Pharo: Live objects for complex projects

http://stephane.ducasse.free.fr
http://www.pharo.org

JPMorgan Chase & Co.

ENSTA Bretagne

Lam Research

Inria
INVENTEURS DU MONDE NUMÉRIQUE

SCHMIDT
Ingenieurbüro für Bauwesen

Lifeware

feenk

ZWEIDENKER

THALES

HR works

GemTalk Systems

Software Soops Group

projector software inspired!

BetaNine software engineering

netstyle.ch

knowroaming

SORABITO

FINWORKS
INFORMATION TECHNOLOGY SOLUTIONS

TA MÈRE SCR
BADASS MOBILE DEVELOPMENT

Systems that make sense
Sensus

LABWARE
Results Count

OBJECT PROFILE

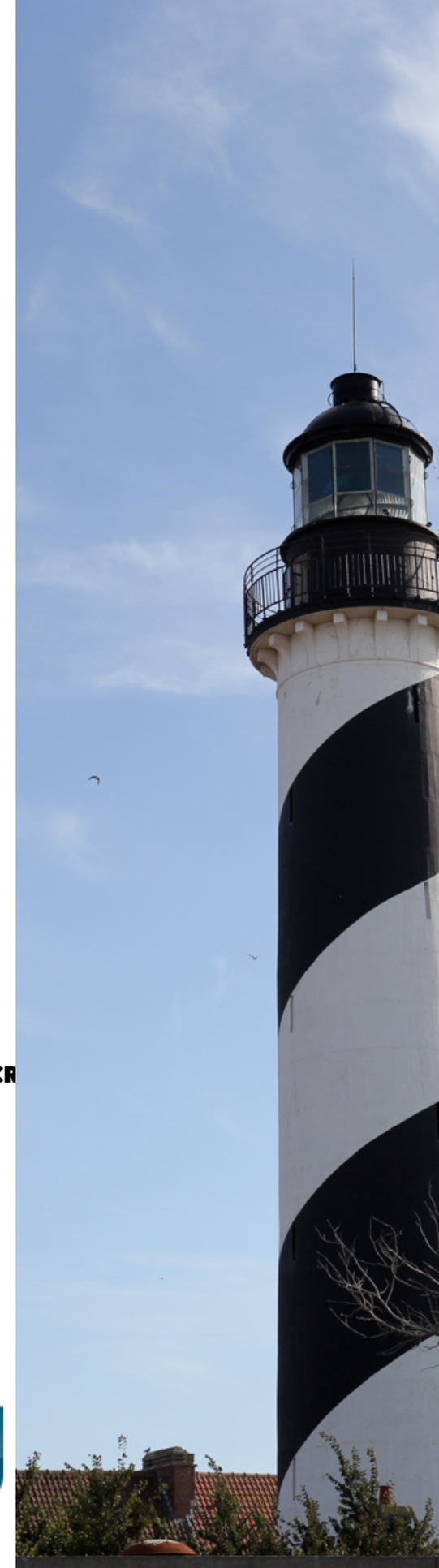
Palantir

SpesenFuchs

FAST
Fundación Argentina de Smalltalk

Yesplan
Let's make it happen

esug
EUROPEAN SMALLTALK USER GROUP



A word of presentation

Expert in language design

Traits in Php7.0, Perl60 Influenced Traits in Scala

Expert in maintenance

Program analysis, Metamodels, visualization, testing, refactorings, metrics….

Building ***specific*** analysis tools for important running business software (Ada, Cobol, 4D, C, C++, Java…)

Dedicated tools to support decision making process

A startup… is like a compass

Find its way and model it

Pharo?

Epicea - Code Changes
Iceberg repositories
New repository
Clone repository
Add local repository
Fetch all
Repositories
Name
Current branch
Loaded version
Status
iceberg
dev-0.4
f9c63ee (15 May 2017)
Up to date
libgit2-pharo-bindings
master
1f582be (18 April 2017)
Up to date
General
Packages
Branch browser
Commits
Date & time
Id
Parents
Commit info
Left: working copy / Right: incoming updates
Date & time
2017-05-13 16:22
Commit Id
Parent(s)
Author
Esteban Lorenzano
Comment
remove not used method
Stack
Source
Pharo

Pharo!

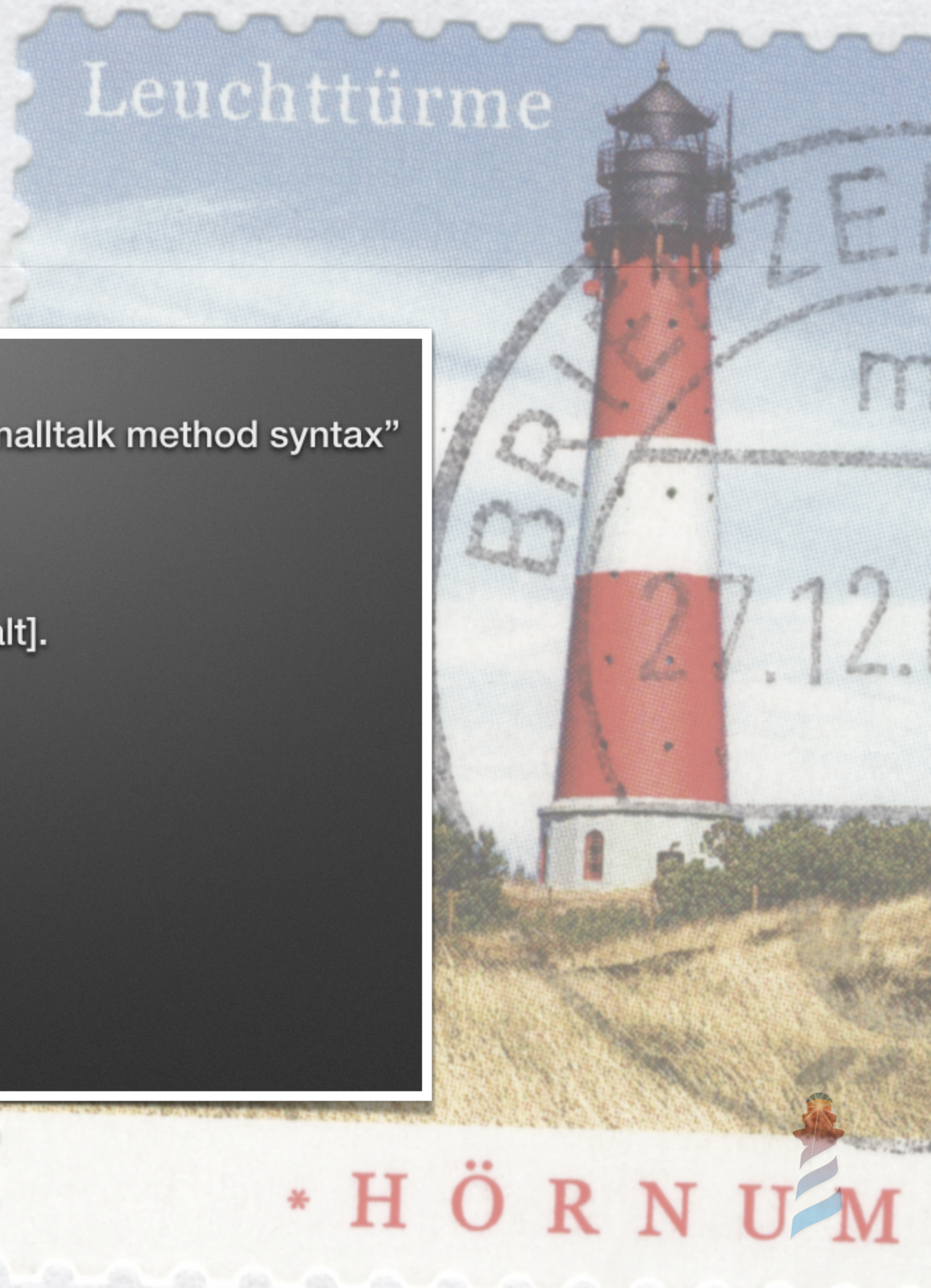
- System: Pure object language + full IDE
- Powerful, elegant and fun to program
- Great community / industrial consortium
- Living system under your fingers
- Works on Mac OSX, Linux, iOS, Android, Windows, Pi - 100% MIT

Elegant!

- Full syntax on a postcard
- Simple and powerful objet model

Full Syntax!

```
exampleWithNumber: x
    “A method that illustrates every part of Smalltalk method syntax”
    <menu>
    | y |
    true & false not & (nil isNil) ifFalse: [self halt].
    y := self size + super size.
    #($a #a ‘a’ 1 1.0)
        do: [ :each | Transcript
                show: (each class name);
                show: (each printString);
                show: ‘ ‘].
    ^ x < y
```



Yes the full Syntax!

Full Syntax!

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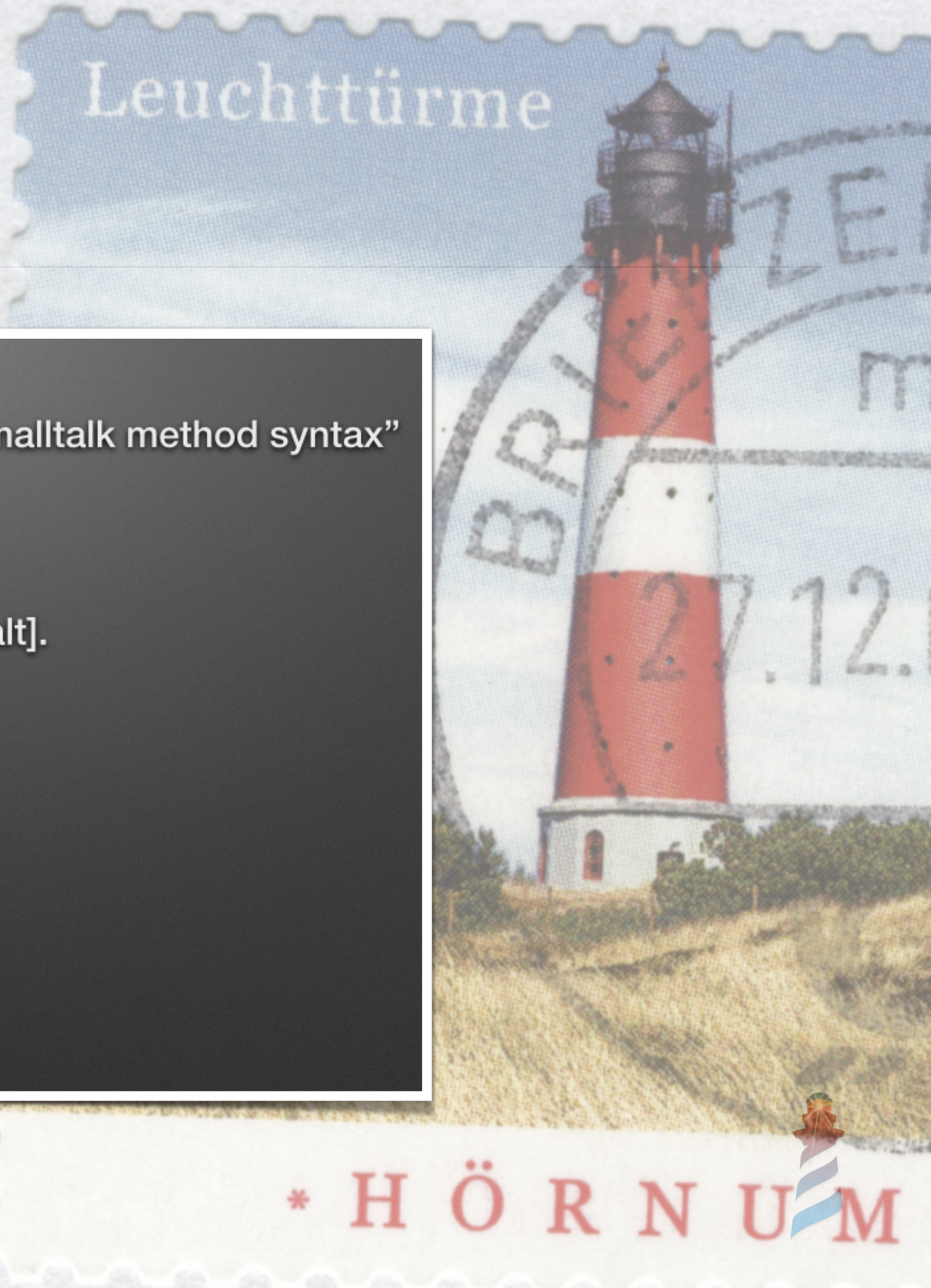
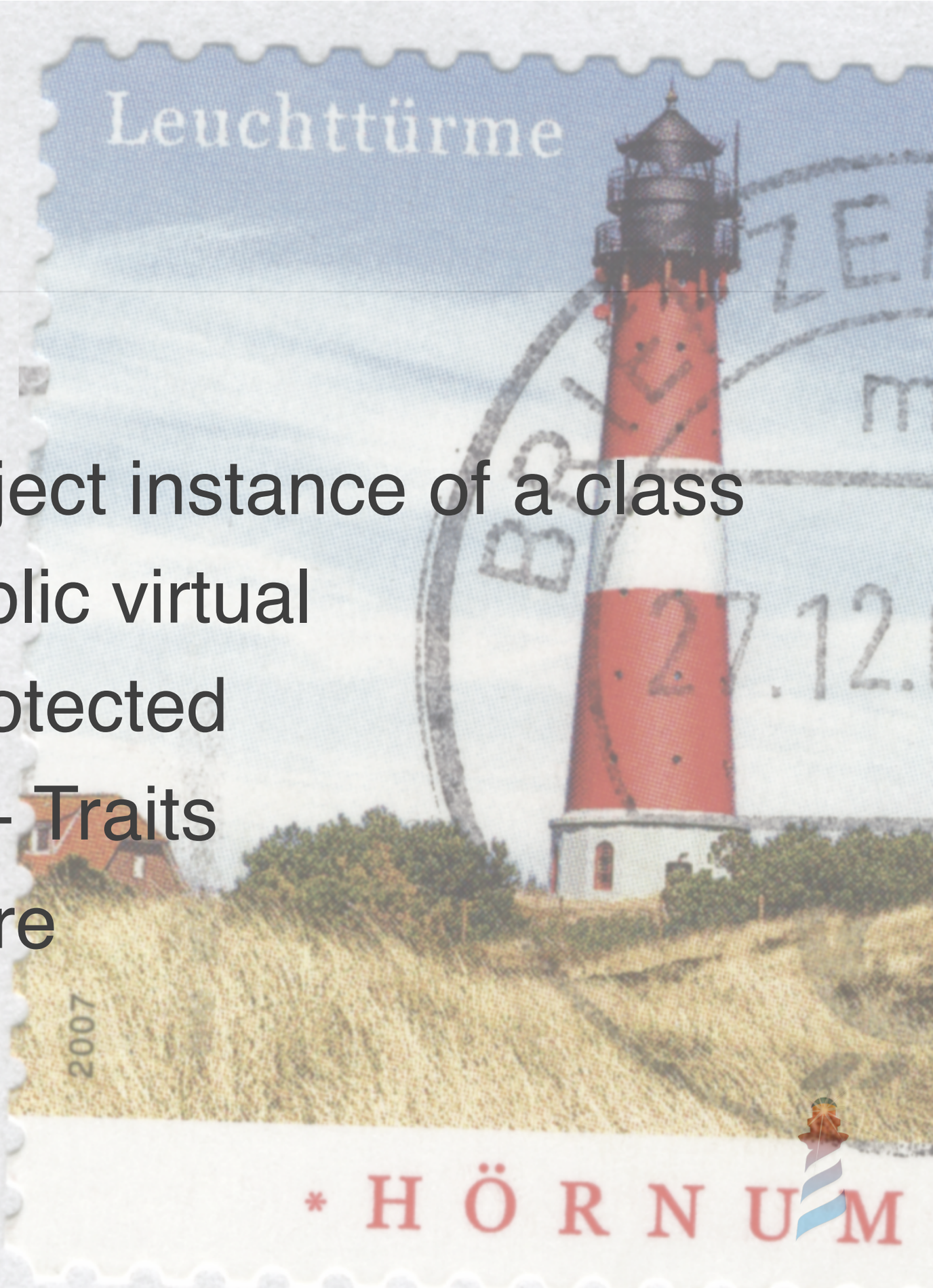


Full Model!

- Dynamically typed
- Everything is an object instance of a class
- All methods are public virtual
- All attributes are protected
- Single inheritance + Traits
- Closures everywhere



Focus on intrinsic complexity

Eliminate accidental complexity

Fully Written in Itself

- Everything is written in Pharo
- One simple syntax/model to access everything

Learn
Adapt
Modify

Pharo is highly immersive

Most languages do not expose much

Looking inside

- Pharo is not a blackbox
- Pharo is fully inspectable and reflective
- You can get immersed in objects

Immersed and interacting

- You can interact with objects

Workspace

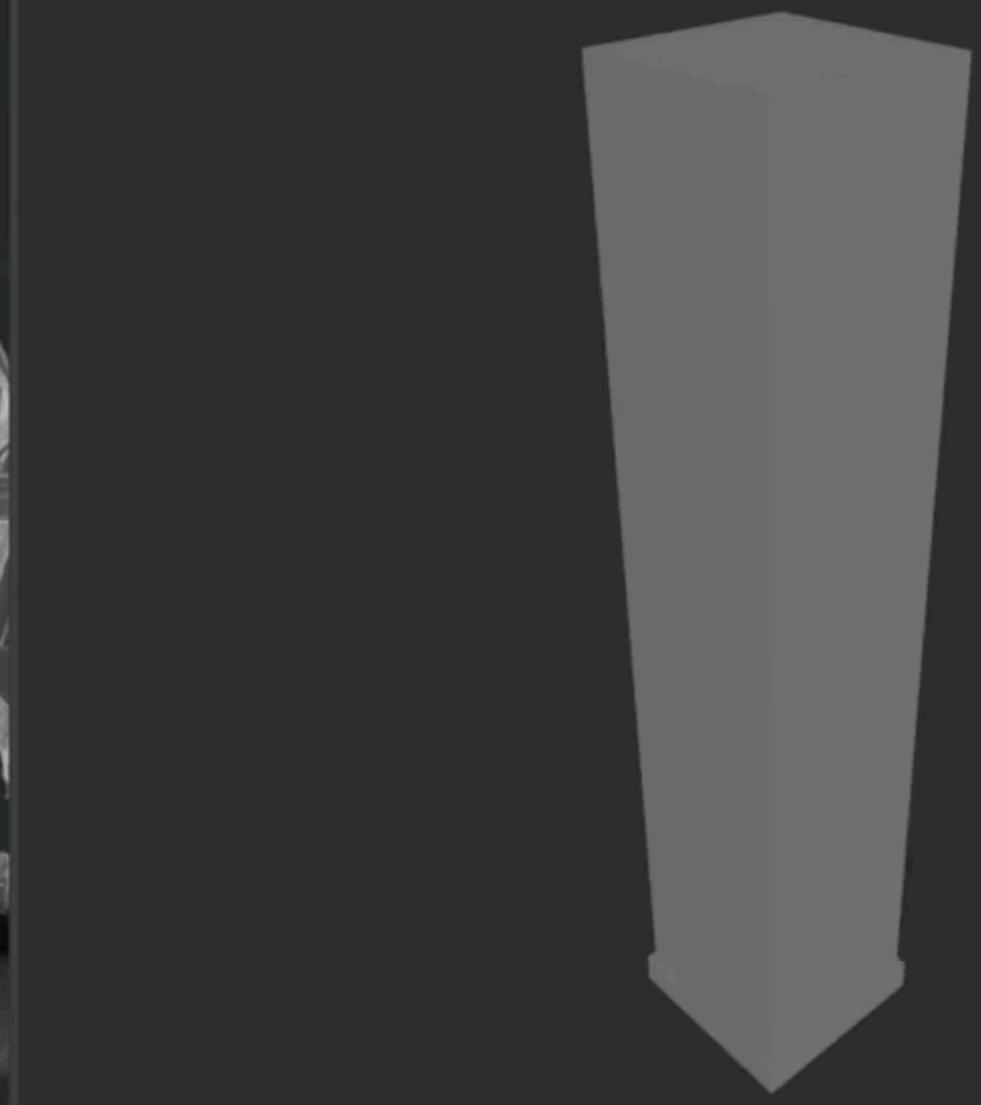
```
| elements lay |


elements := (1 to: 5) collect: [ :ob |
  (R3CubeShape new) elementOn: ob ].


lay := R3WallLayout new.
lay on: elements.

UberPresenter present: elements
```

Uber Presenter



We can do the same with web app, sockets, networks, sensors, living programing….

Pharo's goal...

