Pharo 14

http://www.pharo.org

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ESUG 2026

Berger Levrault

Inria
INVENTEURS DU MONDE NUMÉRIQUE

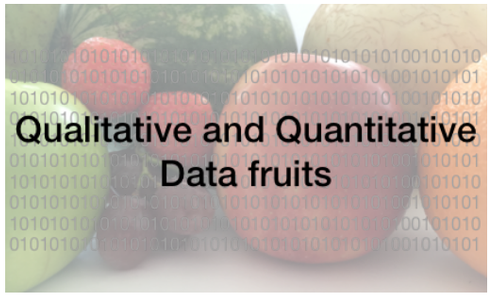
Lifeware

ENSTA Bretagne

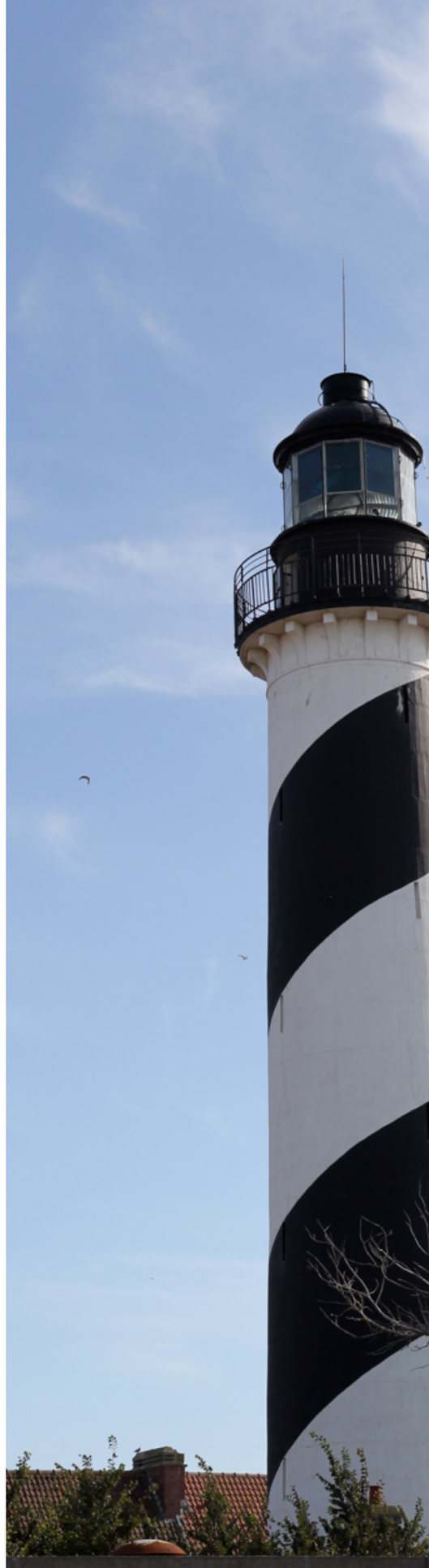
THALES

ZWEIDENKER

Yesplan
Let's make it happen



esug
EUROPEAN SMALLTALK USER GROUP



GemTalk SYSTEMS

SPESENFUCHS

projector software

feenk

netstyle.ch

osoco
osoco software company

inspired!

SRA GROUP

telna

Université de Lille

FINWORKS
INFORMATION TECHNOLOGY SOLUTIONS

A single word

HUGE amount of work

HUGE

Multiple parts

- Process CI
- Pharo Infrastructure (cmd line, interruption..)
- Debugging
- Compiler
- Spec
- Tools
- and more …

[All the crazyness we do]

- Debugging in gdb using Smalltalk garbageCollect as C breakpoints!
- Debugging mini images that collapse on the server without ui nor tools
- Broken tests on the server while working locally :(
- Fighting with libGit broken versionning and absence of backward compatibility
- And many more :(

