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R as a Citizen in a Polyglot World

The promise of the Truffle framework

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useR! 2015

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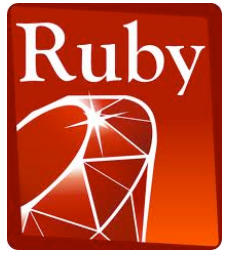
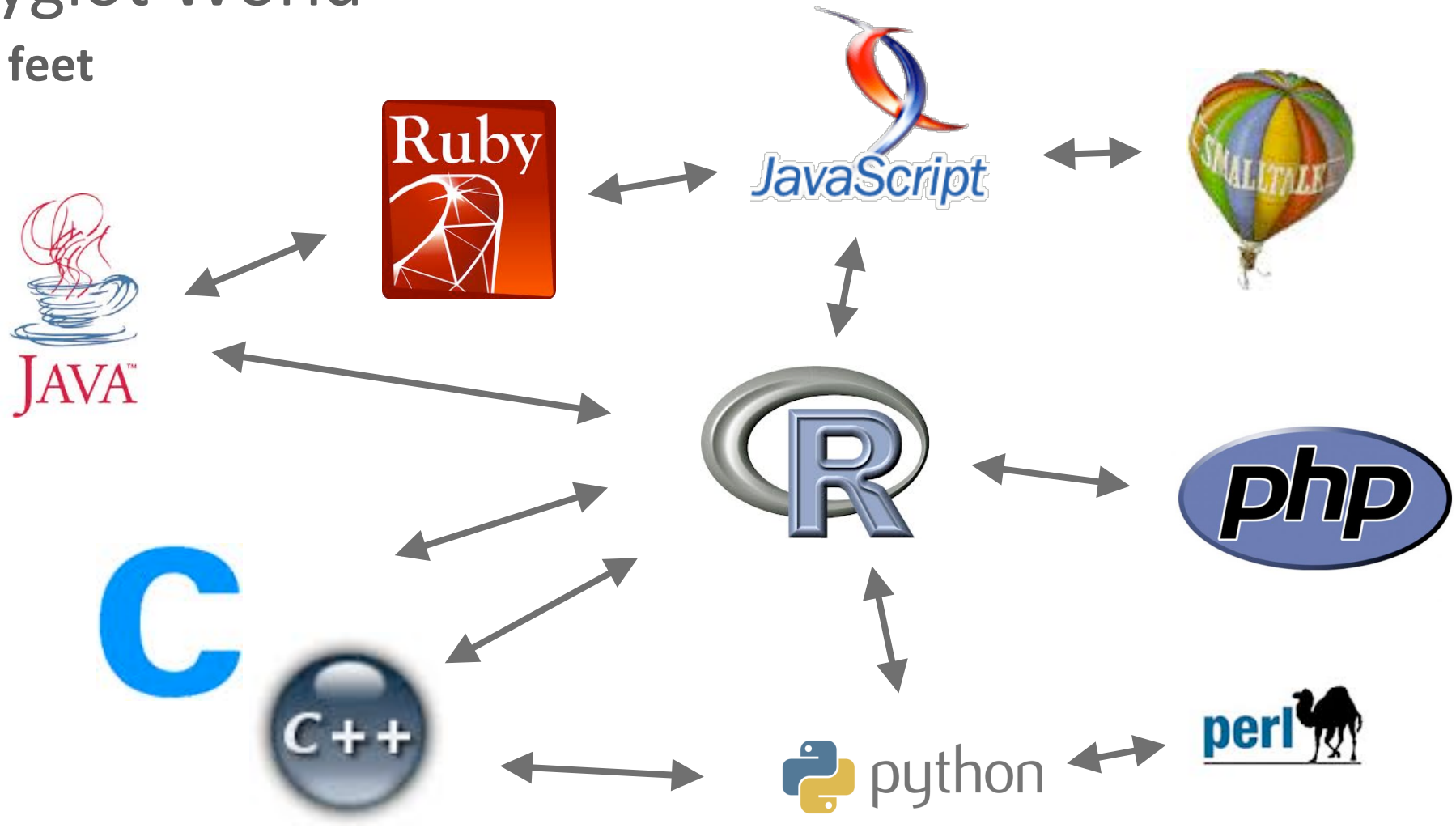
„The Polyglot World“