A powerful engine to invent (y)our future

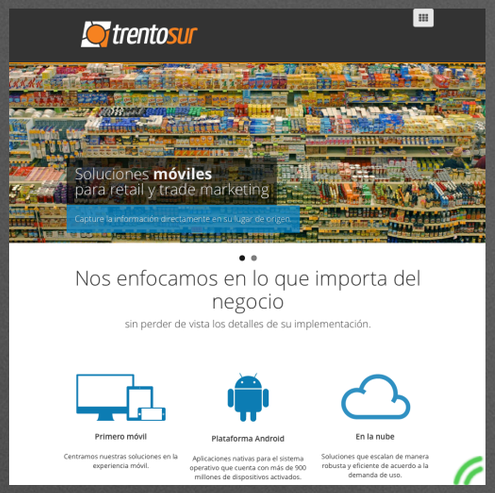
An ecosystem where innovation/business bloom

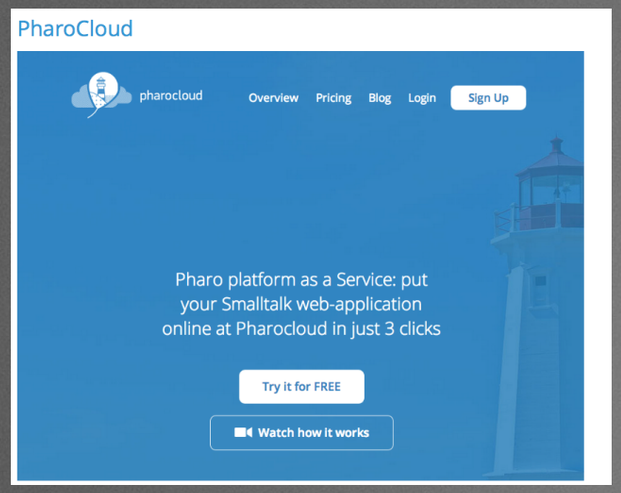
… that **you** can make money with Pharo.

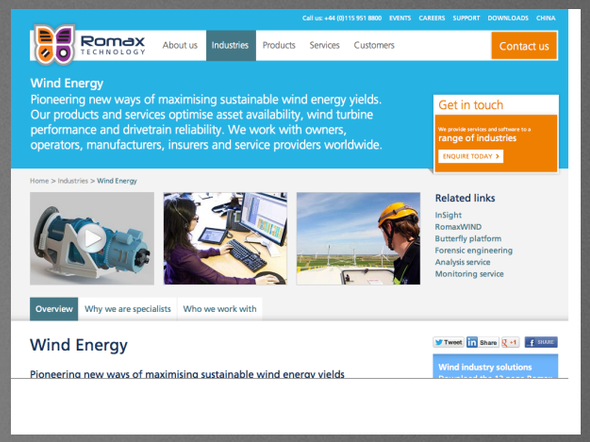
… to be able to invent solutions to existing problems.

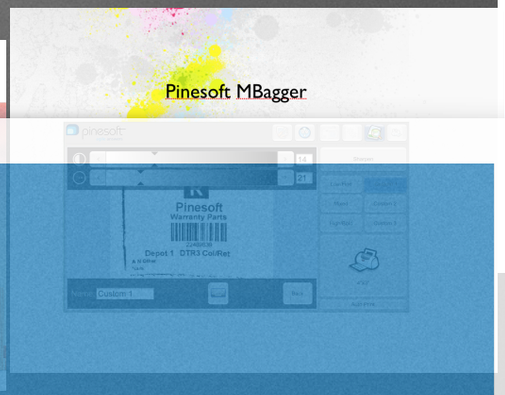
… a powerful innovative dynamic language where we can build (y)our future.

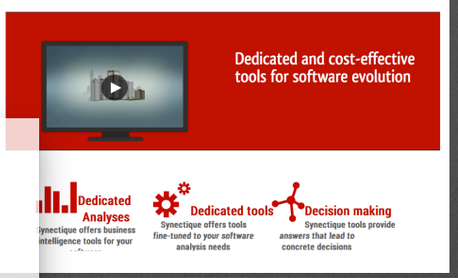
Some Success Stories

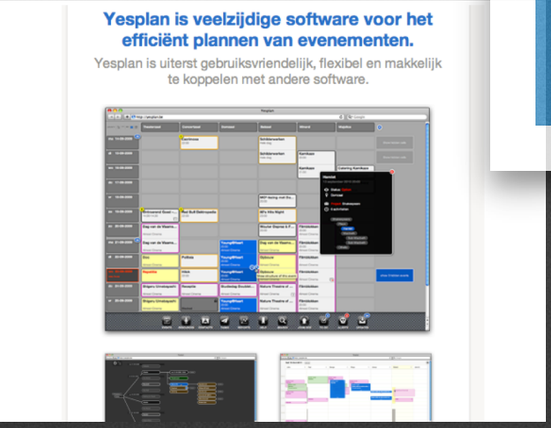


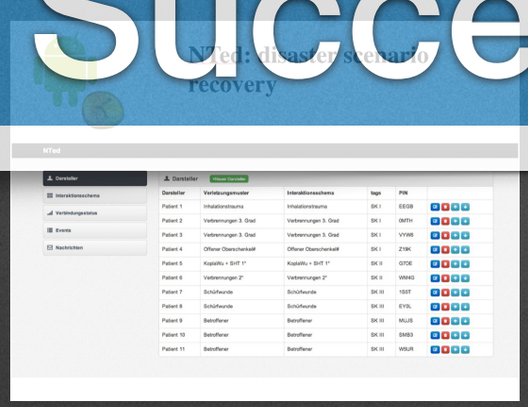


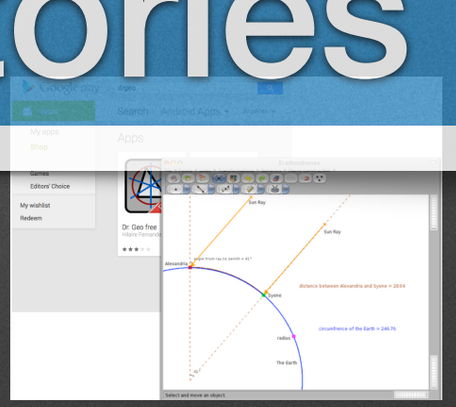


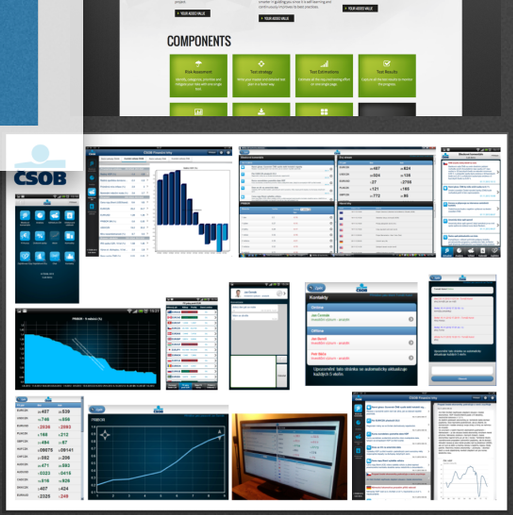


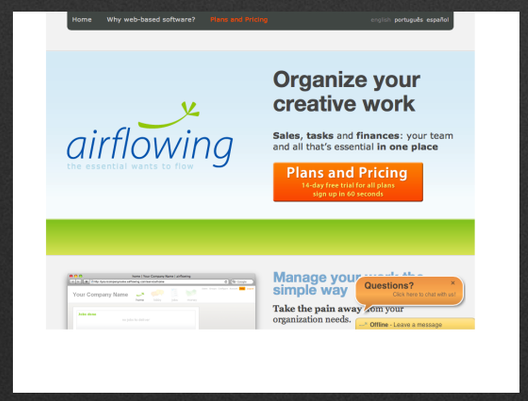


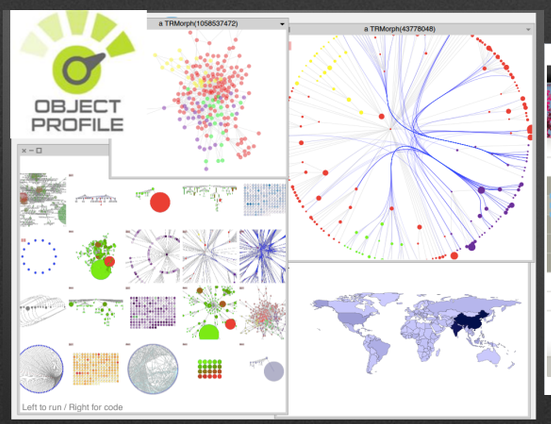


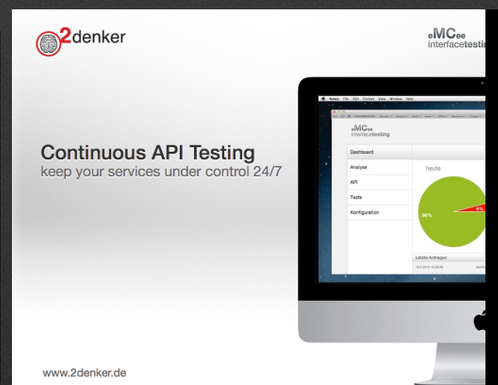


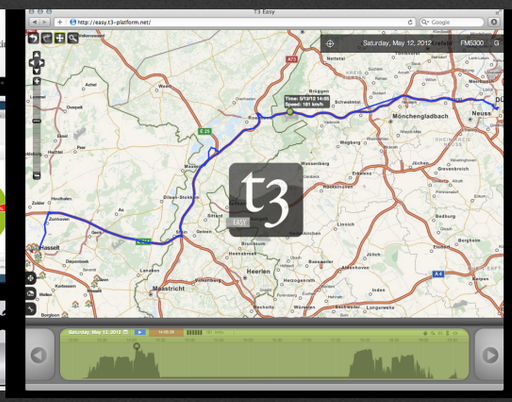












LAMRC

Back-End Wafer-Level Packaging

50% microprocessors of your mobile/PC/tablet

Your mobile hardware as a high-chance to have been produced by a robot controlled via a smalltalk

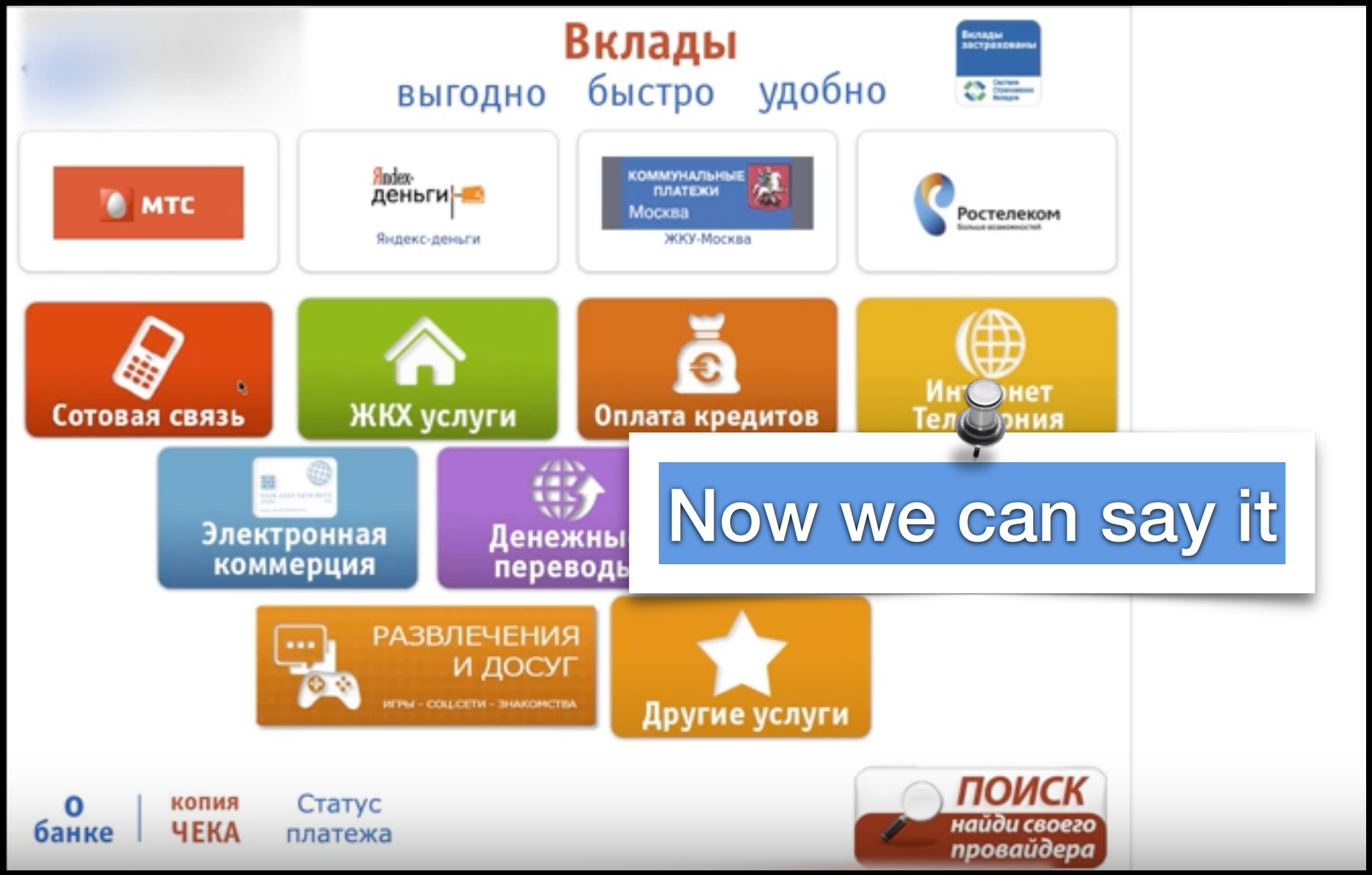
LAMRC

Back-End Wafer-Level Packaging

Your mobile hardware as
a high-chance to have
been produced by a
robot controlled via a
smalltalk

Starting to experiment with Pharo

Pharo in ATM like Device in Moscow



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Online marketplace raised 4.7 M$

Find Machines

Search by Category

Construction Machinery

- Mini Excavators
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- Cranes
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- Graders
- Finishers
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- Compressors
- Small Items
- Other Construction Machineries

Material Handling

- Forklifts

Farm Machinery

- Tractors
- Other Farm Machinery

Vehicles

- Dumps
- Trucks
- Other Vehicles

Others

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- Parts
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Search by Keyword

Enter a keyword (e.g. KOMATSU PC200)

Search

New Machines

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PDS175S
400,000 JPY

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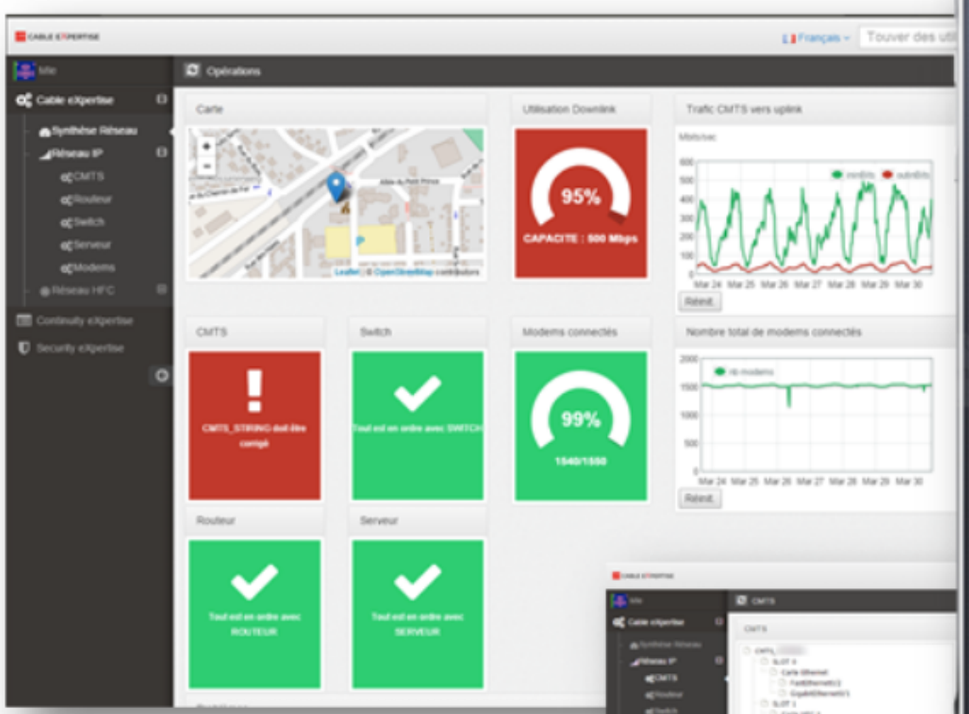
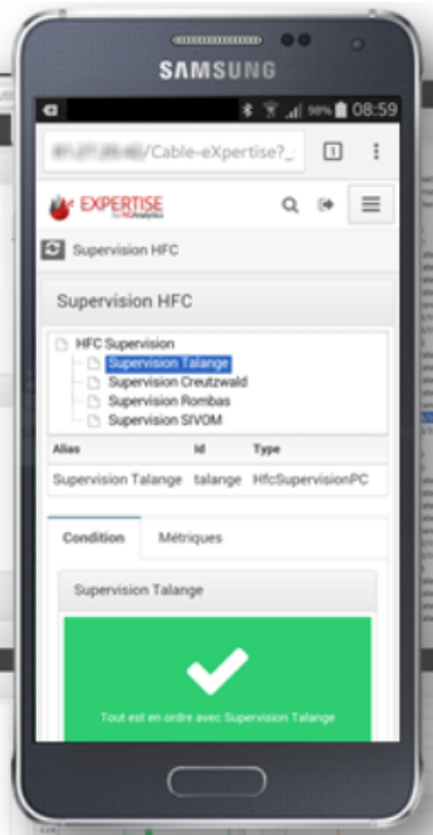
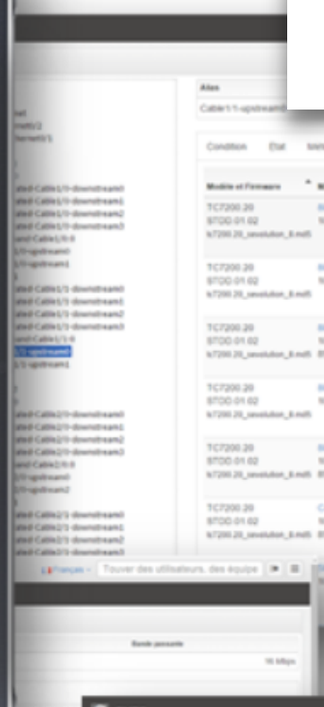
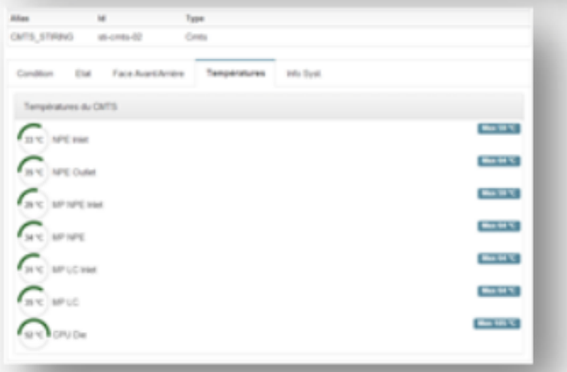
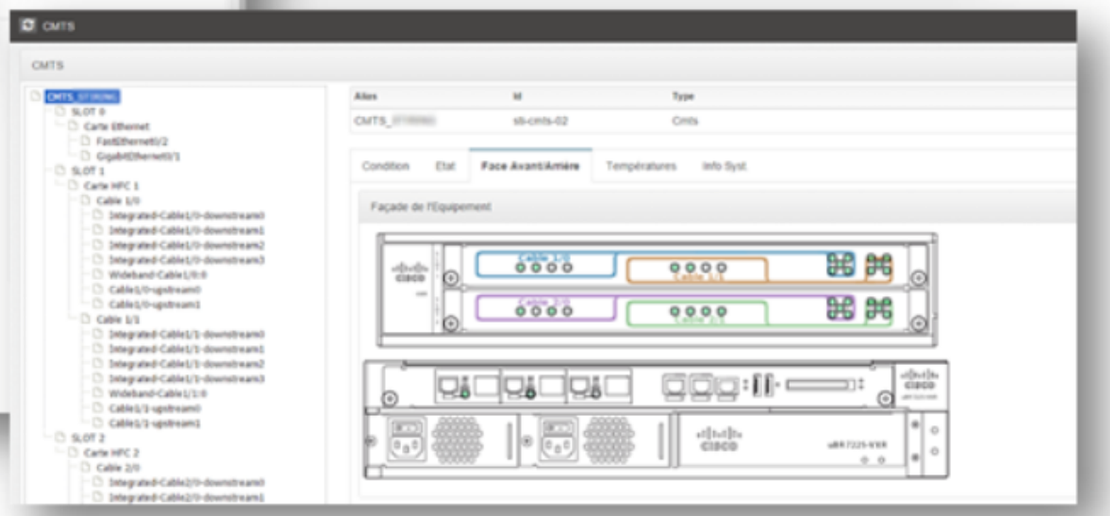
Network Monitoring for small ISPs











pharocloud

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Pharo platform as a Service: put your Smalltalk web-application online at Pharocloud in just a couple clicks