Outline

- **Process CI**
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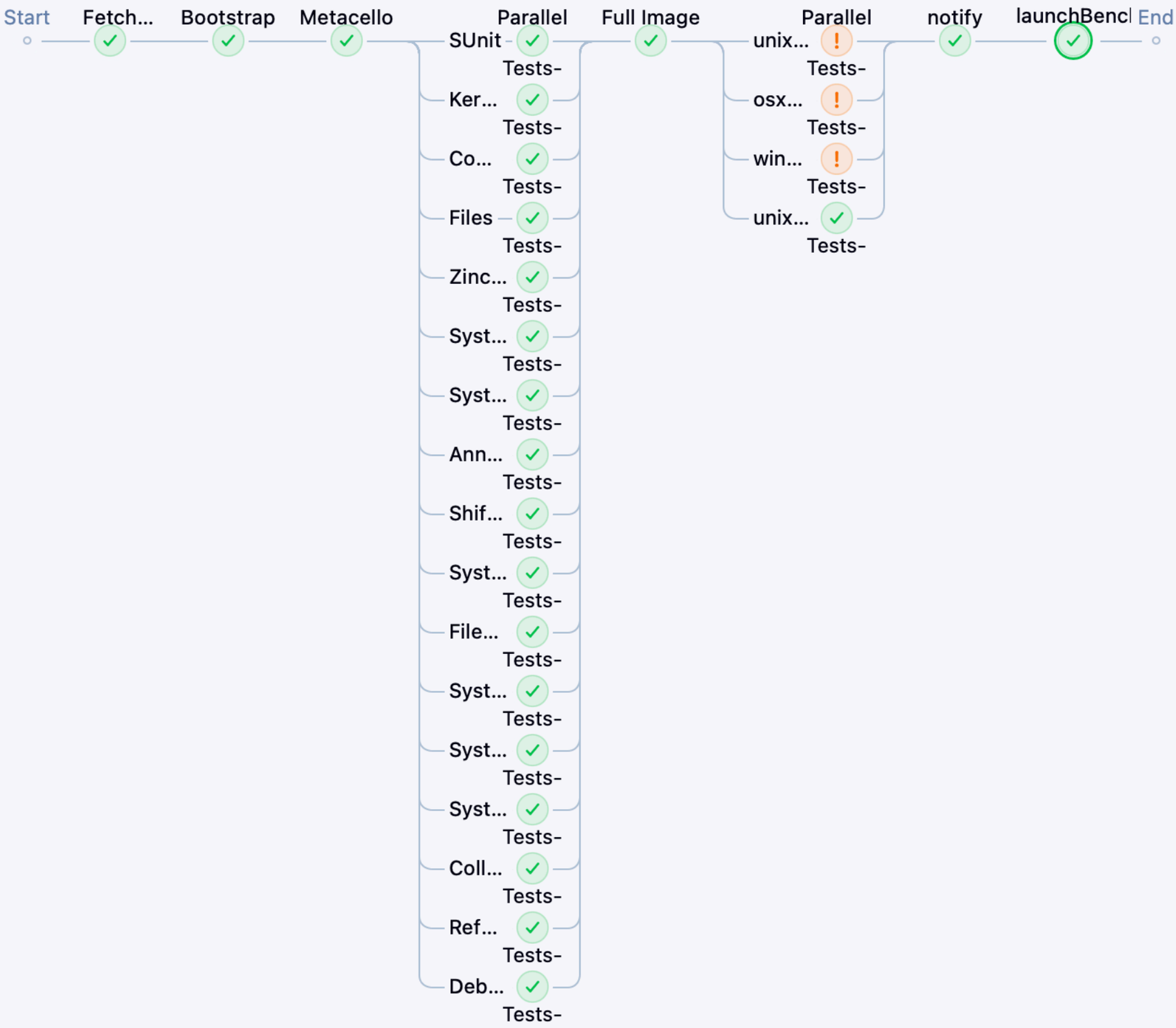
Fighting the Antagonism

- Image-loaded code vs. baseline of code to be loaded
- When subsystem is added in the image, it may introduce hidden dependencies
- Got some “ugly” tests verify dependencies
- But static and tedious when breaking

