An extensible production-level debugger

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An extensible production-level debugger

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Problem: building and evaluating new debuggers

Debuggers are difficult to build.

- Huge development costs
- Difficult to reuse: prototypes are often one-shot
- Costly and difficult to maintain
- Difficult to test

How to make debuggers extensible to facilitate the construction and maintenance of new prototypes?

Debuggers are difficult to evaluate.

- Prototypes are often unstable
- Difficult to evaluate on real-world scenarios: practitioners need to adopt and use the new debugger

How to make debuggers solid to make them usable in practice and evaluate them?

Requirements for extensible production-level debugger

Modular and easy to **reuse**, **test** and **maintain**

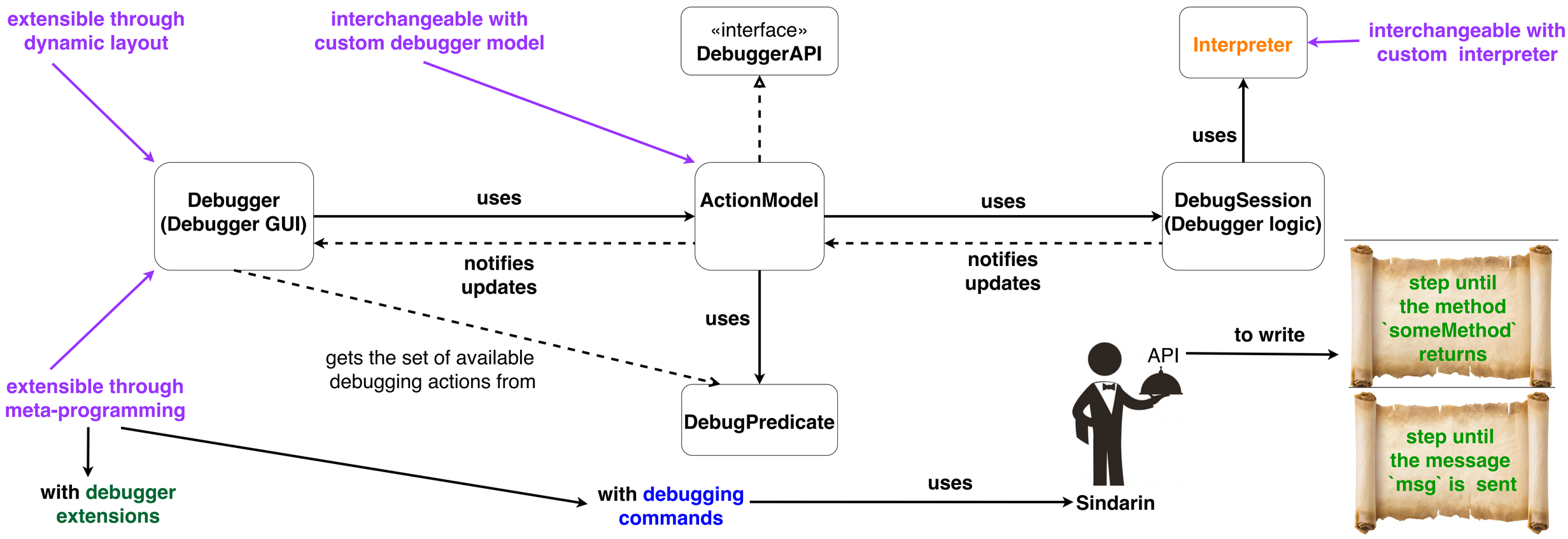
extensible and easy to build on top

production-level and regularly **maintained**

Tools resulting from prototypes are **stable**, through **testing** and **bug fixes**

Easy to adopt: practitioners use the debugger they know along with the new tool

The Pharo debugger design



Building new debugging tools: Examples

CHEST:

a global collection with an API to access objects from everywhere

1 copy `a` from program 1

while debugging code `methodWithTwoAssignments`

```
| a |
a := 1.
a := 5.
^ Point x: 5 y: '3' asInteger
```

store `a` in chest

Chest
inChest: 'ClipboardDefault'
at: 'clipboardEntry'
put: a

`a` is now in a chest

API Example

2 paste `a` from program 1 into program 2

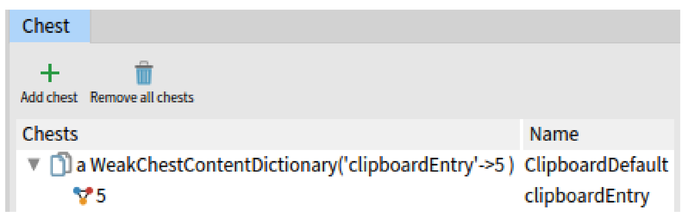
```
toto := 42.
tata := (Chest named: 'ClipboardDefault')
            at: 'clipboardEntry'
```

load `a` from program 1 into program 2

How to compare my objects between program 1 and 2 ?

inside program 2

```
toto == tata   false
```



integrated as debugger extension

JUMP TO CARET:

a Goto command to debug

Scenario: we expect our code to take the `ifFalse:` path but takes the `ifTrue:` path

we are here

```
a < 100
    ifTrue: ['doSomeCode' printString ]
    ifFalse: ['doSomeOtherCode' printString ]
```

we want to go there, to see what would happen

We can jump to caret, to see what would happen if the other branch was executed

The program state is identical before and after having jumped to caret!
We can now debug this branch!

```
a < 100
    ifTrue: [ 'doSomeCode' printString ]
    ifFalse: [ 'doSomeOtherCode' printString ]
```

we are now there

A production debugger integrated into the Pharo language

THALES

REAL USERS

moldable debugger, possible to add:
- specific debugging operations
- specific debugging tools

new debugging tools can be used as extensions of the existing debugger

Concerns are separated as each composant is independent: the interpreter, the model, the API, the UI, the debugging commands, and the debugger extensions

3 main contributors, 958 commits

Listening to feedback from users

The debugger is used for empirical evaluation of research prototypes

Lots of contributions merged into the Pharo baseline

559 tests ✓