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Deploy Pharo on the cloud in 3 min

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Das Content Manag

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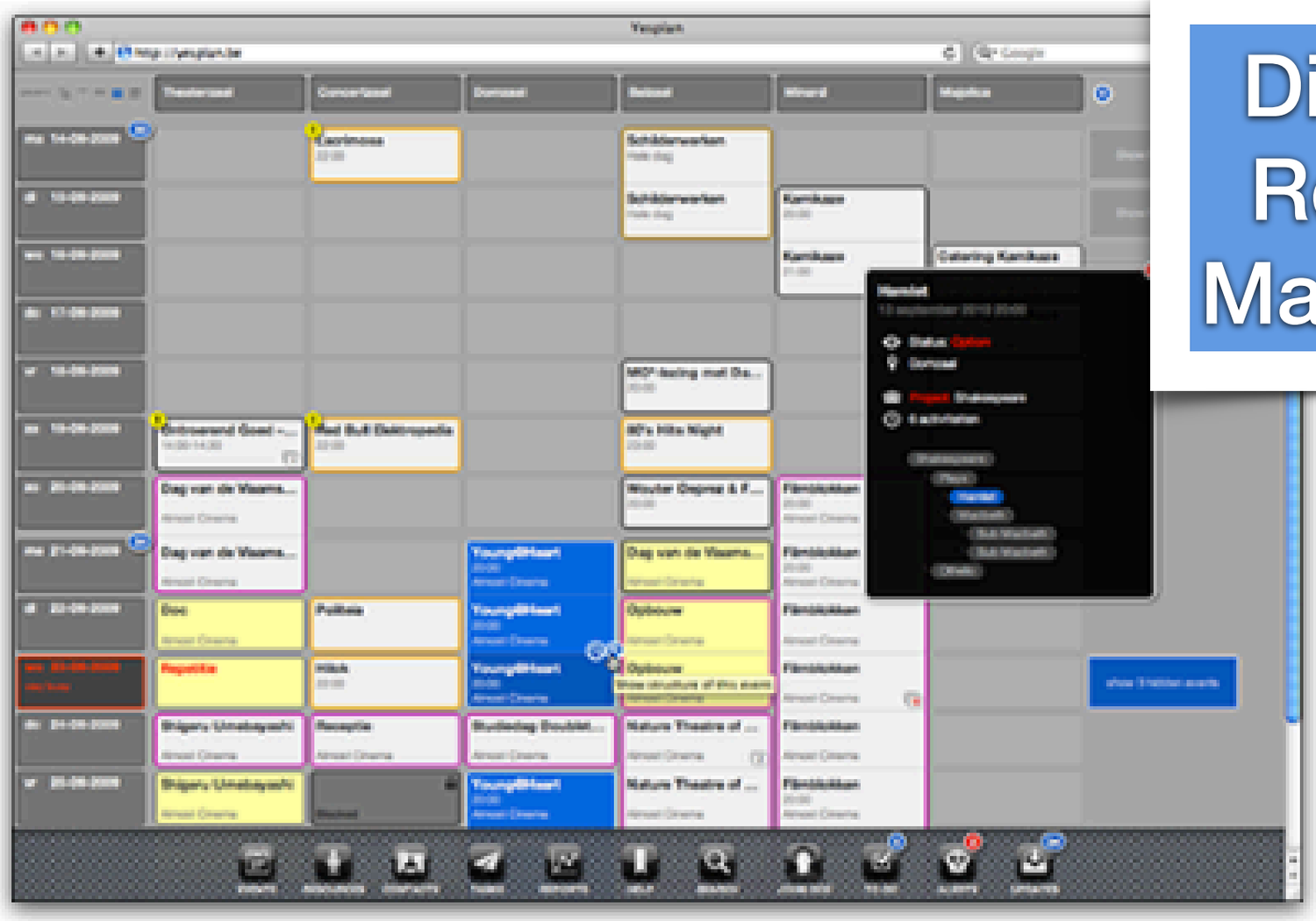
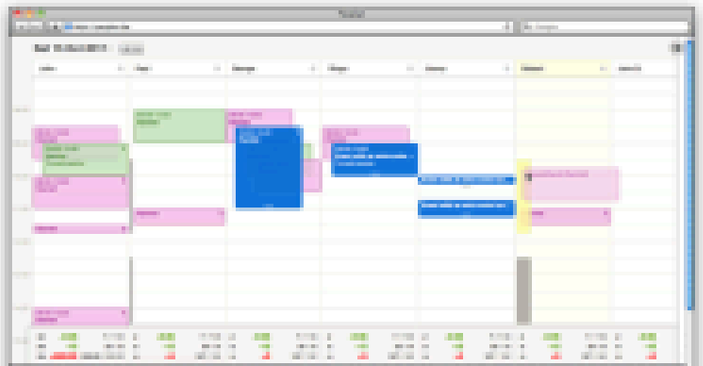
Suchen...

Yesplan is veelzijdige software voor het efficiënt plannen van evenementen.

Yesplan is uiterst gebruiksvriendelijk, flexibel en makkelijk te koppelen met andere software.



Distributed Resources Management



2denker

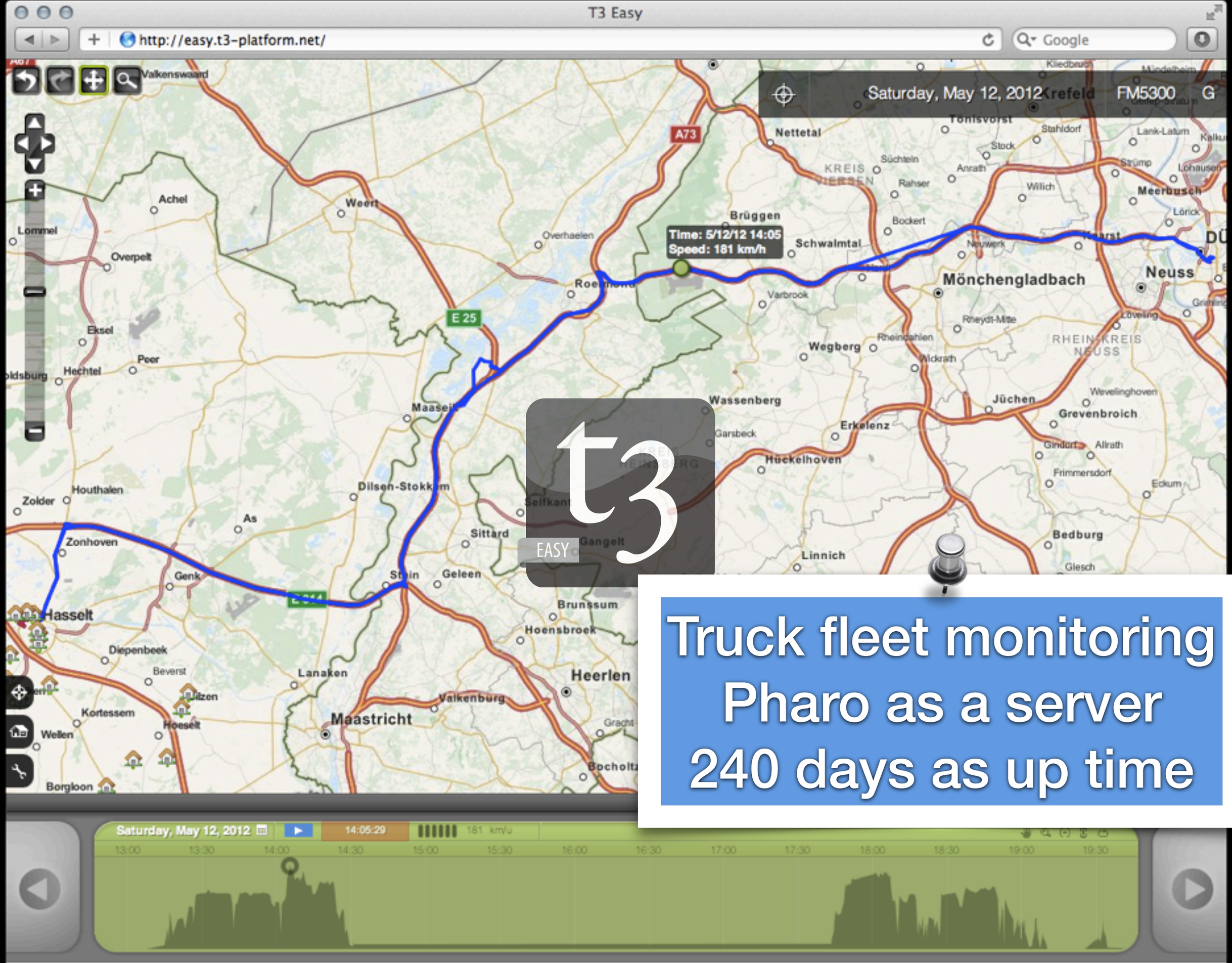
eMCee interfacetesting

Server Testing

Continuous API Testing

keep your services under control 24/7

www.2denker.de


T3 Easy
http://easy.t3-platform.net/
Google
Saturday, May 12, 2012
FM5300
G
Time: 5/12/12 14:05
Speed: 181 km/h
A73
E 25
Nettetal
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Schwalmtal
Mönchengladbach
Neuss
Meerbusch
Krefeld
Wegberg
Wassenberg
Erkelenz
Hückelhoven
Jüchen
Grevenbroich
Bedburg
Linnich
Hasselt
Maastricht
Heerlen
Sittard
Geleen
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Hoensbroek
Lanaken
Valkenburg
Dilsen-Stokkem
Zonhoven
Genk
Diepenbeek
Kortessem
Wellen
Borgloon
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Zolder
Achel
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Lommel
Overpelt
Eksel
Peer
Hechtel
Overhaelen
Roermond
Venlo
Tönisvorst
Stahldorf
Süchteln
Anrath
Willich
Rahser
Bockert
Neuwerk
Lörick
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Strümp
Lank-Latum
Stock
Rheydt-Mitte
Rheindahlen
Wickrath
Lövenich
Wevelinghoven
Gindorf
Allrath
Frimmersdorf
Eckum
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Selfkant
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Varbrook
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EASY
Truck fleet monitoring
Pharo as a server
240 days as up time

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Quuve: Investment Portfolio

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MobileTerminated ForwardSM

```
                    plan: SCCPGlobalTitle npISDN;
                    addr: destGT;
                    translation: 0;
                    yourself);
        yourself.

    forwardSM := ASN1Dictionary new
        at: 'sm-RP-DA' put: (ASN1Dictionary new
            at: 'imsi' put: destIMSI toTBCD;
            yourself);
        at: 'sm-RP-OA' put: (ASN1Dictionary new
            at: 'serviceCentreAddressOA' put: sourceSMSC toE164;
            yourself);
        at: 'sm-RP-UI' put: (ByteArray readHexFrom: '240c91948148136542000051107121955340 10c8329bfd0699e5ef3
        yourself.
    operationName := 'forwardSM'.

    dialogue := ZHLR endPoint  newDialogue.


    invoke := dialogue
                requestTcInvokeNamed: operationName parameters:  for
                class: 1 timeout: 500.
        invoke
        onReturn: [ ];
        onError: [];
        onReject: [];
        onReturnLast: [:result | ].

    dialogue
        requestTcBeginDestinationAddress: imsiAddr
        originatingAddress: mscAddr
        applicationContextName: '0.4.0.0.1.0.25.2' asAsn1Oid .
```

Do it d
Print it p
Extended search...
Do again j
Undo z

Free Software Mobile Communication solutions

Apply a display filter ... <⌘/>

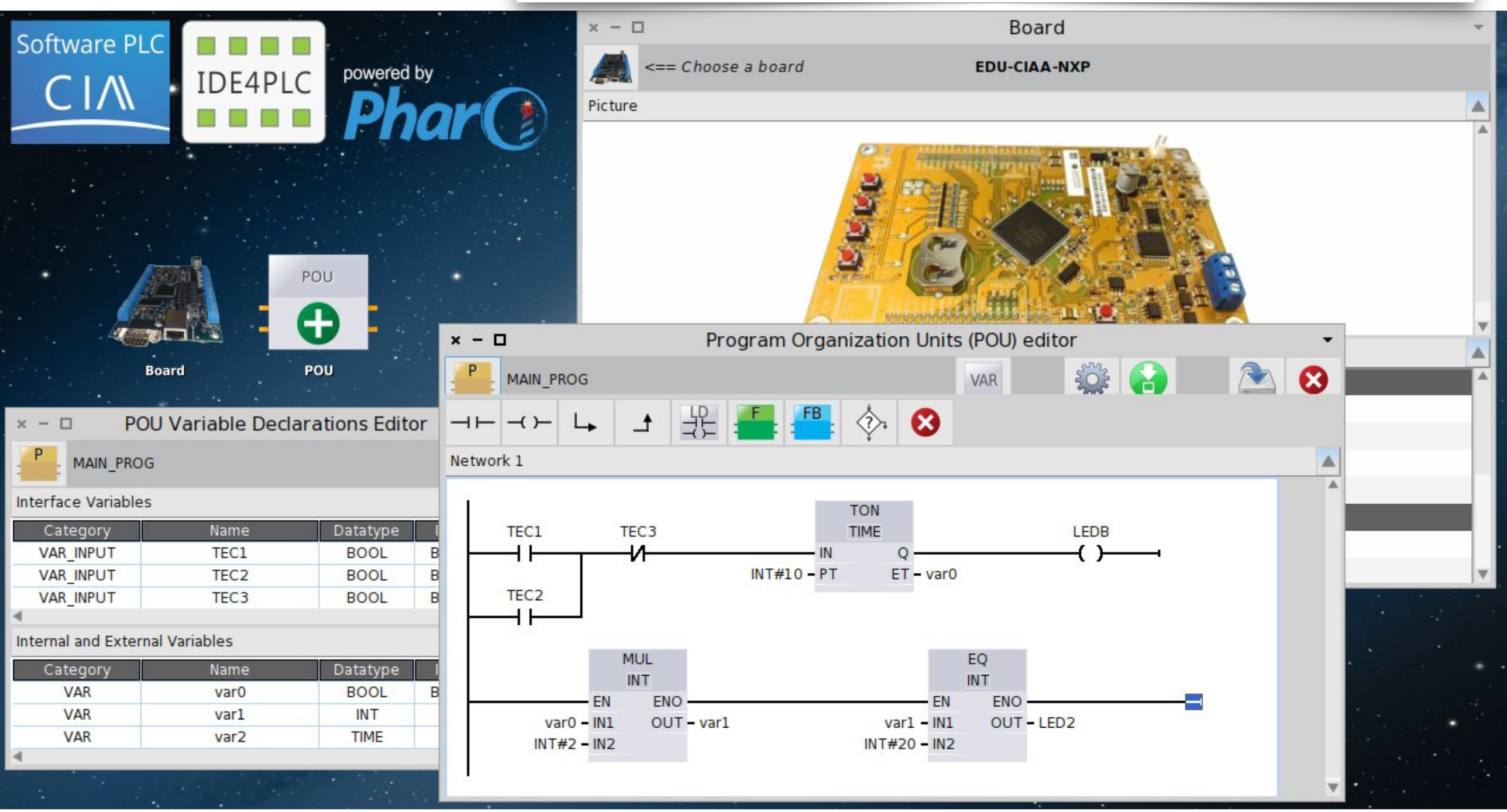
No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	6	2000	GSM S..	236	invoke forwardSM

```
▸ Frame 1: 236 bytes on wire (1888 bits), 236 bytes captured (1888 bits)
▸ Linux cooked capture
▸ Internet Protocol Version 4, Src: 208.208.208.208, Dst: 208.208.208.208
▸ Stream Control Transmission Protocol, Src Port: 2905 (2905), Dst Port: 2905 (2905)
▸ MTP 3 User Adaptation Layer
▸ Signalling Connection Control Part
▸ Transaction Capabilities Application Part
▸ GSM Mobile Application
▾ GSM SMS TPDU (GSM 03.40) SMS-DELIVER
    0... .... = TP-RP: TP Reply Path parameter is not set in this SMS SUBMIT/DELIVER
    .0.. .... = TP-UDHI: The TP UD field contains only the short message
    ..1. .... = TP-SRI: A status report shall be returned to the SME
    .... 0... = TP-LP: The message has not been forwarded and is not a spawned message
    .... .1.. = TP-MMS: No more messages are waiting for the MS in this SC
    .... ..00 = TP-MTI: SMS-DELIVER (0)
  ▸ TP-Originating-Address - (4918843150 24)
  ▸ TP-PID: 0
  ▸ TP-DCS: 0
  ▸ TP-Service-Centre-Time-Stamp
    TP-User-Data-Length: (16) depends on Data-Coding-Scheme
  ▾ TP-User-Data
      SMS text: Hello from Pharo
```

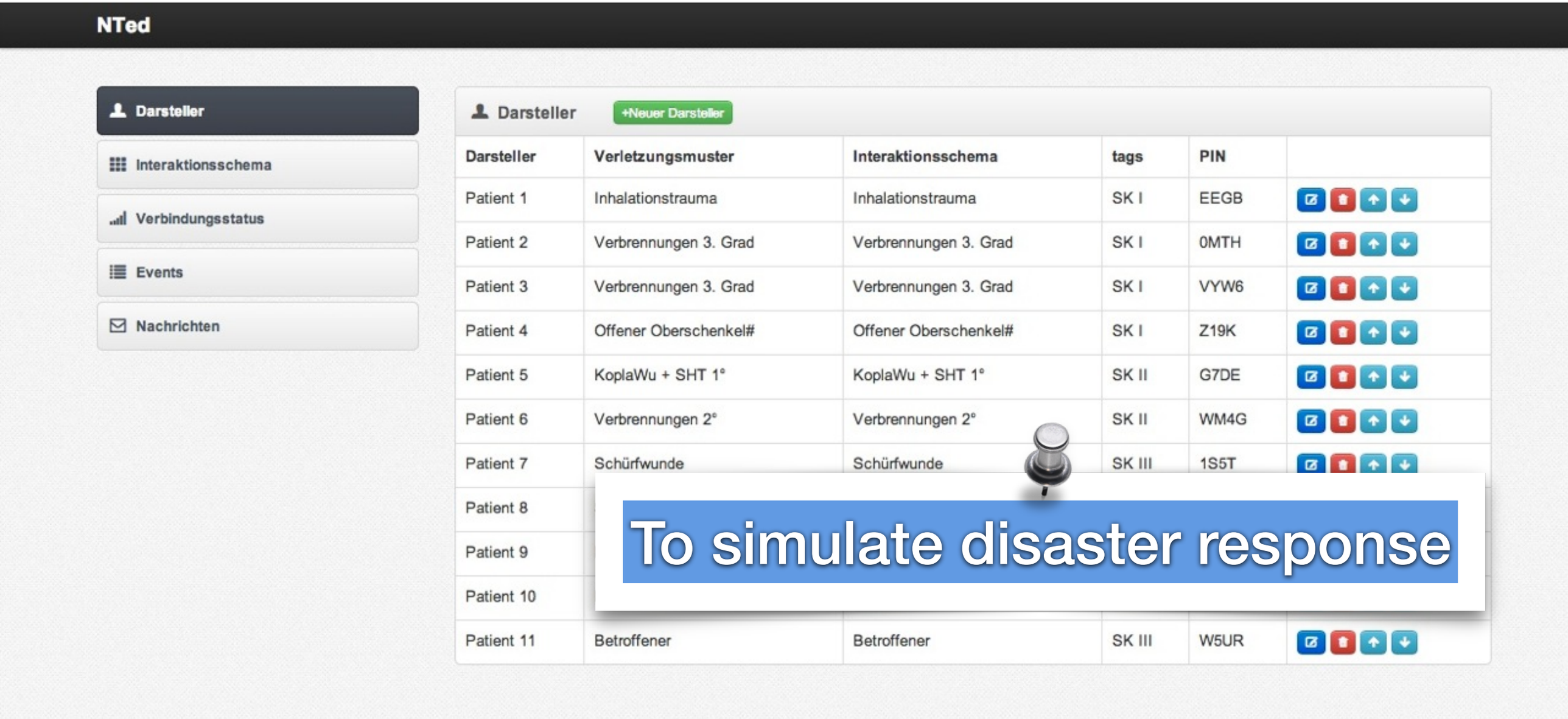
```
0000  62 69 48 04 01 00 00 09  6b 1e 28 1c 06 07 00 11   biH..... k.(.....
0008  86 05 01 01 01 a0 11 60  0f 80 02 07 80 a1 09 06   .......` ........
0010  07 04 00 00 01 00 19 02  6c 41 a1 3f 02 01 01 02   ........ lA.?....
0018  01 2c 30 37 80 08 62 02  43 68 10 91 50 f9 84 08   ..07..b. Ch..P...
00c8  91 94 51 97 10 00 08 00  04 21 24 8c 91 94 81 48   ..Q..... .!$....H
00d8  13 65 42 00 00 51 10 71  21 95 53 40 10 c8 32 9b   .eB..Q.q !.S@..2.
00e8  fd 06 99 e5 ef 36 00 0a  0e cb df 00               .....6.. ....
```

