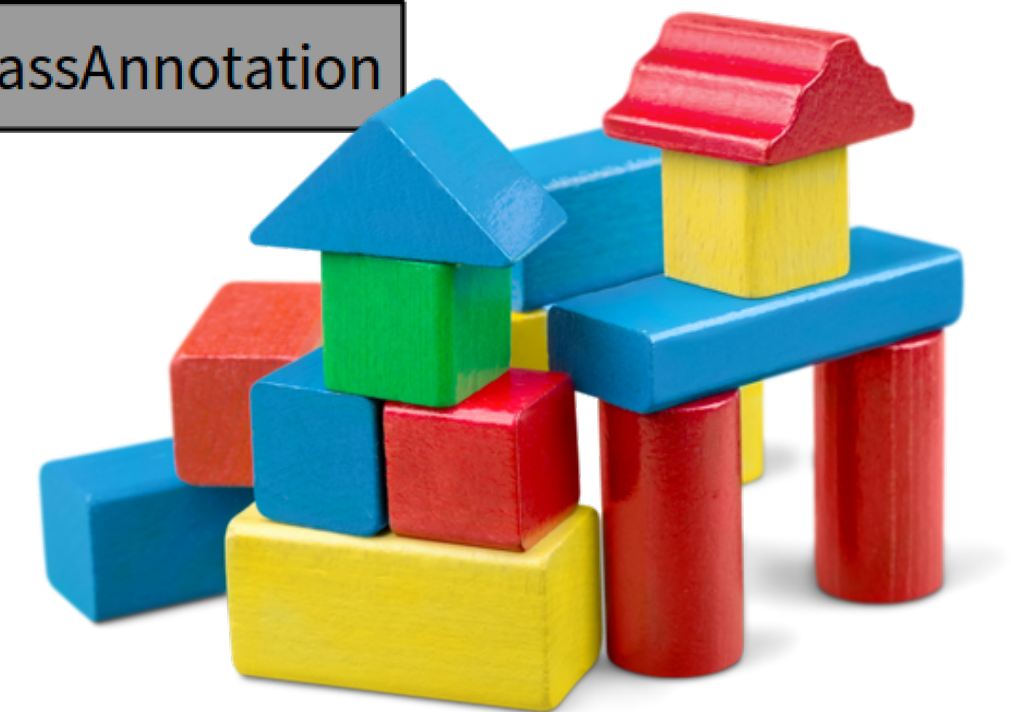
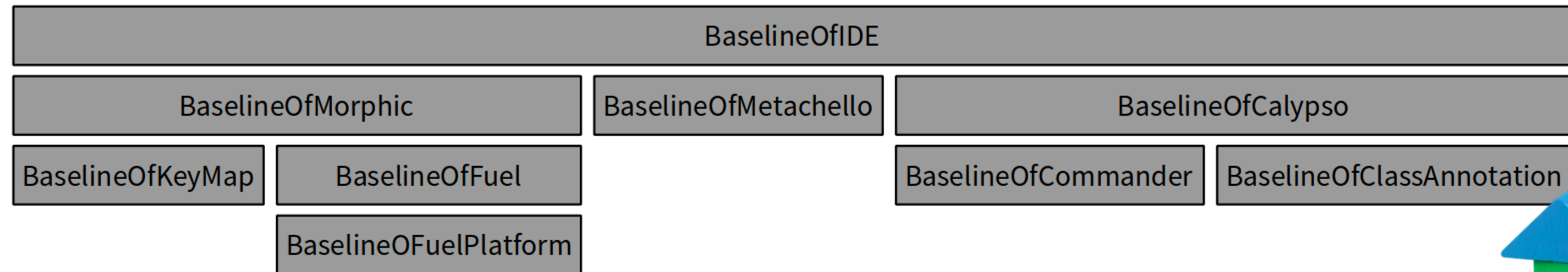
- One specific tool is Baseline in Pharo.
- A baseline is a kind of map to load projects from repositories.
- This prototype that works with Baselines, is embedded in the system browser. Eg: BaselineOfMorphic.



Challenge

Adding a new dependency visualization

- New visual tool with boxes.
- It will be available on system browser, inspector, debugger, etc. if necessary.
- It provides a path to grow and be extended by other users.
- For example this mock image made by hand:

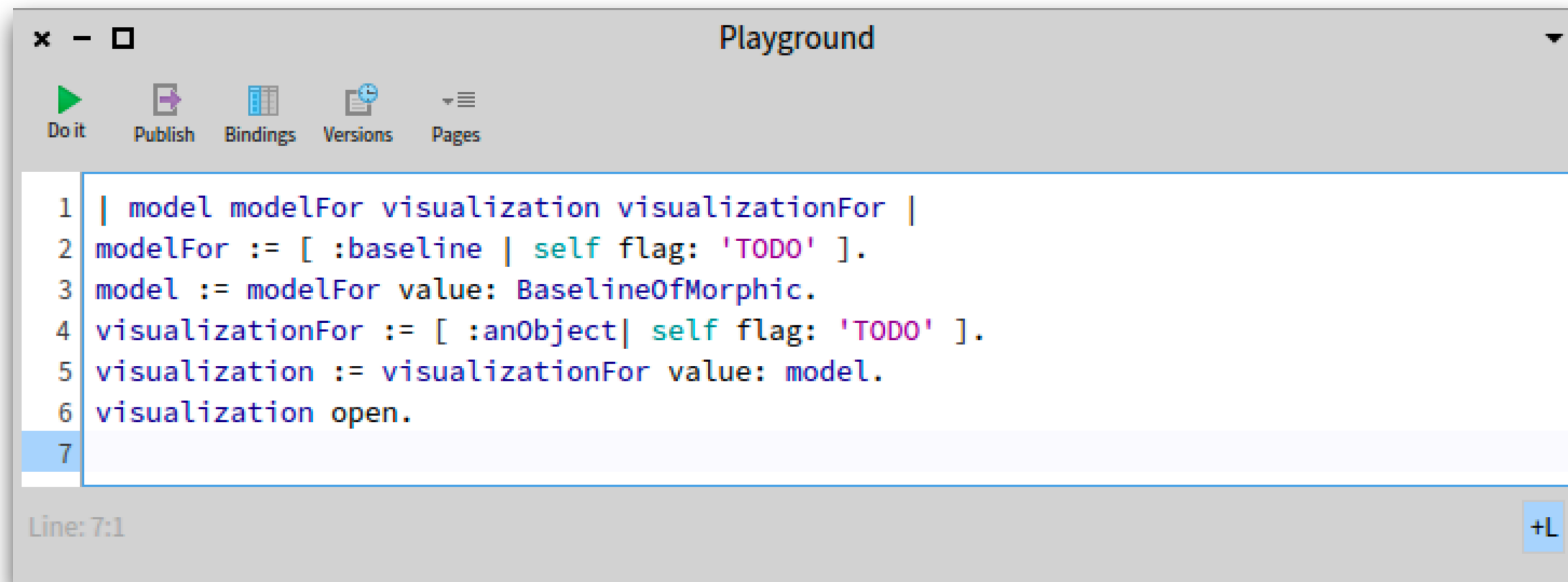


This talk you will see how to create a basic visualization and transform it into a useable tool.

Starting part

In a playground window

In the beginning I started with model and UI.



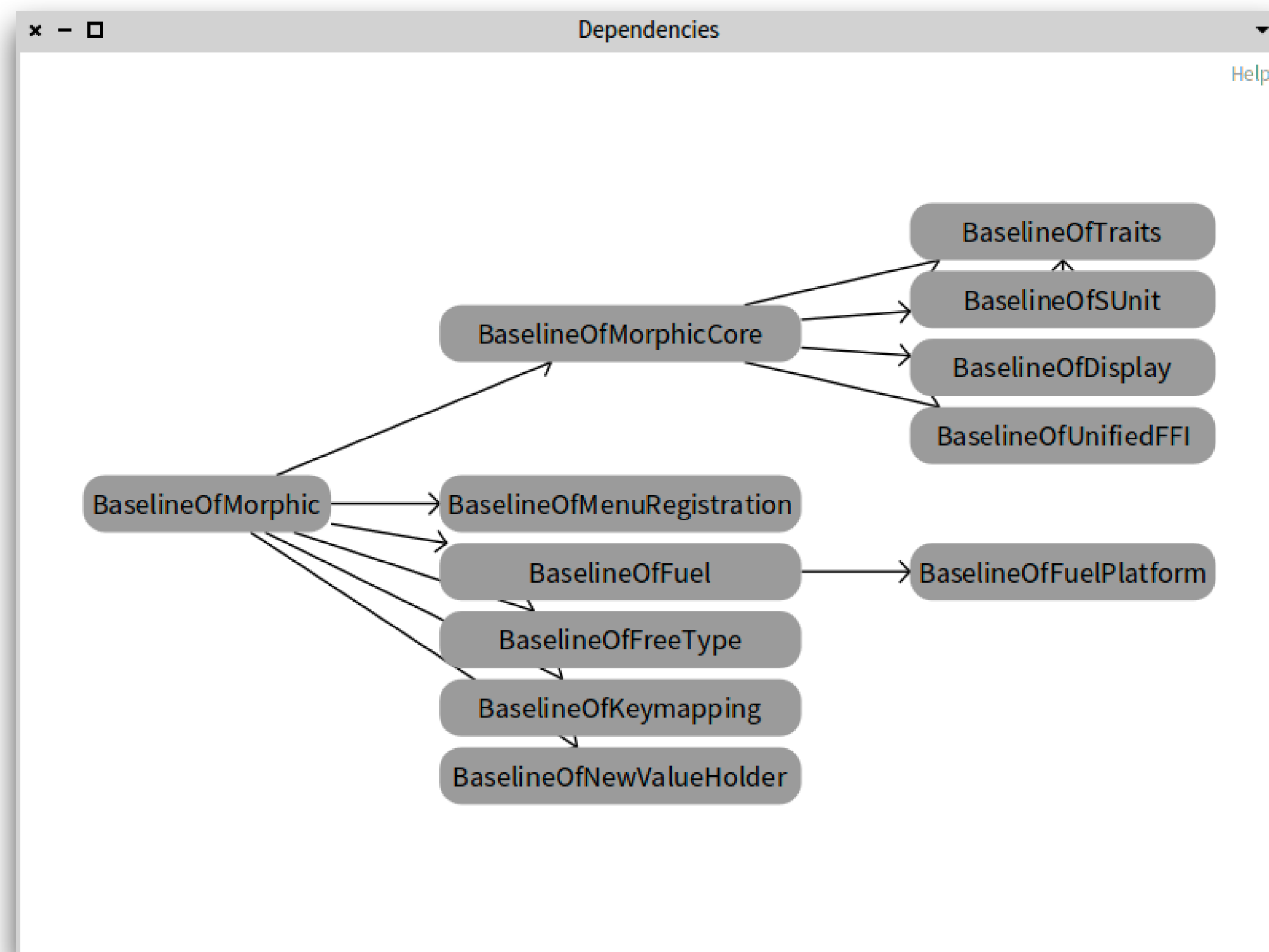
```
1 | model modelFor visualization visualizationFor |
2 modelFor := [ :baseline | self flag: 'TODO' ].
3 model := modelFor value: BaselineOfMorphic.
4 visualizationFor := [ :anObject | self flag: 'TODO' ].
5 visualization := visualizationFor value: model.
6 visualization open.
7
```