CI supported modularity

- Modularity by construction
- Load the baselines to validate them and run their tests
- Mid term goals: Validation of all baselines

CI supported modularity



Modularity by construction

- strict mode to load baseline
- No undeclared in loaded code

- Our goal is to validate all Pharo
- system be prepared
- No undeclared in your code

Outline

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Better interruption handling

- Remember 2025 talk of Guille Polito on memory

- The Gist of it!

  when there is an endless loop, the system in urgent mode cannot allocate more objects on heavy stress and felt in “move stack pages to memory”

  But there is no memory !!!! so… collapse in GC spinning wheel of death

Better interruption handling

Stack page size can be set at VM startup

Exception to be able to react to memory exhaustion

Already there but not by default

Old Command line infrastructure

Was clunky, clumpsy and a bit rotten too :)

Two different handlers

Not regular

Not optional

Modernized command line infrastructure

- Unique command line handler at image startup
- All commands are now written in Clap

Unique command line handler

- Used at image startup
- ClapCommandLineHandler runs clap applications

Default low-level entry

perform [--help] [--save] [--no-quit] [--as-array <array-argument>] [<global>] [<messageSelector>] [<arguments>]

Pharo P14.image perform Point new
(nil@nil)

You can add your own

Outline

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Compiler cleanup

Paving the way for modules

- Modules for real: [Guille' presentation]
- We are (mentally) far from modularity
  - Yes creating a symbol as a side effect on the SymbolTable [Guille' presentation]
- Compiler should be **optional**
- Compiler**s** versus **The** Compiler

A simple module scenario

Pharo bootstrap
    running in P10
    get impacted by any VM and compiler changes

What if we could run the old compiler in a given module and execute the tests (yes we different SUnit version) of the bootstrap

Can we have (another) compiler compiling the compiler?

Compiler challenges

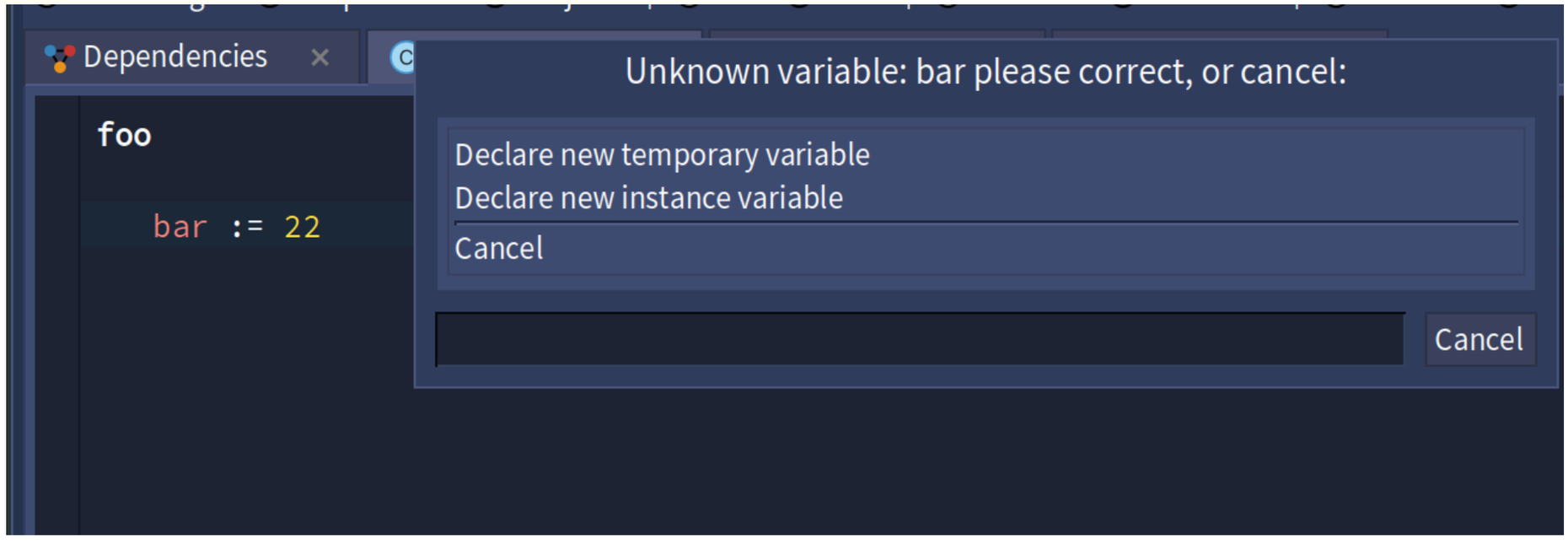
- There is no such One Compiler!
- Hidden global
- Cannot compile IR methods without Death Recursion
- Avoid ^%$&*%(*&^$% coupled in a strange way parameters
- Layer violations
- 10 different ways to add a method in a class!