From 30,000 feet



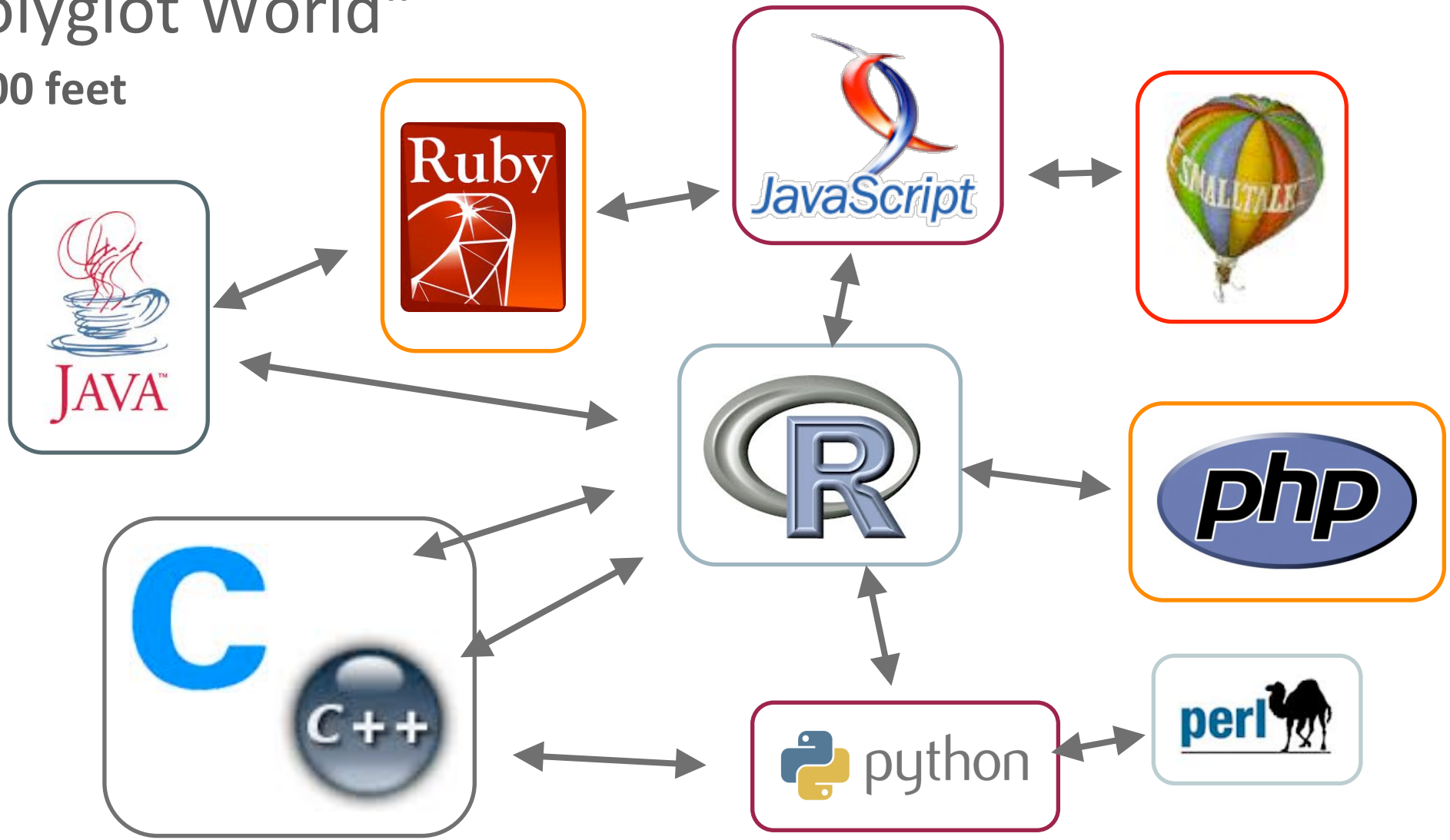
„The Polyglot World“

