

A master class:

“Live objects for complex projects with Pharo”

<http://stephane.ducasse.free.fr>

<http://www.pharo.org>

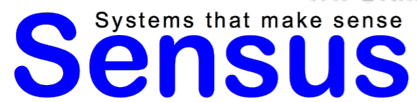
Inria



Université
de Lille

cnrs





Pharo!

- System: Pure object language + full IDE
- Powerful, elegant and fun to program
- Great community
- Living system under your fingers
- Works on Mac OSX, Linux(es), iOS, Windows, Pi, and “android”
- 100% MIT

Elegant!

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

Leuchttürme



```
exampleWithNumber: x

<syntaxOn: #postcard>
"A "complete" Pharo syntax"
| y |
true & false not & (nil isNil)
  ifFalse: [ self perform: #add: with: x ].
y := thisContext stack size + super size.
byteArray := #[2 2r100 8r20 16rFF].
{ -42 . #($a #a #'I''m' 'a' 1.0 1.23e2 3.14s2 1) }
do: [ :each |
  | var |
  var := Transcript
  show: each class name;
  show: each printString ].

^ x < y
```

method name, parameter, pragma, comment, local variable, binary message, unary message, boolean literals, nil literal, block, keyword message, pseudo variables, assignment, instance variable, integer literals, byte array, array generated at runtime, literal array, symbols, character, string, floating point, scaled decimal, local block variable, block parameter, global variable, cascade, keyword message, return instruction

other method definition examples:
unary
+ binaryMessageArgument
keyword: arg
keyword: arg1 withTwo: arg2

PLACE
STAMP
HERE

<https://www.pharo.org>



Yes the full Syntax!

Yes there is nothing else...

Leuchttürme



```

exampleWithNumber: x

<syntaxOn: #postcard>
"A "complete" Pharo syntax"
| y |
true & false not & (nil isNil)
  iffFalse: [ self perform: #add: with: x ].
y := thisContext stack size + super size.
byteArray := #[2 2r100 8r20 16rFF].
{ -42 . #($a #a #'I''m' 'a' 1.0 1.23e2 3.14s2 1) }
do: [ :each |
  | var |
  var := Transcript
  show: each class name;
  show: each printString ].
^ x < y

```

Annotations for the code block:

- method name: exampleWithNumber
- parameter: x
- pragma: <syntaxOn: #postcard>
- comment: "A "complete" Pharo syntax"
- local variable: y
- boolean literals: true, false
- nil literal: nil
- block: (nil isNil)
- keyword message: perform: #add: with: x
- assignment: y :=
- pseudo variables: thisContext, super
- integer literals: 2, 100, 20, 16
- byte array: #[2 2r100 8r20 16rFF]
- array generated at runtime: { -42 . #(\$a #a #'I''m' 'a' 1.0 1.23e2 3.14s2 1) }
- literal array: #(\$a #a #'I''m' 'a' 1.0 1.23e2 3.14s2 1)
- symbols: \$a, #a, #'I''m'
- character: 'a'
- string: 'a'
- floating point: 1.0, 1.23e2
- scaled decimal: 3.14s2
- local block variable: | var |
- block parameter: each
- global variable: Transcript
- keyword message: show: each class name; show: each printString
- keyword message: ^
- return instruction: x < y
- other method definition examples: unary, + binaryMessageArgument, keyword: arg, keyword: arg1 withTwo: arg2

PLACE
STAMP
HERE

<https://www.pharo.org>

N U M

exampleWithNumber: x

```
<syntaxOn: #postcard>
```

```
"A ""complete"" Pharo syntax"
```

```
| y |
```

```
true & false not & (nil isNil)
```

```
  ifFalse: [ self perform: #add: with: x ].
```

```
y := thisContext stack size + super size.
```

```
byteArray := #[2 2r100 8r20 16rFF].
```

```
{ -42 . #($a #a #'I' 'm' 'a' 1.0 1.23e2 3.14s2 1) }
```

```
do: [ :each |
```

```
  | var |
```

```
  var := Transcript
```

```
    show: each class name;
```

```
    show: each printString ].
```

```
^ x < y
```

method annotation

exampleWithNumber: **x** parameter

```
<syntaxOn: #postcard>  
"A ""complete"" Pharo syntax" comment
```

```
| y |  
true & false not & (nil isNil)  
ifFalse: [ self perform: #add: with: x ].
```

```
y := thisContext stack size + super size.
```

```
byteArray := #[2 2r100 8r20 16rFF].
```

```
{ -42 . #($a #a #'I' 'm' 'a' 1.0 1.23e2 3.14s2 1) }
```

```
do: [ :each |
```

```
| var |
```

```
var := Transcript
```

```
show: each class name;
```

```
show: each printString ].
```

return

```
^ x < y
```

exampleWithNumber: x **parameter**

<syntaxOn: #postcard>

"A ""complete"" Pharo syntax"

| y |

true & false not & (nil isNil)

ifFalse: [self perform: #add: with: x].

y := thisContext stack size + super size.

byteArray := #[2 2r100 8r20 16rFF].

{ -42 . #(\$a #a #'I' 'm' 'a' 1.0 1.23e2 3.14s2 1) }

do: [:each |

| var |

var := Transcript

show: each class name;

show: each printString].

^ x < y

local var

affectation

instance var

local var

exampleWithNumber: x

```
<syntaxOn: #postcard>
```

```
"A ""complete"" Pharo syntax"
```

```
| y |
```

```
true & false not & (nil isNil)
```

```
  ifFalse: [ self perform: #add: with: x ].
```

closure

```
y := thisContext stack size + super size.
```

```
byteArray := #[2 2r100 8r20 16rFF].
```

```
{ -42 . #($a #a #'I' 'm' 'a' 1.0 1.23e2 3.14s2 1) }
```

```
do: [ :each |
```

arg closure

```
| var |
```

```
var := Transcript
```

```
  show: each class name;
```

```
  show: each printString ].
```

```
^ x < y
```

exampleWithNumber: x

```
<syntaxOn: #postcard>
```

```
"A ""complete"" Pharo syntax"
```

```
| y |
```

binary msg

```
true & false not & (nil isNil)
```

```
ifFalse: [ self perform: #add: with: x ].
```

keyword msg

```
y := thisContext stack size + super size.
```

unary msg

```
byteArray := #[2 2r100 8r20 16rFF].
```

```
{ -42 . #($a #a #'I' 'm' 'a' 1.0 1.23e2 3.14s2 1) }
```

```
do: [ :each |
```

```
| var |
```

```
var := Transcript
```

```
show: each class name;
```

```
show: each printString ].
```

cascade

separator

binary msg

```
^ x < y
```

exampleWithNumber: x

```
<syntaxOn: #postcard>
"A ""complete"" Pharo syntax"
| y |
true & false not & (nil isNil)
  ifFalse: [ self perform: #add: with: x ].
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do: [ :each |
  | var |
  var := Transcript
  show: each class name;
  show: each printString ].
```

array character

symbol
string

number

^ x < y

A Pure World of Objects

Only objects +
messages + closures!

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

A Full Uniform Model

- Dynamically typed
- Everything is an object instance of a class
- All methods are public virtual
- All attributes are (C++) protected
- Single inheritance with traits

Less is more!

No constructors, no static methods, no operators

No type declaration, no primitive types,

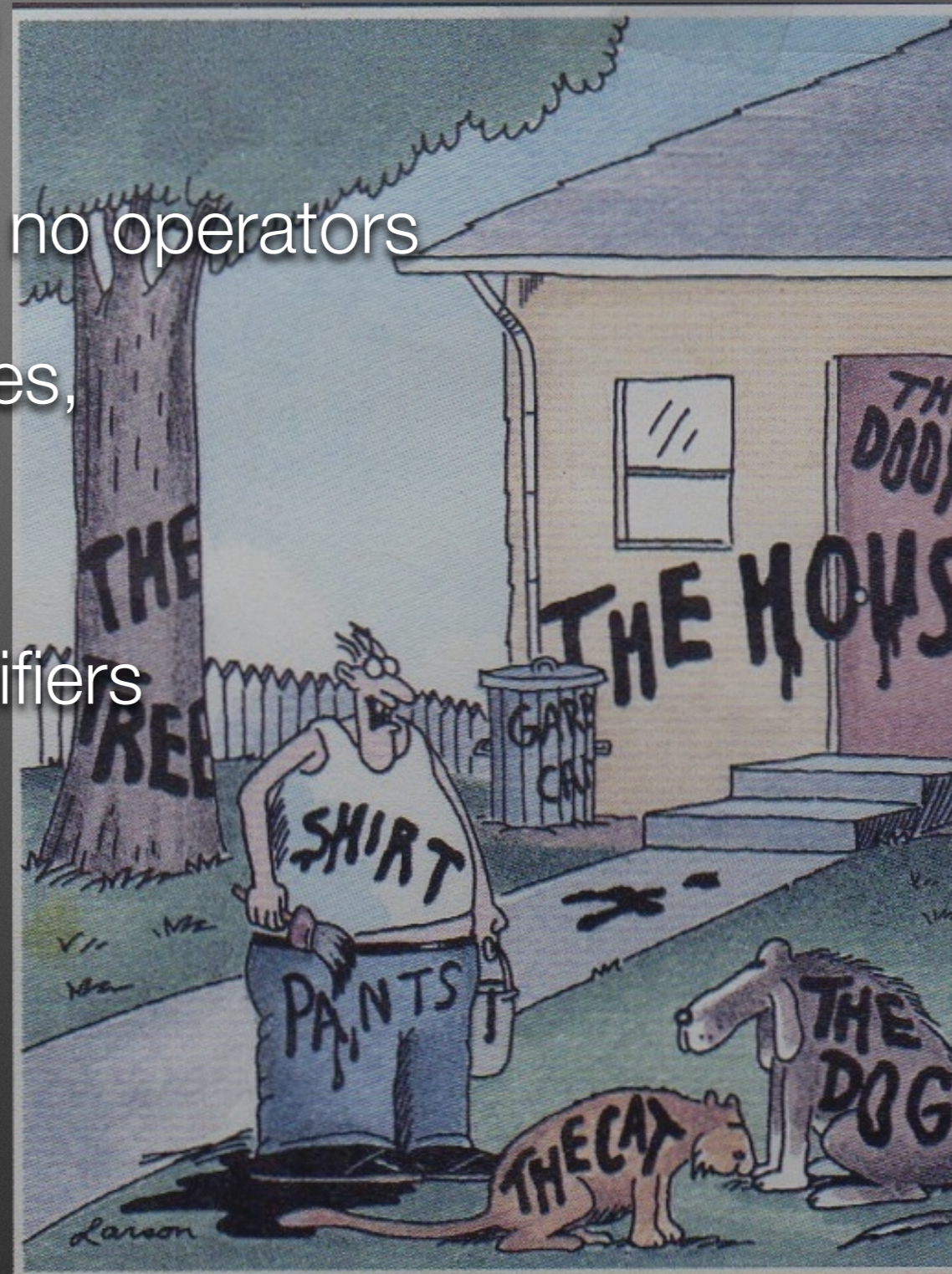
No interfaces, no need for factory

No packages/private/protected modifiers

No parametrized types

No boxing/unboxing

Still powerful



"Now! ... That should clear up a few things around here!"