the Ugly requestor

- Yes the compiler had the user interaction logic

```
foo

    OrderedCollection new
    x: 12 ; y  End of statement expected ->OrderedCollection new
    x: 12 ; y + 3+ 3
```



Compiler revisited

- Split responsibility: Evaluation, InteractiveAPI (requestor), and Compilation
- Cleaned API
- Cleaned clients
- Layering in place
- Compilation returns **a compilation result** (source, metadata, and compile method)
- **MethodInstallers** *silent*, announcing, traits, modules…

No omnipresent compiler!

Long term goal: Shipping Pharo Apps without a compiler!

- Debug without source
- D**ebug without the compiler**
- Have different compilation semantics (plugins)

- How the debugger can debug when it has no clue about the plugin used to compile the method?
- Try and fail

DebugInfo to the rescue!

- Dwarf like metadata for debugger
- API to
  - identify key messages for debugging
  - support backwards approach
  - support forward compiler-less debugging
- Cleaning Context, CompiledMethod, InstructionStream API (oh boy!)

Where to store the metadata?

140,000 methods

2k per method does not fit in the image

Store the metadata in the sources file?

Well did you ever look at the source management code…

Source challenges

- Loading image logic not symmetrical to saving
- Multiple loading code logics
- Multiple saving code logics

Painful to debug… and code without source :(

Only one is more

- MASSIVE cleanup of logic
- CompiledMethods do not need to know “the” compiler!
- One way to load
- One way to save code
- Versionned format! (duh!)
- Open doors for the future

Modernized source next steps

- Possibility to plug
  - alternate approaches (e.g., database,…)
    - Package metadata
- Support for debugger without compiler

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Challenges of mini images debugging

How to debug mini images?

- No UI
- Not all libraries loaded

```
Error: CRITICAL: Data ingestion pipeline failed in worker thread.
UndefinedObject>>DoIt
OpalEvaluator>>evaluate:
[ ] in ClapCodeEvaluator>>evaluateExpression
FullBlockClosure(BlockClosure)>>on:do:
ClapCodeEvaluator>>evaluateExpression
ClapCodeEvaluator>>evaluate
ClapCodeEvaluator>>execute
ClapCodeEvaluator(ClapApplication)>>executeOrPrintHelp
[ ] in ClapContext>>executeToExit:
FullBlockClosure(BlockClosure)>>on:do:
ClapContext>>executeToExit:
```

CmdLine debugger API

Prompt based textual stdin/out debugger :)

```
--------------- Debug phase started ---------------
 For help, type "help"
(debug) help
=========== available commands ===========
        quit ( or 'q')  : kills the debugger
        step ( or 's')  : execute next stepInto
        printCode ( or 'pc')  : print current'method code
        print ( or 'p') <expression> : evaluate the expression
        history ( or 'hist')  : Give the history of last commands
        over ( or 'o')  : execute next stepOver
        printStack ( or 'ps')  : print the current Stack
        help ( or 'h')  : print this help
(debug) step
Stepped to: [ ] in UndefinedObject>>DoIt(PC: 19)
(debug) step
Stepped to: [ ] in UndefinedObject>>DoIt(PC: 20)
(debug) printCode
[ --->1+1<--- ]
(debug) !!
[ --->1+1<--- ]
```