MobileTerminated ForwardSM

Programming environment for Programmable Logic Controllers



NTed: disaster scenario recovery



iBizLog - http://www.ibizlog.com

Full system developed in 5 months one dev (discontinued)

A product by Shdlworks

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drgeo

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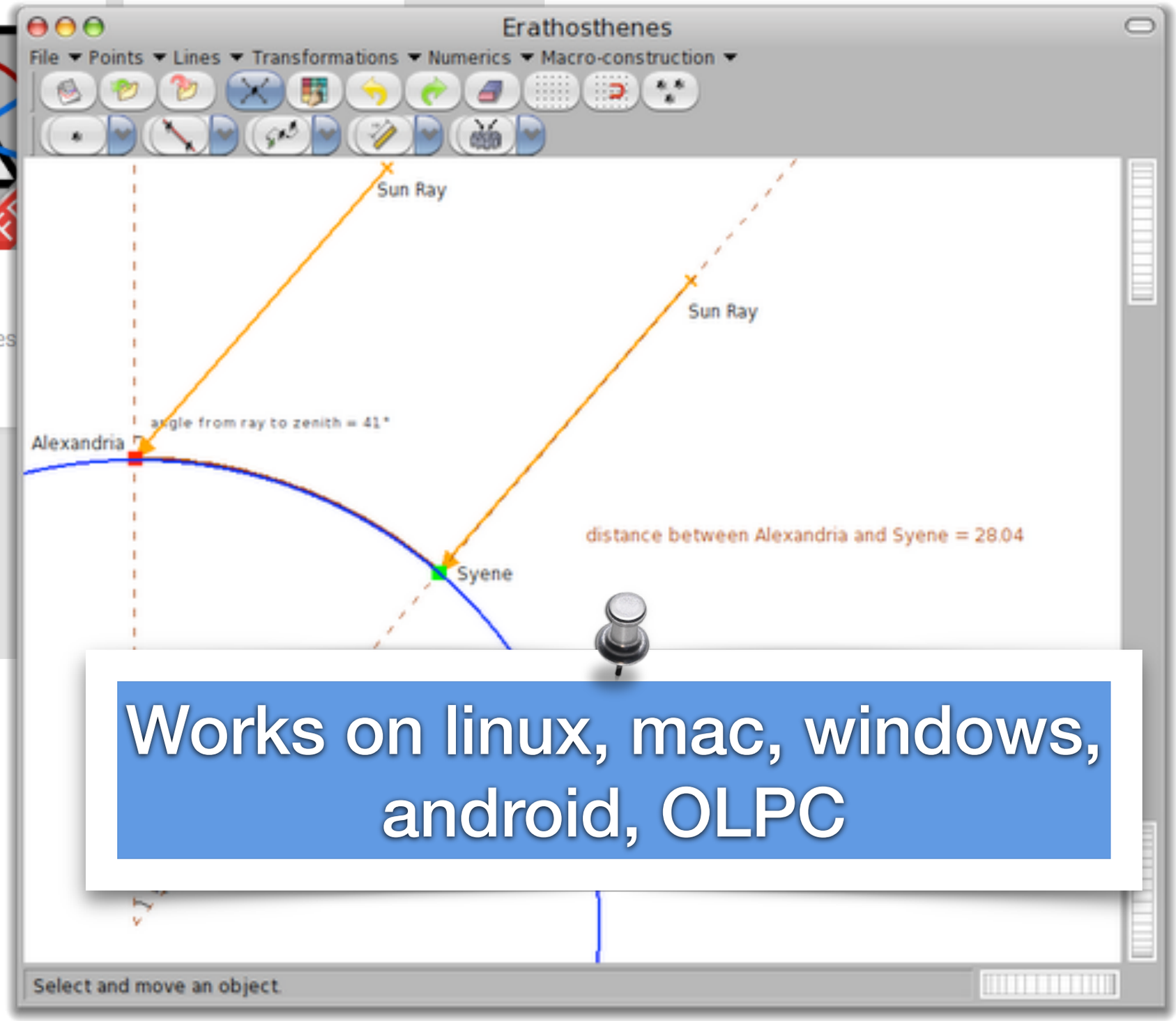
Dr. Geo free

Hilaire Fernandes



Works on linux, mac, windows, android, OLPC

Moose technology: Home

www.moosetechnology.org

Reader

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Moose is a platform for software and data analysis.

It is an open source project since 1996. It is supported by several research groups around the world, and it is increasingly adopted in industrial projects.

Download 4.7

The Moose Book

Sophisticated analysis platform more than 200 men/years

Call for help: webpage redesign
29 April 2013
We are starting a project to redesign the Moose webpage. The initial goals of the redesign are: * ...

Moose 5.0 roadmap
13 April 2013
A summary of the talk laying out the Moose 5.0 roadmap can be found at: http://www.humane-assessment...

Moose 4.8 development: 4045 green tests
20 March 2013
The move from Pharo 1.4 to Pharo 2.0 is finally complete: all 4045 tests are green. The continuous ...

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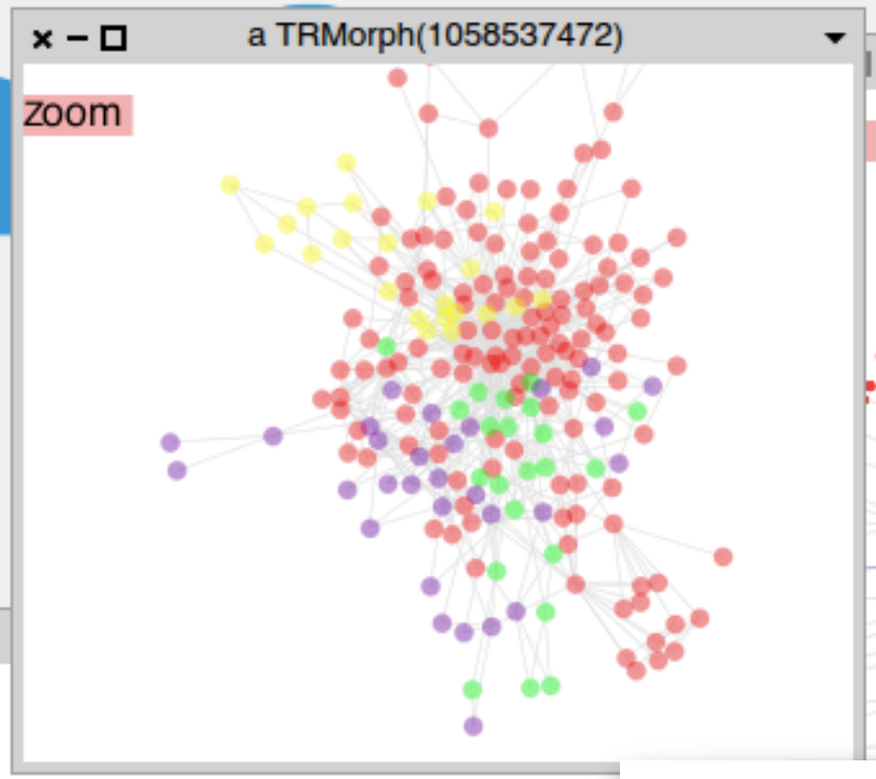
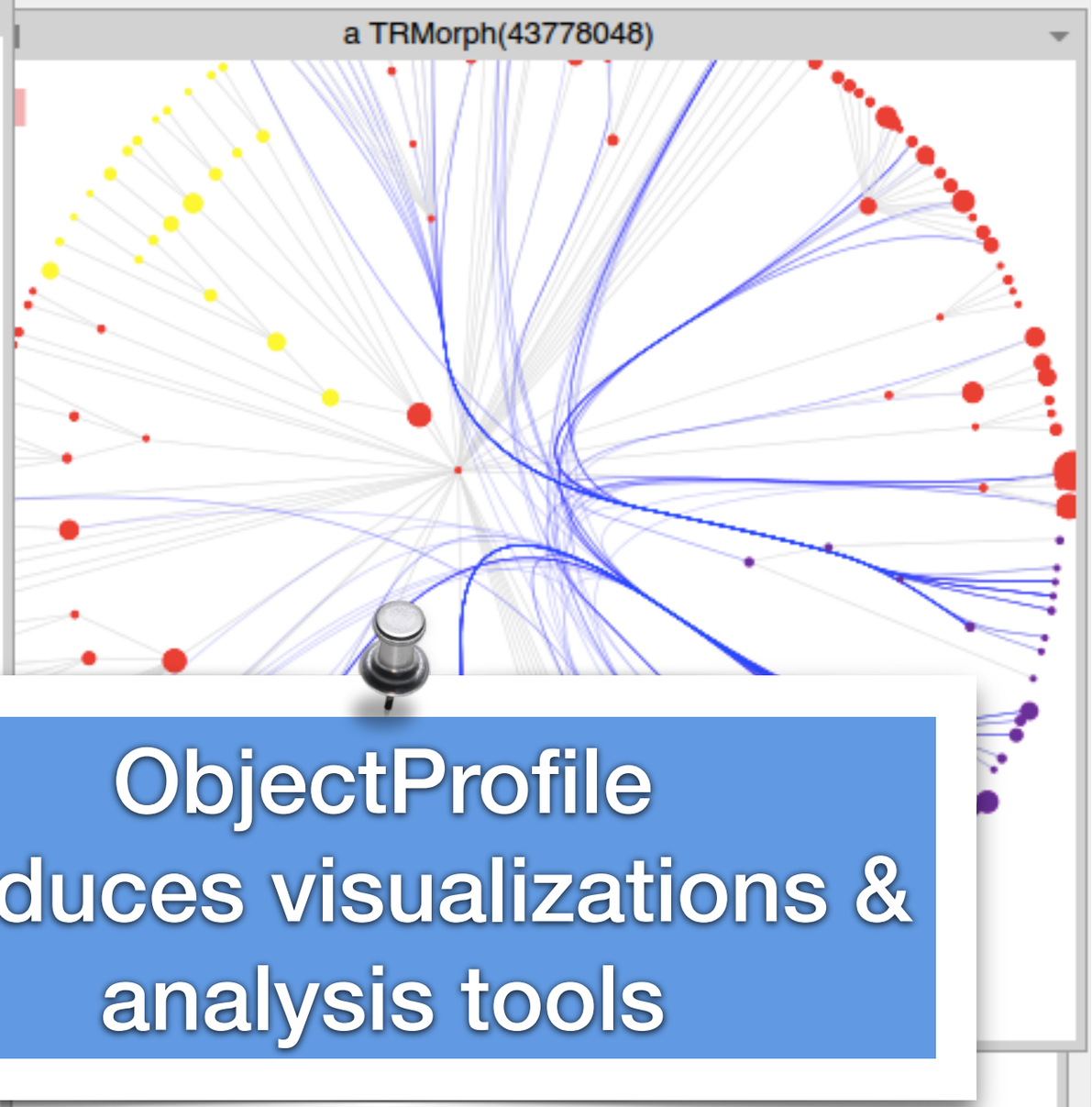
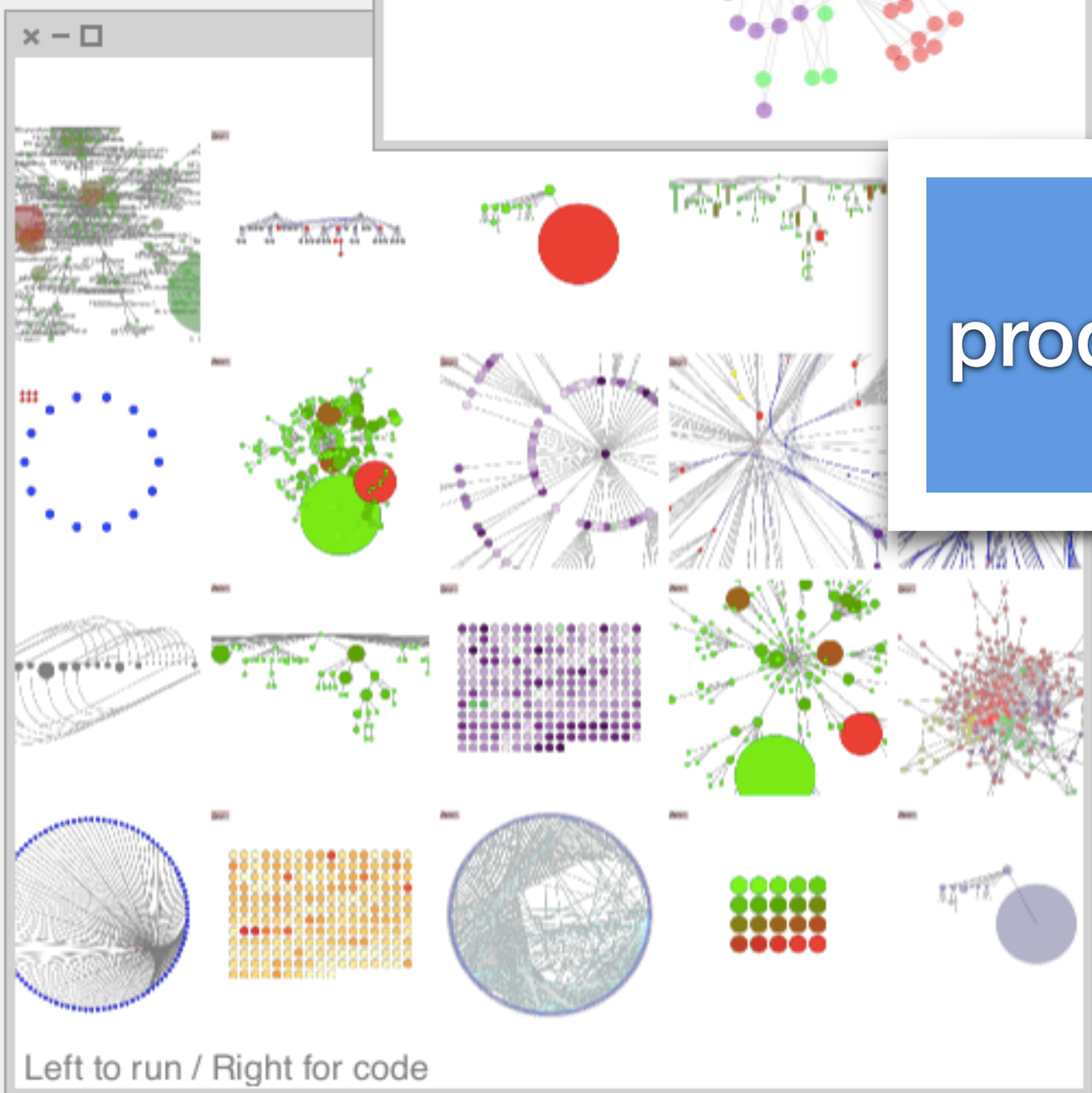
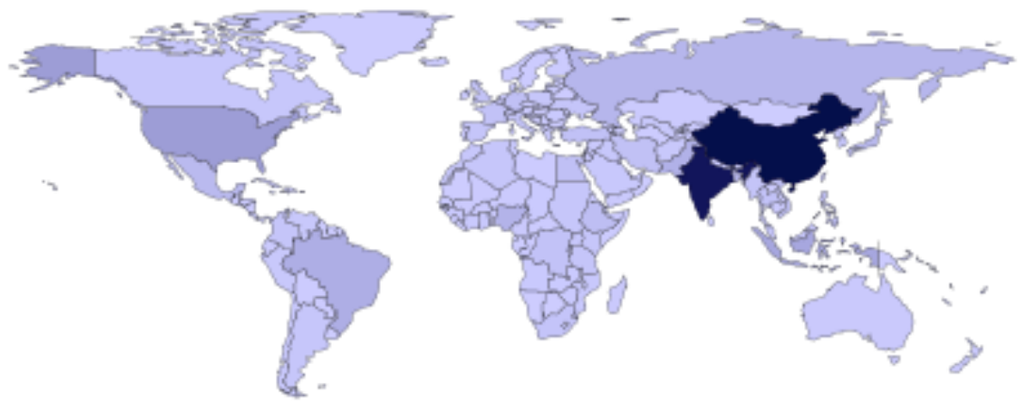






ObjectProfile produces visualizations & analysis tools



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- Your IT is critical to your company.
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- Start controlling your risks in a standardized and easy way !!!

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2 FASTER

NORIZZK.COM is the fastest way to compose your master and detailed test plan. It comes with a predefined knowledge base containing best practices for building your test plan, thus giving you a head start.

NORIZZK.COM allows sharing and reusing knowledge and experiences from previous projects. Over time, NORIZZK.COM becomes smarter in guiding you since it is self-learning and continuously improves its best practices.

YOUR ADDED VALUE

3 CHEAPER

As from now, wasting time and money by re-inventing the wheel is history. NORIZZK.COM gives you significant savings in creating your test plans.

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Identify, categorize, prioritize and mitigate your risks with one single tool.

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Write your master and detailed test plan in a faster way.

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Estimate all the required testing effort on one single page.

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Capture all the test results to monitor the progress.

Reporting
Monitor the progress using the Risk

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Export your test plan to a docx file.