A hand holding a red pencil is drawing a red rose on a hand. The hand being drawn is in a different color, appearing as a red-tinted sketch. The background is white with a yellow horizontal band at the bottom.

Fully Written in Itself

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

Pharo is highly immersive

Immersing...

- * Pharo is not a blackbox
- * Pharo is **fully inspectable** and **reflective**
- * but there is more



Immersed and interacting with live objects



Workspace

```
| elements lay |
```

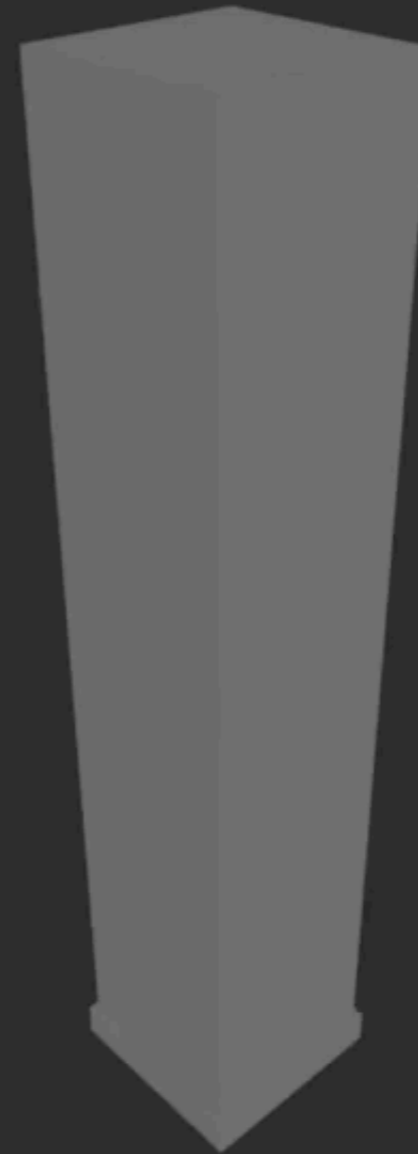
```
elements := (1 to: 5) collect: [ :ob |  
  (R3CubeShape new) elementOn: ob ].
```

```
I
```

```
lay := R3WallLayout new.  
lay on: elements.
```

```
UberPresenter present: elements
```

Uber Presenter



**We can do the same with
web app, sockets, networks,
sensors, living programming....**

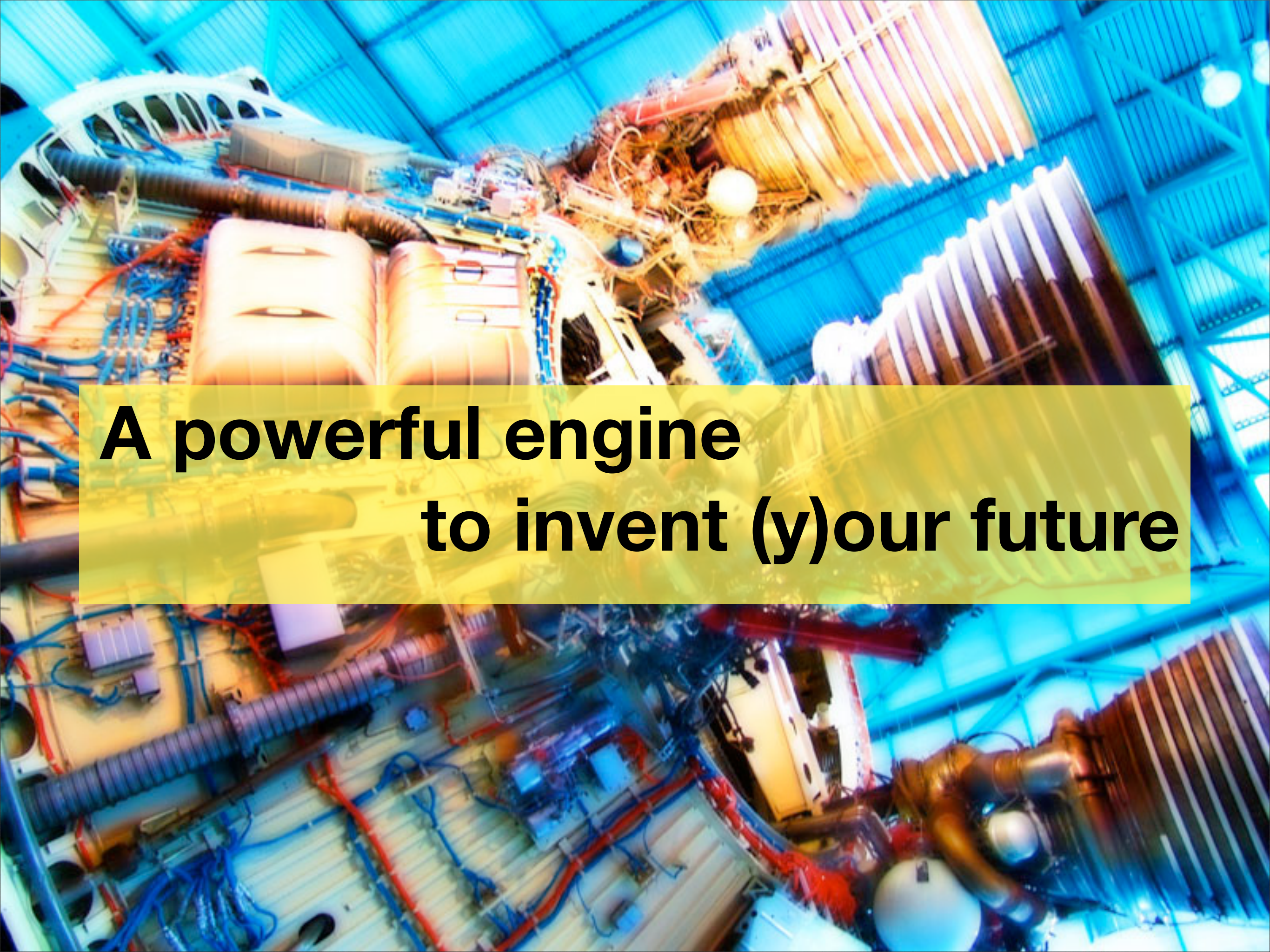


**Hackers
scripting live
the coffee
machine**


Hackers @ work



Our 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.

trentosur

Soluciones móviles para retail y trade marketing

Nos enfocamos en lo que importa del negocio sin perder de vista los detalles de su implementación.

Primer móvil, Plataforma Android, En la nube

PharoCloud

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Romax TECHNOLOGY

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Dedicated Analyses, Dedicated tools, Decision making

Some Success Stories

Yesplan is veelzijdige software voor het efficiënt plannen van evenementen.

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

Need: disaster scenario recovery

Nr	Quadrant	Verkeersnummer	Interaktieschets	Typ	PK
1	Verkeersnummer	Interaktieschets	SK 1	ES08	
2	Verkeersnummer	Verkeersnummer 3. Oud	SK 1	OMTH	
3	Verkeersnummer	Verkeersnummer 3. Oud	SK 1	VY96	
4	Verkeersnummer	Verkeersnummer 3. Oud	SK 1	Z196	
5	Verkeersnummer	Verkeersnummer 3. Oud	SK 9	OT06	
6	Verkeersnummer	Verkeersnummer 2'	SK 9	VM02	
7	Verkeersnummer	Verkeersnummer 1807	SK 10	1807	
8	Verkeersnummer	Verkeersnummer	SK 10	EY15	
9	Verkeersnummer	Verkeersnummer	SK 10	MU15	
10	Verkeersnummer	Verkeersnummer	SK 10	SW03	
11	Verkeersnummer	Verkeersnummer	SK 10	W014	

Moose is a platform for software and data analysis.

Call for help: weblogs

Download 4.7

The Moose Book

Apps

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The world's first online platform fully supporting risk-based test management.

BETTER, FASTER, CHEAPER

COMPONENTS

CSOB

airflowing

Organize your creative work

Sales, tasks and finances: your team and all that's essential in one place

Plans and Pricing

Manage your simple way

OBJECT PROFILE

Left to run / Right for code

Das Content Management mit System

100% Inline-Editor

Drag & Drop

Copy / Paste

2denker

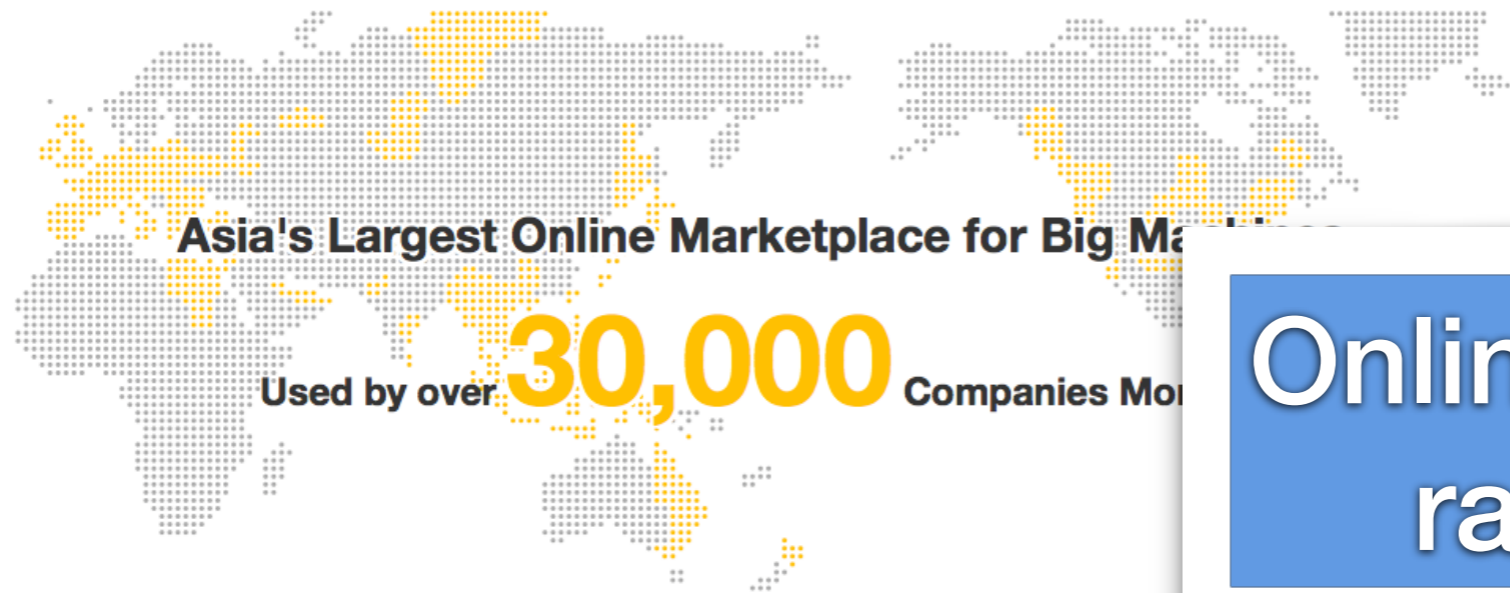
Continuous API Testing

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Used by over **30,000** Companies More