From 20,000 feet



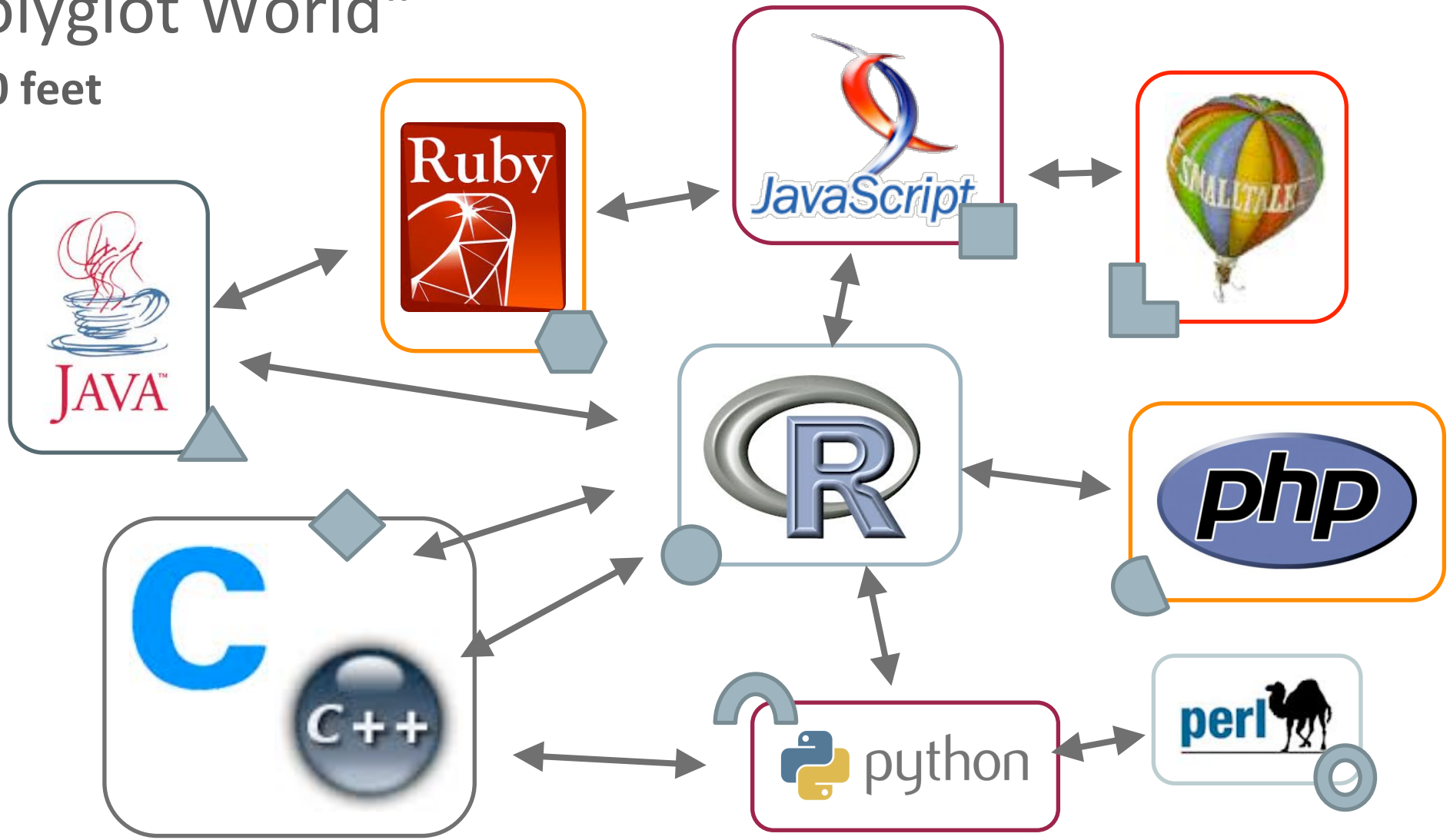
„The Polyglot World“