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- **Spec**
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Spec news

- [alpha] Code editor / Code presenter work
- Refactoring command migration
- Morphic layout fixes
- Better List/Tree filtering behavior
- Dialog/window/modal behavior
- Action/command cleanup

Pharo 14 Tools

Migrating to Spec
    Setting Browser
    Finder
    MethodBrowser

File Browser/Finder/Transcript improvements
StPulse to replace Spotter
Smoother Refactorings

REFACTORING ENGINE

A Better Flow for Refactorings

Driver

Configure the refactoring: gathers input and propose solutions to the user

Reified Preconditions

Validity checks become first-class objects, composable and testable

Transformation

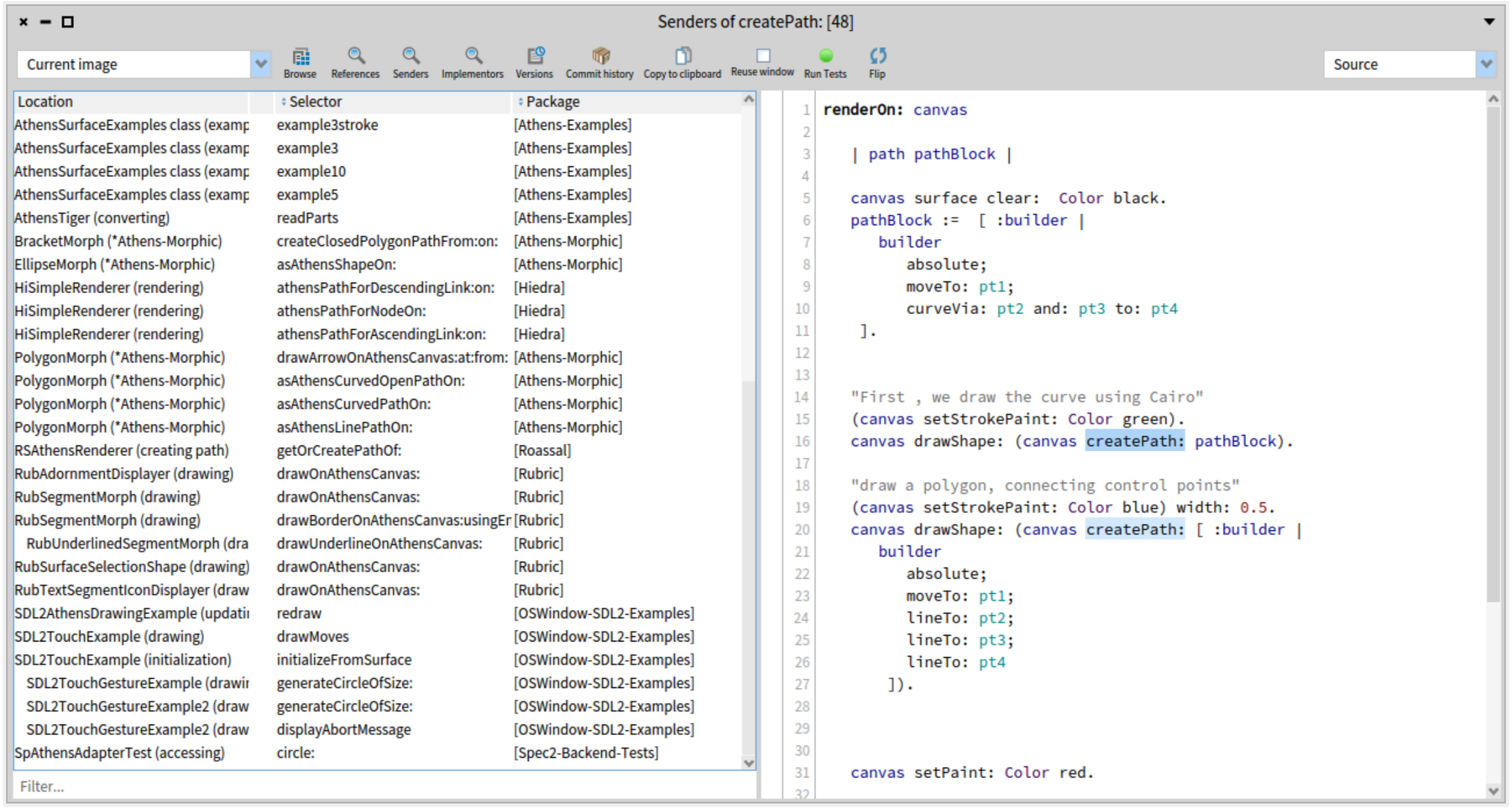
The actual rewrite, isolated from validation and orchestration

