CWI Centrum Wiskunde & Informatica

Enabling PHP Software Engineering Research in Rascal

Mark Hills and Paul Klint

WASDeTT
July 1, 2013
Montpellier, France

http://www.rascal-mpl.org

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- Hostile environments: most PHP code runs on the web

What are we trying to do?

- Big picture: develop a framework for PHP analysis
- Specifics:
  - Empirical software engineering
  - Software metrics
  - Program analysis (static/dynamic)
  - Developer tool support

Rascal to the Rescue!

- “Rascal is a domain specific language for source code analysis and manipulation a.k.a. meta-programming.” (http://www.rascal-mpl.org/)

- Language focus: program analysis, program transformation, domain-specific language creation

- Current projects across large numbers of domains, both within and outside academia

- Open source, over 30 committers worldwide

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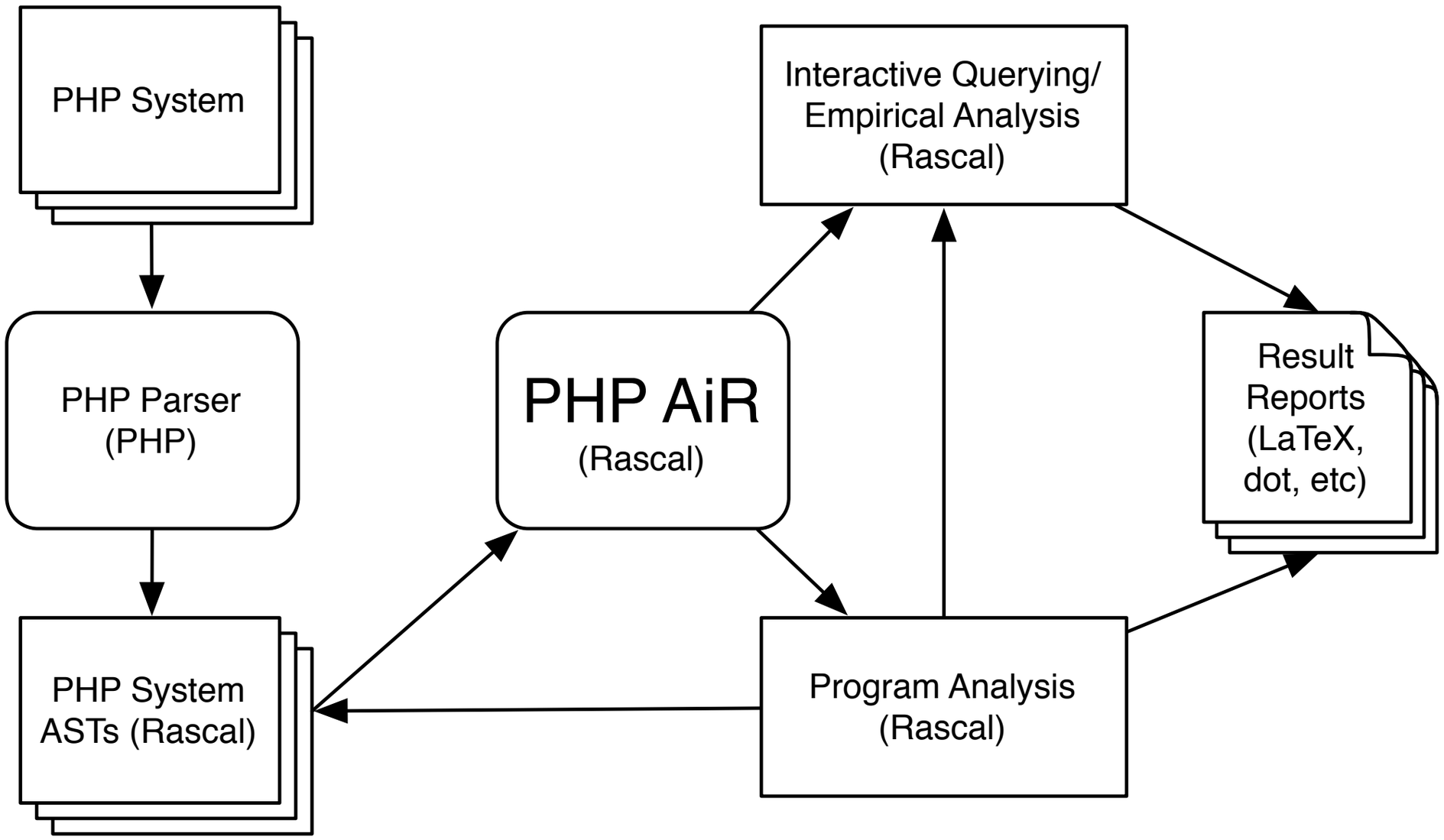
Design Decisions

- Parsing: roll our own, or use existing parsers?
- Where should we optimize?
  - Inside PHP AiR?
  - Inside Rascal?
  - Both?
- How do we cleanly access external data sources that hold analysis data we care about?