From 10,000 feet



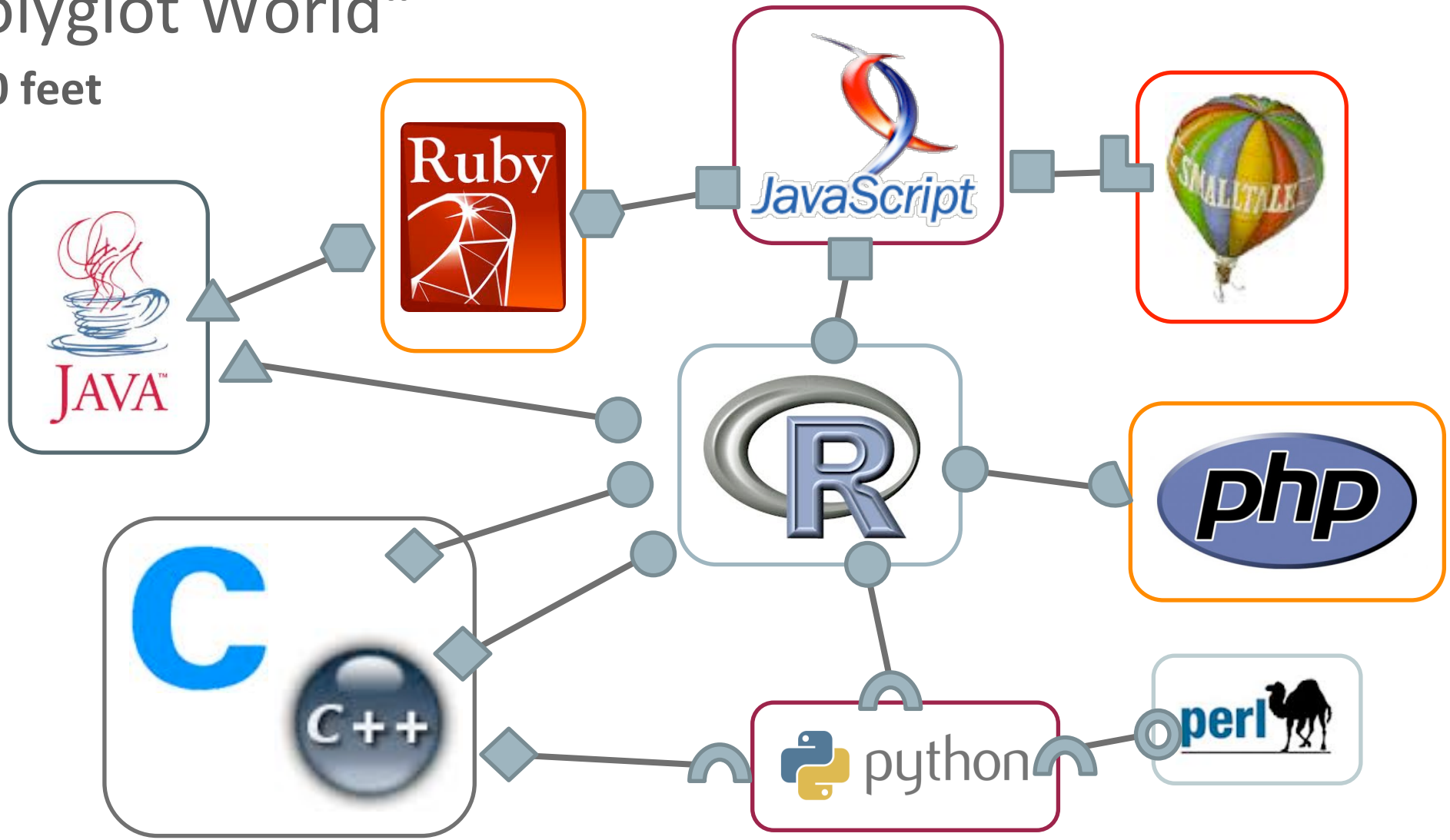
„The Polyglot World“

From 1,000 feet