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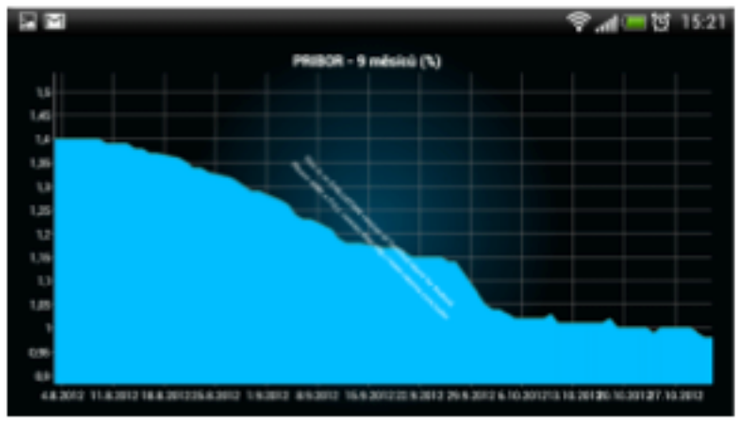
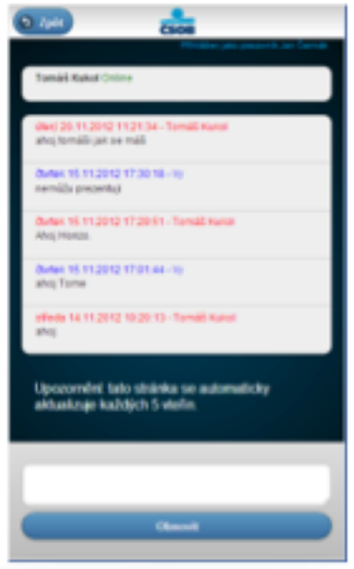
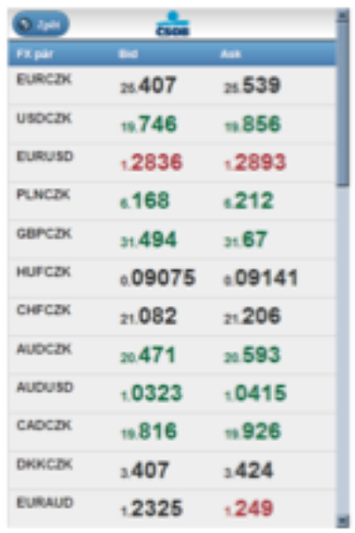
Discover intelligence in your testing

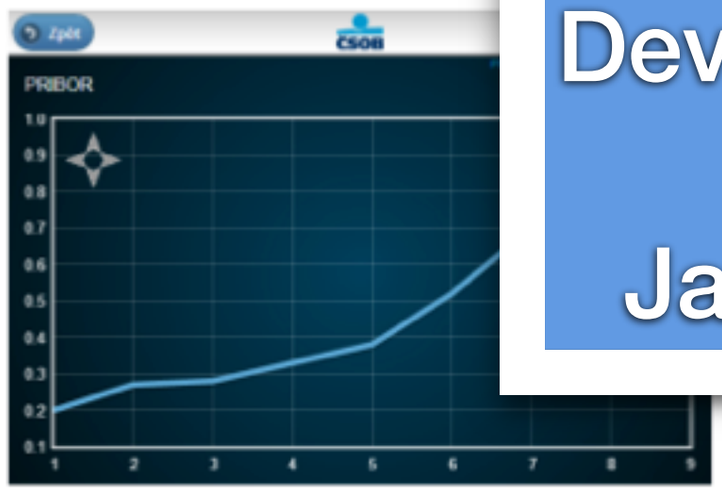
LEARN MORE

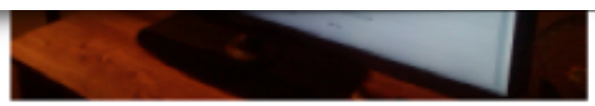
ČSOB











Developed in 3 months one dev
Sold to Belgium bank
Java team estimated 2 years

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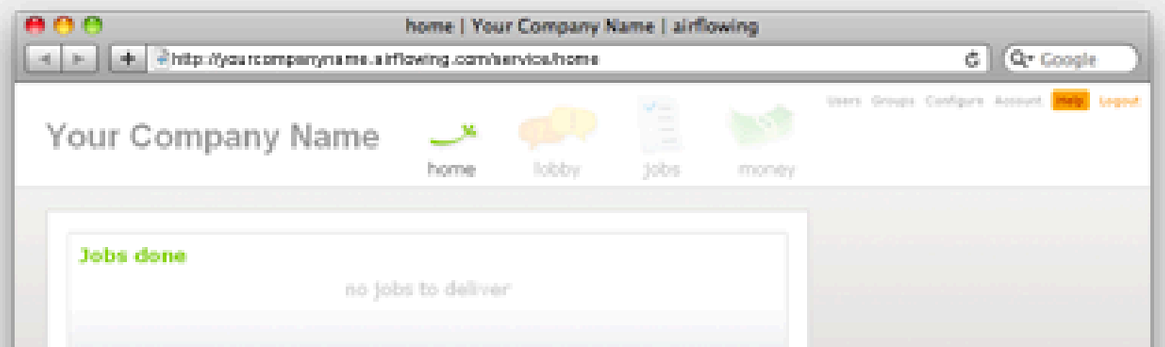
Deployed business model did not work



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Dedicated and cost-effective tools for software evolution

Dedicated Analyses

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Dedicated tools

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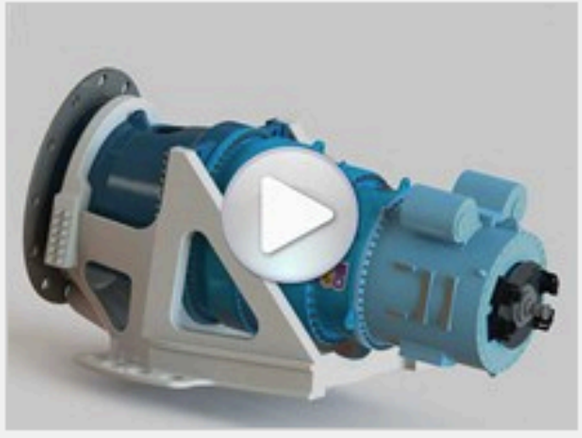

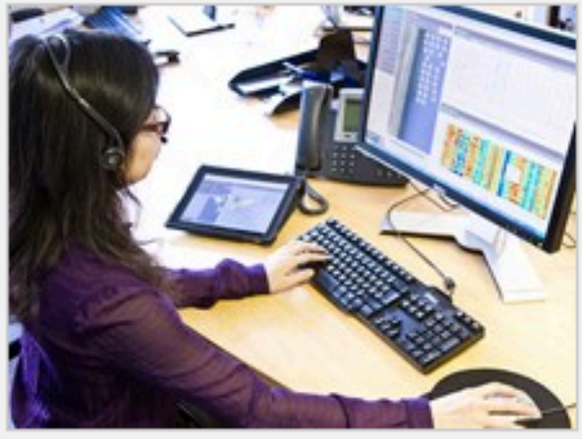

Related links

- InSight
- RomaxWIND
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- Analysis service
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Overview | Why we are specialists | Who we work with

Wind Energy

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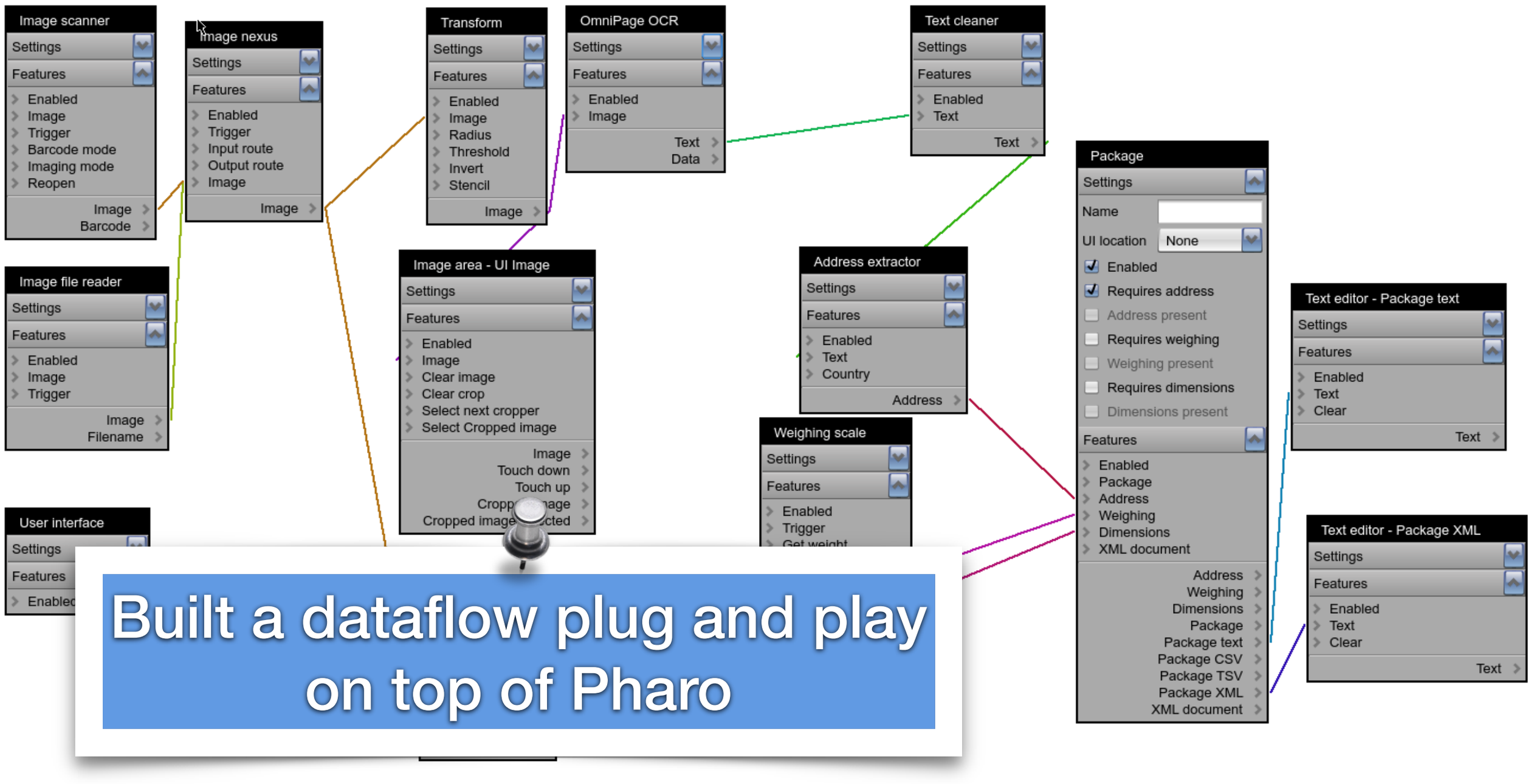
Pioneering new ways of maximising sustainable wind energy yields

Wind industry solutions

postid

scan share send

handle return mails in Switzerland



Built a dataflow plug and play on top of Pharo

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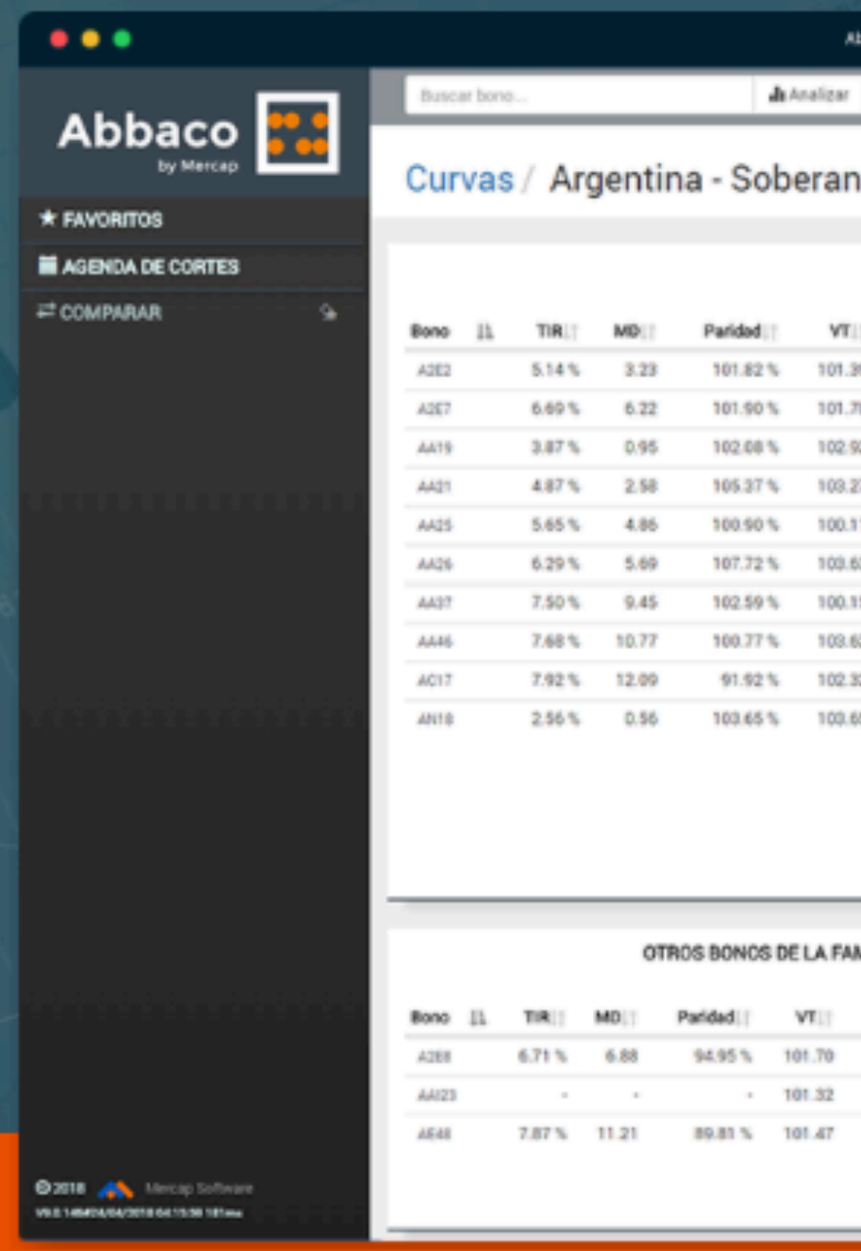
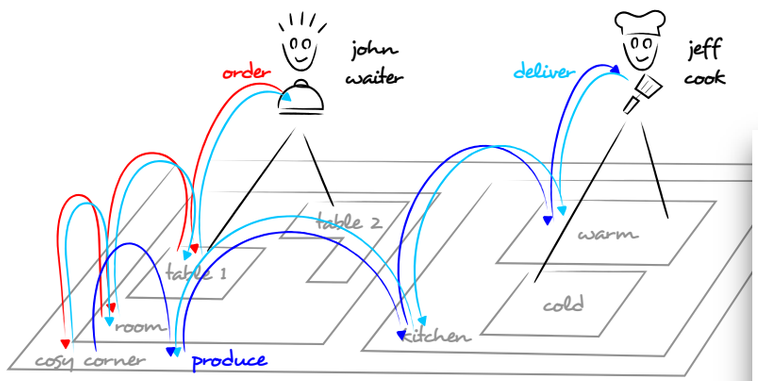


feenk



Help growing startups
Get back control on software

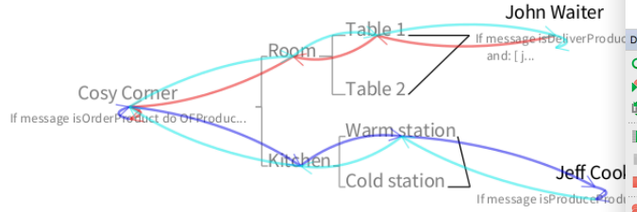
Playground

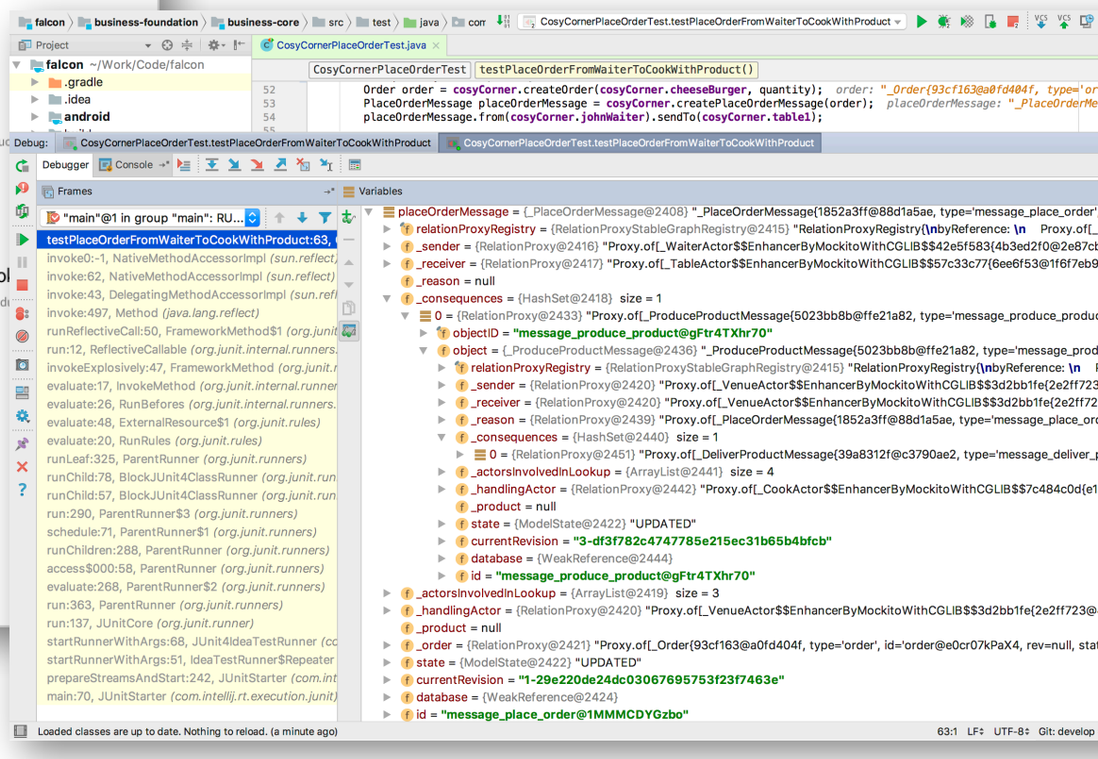
ofdemo2

```
"CONTRIBUTORS"
jeffCook := OFCookActor new name: 'Jeff Cook'.
johnWaiter := OFWaiterActor new name: 'John Waiter'.
"AREAS"
cosyCorner := OFVenueActor new name: 'Cosy Corner'.
kitchen := OFRoomActor new name: 'Kitchen'; parentArea: cosyCorner.
warmStation := OFKitchenActor new name: 'Warm station'; parentArea: kitchen; addContributor:
jeffCook.
coldStation := OFKitchenActor new name: 'Cold station'; parentArea: kitchen; addContributor:
jeffCook.
room := OFRoomActor new name: 'Room'; parentArea: cosyCorner.
table1 := OFTableActor new name: 'Table 1'; parentArea: room; addContributor: johnWaiter.
table2 := OFTableActor new name: 'Table 2'; parentArea: room; addContributor: johnWaiter.
"PRODUCTS"
steak := OFProduct new name: 'Steak'; characteristics: {OFPWarm}.
sandwich := OFProduct new name: 'Sandwich' ; characteristics: {OFPCold}.
cosyCorner products: { steak . sandwich }.
"MESSAGE HANDLERS"
cosyCorner addScriptedMessageHandler
   when: [ :message | message isOrderProduct ];
   execute: [:message :handler | OFProduceProductMessage new ].
jeffCook addScriptedMessageHandler
   when: [ :message | message isProduceProduct ];
   execute: [ :message :handler |
      handler
         queue: message
         to: [OFDeliverProductMessage new to: handler actor areas anyOne] ].
johnWaiter addScriptedMessageHandler
   when: [ :message |
      message isDeliverProduct and: [
         johnWaiter areas includes: message initialReason receiver ] ];
   execute: [:message :handler |
      handler
         queue: message
         to: [ self inform: message product gtDisplayString, ' delivered!' ] ].
cosyCorner.
"ORDERS"
orderSteak := OFOrderProductMessage new product: steak; sendBy: johnWaiter to: table1.
orderSandwich := OFOrderProductMessage new product: sandwich; sendBy: johnWaiter to: table1.
cosyCorner
```

an OFOrderProductMessage (Order Steak)

Propagation | Raw | Lookup | Consequence (... | Consequences | Involved actors | Meta