Result: PHP AiR (Analysis in Rascal)



One Example: Empirical Study of PHP Feature Usage

- Perspective: Creators of program analysis tools
- What does a typical PHP program look like?
- What features of PHP do people really use?

- How often are dynamic features, which are hard for static analysis to handle, used in real programs?
- When dynamic features appear, are they really dynamic? Or are they used in static ways?

"An Empirical Study of PHP Feature Usage: A Static Analysis Perspective", Hills, Klint, and Vinju, To Appear at ISSTA 2013.

Lessons Learned

- Rascal data types and declarative programming lead to smaller, more expressive code

- Having source locations as a built-in datatype provides a powerful abstraction for referencing code

- Tool flexibility is important: an all or nothing approach to Rascal would slow us down (e.g., parsing)

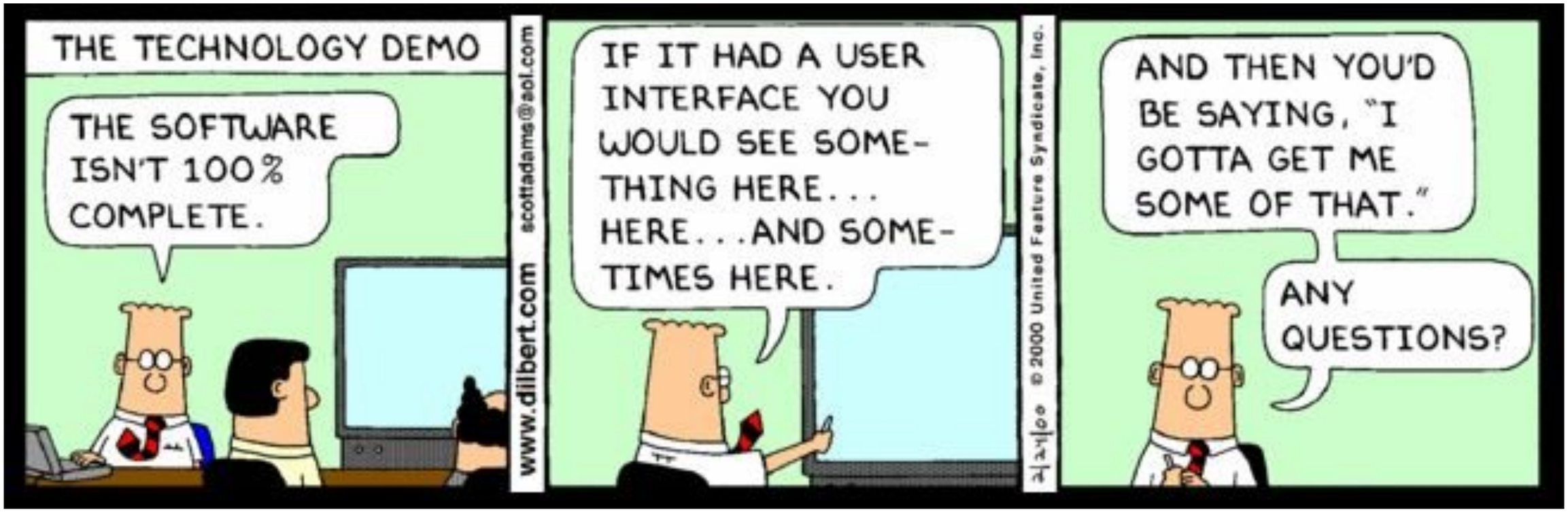
- Scripting analyses eases reproducibility

- Performance is a persistent issue, and needs more work

Related Work (PHP Frameworks)

- PHP-sat & PHP-tools
- PHP CodeSniffer (standards conformance)
- PHP Copy/Paste Detector (only exact copies)
- PHPDepend, PHPLoc (metrics)
- PHPMD (metrics, simple bugs)
- php, HipHop (analysis & compilation)

Demo: PHP AiR


THE TECHNOLOGY DEMO
THE SOFTWARE ISN'T 100% COMPLETE.
IF IT HAD A USER INTERFACE YOU WOULD SEE SOMETHING HERE... HERE...AND SOMETIMES HERE.
AND THEN YOU'D BE SAYING, "I GOTTA GET ME SOME OF THAT."
ANY QUESTIONS?
www.dilbert.com scottadams@aol.com
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Discussion

Thank you!
Any Questions?

- Rascal: http://www.rascal-mpl.org
- SWAT: http://www.cwi.nl/sen1
- Me: http://www.cwi.nl/~hills