The result: *each step owns its own logic — clearer code, safer transformations, and refactorings that are easier to extend.*

New method browser

- Spec-based (for Toplo migration)
- Support for refactorings
- Test execution
- H/V layout views
- Tabs

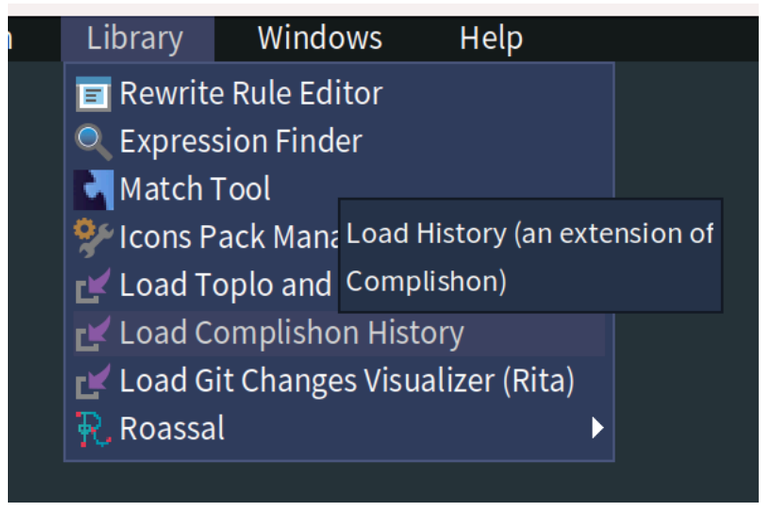
New Method Browser: Browsing, Rebuilt



Complishion on steriods

- **Package dependencies** to better choices
- **Coding history** mixed with your **last selections** :)
- [preview] Typo tolerance
- [See Complishion talk]