Online marketplace raised 4.7 M\$

Find Machines

Search by Category

Construction Machinery

 Mini Excavators	 Excavators	 Wheel Loaders	 Dozers
 Cranes	 Rollers	 Graders	 Finishers
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 Other Construction Machinery			

Material Handling

Forklifts

Farm Machinery

Tractors

Other Farm Machinery

Vehicles

Dumps

Trucks

Other Vehicles

Others

Attachments

Parts

Others

Search by Keyword

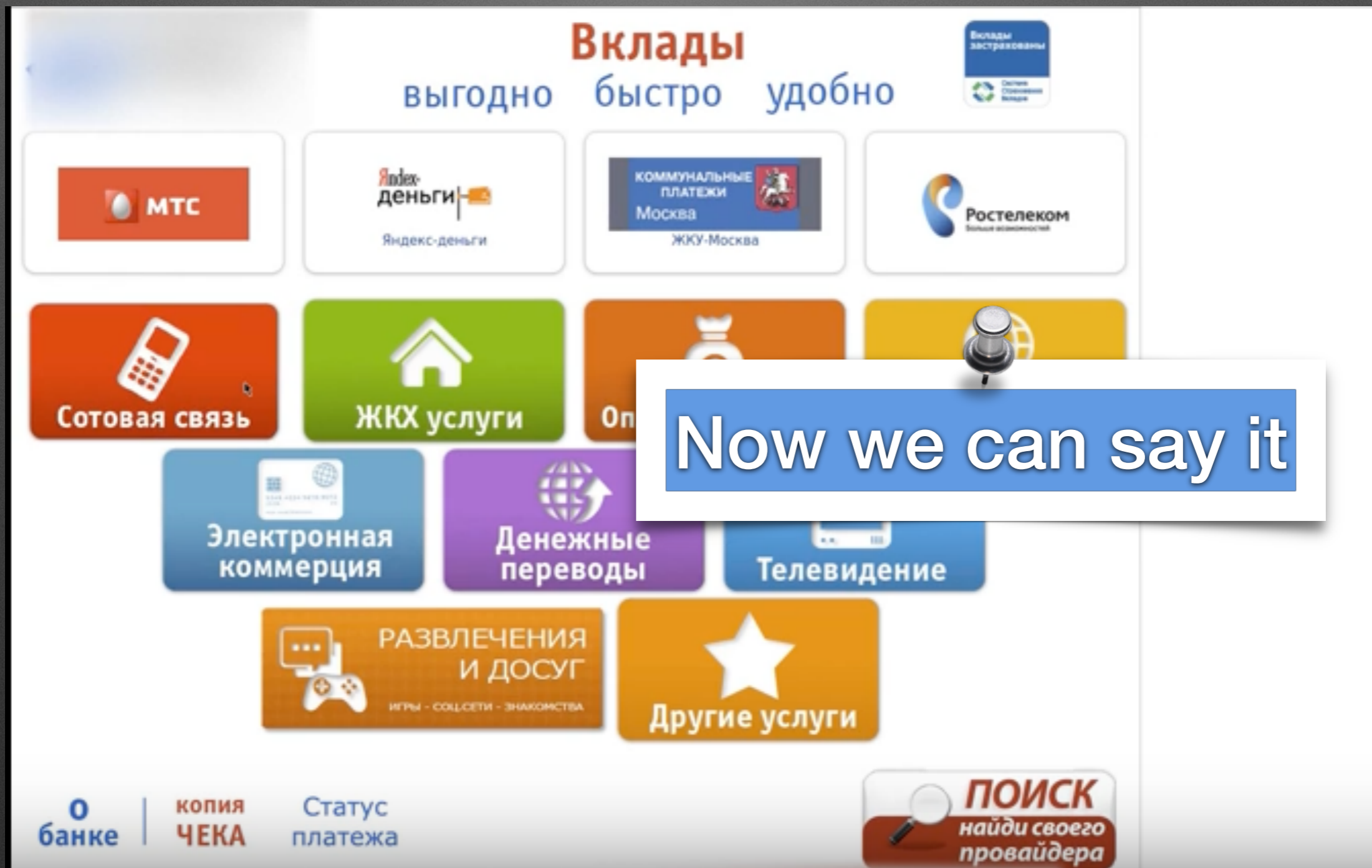
Enter a keyword (e.g. KOMATSU PC200)

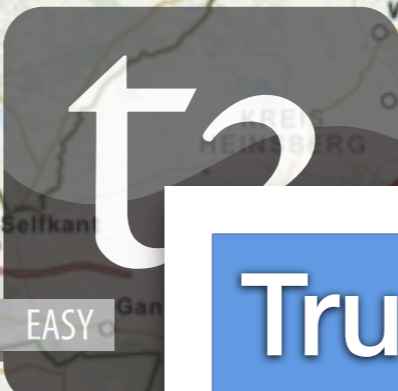
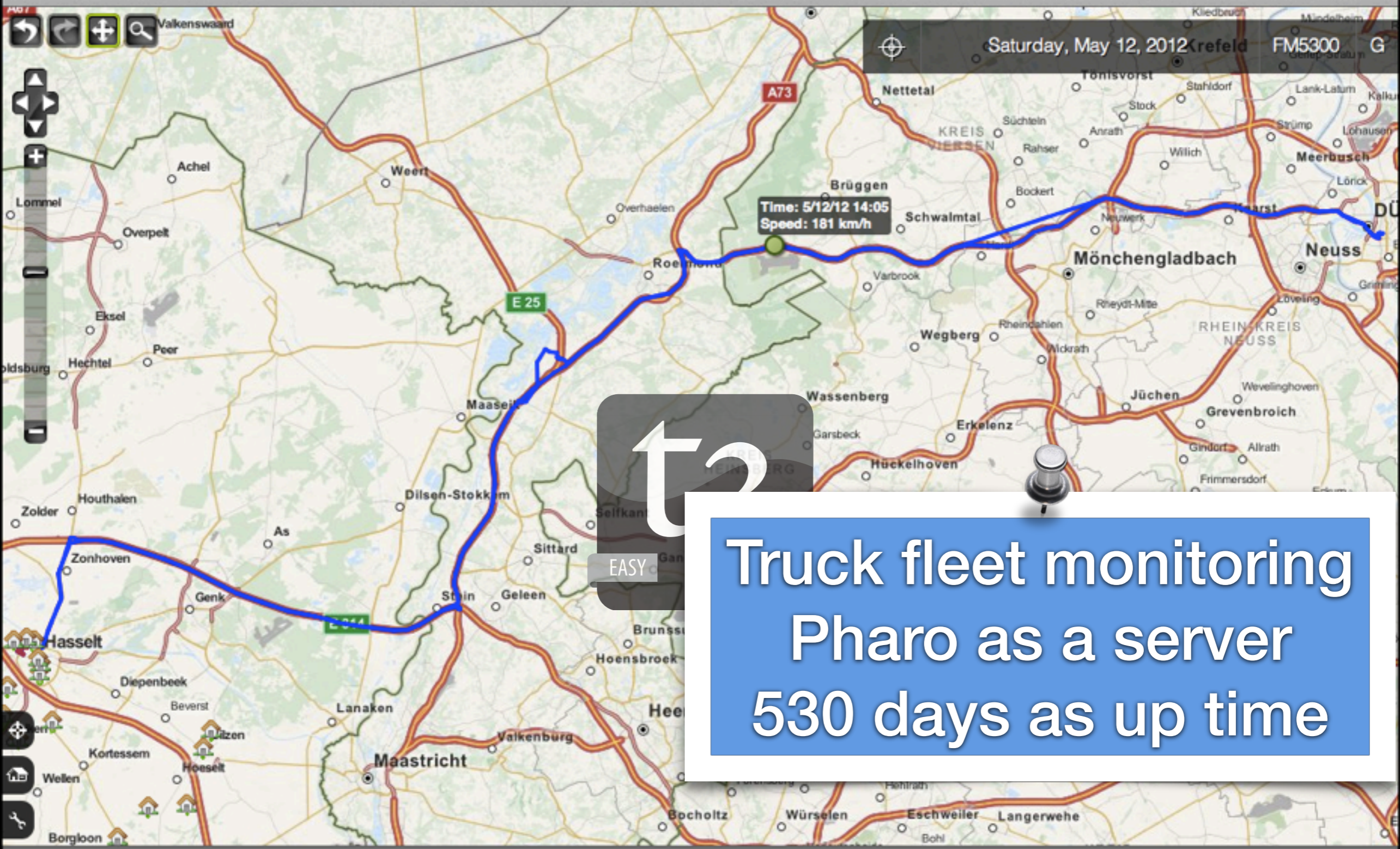
New Machines Updated on: 2016/09/13 17:46:18 (JST)

[See More >](#)

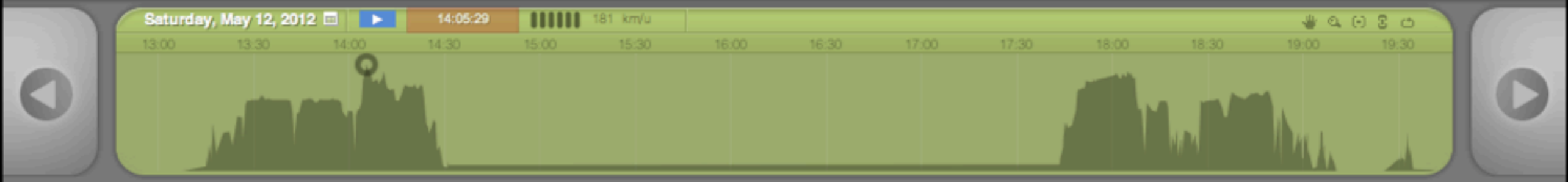
 HOKUETSU PDS175S 400,000 JPY	 KUBOTA U-55-6 3,500,000 JPY	 OTHER MGR2500 133,100 JPY	 ISEKI HL407G 198,000 JPY	 OTHER MR6500 143,000 JPY	 OTHER GH250-GML 165,000 JPY
--	---------------------------------------	-------------------------------------	------------------------------------	------------------------------------	---------------------------------------

Pharo in ATM like Device in Moscow





Truck fleet monitoring
Pharo as a server
530 days as up time



Network Monitoring for small ISPs

The image displays a comprehensive network monitoring solution for small ISPs, centered around the EXPERTISE mobile application. The background features several desktop dashboards:

- Dashboard 1 (Top Left):** Shows 'Utilisation Downlink' at 95% with a capacity of 500 Mbps. It includes a map and a line graph for 'Trafic CMTS vers uplink'.
- Dashboard 2 (Middle Left):** Displays 'Modems connectés' at 99% (1540/1550) and 'Serveur' status.
- Dashboard 3 (Bottom Left):** A tree view of network components under 'CMTS', including 'Cable Ethernet', 'FastEthernet/2', and 'GigabitEthernet/1'.
- Dashboard 4 (Bottom Middle):** A grid of performance graphs for various network elements, showing metrics like 'CMTS 100 - 100 des modems en Downstream'.
- Dashboard 5 (Bottom Right):** A detailed view of 'CMTS_0100000' showing 'Face Avant/Arrière', 'Températures', and 'Info Syst'.