Line: 7:1 +L

Starting part

In a playground window

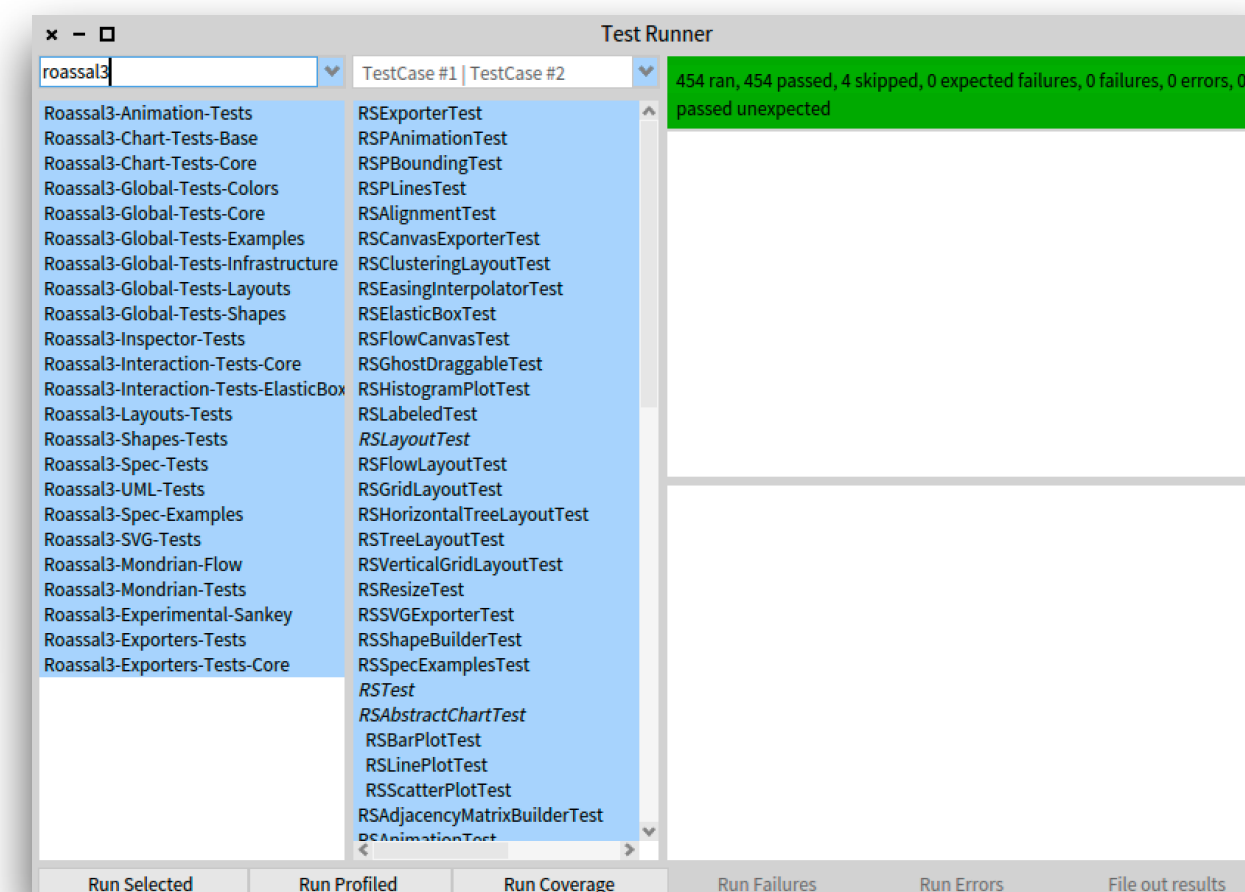
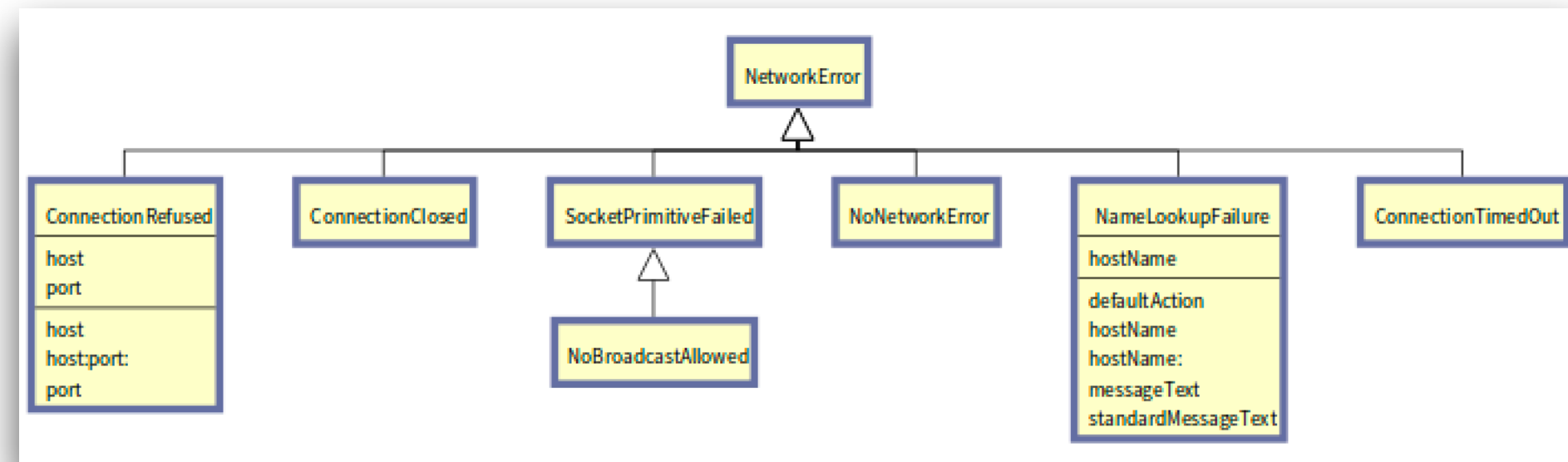
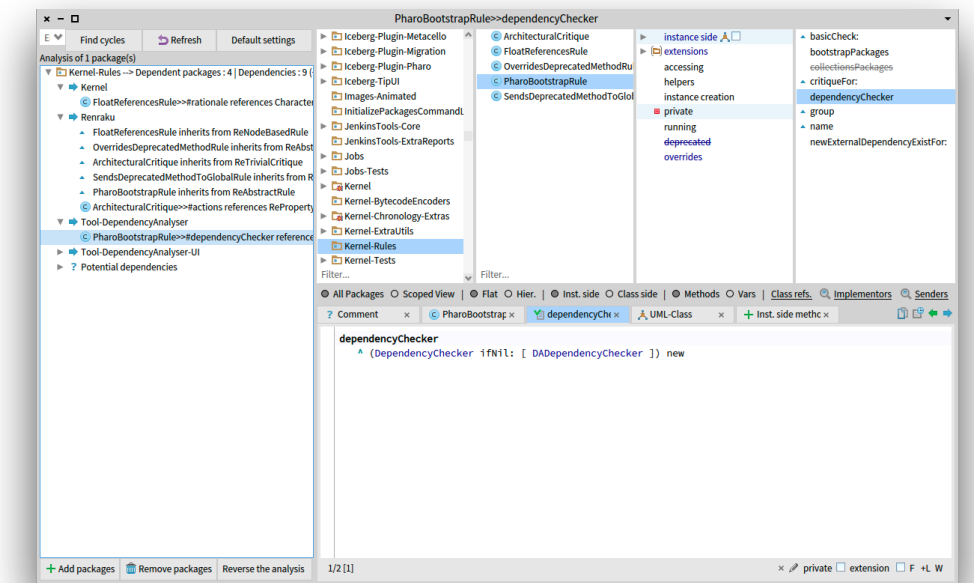
At the end I create 85 lines of code that produces a basic visualization.



```
1 | canvas models modelsByGroup baseline findModels todo |
2
3 "baseline := BaselineOfIDE."
4 baseline := BaselineOfMorphic.
5
6 models := OrderedCollection new.
7
8 todo := OrderedCollection new.
9 todo add: ({baseline name. baseline. 1}).
10 findModels := [
11   todo ifNotEmpty: [ | model |
12     model := todo removeFirst.
13     models detect: [ :each | each first = model first ] ifNone: [
14       | dependencies |
15       model := model asOrderedCollection.
16       models add: model.
17       [
18         dependencies := (model second version projects coll
19         select: [ :each | each notNil ].
20         todo addAll: (dependencies collect: [ :each | | clas
21         class := Smalltalk globals at: each asSymbol
22         ifPresent: [ :cls | cls ]
23         ifAbsent: [ nil ].
24         { each. class. model third + 1 }
25       ]
26     ]
27   ]
28 ]
29
30 canvas addAll: shapes.
31
32 ].
33
34
35
36
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52
53
54
55
56
57
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59
60
61
62
63
64
65 RSLineBuilder arrowedLine
66   withBorderAttachPoint;
67   color: Color black;
68   canvas: canvas;
69   shapes: canvas nodes;
70   connectToAll: [ :model |
71     model fourth collect: [ :depName |
72       models detect: [ :each | each first = depName ]
73     ].
74   ].
75 canvas lines pushBack.
76 RSHorizontalTreeLayout new
77   horizontalGap: 50;
78   verticalGap: 5;
79   on: canvas nodes.
80
81 canvas @ RSCanvasController.
82 canvas open
83   setLabel: 'Dependencies';
84   position: 100@100;
85   extent: 800@600.
86
```