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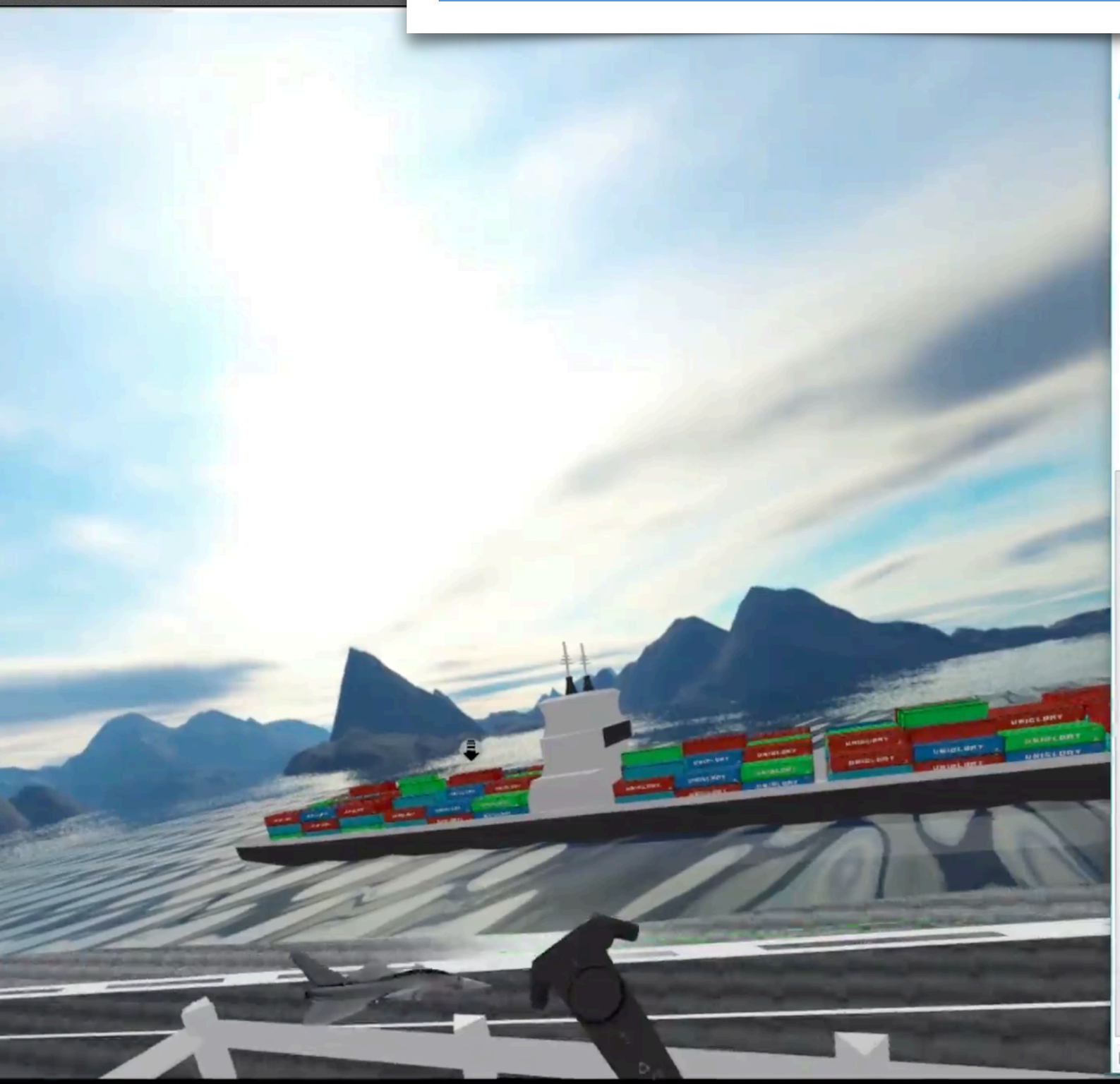
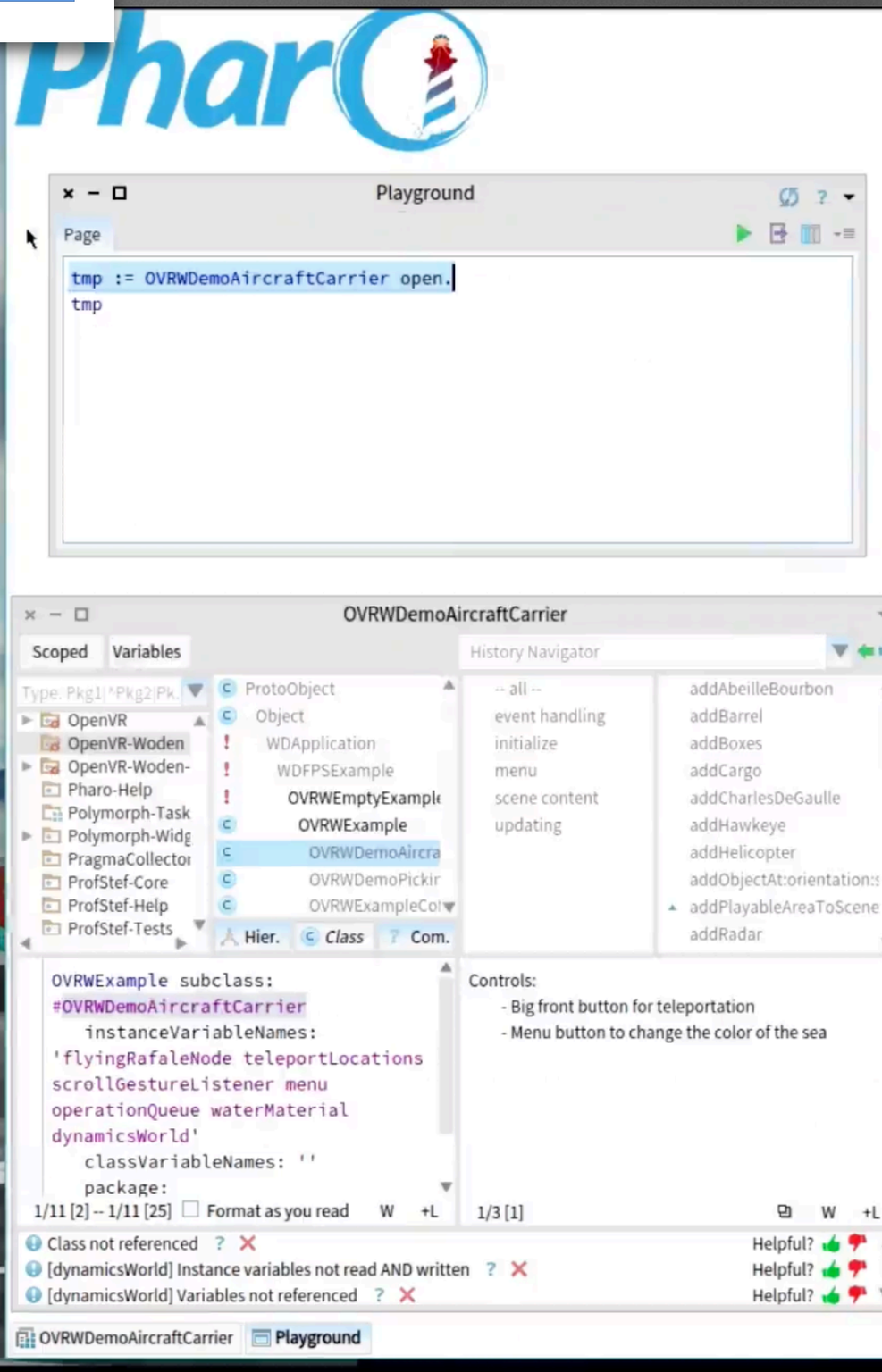
glamoroustoolkit

feenk.com/gt

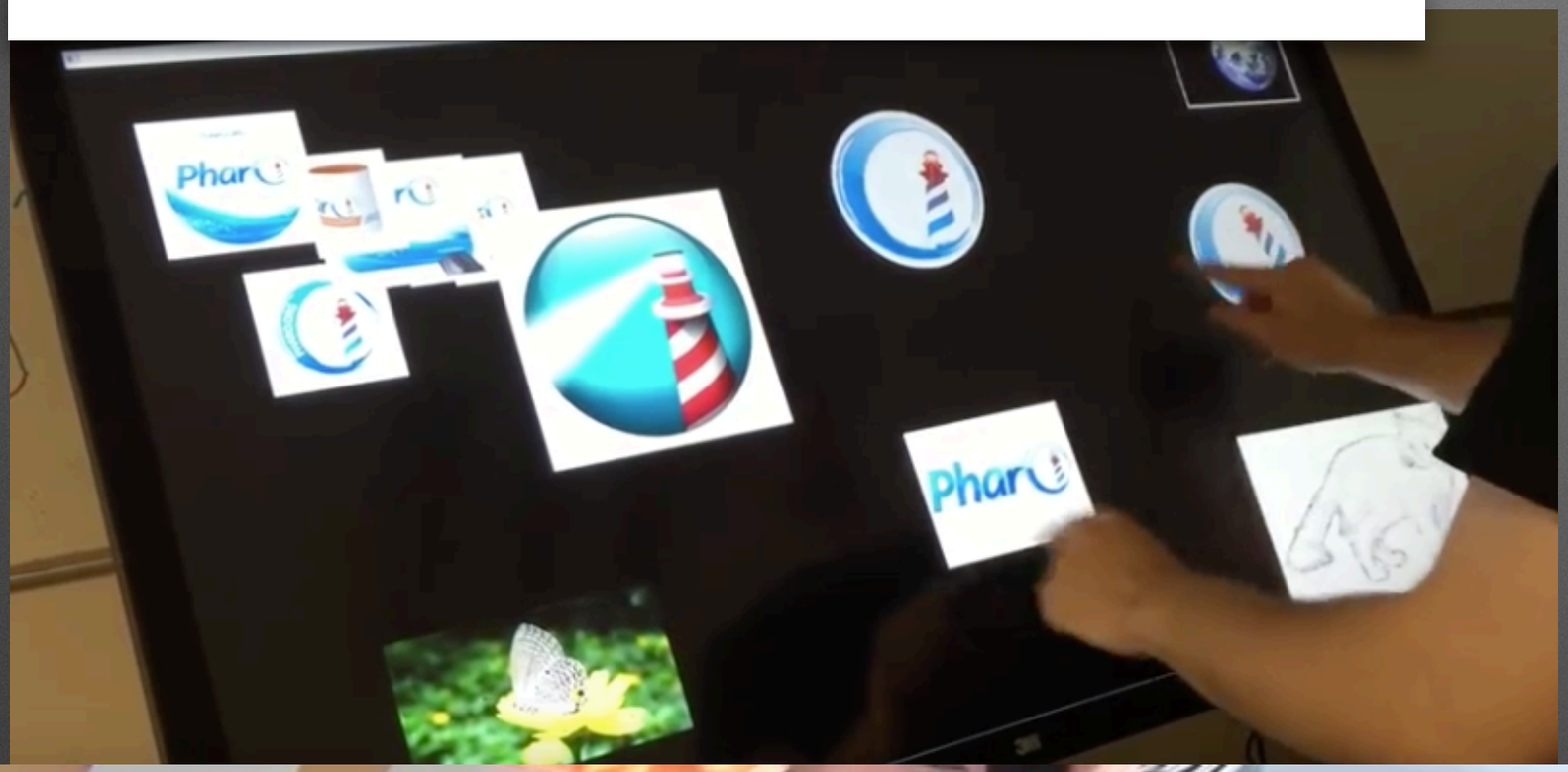
Build advanced tools for business experts and CEO of large companies

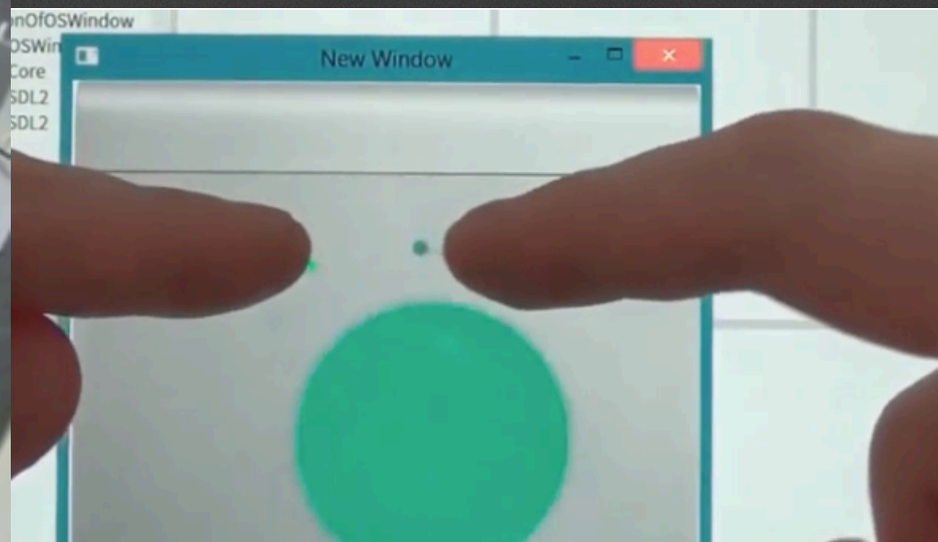
Thales prototyping VR



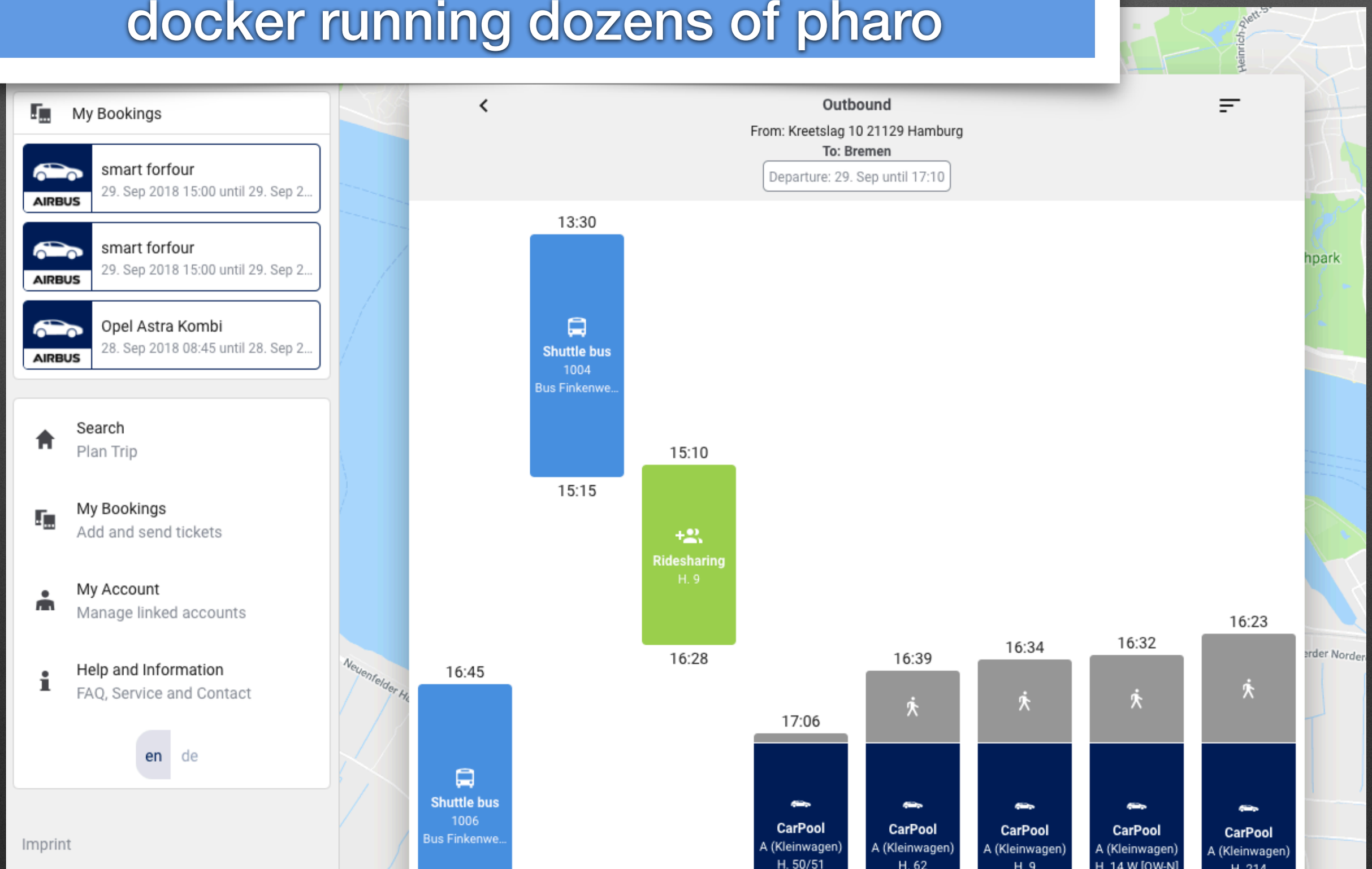


Thales prototypes advanced interaction design





Mobility Map: a broker for mobility services
multi-modal routing search
docker running dozens of pharo



Remember? Our goal...

A powerful engine to invent (y)our future

An ecosystem where innovation/business bloom

You are not alone...

Industrial consortium

http://consortium.pharo.org

No marketing
No hype
Adults deciding to use
Understanding strengths and
weaknesses

We are a cool community

More Pharo's Teachers

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SCG (CH)
CAR (FR)
RMOD (FR)
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OC (FR)
CCMI-FIT (CZ)
ASERG (BR)
Pleiad (CL)
SoftQual(Serb)

A Pure OO World

Only objects +

messages + closures!

mouse, booleans, arrays, numbers, strings, windows, scrollbars, canvas, files, trees, compilers, sound, url, socket, fonts, text, collections, stack, shortcut, streams, …

Domain Modeling = Focus on your domain

Amazing moldable tools

Customize object interaction/presentation to focus on YOUR domain

Playground

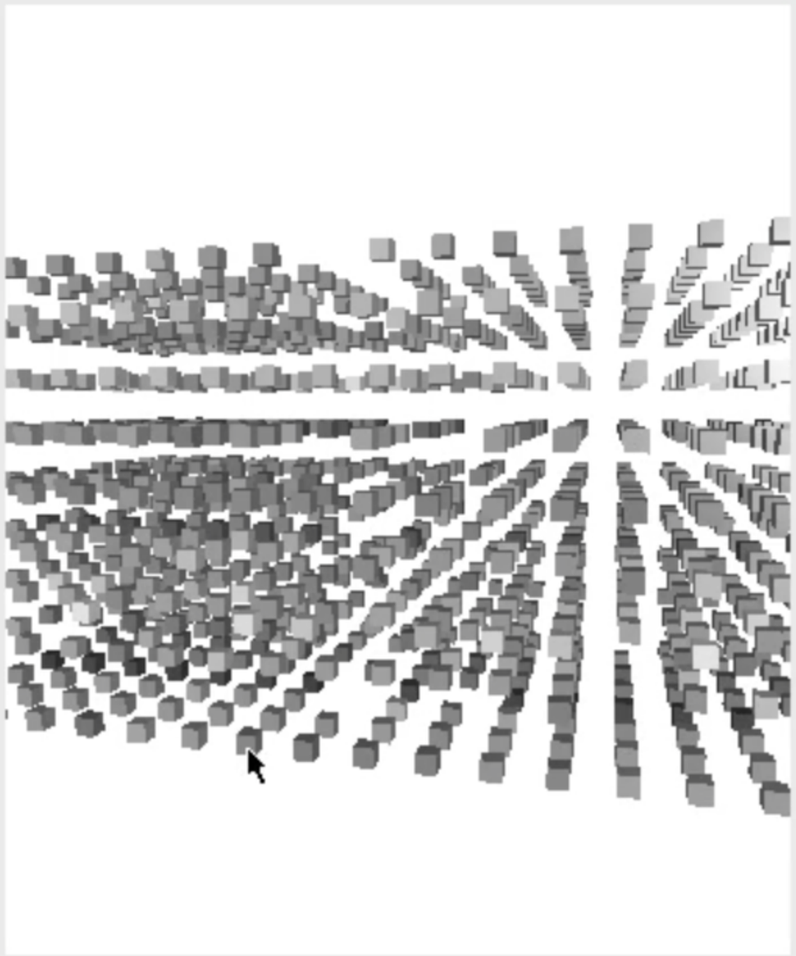
Page

```
data := TestData new data.


cube := MatrixCube new initWithData: data.
cube view
```

a RWView

Raw | Live | Meta



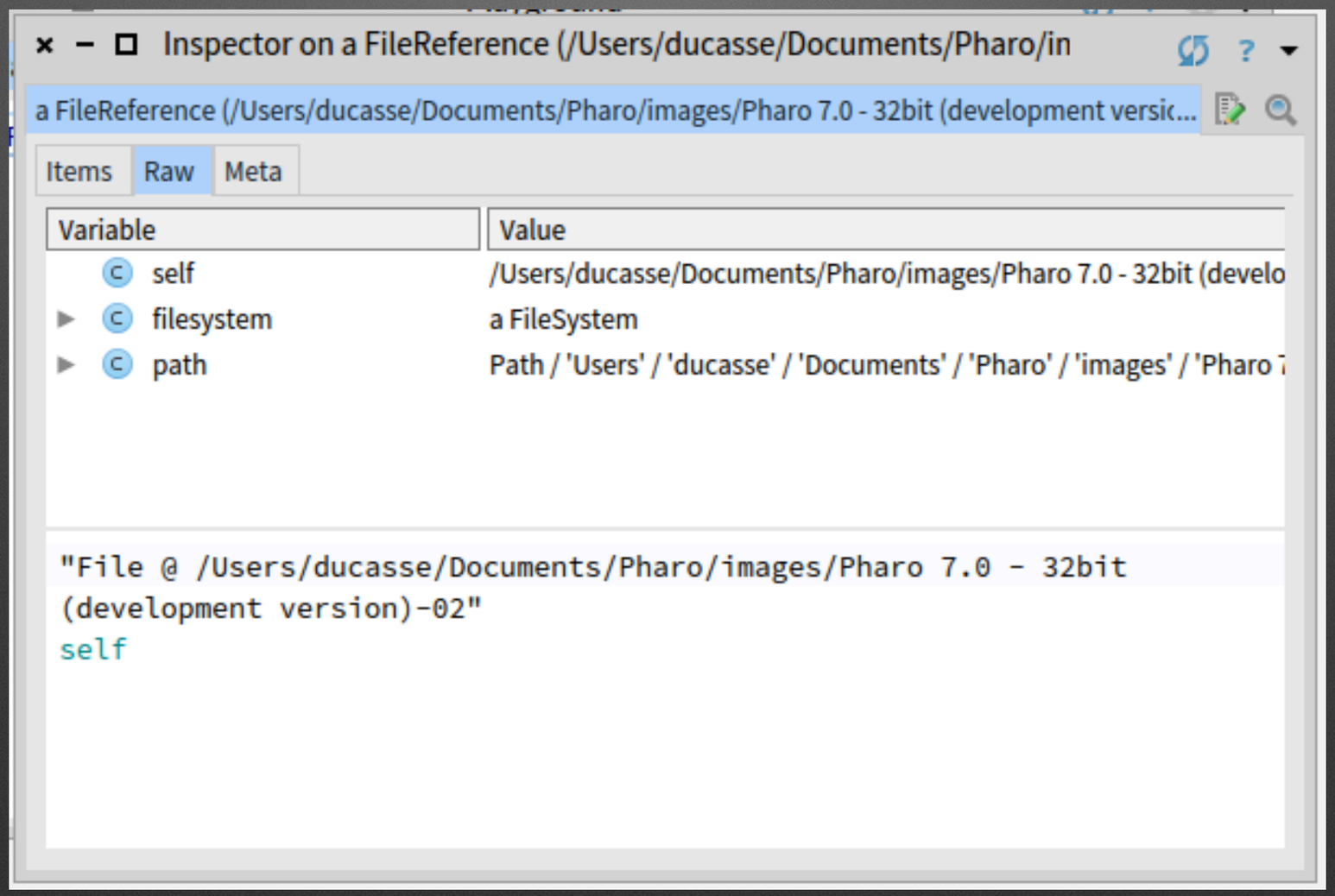
an Array [4 items] ('2000-01-01' 'Malawi' 'France'...