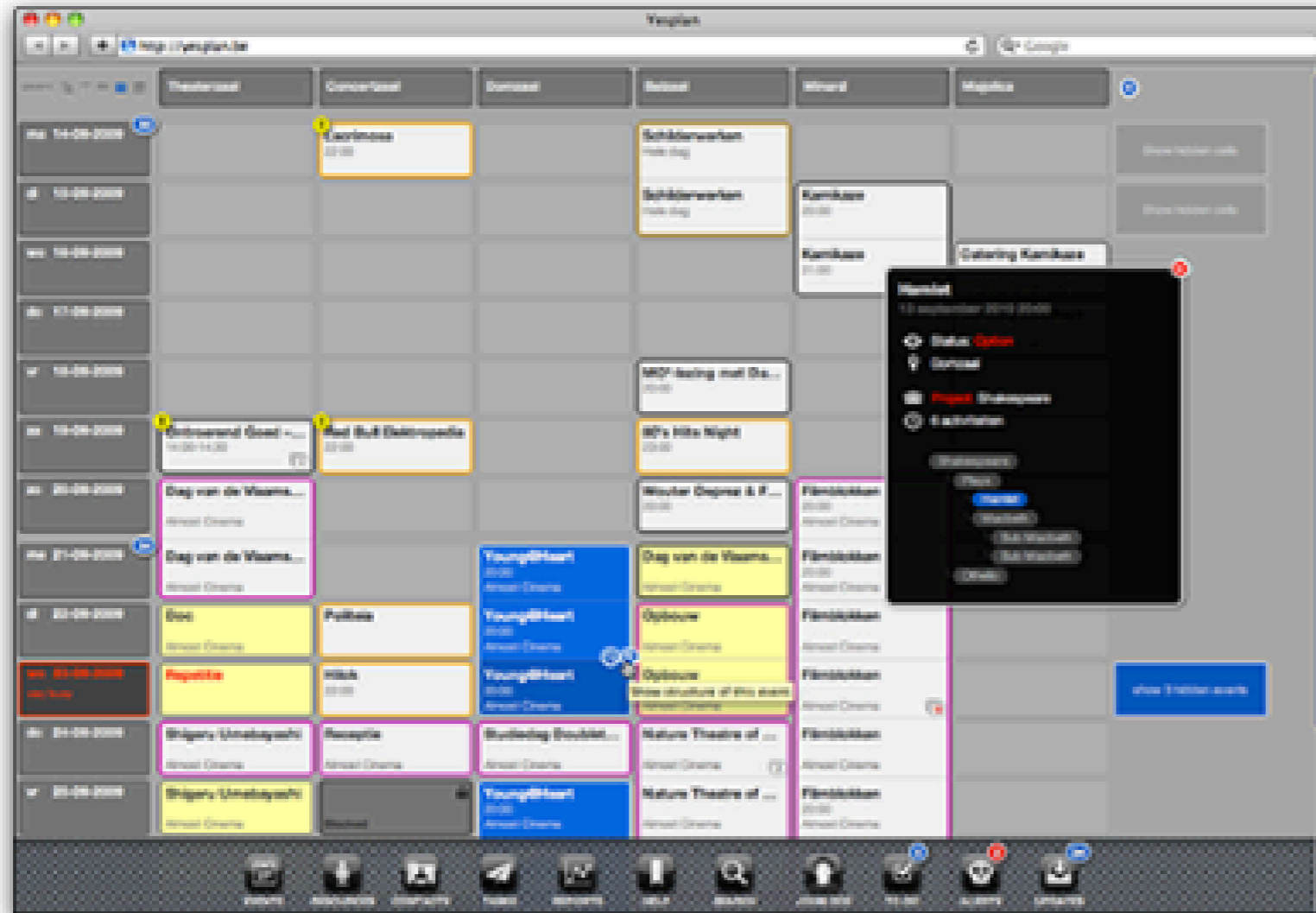
The central focus is the **EXPERTISE** mobile app on a Samsung smartphone. The app interface includes:

- Supervision HFC** section with a tree view for 'Supervision Talange', 'Supervision Creutzwald', 'Supervision Rombas', and 'Supervision SIVOM'.
- Table:** A table with columns 'Alias', 'M', and 'Type'. It lists 'Supervision Talange' with 'M: talange' and 'Type: HfcSupervisionPC'.
- Condition / Métriques:** A section for 'Supervision Talange' showing a large green checkmark and the text 'Tout est en ordre avec Supervision Talange'.

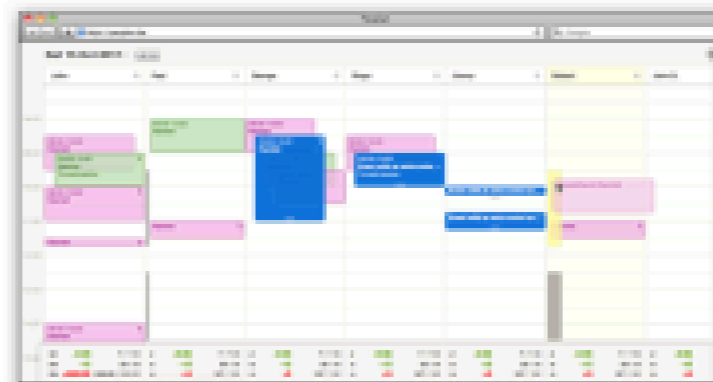
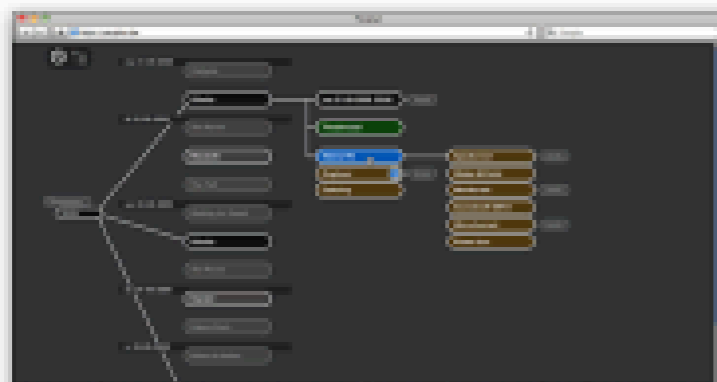
Other background elements include a table of network metrics with columns for 'Alias', 'M', 'Type', 'Bande passante', 'Condition', 'Etat', 'Métriques', and 'Graphes'. The table lists various network components like 'Cable L1/0-downstream' and 'Cable L1/0-upstream' with associated metrics.

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



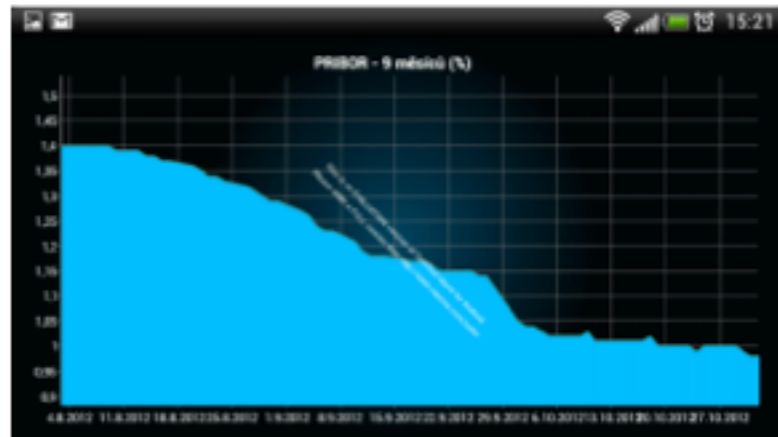
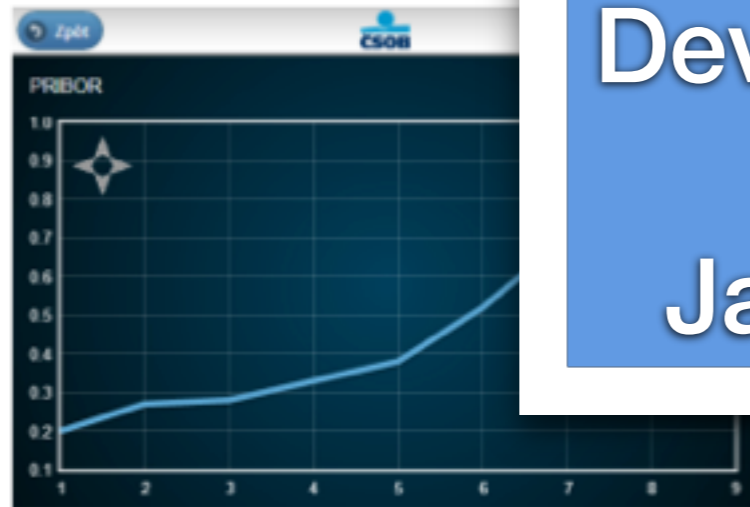


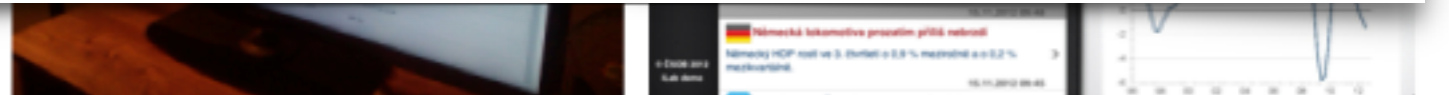
Table of FX rates for various currencies including EUR/USD, EUR/CHF, EUR/CZK, etc.



Table of exchange rates for various currency pairs like EUR/CZK, USD/CZK, EUR/USD, etc.