Past activities



Optional but super cool

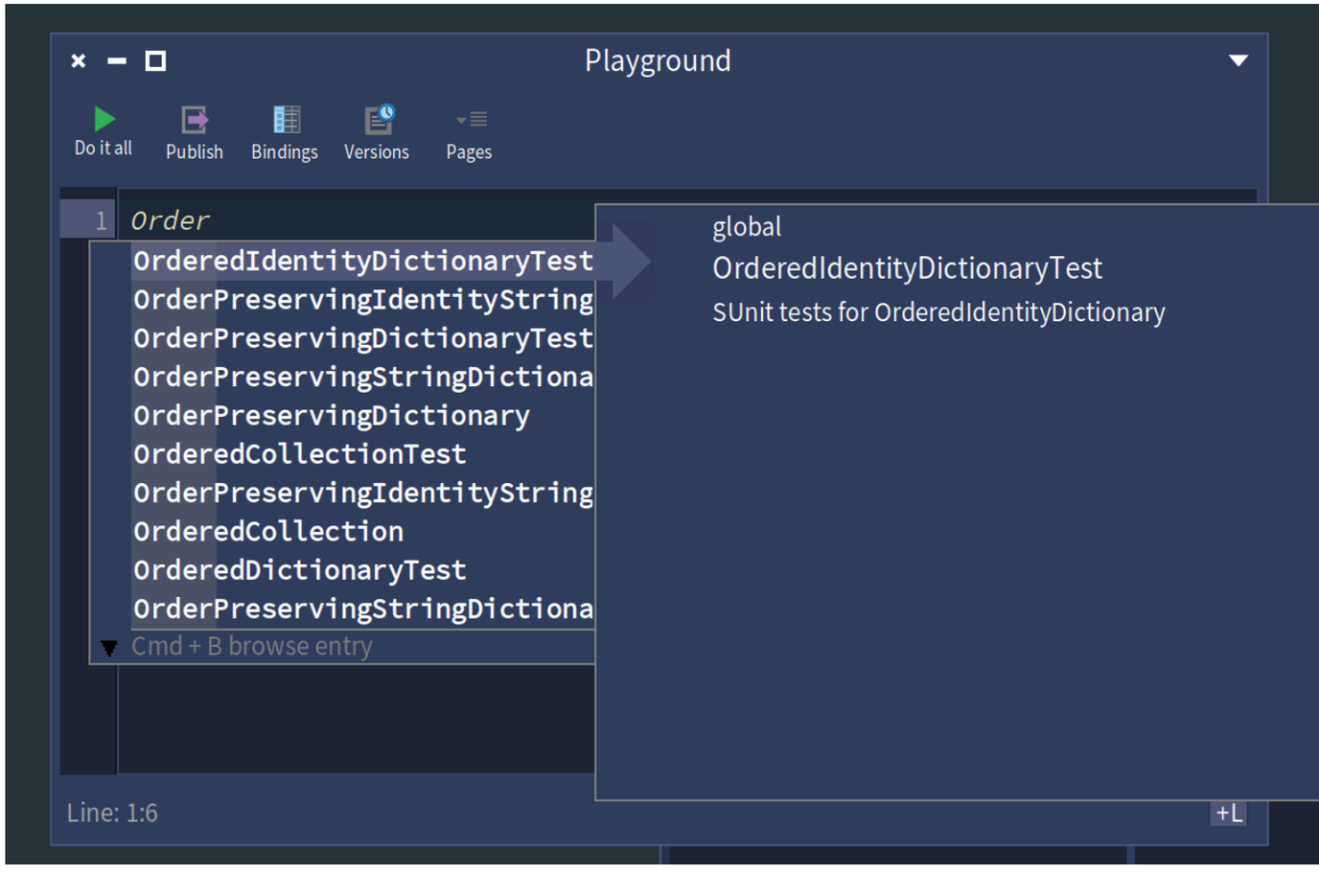
Take your **recent class/method addition**/removal

Take your **recent selections** in the menu

Use a recently use window

Without With

- Selecting OrderedCollection



Iceberg

- New Spec merge browser replaces
- optional command-line Git backend
- Metacello/direct Git URL fixes
- Repository lifecycle and libgit resource cleanup
- Repository browser UX improvements
- dirty-package, diff, snapshot, and history performance work
- UIManager and deprecated API cleanup
- LibGit chase game: version numbering is not backward compatible

Tests

- TestRunner object
  - responsible of running the tests (shuffling, report generation)
    - To be improved and more used
- Pass on HD report
- Support server test local machine running
  - Sorting then shuffling with the same seed

VM side

- Merge several feature branches
- Starting to work on VM migration to Pharo 13
- Change of Clang versions (from 9 to 21) - Ouch
- OBS revisited

VM summary

- Frame unification and stack management improvements, delivering substantial interpreter and execution engine cleanups.
- RISC-V JIT support, expanding platform coverage and future-proofing VM development.
- New memory management capabilities, including direct old-space allocation and numerous GC and allocation improvements

VM summary

- Extensive compiler and Slang/C translation work, many correctness fixes, new tests, and improved inspection tools.
- Platform and build modernization, including SDL updates, improved CI, cross-build support, and updated third-party dependencies.
- Large-scale cleanup and refactoring efforts across the VM, interpreter, Cogit, PICs, and infrastructure.