Next step: classes - packages

- Classes enables a better structure for big projects
- The project can use tests classes, and test runners
- Scalable, classes can be transformed into a major project
- More tools like dependency analyzer, repositories, versions, documentation, etc.
- Reutilizable, users choose to use or not your tool.

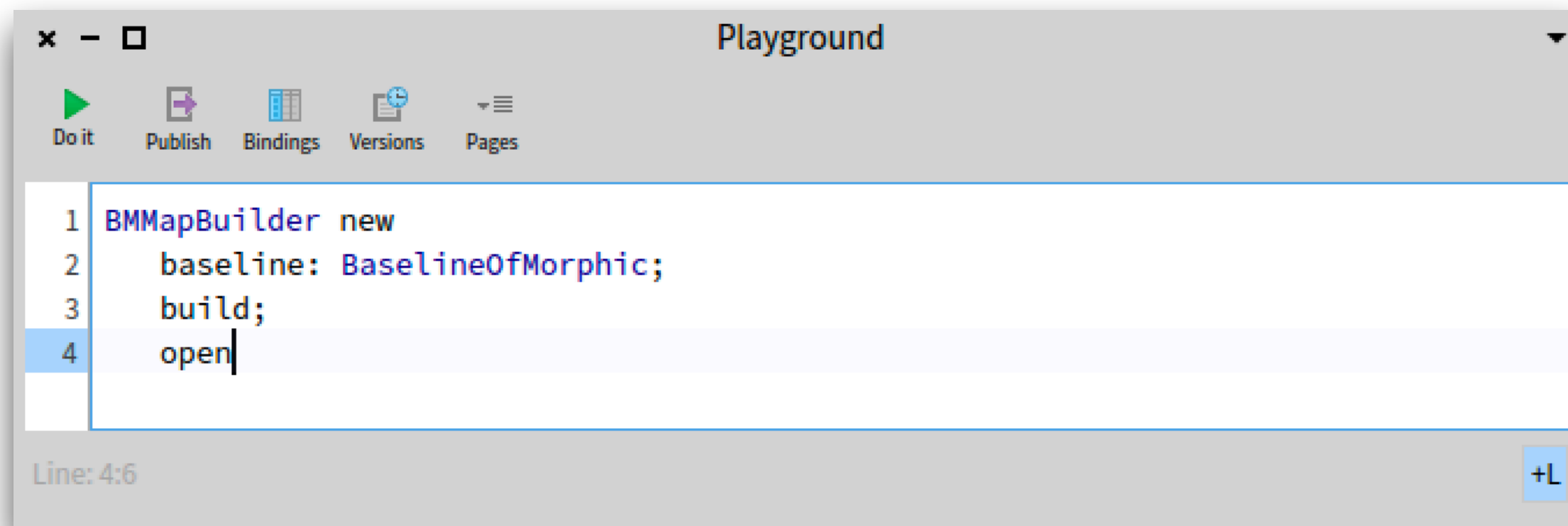


Repositories		
Repositories	Status	Branch
pharo	Local repository missing	Unknown
Spec2	Local repository missing	Unknown
NewTools	Local repository missing	Unknown
Microdown	Local repository missing	Unknown
BeautifulComments	Local repository missing	Unknown
iceberg	Local repository missing	Unknown
libgit2-pharo-bindings	Local repository missing	Unknown
tonel	Local repository missing	Unknown
*Geometry	Uncommitted changes	master
Athens-SVG	Up to date	master
*NumericScales	Uncommitted changes	v1.0
*Roassal3	Uncommitted changes	master
Roassal3Exporters	Up to date	master
Units	Up to date	master