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



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: '240c9194814813654700005110712195534010c8329bfd0699e5ef3'  
    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 .
```

Free Software Mobile Communication solutions

Apply a display filter ... <OK/>

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	0	2080	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: 2005 (2005), Dst Port: 2005 (2005)
▶ MTP 3 User Adaptation Layer
▶ Signalling Connection Control Part
▶ Transaction Capabilities Application Part
▶ GSM Mobile Application
▶ GSM SMS TPOU (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 SNE
 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 - (491884315624)
 ▶ TP-PID: 0
 ▶ TP-DC5: 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 52 69 40 04 01 00 00 09 6b 1e 20 1c 06 07 00 11 bin.... k.(....
0008 86 85 01 01 01 a8 11 60 0f 88 02 07 80 a1 80 06
000e 07 84 80 00 01 00 19 02 6c 41 a1 3f 02 01 01 02 1A.?
0014 01 2e 30 37 80 08 02 02 43 58 10 91 50 f9 84 08 ..07..b. Ch..P...
001c 91 94 51 97 10 00 00 00 04 21 24 0c 91 94 81 48 ..0..... !S...H
0024 13 65 42 00 00 51 18 71 21 95 53 48 10 c8 32 9b .eB..Q.q |.5@..Z.
002c fd 86 99 e5 ef 36 80 8a 0e cb df 006.....

Programming environment for Programmable Logic Controllers

Software PLC
CIAA

IDE4PLC
powered by
Pharos




Board

POU

Board

EDU-CIAA-NXP

Choose a board



POU Variable Declarations Editor

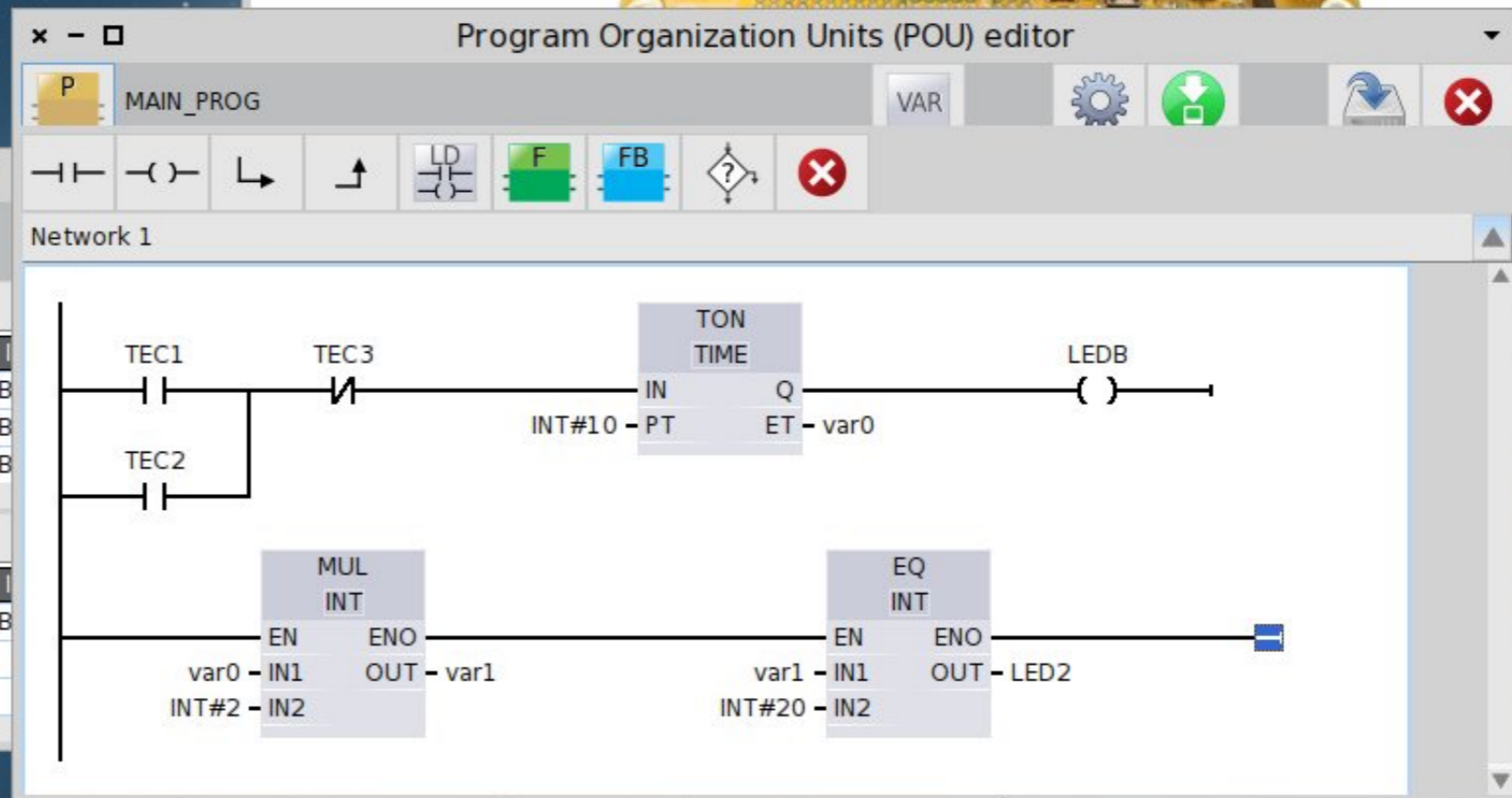
MAIN_PROG

Interface Variables

Category	Name	Datatype	I/O
VAR_INPUT	TEC1	BOOL	B
VAR_INPUT	TEC2	BOOL	B
VAR_INPUT	TEC3	BOOL	B

Internal and External Variables

Category	Name	Datatype	I/O
VAR	var0	BOOL	B
VAR	var1	INT	I
VAR	var2	TIME	T



Apps



Dr. Geo free
Hilaire Fernandes



Erathosthenes

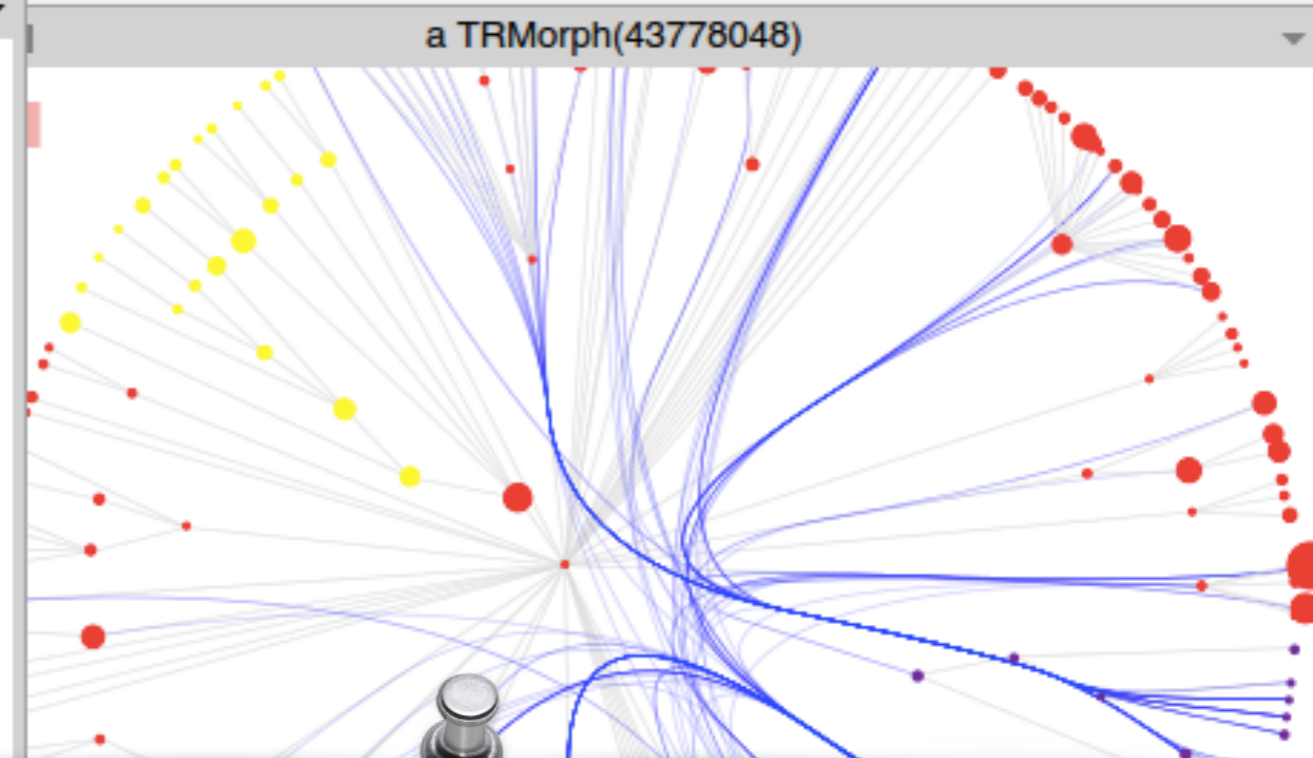
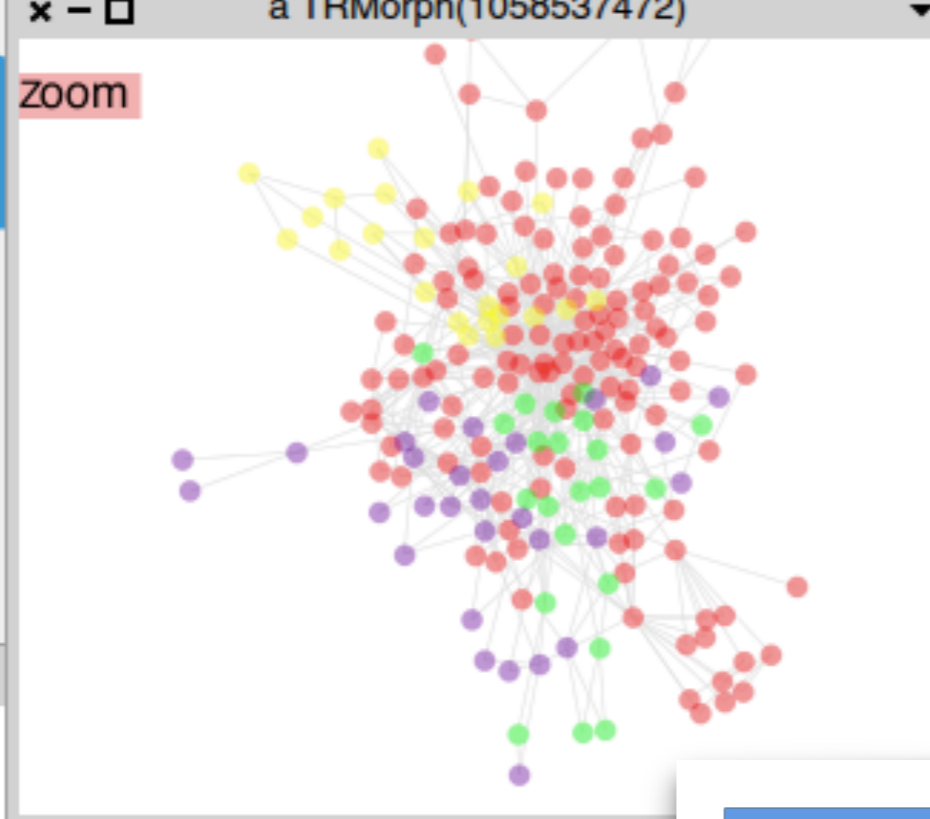
File Points Lines Transformations Numerics Macro-construction

Works on linux, mac, windows,
android, OLPC

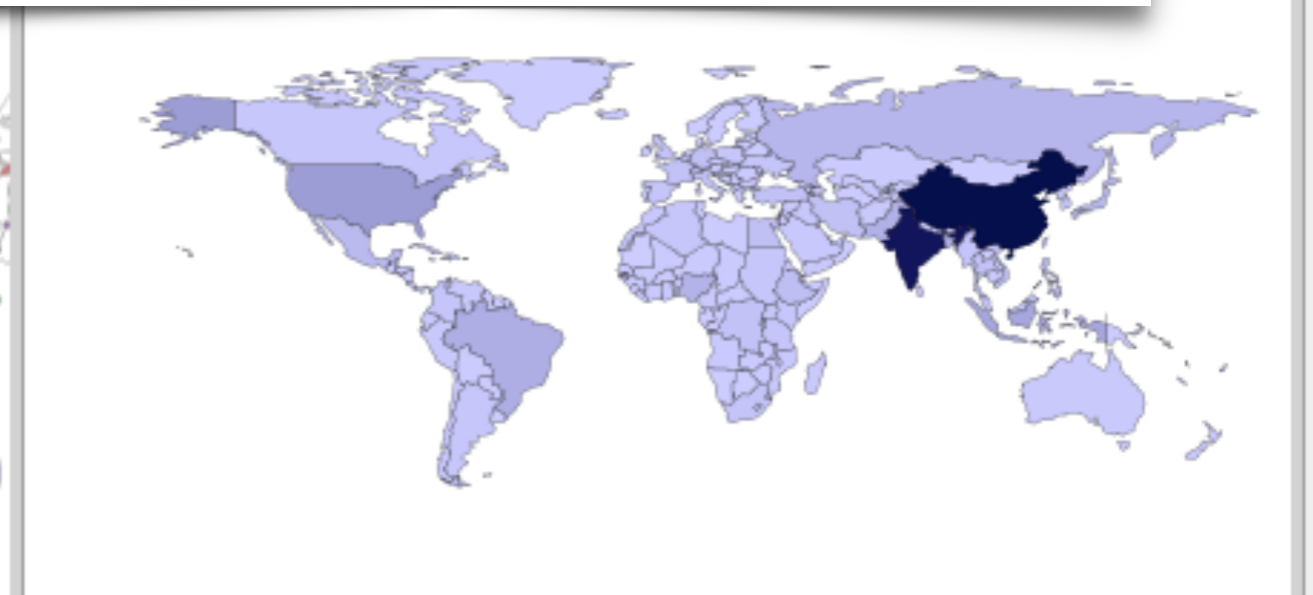
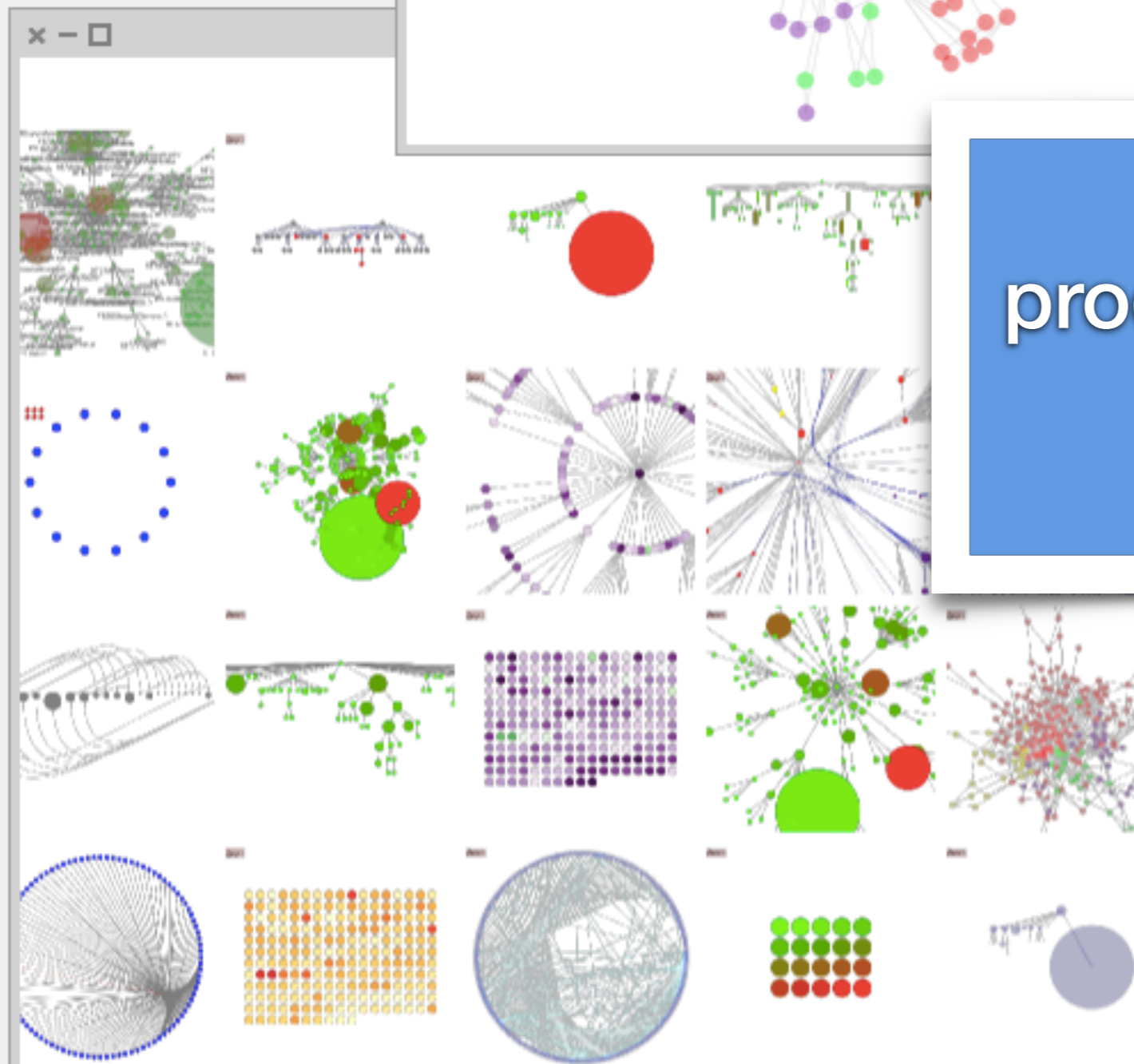
Select and move an object.




Pha



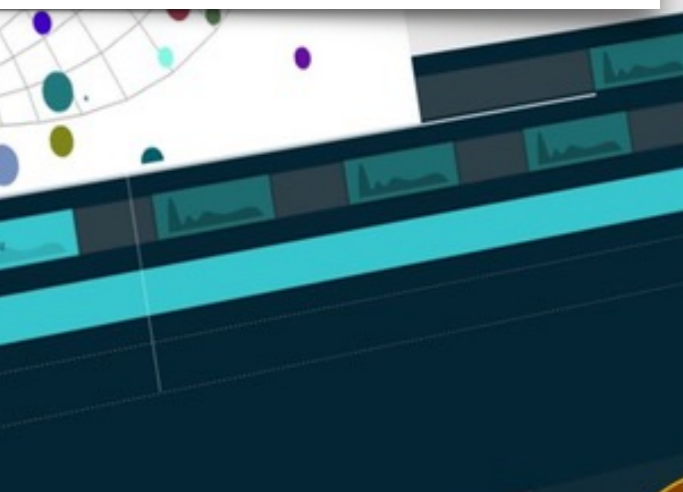
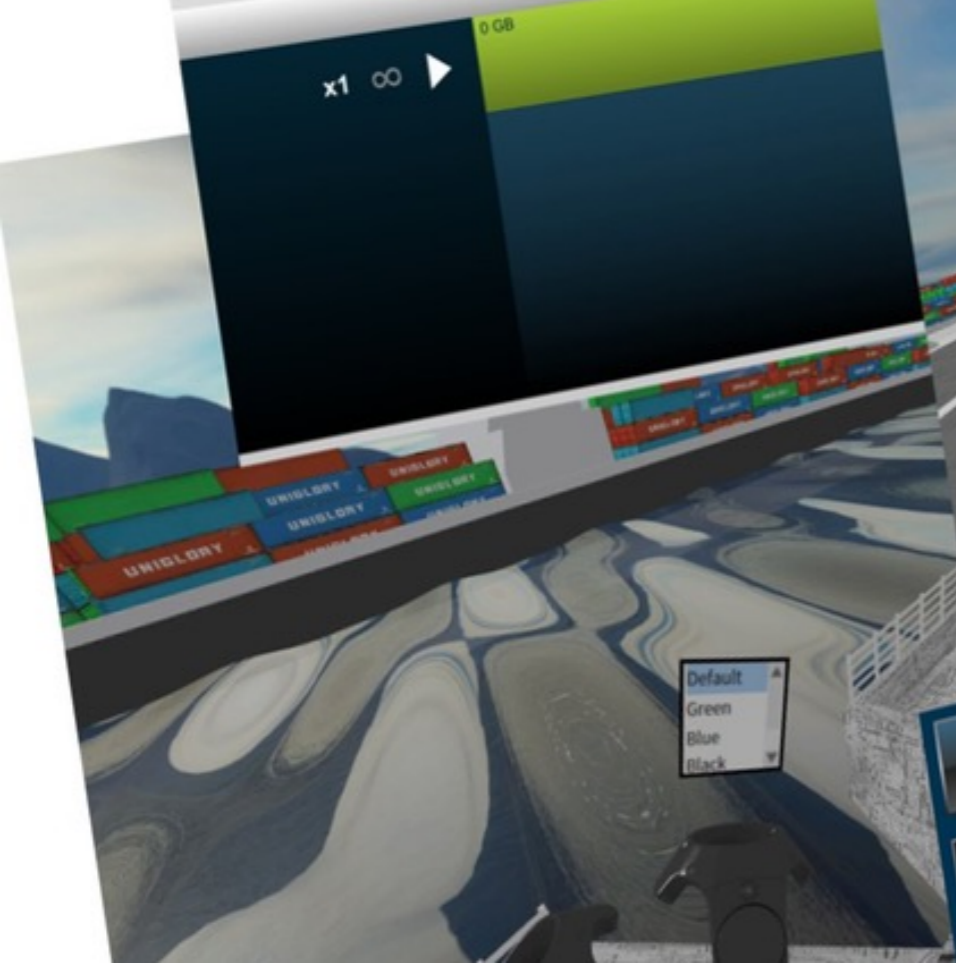
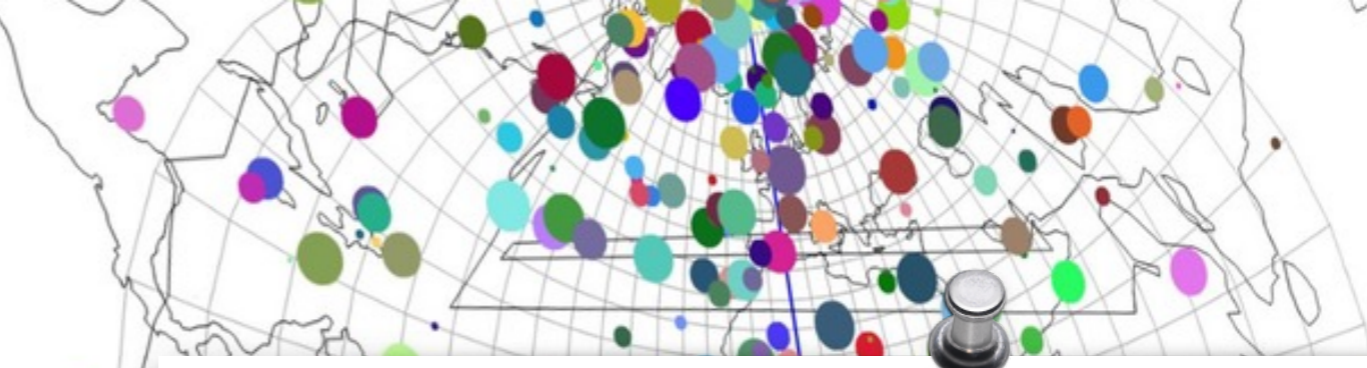
ObjectProfile
produces visualizations &
analysis tools
DSL



Left to run / Right for code



Advanced UIs at Thales (flights, submarines,...) 2D, 3D, Tactile, VR,...





Manage travel costs

Spesenfuchs

Spesenfuchs ist eine Reisekostensoftware für jedermann. Einfach, schnell und kostenlos. Alle Pauschalen und gesetzlichen Regelungen sind hinterlegt. Es ist keine Registrierung notwendig!