Items | Raw | Meta

Index	Item
1	'2000-01-01'
2	'Malawi'
3	'France'
4	'400.0'

enter search query (example: "each = 5")

Traditionally a file reference…



Inspector on a FileReference (/Users/ducasse/Library/Application Support/Pharo/images/SpurForShooting6)

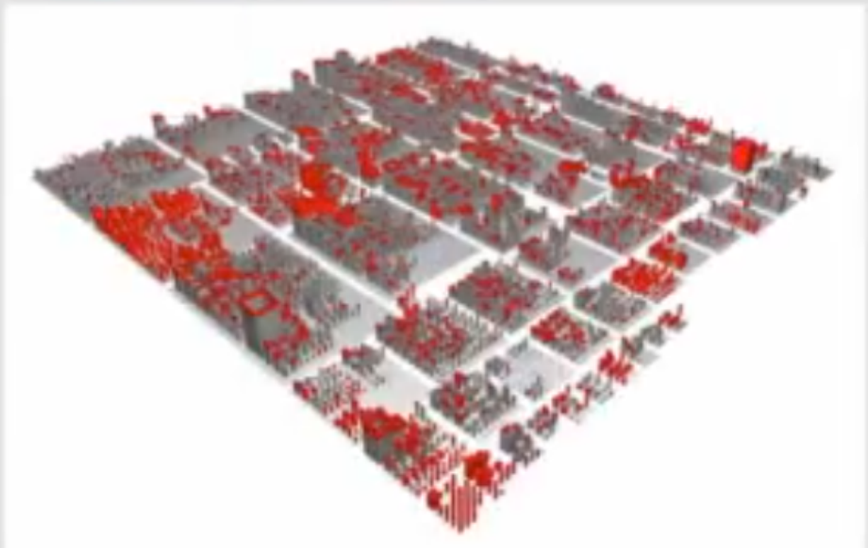
a FileReference (/Users/ducasse/Library/Application Support/Pharo/images/SpurForSh...

Items | Raw | Meta

Name	Size	Creation
..	408 B	2016-03-04 20:23:03
current	238 B	2016-02-25 10:34:24
.DS_Store	6.15 kB	2016-02-25 10:34:44
pharo-city.png	136.55 kB	2015-06-25 17:31:20
pharo.log	155.14 kB	2015-06-30 14:51:30
photos.zip	157.78 kB	2015-06-30 16:59:24
script.st	291 B	2015-09-17 15:21:14
scripts.zip	1.53 kB	2015-07-15 01:48:50

a FileReference (/Users/ducasse/Library/Application Support/Pha

Picture | Contents | Raw | Meta



Inspector on a DiceHandle class (DiceHandle)

a MethodDictionary [5 items...

It... Ke... Raw Meta

Key	Value
#add:	DiceHandle>
#initialize	DiceHandle>
#dices	DiceHandle>
#+	DiceHandle>
#roll	DiceHandle>

Quick selection field. Given your

a CompiledMethod (DiceHan...

... I... S... Ir A... He... Me...

- RBMethodNode(+ anHandle |
  - RBArgumentNode(anHandle)
  - RBSequenceNode(| hn | hn :=
    - RBTemporaryNode(hn)
    - RBAssignmentNode(hn := D
      - RBMessageNode(DiceHar
      - RBTemporaryNode(hn)
    - RBMessageNode(self dices
    - RBMessageNode(anHandle
    - RBReturnNode(^ hn)

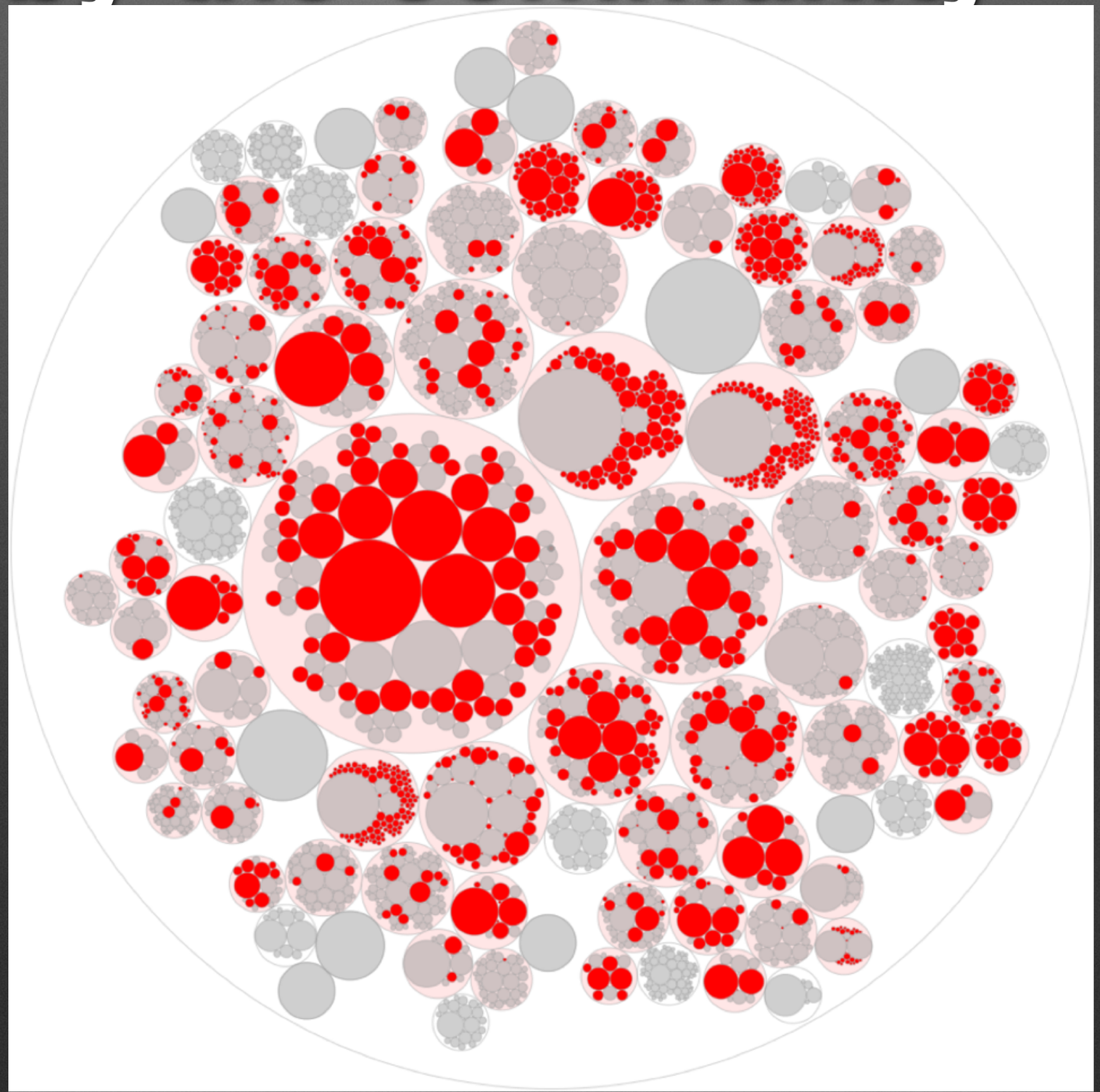
a RBAssignmentNode (RBAs...

F... S... Tr... Scc... Meta

```
+ anHandle

    | hn |
    hn := DiceHandle new.
    self dices do: [ :aDice | hn
add: aDice ].
    anHandle dices do: [ :aDice |
hn add: aDice ].
    ^ hn
```

of specific views developed by the community



Hot update on the spot customizable debugger

QuittanceGenerator class>>#exampleJustMonthAndRenter

Halt

Bytecode

Stack

Proceed Restart Into Over Through

PDFCellElement	getSubElementsWith:styleSheet:
PDFCellElement(PDFComposite)	generateCodeSegmentsCollectionWi
PDFCellElement(PDFComposite)	generateCodeSegmentWith:styleShe
PDFDataTableElement(PDFComposite)	generateCodeSegmentsCollectionWi [:aSubElement | aSubElement generateCodeSe
Array(SequenceableCollection)	collect:

Source

Where is? Browse

```
generateCodeSegmentsCollectionWith: aPDFGenerator styleSheet: compositeStyleSheet format: aFormat
    ^ (self getSubElementsWith: aPDFGenerator styleSheet: compositeStyleSheet)
        collect: [ :aSubElement |
            aSubElement
                generateCodeSegmentWith: aPDFGenerator
                styleSheet: (aSubElement buildCompositeStyleSheetFrom: compositeStyleSheet)
                format: aFormat ]
```

Variables

Type	Variable	Value
implicit	self	a PDFCellElement
parameter	aFormat	a PDFA4Format
parameter	aPDFGenerator	a PDFGenerator
parameter	compositeStyleSheet	a StyleSheet

```
        dimension: 80 mm @ 20 mm;
```

debug it

Bytecode GT

Parser Stack | Through Action | Into Reduce | Next Token

Symbol	Value
Expression	a JSUnaryExpressionNode
")"	{)(238498,238498,#(23))}
"{"	{{(238499,238499,#(25))}
StatementList	an OrderedCollection(a JSExpressionStatementNode a JSI
"("	{((238678,238678,#(28))}
"function"	{function(238679,238686,#(53 82))}
Identifieropt	nil
"("	{((238687,238687,#(28))}
FormalParameterListopt	an Array(an OrderedCollection() an OrderedCollection())
")"	{)(238688,238688,#(23))}
"{"	{{(238689,238689,#(25))}
SourceElements	an OrderedCollection(a JSVariableStatementNode a JSVari
MemberExpression	a JSNameExpressionNode
"."	{.(274447,274447,#(38))}

Possible Actions

Symbol	Action
<identifier>	Shift
IdentifierName	Shift

GLR

1

Input | Step to Cursor

```
            return t._stash(this); // dojo.NodeList
        }

    });

    nl.events = [
        // summary:
        //          list of all DOM events used in NodeList
        "blur", "focus", "change", "click", "error", "keydown", "keypress",
        "keyup", "load", "mousedown", "mouseenter", "mouseleave", "mousemove",
        "mouseout", "mouseover", "mouseup", "submit"
    ];

    // FIXME: pseudo-doc the above automatically generated on-event functions

    // syntactic sugar for DOM events
    d.forEach(nl.events, function(evt){
```

Scanner | Step Next Character

Name	Value
State	default

Stack | Proceed | Restart | Into | Over | Through

JSParser(SmaCCGLRParser)	performParsingStep	
JSParser(SmaCCGLRParser)	performParsingLoop	
JSParser(SmaCCParser)	parse	
JSParser class(SmaCCParser class)	parseStream:startingAt:	
JSParser class(SmaCCParser class)	parseFile:	[self parseStrean
BlockClosure	ensure:	
JSParser class(SmaCCParser class)	parseFile:	
UndefinedObject	DoIt	
CompiledMethod	valueWithReceiver:arguments:	
RubSmalltalkEditor	debug:receiver:in:	[aCompiledMethc
BlockClosure	newProcess	[self value.Proces

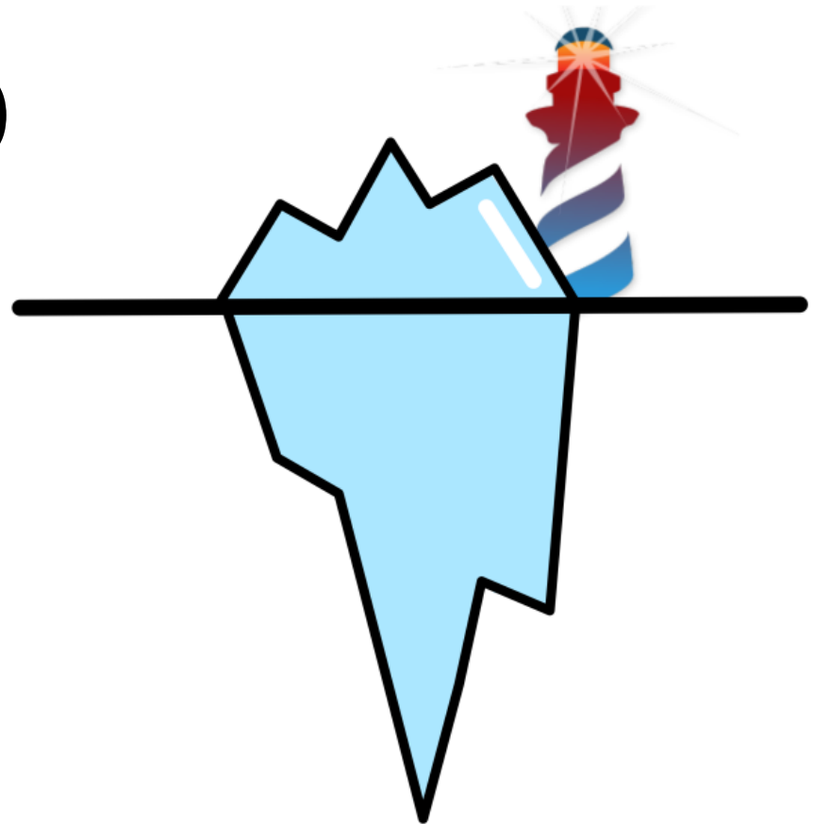
Source | Where is? | Browse

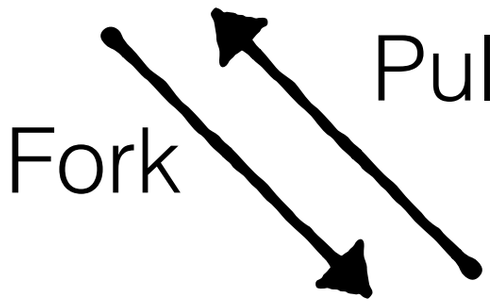
```
(tryAllStates and: [ self isEOFToken ])
    ifTrue: [ ^ self processEOFToken ].
currentToken isPattern
    ifTrue: [ ^ self splitForPatternToken ].
[ actions := self actionsForCurrentToken.
actions isEmpty
    ifTrue: [ self killState.
        currentToken := nil.
        ^ self ].
2 to: actions size do: [ :i | self splitWithAction: (actions at: i) ].
action := actions first.
action = self acceptAction
    or: [ self performAction: action.
        currentToken isNil ] ] whileFalse.
action = self acceptAction
    ifTrue: [ currentState markAccepted ]
```

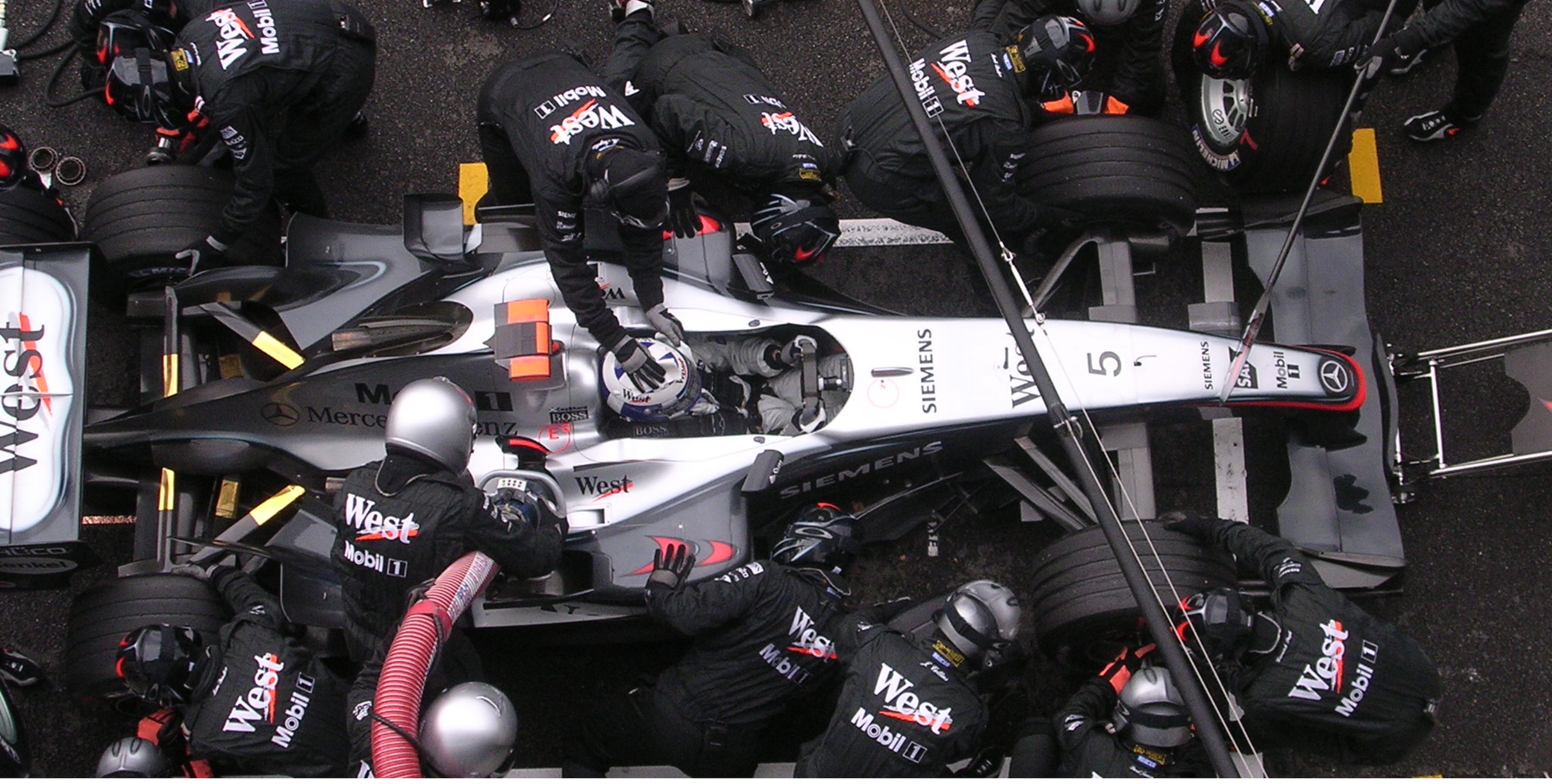
Since may 2008

Pharo 7.0 - Nov 2018 … 63 contributors - 111 Forks.
Pharo 6.0 - Apr 2017 100 commiters (1700 issues closed)
Pharo 5.0 - Apr 2016 90 commiters (1600 issues closed)
Pharo 4.0 - Apr 2015 70 commiters (1271 issues closed…)
Pharo 3.0 - Apr 2013 (2364 issues closed)
Pharo 2.0 - Apr 2013 (1727 issues closed)
Pharo 1.4 - Apr 2012 (860 updates)
Pharo 1.3 (700 updates)
Pharo 1.2 - mar 2011 (500 updates)
Pharo 1.1 - jul 2010 (410 updates)

Starting to get GitHub exposure







Pharo is our vehicle
We improve it everyday

Of course not everything is perfect :)
But it feels like

Pharo

is yours

- A powerful, innovative and flexible framework
- Dedicated to build complex Web applications
- Live coding and debugging
- Support reusable Web components
- Secure by default
- Web 2.0 support (Ajax, Reef, ...)
- REST integration

Concentrate on your application ...

... no manual
request parsing

… no XML configuration files

Natural Flow

We don’t think in pages …

..., but in stateful components

Valid

Source: stock.xchng, Al Nakib

Secure by default
no injection

WACounter [R|S]

Development tools

New Session Configure Toggle Halos Profiler Memory Terminate Deprecated XHTML 10/12 ms

http://books.pharo.org

Pharo Books

Pharo is a clean, innovative, open-source, live-programming environment.

Contribute to the SquareBracketsAssociates community free books
https://github.com/SquareBracketAssociates/

Access the book compilation farm!