BaselineMap

The new project

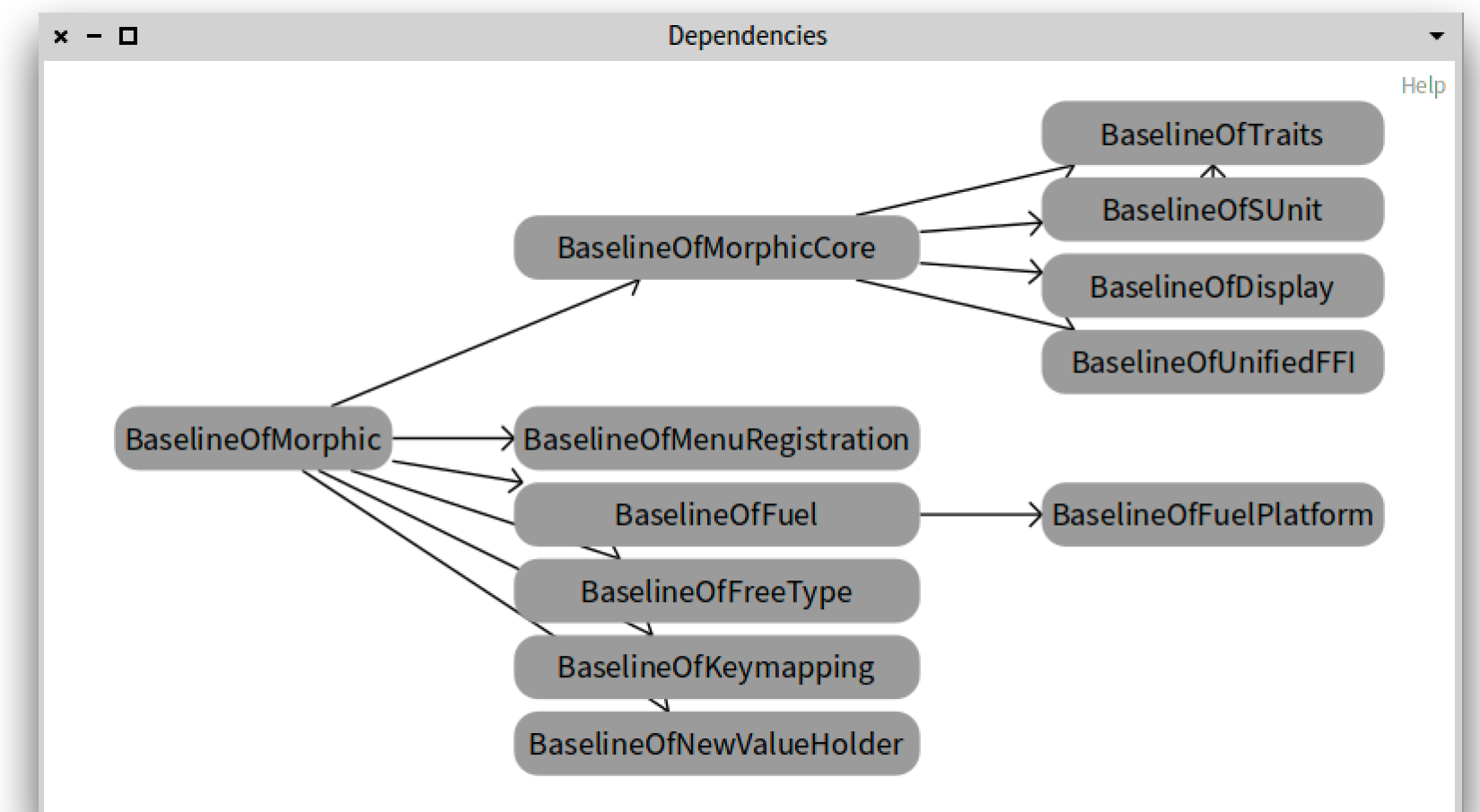
- I have created a GitHub repository called <https://github.com/akevalion/BaselineMap>
- Then I have moved all the code from the script into a class called, **BMMapBuilder** now it has 105 lines of code.
- It should be easy to read, by other people
- It should be easy to modify avoiding hundreds of changes for new requirements



A screenshot of a web-based code editor titled "Playground". The editor has a toolbar with icons for "Do it", "Publish", "Bindings", "Versions", and "Pages". The code area contains the following text:

```
1 BMMapBuilder new
2   baseline: BaselineOfMorphic;
3   build;
4   open
```