Reisekosten clever abrechnen >

Ohne Login benutzen

Login mit Facebook

Registrieren

E-Mail

Passwort

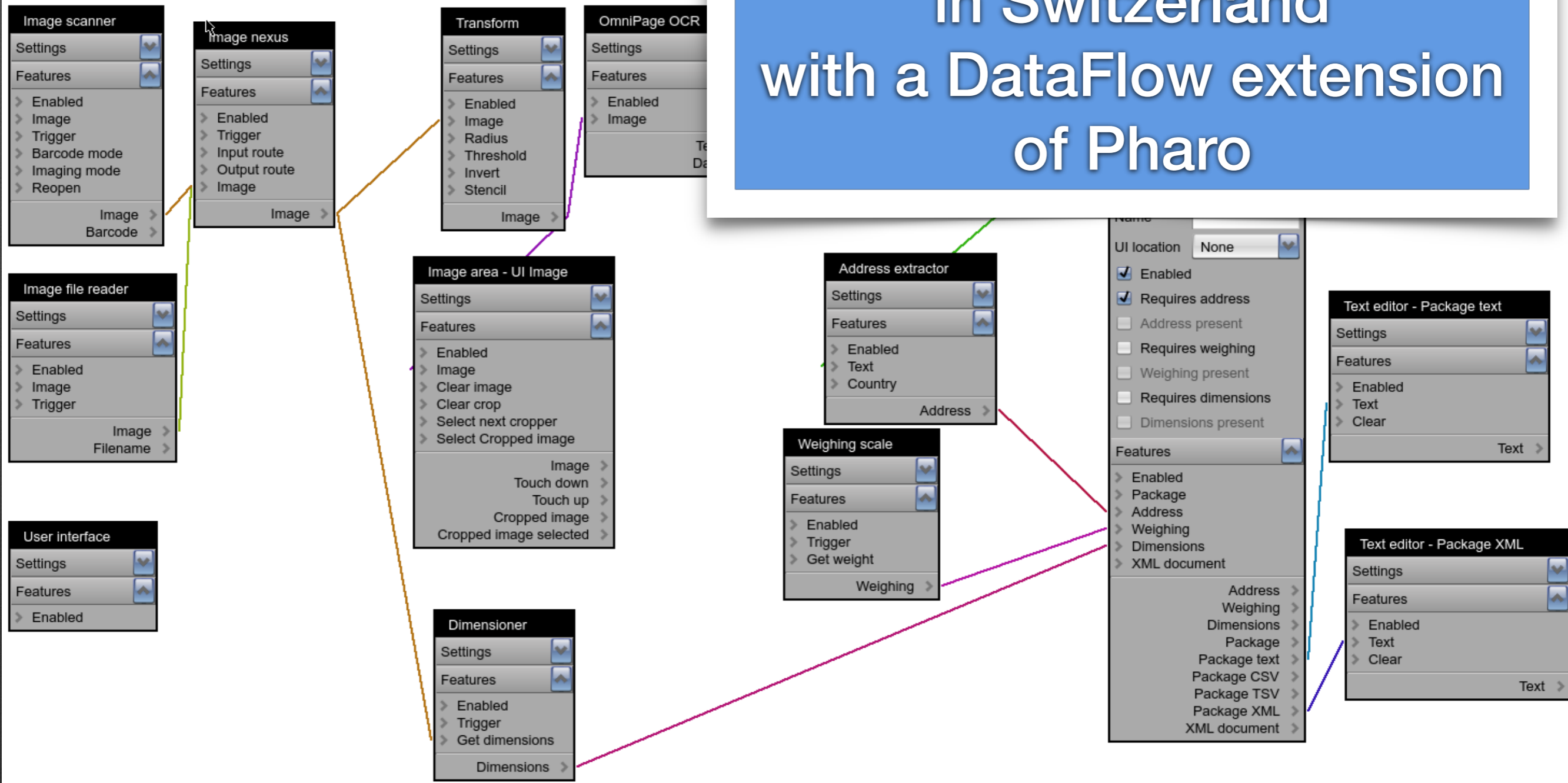
Login

postid

scan share send



To handle return mails
in Switzerland
with a DataFlow extension
of Pharo



A cool community



More Pharo's Teachers

- Uni. of Buenos Aires • Uni. of Bern • Uni. of Maroua • Uni. of Brussels • Ecole des Mines de Douai • Uni. de Savoie • CULS Prague
- Uni. of Quilmes • Uni. of La Plata • Northern Michigan Uni. • Uni. Technologica Nacional (UTN) • Uni. Catholic of Argentina • Uni. of Santiago • Uni. Policnica de Catalunya • Uni. de Bretagne Occidentale • Uni. of Tomsk • Uni. of Fernhagen • IT University of Copenhagen • Uni. Cat del Sacro Cuore of Brescia • Uni. of Yaounde • Uni. Maroua • Uni. of Lomé • INFI • Uni. of Lyon • Uni. of Cagliari • Uni. of Cordoba • Uni. Ryerson • Uni. Comchabamba • Uni. Monterrey • USTH • ENIT

International Research Groups

Lafhis (AR)

SCG (CH)

CAR (FR)

RMOD (FR)

Ummisco (IRD)

Reveal (CH)

Lysic (FR)

ENSTA-Bretagne (FR)

CEA-List (FR)

Ryerson (CAN)

OC (FR)

CCMI-FIT (CZ)

ASEREG (BR)

Pleiad (CL)

Macau (UNO)

Cirad (FR)

USTH (Vietnam)

Soft-Qual (Serbia)

Uni. Quilmes (AR)

ENIT (FR)

Cochabamba (Bo)

Maroua (CAM)

ETS (CAN)

Since May 2008



Version	Release date	Major features
	March 16, 2008 ^[2]	Fork of Squeak environment
Pharo 1.0	April 15, 2010	real closures, EToys and MVC removed
Pharo 1.1	July 26, 2010	Cog JIT VM, Settings framework
Pharo 1.2	March 29, 2011	new Finder, Recent changes tool, improved Help, better themes
Pharo 1.3	August 2011	Zinc, headless images
Pharo 1.4	April 2012 ^[3]	Ring metamodel, better code simulator
Pharo 2.0	March 18, 2013. ^[4]	browser improvements, QA tools, Fuel serializer, better files API
Pharo 3.0	April 2014. ^[5]	new modular compiler (Opal) and debugger, continuations
Pharo 4.0	April 2015. ^[6]	GTools, slots
Pharo 5.0	May 2016. ^[7]	Spur VM, UFFI, improved reflectivity
Pharo 6.0	6 June, 2017. ^[8]	64-bit and Git support
Pharo 6.1	24 July, 2017. ^[9]	improved Git support
Pharo 7.0	22 January, 2019. ^[10]	bootstrapping, new code browser (Calypso), stateful traits
Pharo 8.0	20 January, 2020. ^[11]	improved support of Git, testing, refactoring and Windows

Pharo in Numbers

Since 2008

Language Core + IDE +

Tools + Frameworks

710 packages (tests included)

~ **25000 tests**

5 platforms

9 400 classes

130 000 methods

61 Mb (64 bits)

<http://github.com/pharo-project/Pharo>
(~220 forks, 15/123 contributors)

Growing ecosystem

polymath

pharo-graphics

pharo-gis

pharo-container

pharo-ai



**Pharo is our vehicle
We improve it everyday**

