R as a Citizen in a Polyglot World

The promise of the Truffle framework

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useR! 2015
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„The Polyglot World“
From 30,000 feet
„The Polyglot World“
From 20,000 feet
„The Polyglot World“
From 10,000 feet
„The Polyglot World“

From 1,000 feet
„The Polyglot World“

From 1,000 feet
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The Graal/Truffle Technology Stack

World’s first competitive-performance multilingual runtime stack
Oracle Labs’ Graal/Truffle Technology Stack

Components

• Language implementations:
  – JS, Ruby, Python, C, Smalltalk, ...

• Truffle framework
  – Language runtime features
  – Interoperability, tooling, debugging
  – Partial evaluation of AST interpreters

• Graal compiler
  – Java bytecode compiler

“One VM to rule them all, and with interoperability bind them”
Demo
FastR: apply the advantages of the Truffle/Graal stack to R

- **Superior performance without resorting to C and Fortran**
  - Significant amounts of time are spent converting R to C code for performance

- **Interoperability with CRAN, Bioconductor, github, ... repositories and packages**
  - Can hardly be called “R” without this

- **Interoperability within the Graal/Truffle ecosystem**
  - Transparent inerop with JS, C, Ruby, ...

- **Research vehicle for data-heavy and parallel applications**
  - multi-tenancy, multi-threading and multi-node execution of R applications, alternative internal data representations, etc.
The FastR Project

• Derivative of GNU-R – all code GPLv2
  – [https://bitbucket.org/allr/fastr](https://bitbucket.org/allr/fastr)
  – Sources only, no binary release (yet)

• Started with Jan Vitek’s group at Purdue, ongoing at Northeastern

• Collaborations with:
  – Purdue/Northeastern (testr, S3/S4 semantics, formulas, …)
  – JKU Linz (Truffle, language interoperability, …)
  – Formerly: UC Davis, TU Dortmund
  – TU Berlin (planned)
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Hardware and Software
Engineered to Work Together