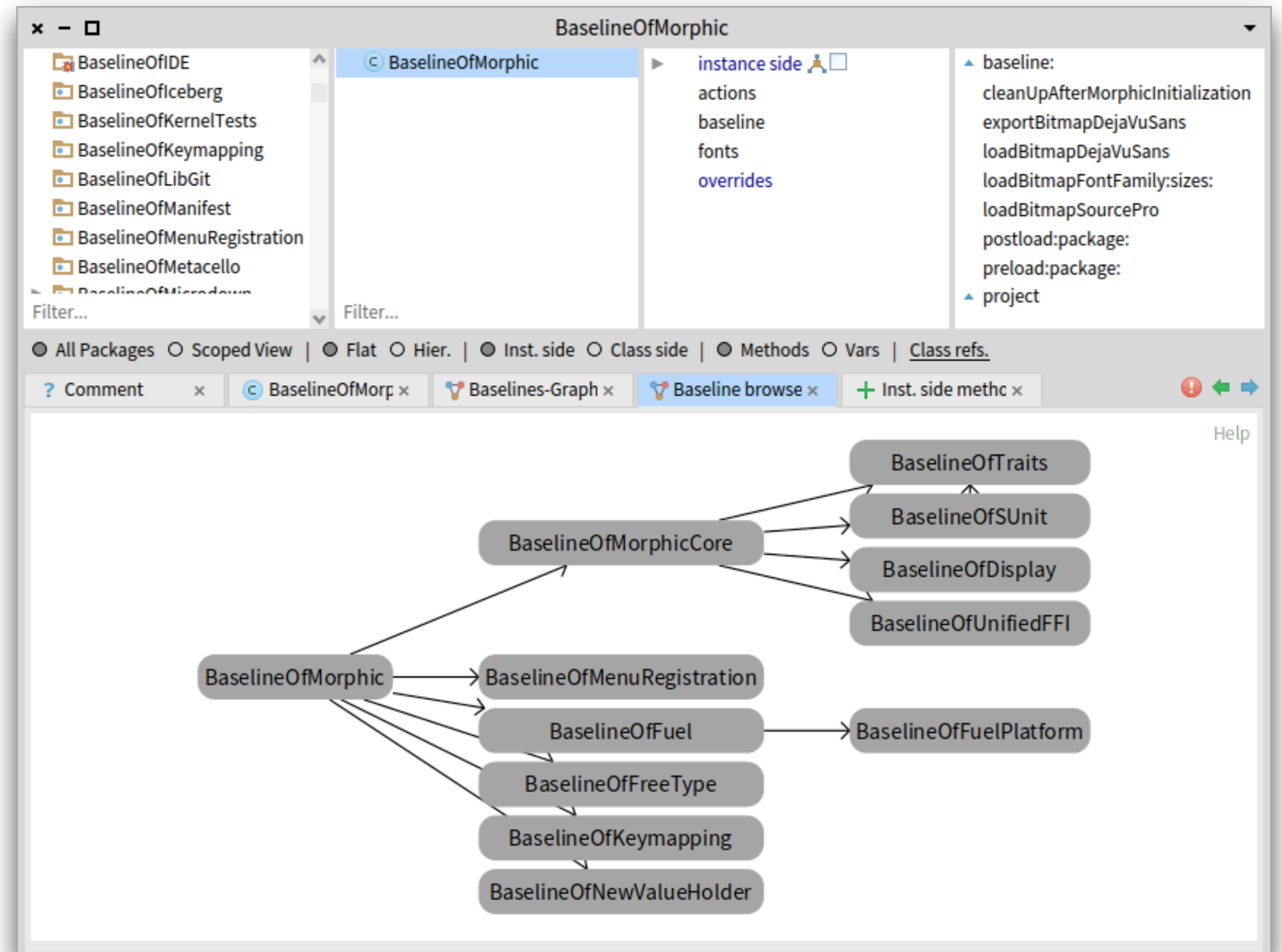
At the bottom left, it says "Line: 4:6". At the bottom right, there is a blue button with a white "+" and the letter "L".



Baseline map

In the system browser

- Currently system browser of Pharo is made in Calypso project, and it provides a system to plug in new visual tools.
- ClyBrowserToolMorph is the entry here to add new tools to browser.
- By creating a new subclass of ClyBrowserToolMorph you can add a new tool.

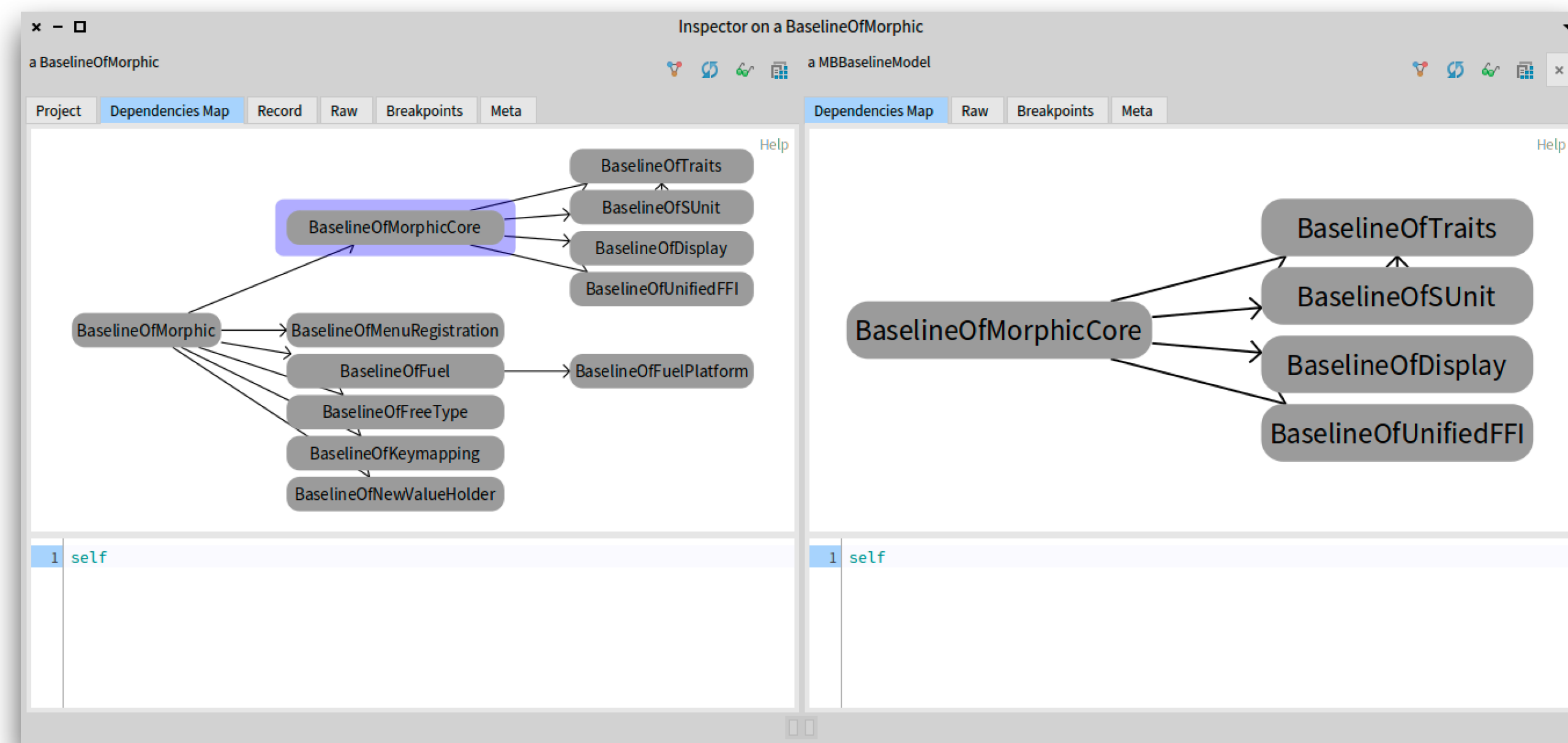


Baseline map

In the inspector

- Inspector in other hand provides an annotation for an object inspector:

```
1 inspectionBaselineMap
2 <inspectorPresentationOrder: 10 title: 'Dependencies Map'>
3 | canvas |
4 canvas := BMSettings classMapBuilder new
5     baseline: self class;
6     build;
7     canvas.
8
9 ^ SpRoassal3InspectorPresenter new
10    canvas: canvas;
11    yourself
```