Pharo

is yours

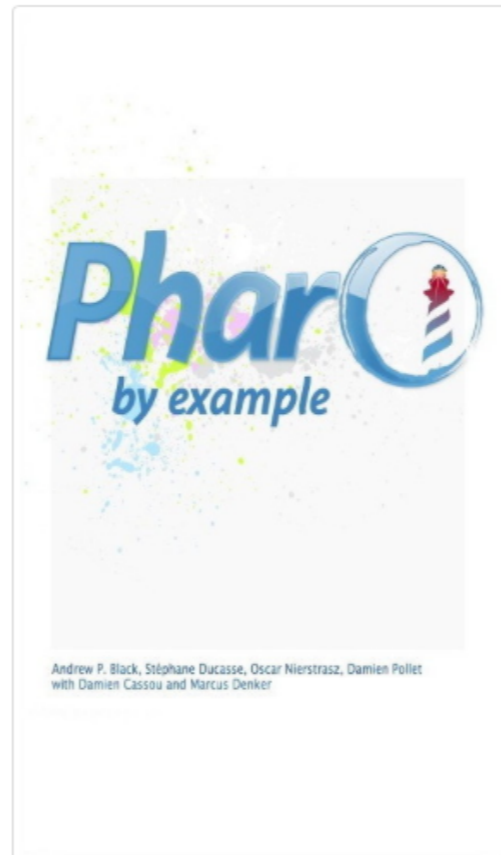
<http://books.pharo.org>

Pharo Books

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

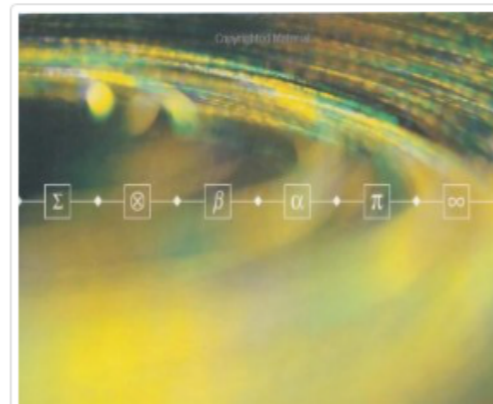
Contribute to the SquareBracketsAssociates community free books
<https://github.com/SquareBracketAssociates/>

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 »](#)

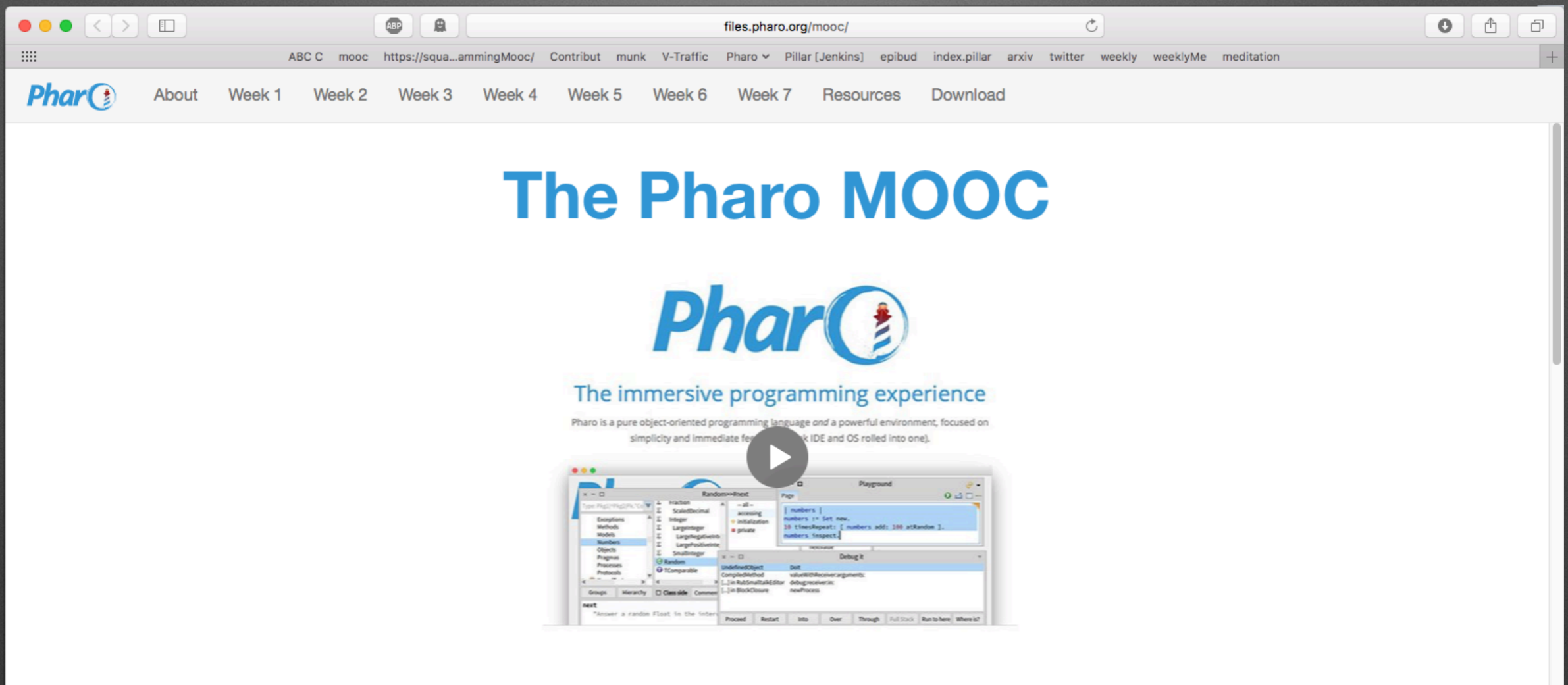


Enterprise Pharo is the third volume of the series. This book covers libraries and frameworks for enterprises, and in particular those doing web development.

[View details »](#)



<http://mooc.pharo.org>



files.pharo.org/mooc/

ABC C mooc https://squa...ammingMooC/ Contribut munk V-Traffic Pharo Pillar [Jenkins] epibud index.pillar arxiv twitter weekly weeklyMe meditation

Pharo About Week 1 Week 2 Week 3 Week 4 Week 5 Week 6 Week 7 Resources Download

The Pharo MOOC

Pharo

The immersive programming experience

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

Playground

Debug it

About this course

If you are either a beginner or an expert in object-oriented programming, this MOOC will change the way you program with objects: come and learn or rediscover object-oriented programming with Pharo!

Pharo is a pure object-oriented programming language in the tradition of Smalltalk. It offers a unique developing experience in constant interaction with live objects. Pharo is elegant, fun to use and very powerful. It is very easy to learn and enables to understand advanced concept in a natural way. When programming in Pharo, you are immersed in a world of live objects. You have immediate feedback at any moment of your development on objects representing web applications, code itself, graphics, network. [More...](#)

Obtaining the MOOC

We strongly suggest to follow the MOOC during the next session on [France Université Numérique](#) that will start **October 16th, 2017** because you will have support from the teaching team.

Join the discord channel mooc on the Pharo community (Invitation at <http://discord.gg/Sj2rhxn>)

But, you can also access all ressources of this MOOC offline on:

https://discord.gg/QewZMZa

The screenshot shows a Discord server named "Pharo" with a channel named "#mooc". The interface includes a left sidebar with server navigation, a central chat area with messages, and a right sidebar with a list of online members.

Server: Pharo

- FOR NEW USERS
 - # learning-help
 - # mooc
- PHARO
 - # general
 - # development
 - # offtopic
 - # iceberg
 - # bootstrap
- LIBRARIES
 - # databases
 - # polymath
 - # roassal
 - # roassal-scriptoftheday
 - # seaside