Enhancements

- Clean blocks and debugger/evaluation behavior
- ClassBuilder, trait, and superclass correctness
- Morphic/UIManager dependency reduction
- Calypso, FastTable, text, graphics, Zinc, and Zodiac fixes
- Many more …

Backward compatible

We are **REALLY** concerned about backward compatibility

Most of the work is backward compatible

Toplo/Bloc on Preview

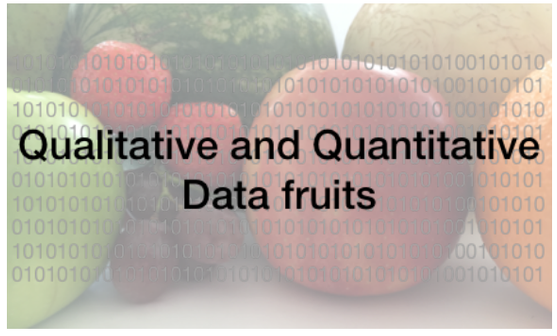
Missed our target to have Toplo in P14 :(

But we made a lot of progress

See the presentation about Bloc/Toplo

Consortium news

- Spesenfuchs increased its level! Thank you
- Qualitative and Quantitative Data Fruits is platinium



- We are honored, committed and feel responsible of delivering for you

Consortium news

- New support process
  - Systematically report support consumption
- Evaluating support for migration from proprietary Smalltalks

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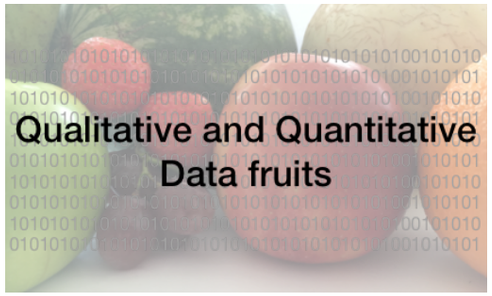

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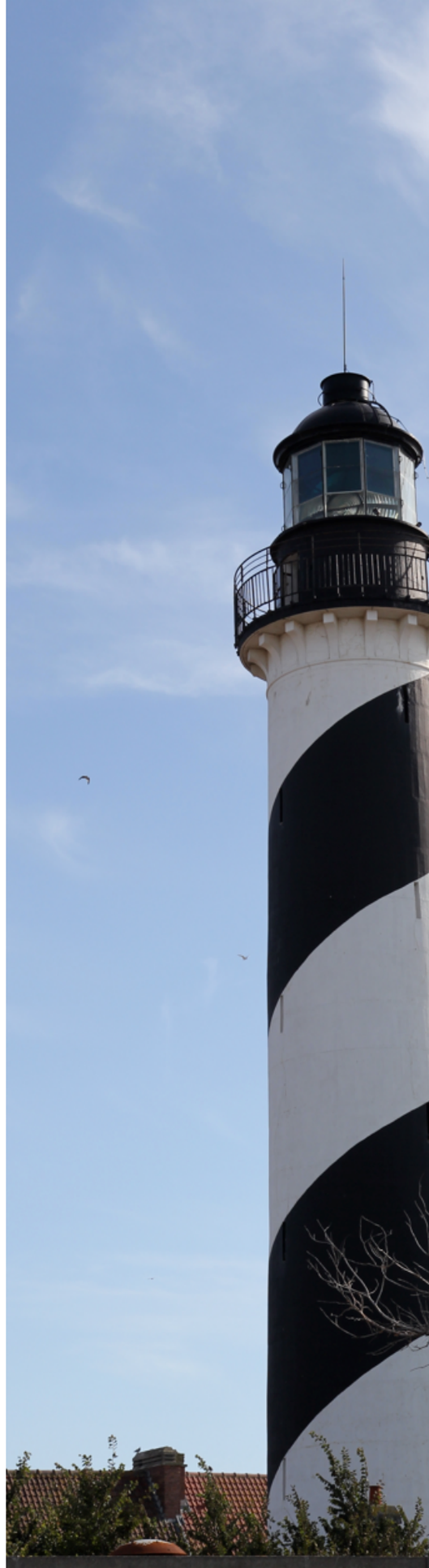

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