BaselineMap

Structure to be extended

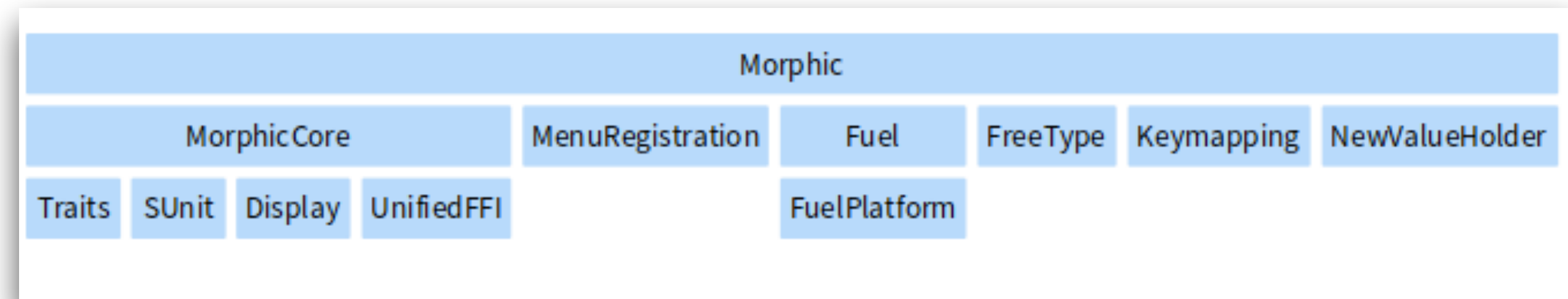
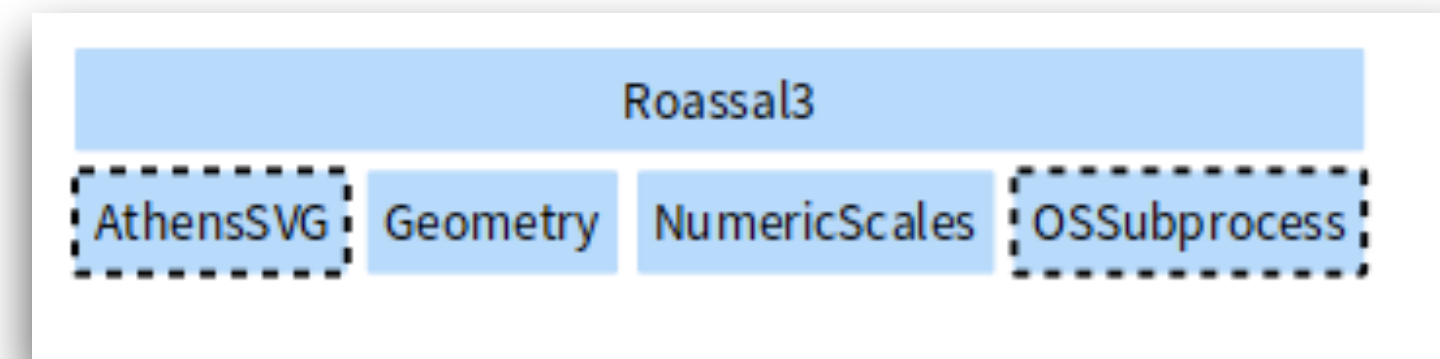
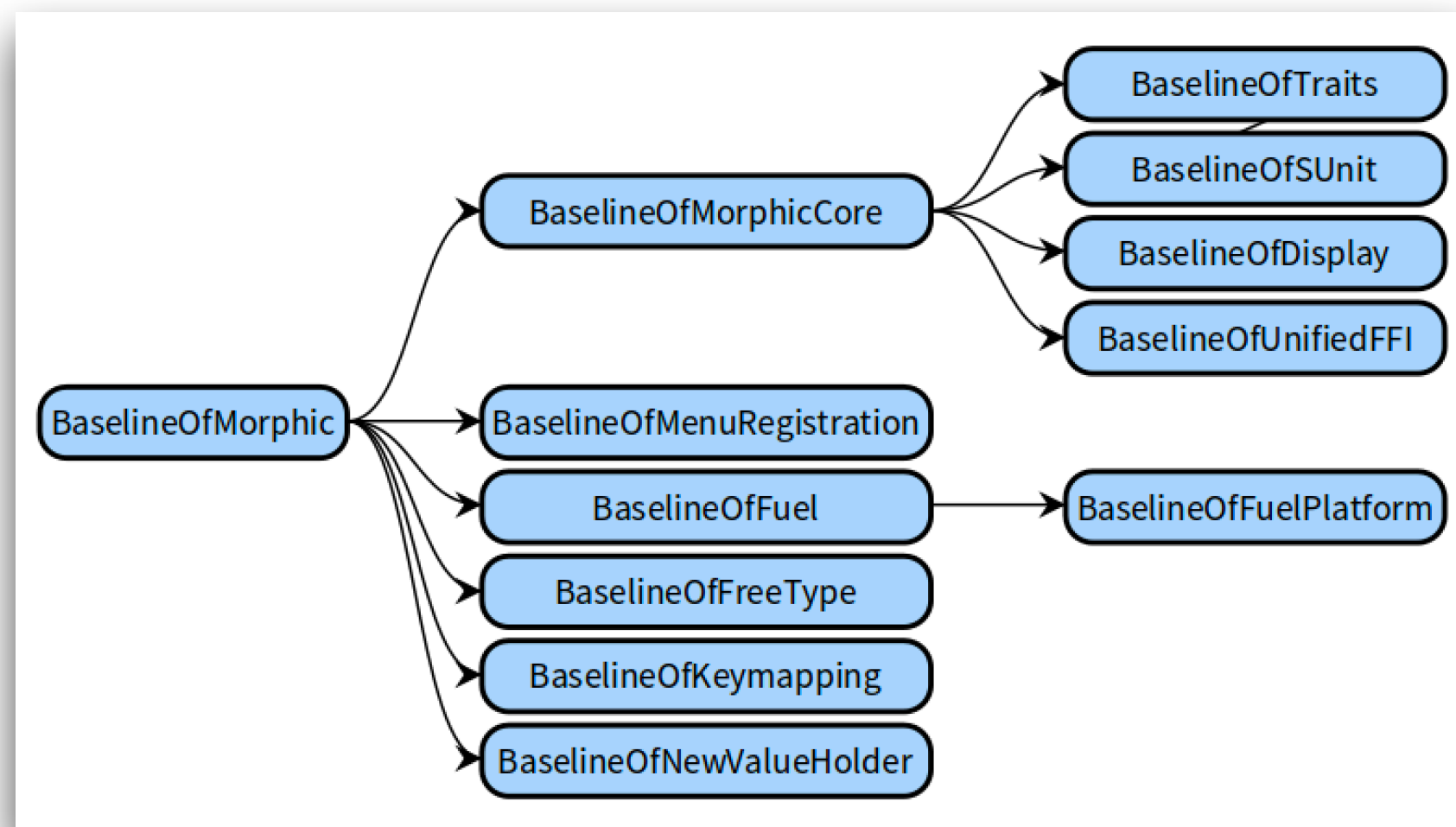
- With hooks methods, object models, design patterns, tests. This class is ready to be extended in a future.
- Github opens collaboration between users => community.
- Test packages guarantee that my code within my parameters works. Also it can be used by Github CI