 - # moose
 - # bloc
 - # ai
 - # ai-scriptoftheday

Channel: #mooc

23 new messages since 9:59 AM on November 23, 2017 MARK AS READ

Messages:

- akgrant0710** Last Saturday at 11:21 AM
dict includesKey: 'a key'
Take a look through the testing protocol of Dictionary (and superclasses)
- Peter Uhnak** Last Saturday at 11:26 AM
[@Marek Erben](#) especially at::ifPresent:, at::ifAbsentPut: & co.
- Marek Erben** Last Saturday at 1:14 PM
Yeah, thank you [@Peter Uhnak](#)
One more question - is there some simple way to remove one occurrence of item in Bag collection?
- Peter Uhnak** Last Saturday at 1:34 PM
remove: should do it
- Marek Erben** Last Saturday at 1:35 PM
But it removes all the occurrences of item, doesn't it?
- Yani** Last Saturday at 2:20 PM
as in script of the day >url>
- Peter Uhnak** Last Saturday at 2:36 PM
[@Marek Erben](#) did you try? 😊
trying is for free 😊 (edited)

Members:

- ADMIN—3
 - Esteban Lorenzano
 - Juraj Kubelka
 - kilon (Playing Elite: Dangerous)
- CHANNEL-ADMIN—7
 - Alexandre Bergel
 - Clement Bera
 - PhilBack
 - Stepharo
 - Torsten Bergmann ...
 - Tudor Girba
 - Yuriy Tymchuk
- ONLINE—42
 - akgrant0710
 - AlejandroInfante
 - awarenhem
 - Benoit Verhaeghe

Bottom Bar: + | Message #mooc

https:// pharoweekly.wordpress.com

ABC C mooc https://squa...ammingMooc/ Contribut munk V-Traffic Pharo Pillar [Jenkins] epibud index.pillar arxiv twitter weekly weeklyMe meditation

My Site Reader Write

WEEKLY NEWS ABOUT PHARO

Everything you wanted to know about <http://www.pharo.org> without being forced to read 1000 mails

[HITCHHIKER'S GUIDE TO ...](#) [SMALLTALK, TIPS'N TRICKS](#) [COG BLOG](#) [ABOUT](#)

NOV 25 2017 **WHAT ABOUT CONTRIBUTING?**

UNSORTED

[EDIT](#)

Here is the testimony of Astares regularly contributing to Pharo 70.

What is not visible in the list are the many enhancements happening also on Calypso, Bloc, Grease and many many others.

Nonetheless the core image still needs love from more people. Remember even the smallest change can make a difference and shape the future. Also "a contribution per day keeps bad systems away".

Even one contribution per week or month.

So jump in – the water is just fine!

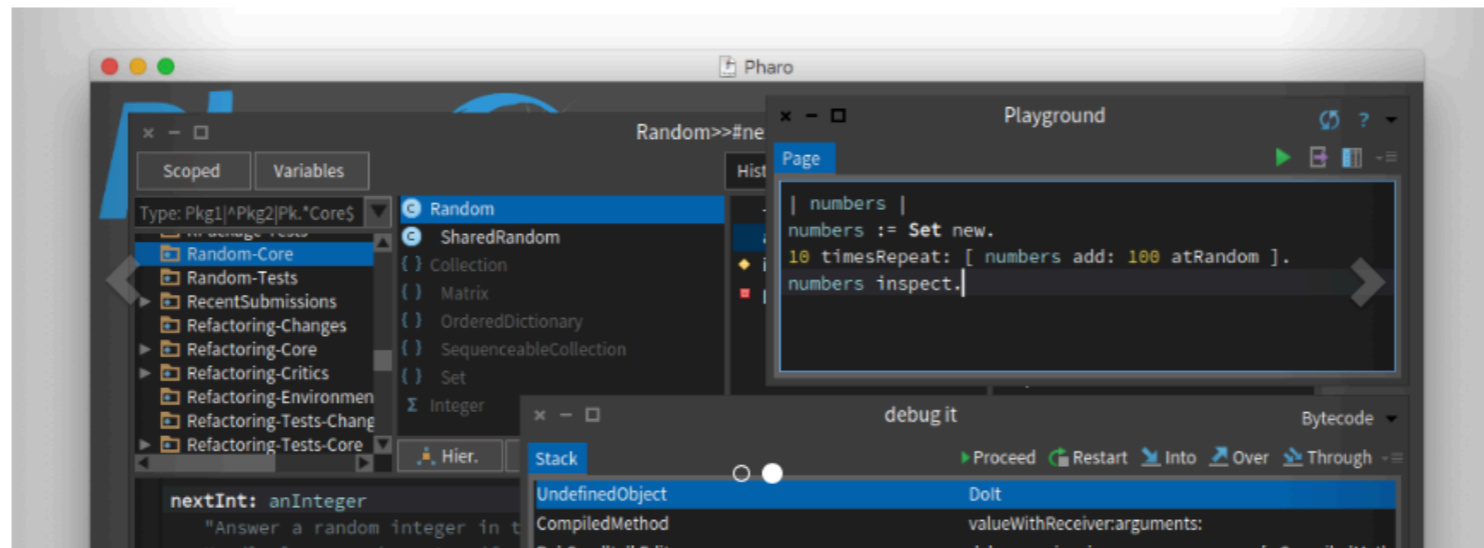
Bye
T. (aka astares)

NOV 22 2017 **EDUARDO 7.0.1 NEXT ENHANCEMENTS 2**



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).



Discover

Learn more about Pharo's key features and elegant design.

Download

Download latest version (8.0)!
Read more about [here](#)

Learn

Access the Pharo Moot!
3000 people registered and follow the Pharo Moot. You can find it [here](#).
Watch the [teaser!](#)