Pharo by Example, intended for both students and developers, will guide you gently through the Pharo language and environment by means of a series of examples and exercises.

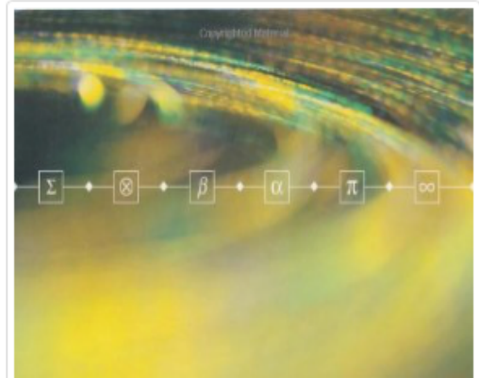
View details »

Deep into Pharo is the second volume of a series of books covering Pharo. Whereas the first volume is intended for newcomers, this second volume covers deeper topics.

View details »

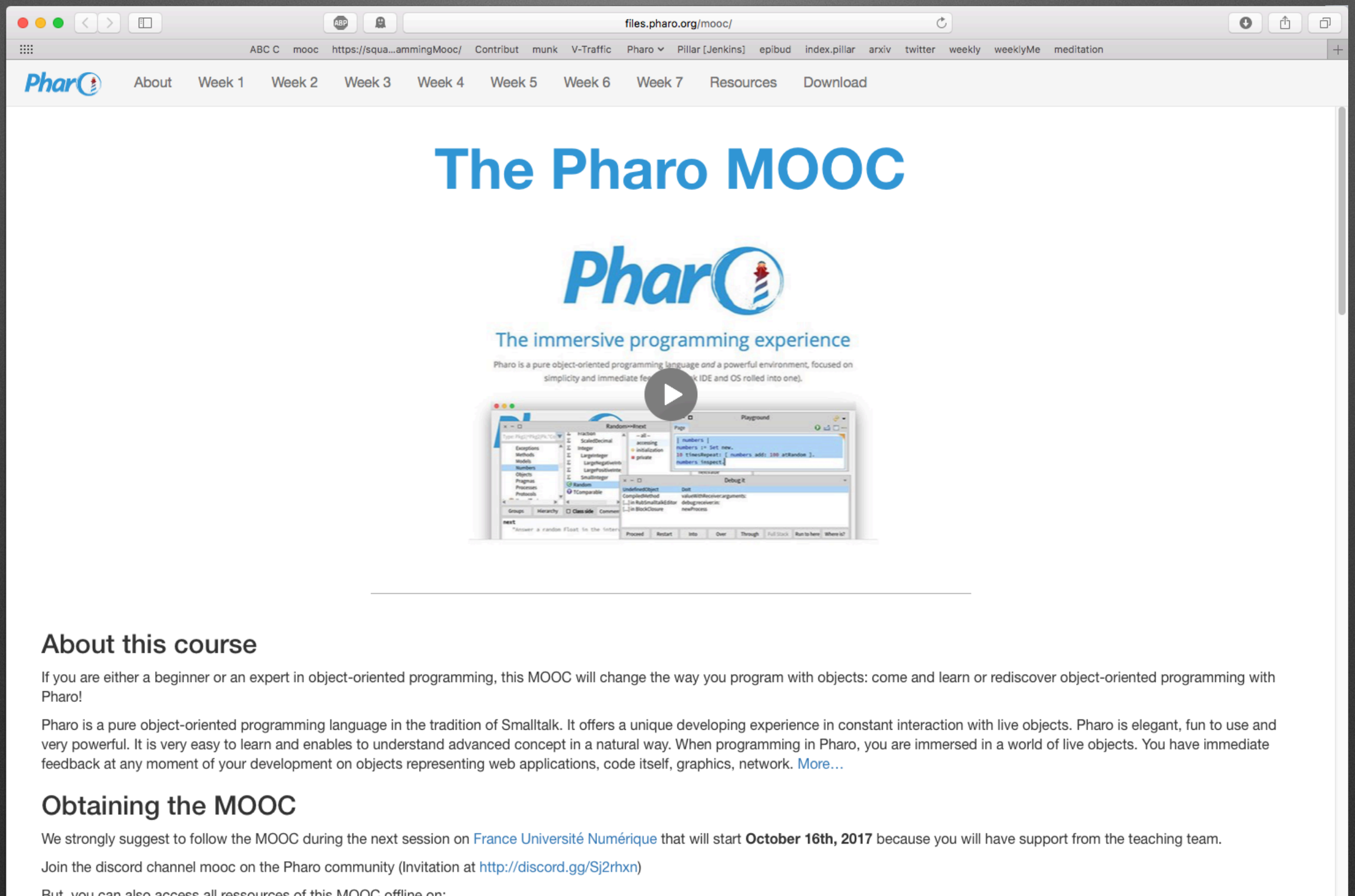
Enterprise Pharo is the third volume of the series. This book covers libraries and frameworks for enterprises, and in particular those doing web development.

View details »

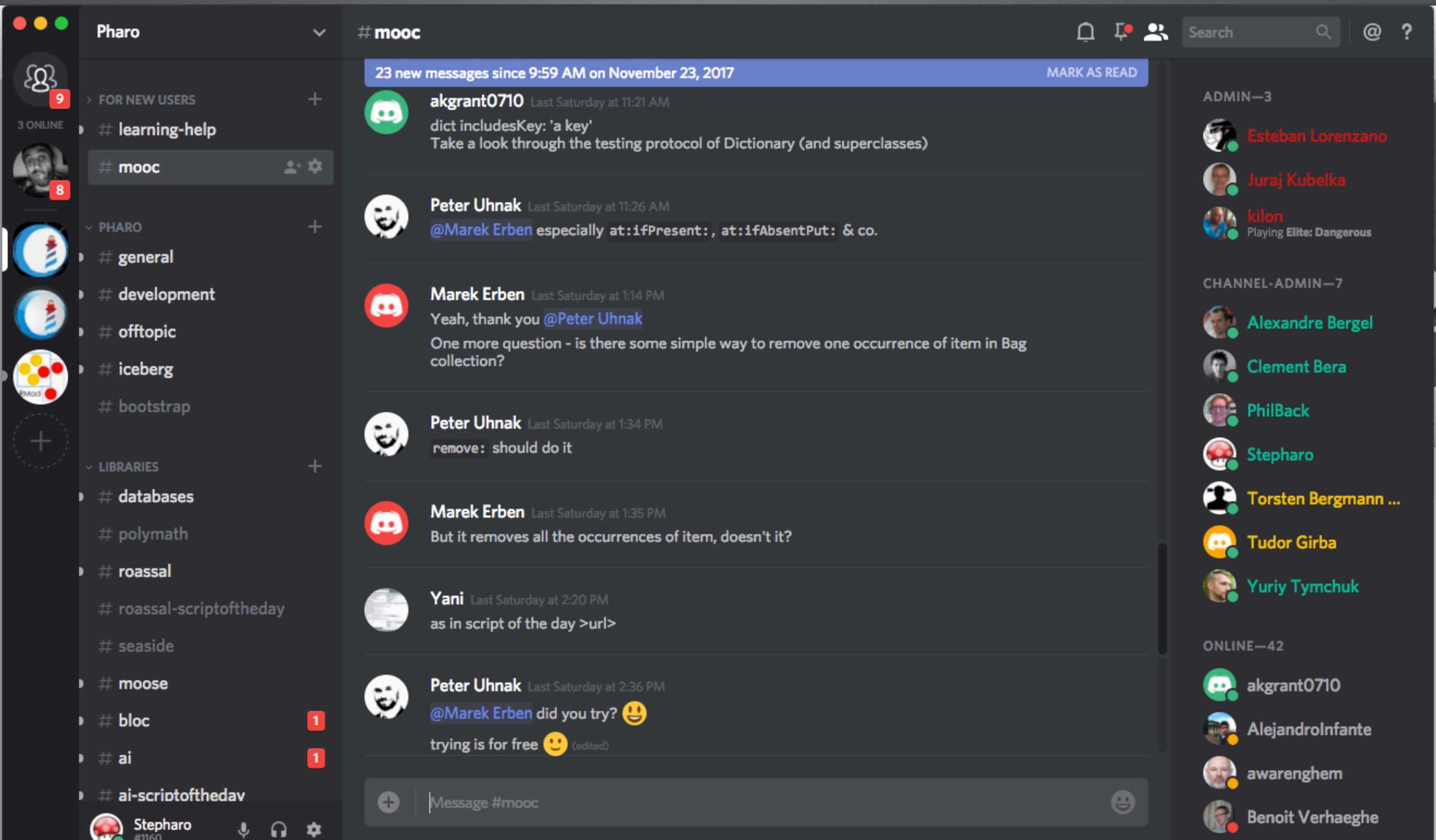


TinyBlog: Un Tutorial Web en Pharo

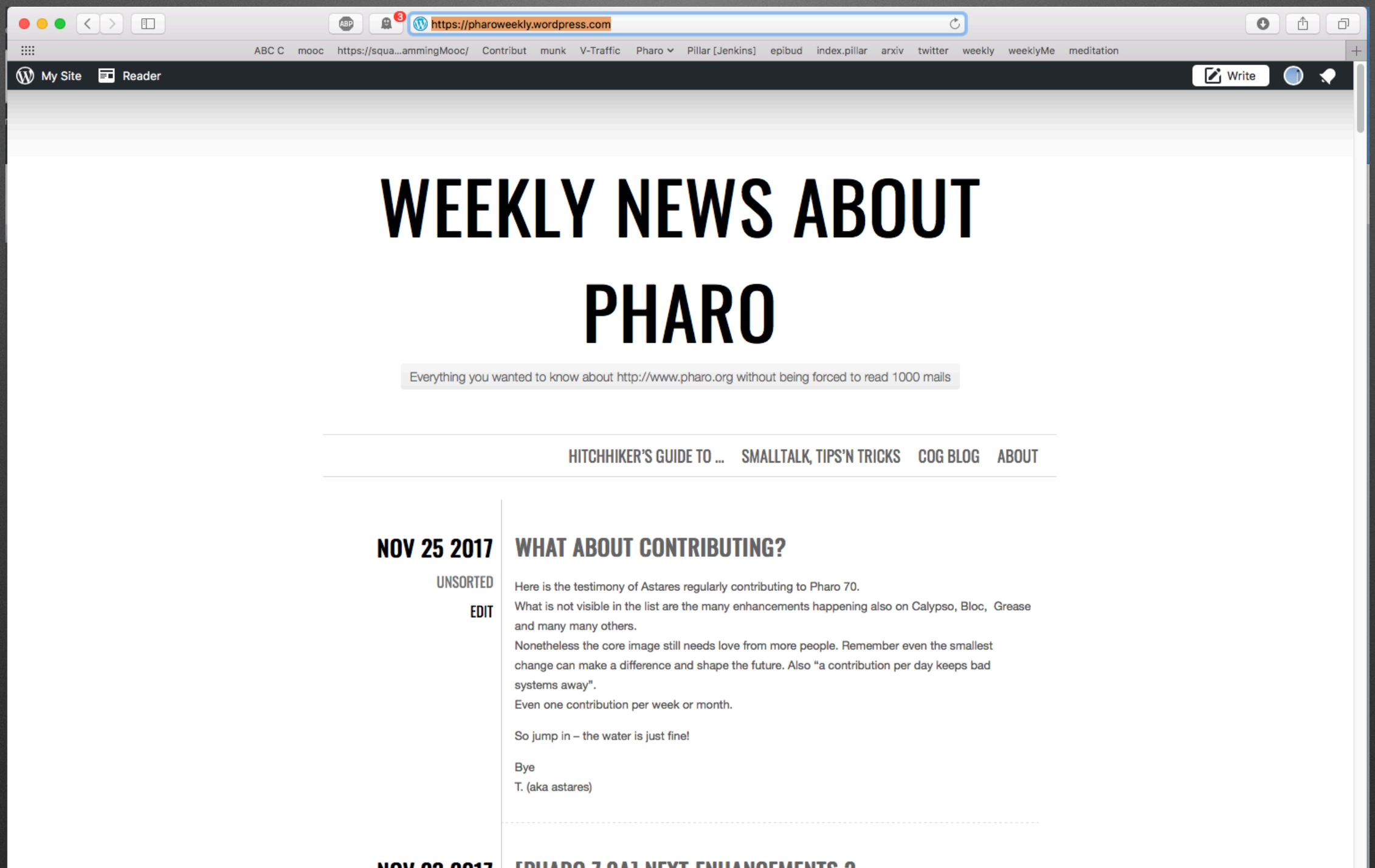
http://mooc.pharo.org



http://discord.gg/Sj2rhxn



https://
pharoweekly.wordpress.com

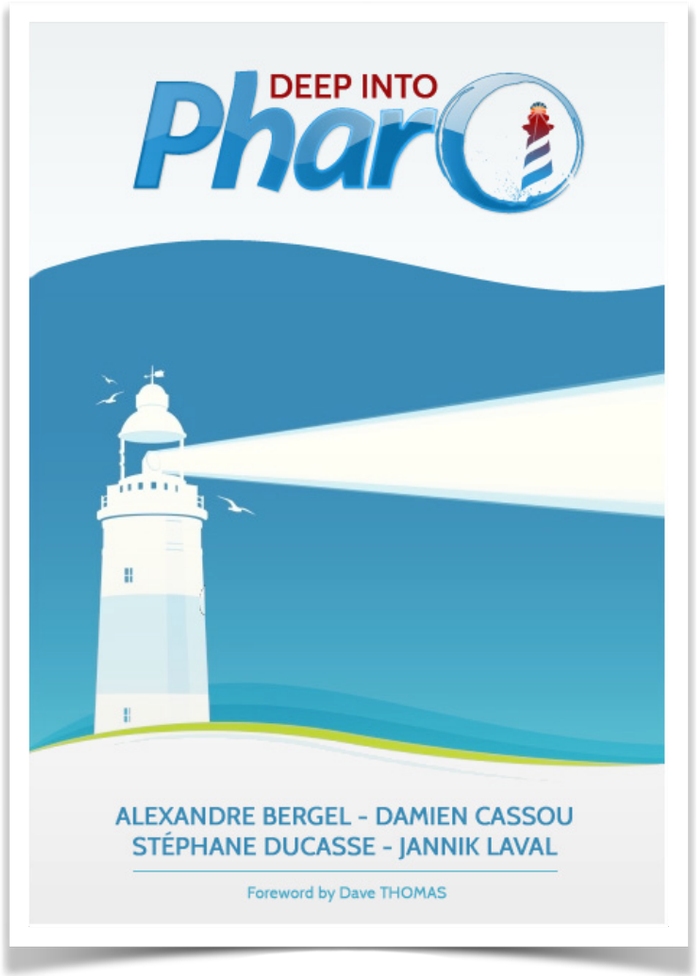


Pharo by Example

- http://books.pharo.org
  - translated to french, merci!
  - translated to spanish, gracias!
  - translated to japanese, ありがとう!
- Currently updated to Pharo 50

Deep into Pharo

- http://books.pharo.org
- Some advanced topics
  - Libraries
  - Core language
  - Tools

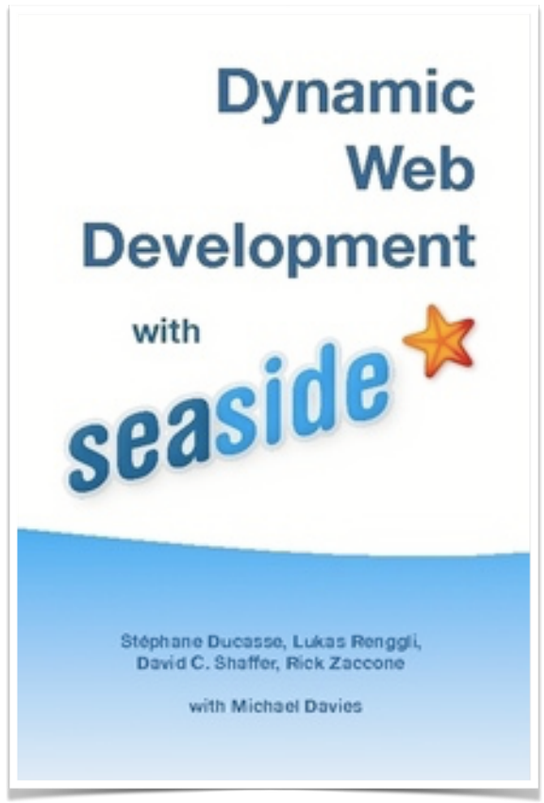


Entreprise Pharo

- http://books.pharo.org
- Web related
  - Encodings,
  - Mustache
  - JSON
  - WebSockets
  - HTTP/HTTPS

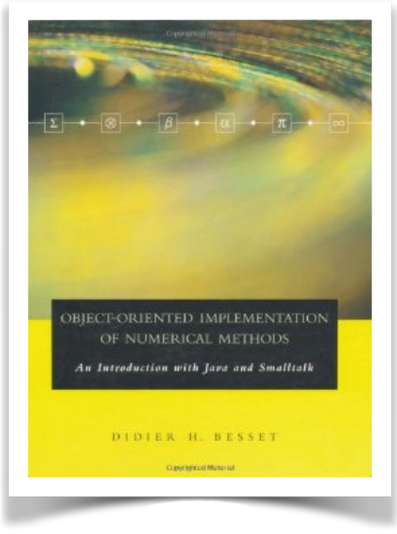
Dynamic Web with Seaside

- http://book.seaside.st
- Full framework explained
- DSL + Call:/answer:
- Automatic form generation
- Deployment



Numerical Methods

- https://github.com/SquareBracketAssociates/NumericalMethods
- Data mining
- Clustering
- Iterative algorithms
- Series
- Statistical analysis



Fun, simple

Pure & elegant

Productive

Empowering

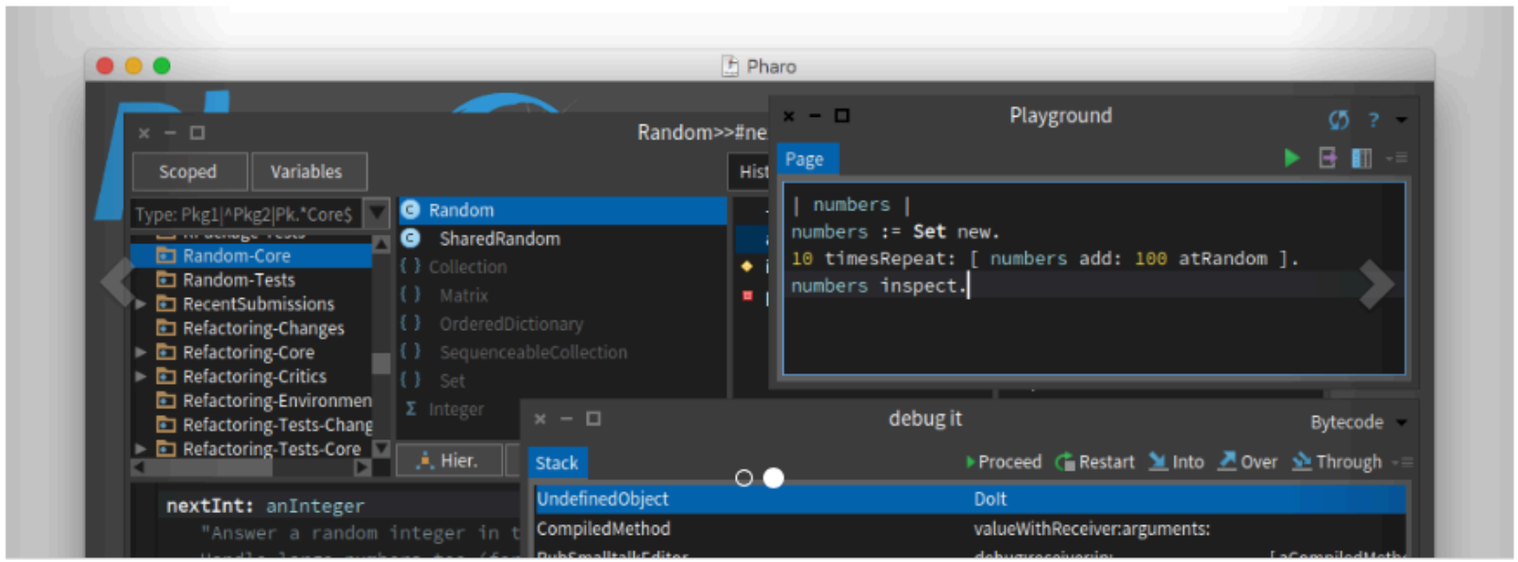
Addictive

Full access

Try Pharo now!

http://pharo.org/download

Phar

The immersive programming experience

Pharo is a pure object-oriented programming language *and* a powerful environment, focused on simplicity and immediate feedback (think IDE and OS rolled into one).