Customization

New baseline maps

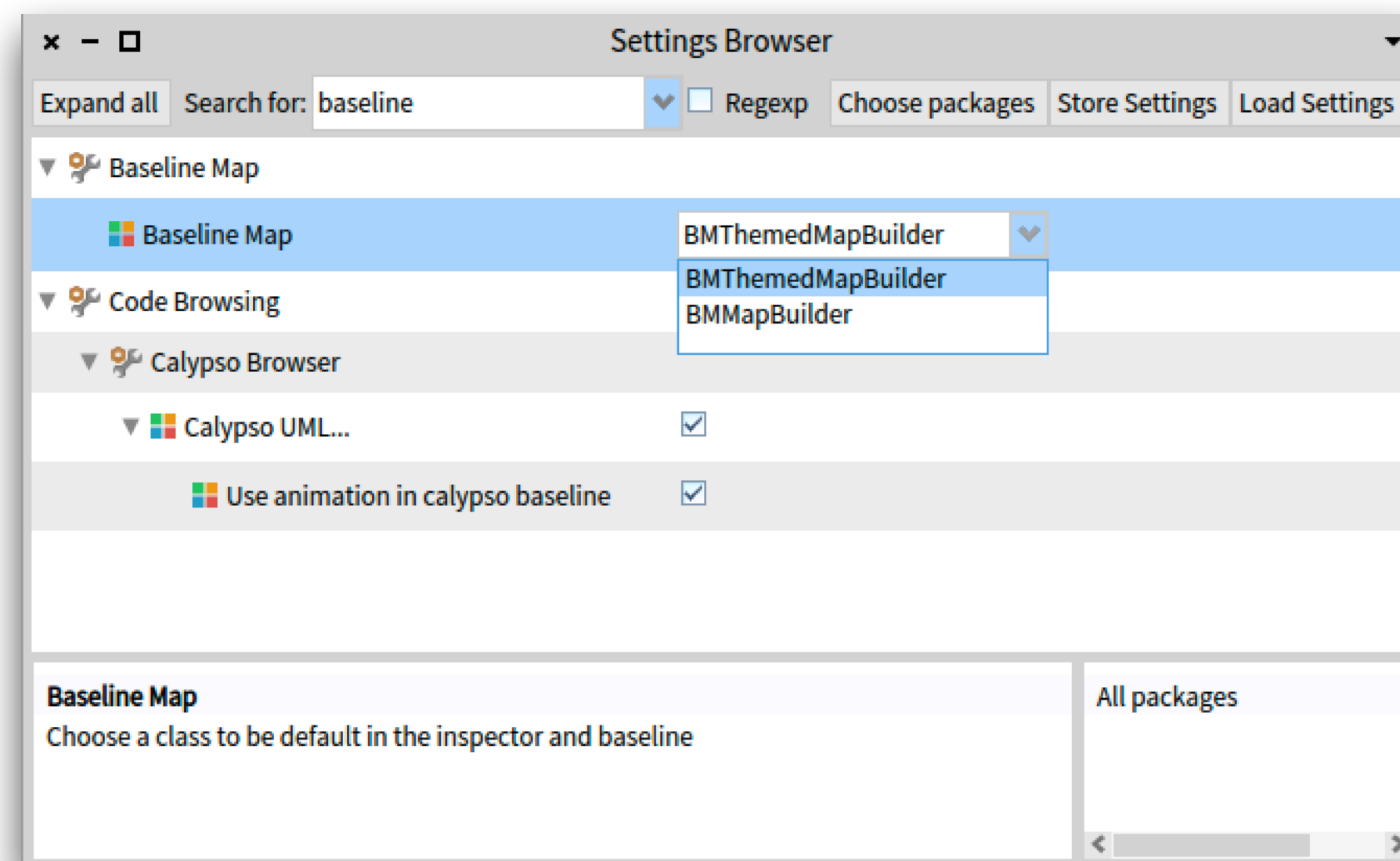
- Because it is free to use, other users can create their own versions.



New maps

Collaboration with users

- With new versions of this visualization, this project can be extended to its limits.
- Now with a configuration class, users can use Settings Browser a tool created in Pharo to customize the application.



Demo

Reflexion

Communication

- After an idea, for a new project. Smalltalkers should create an understandable and extendible application, in this way your project can be used or extended by other developers.
- Rules, organization, patterns are very important.
- Documentation, tests, comments, correct names for classes, methods, attributes, examples, all this matters.
- Plugging a new tool in the ecosystem implies that you will collaborate with other people project's.

Thank you!