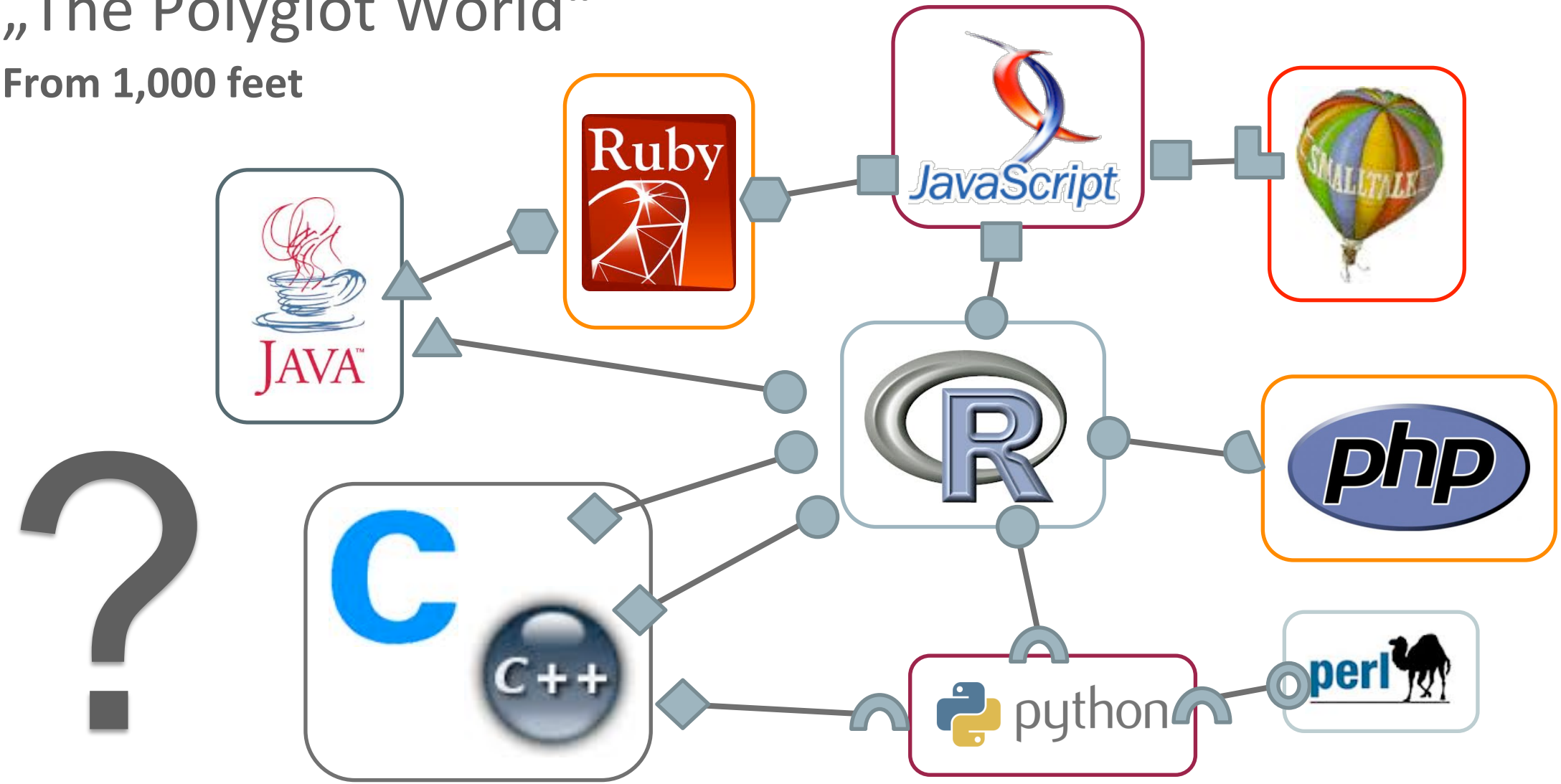
„The Polyglot World“

From 1,000 feet

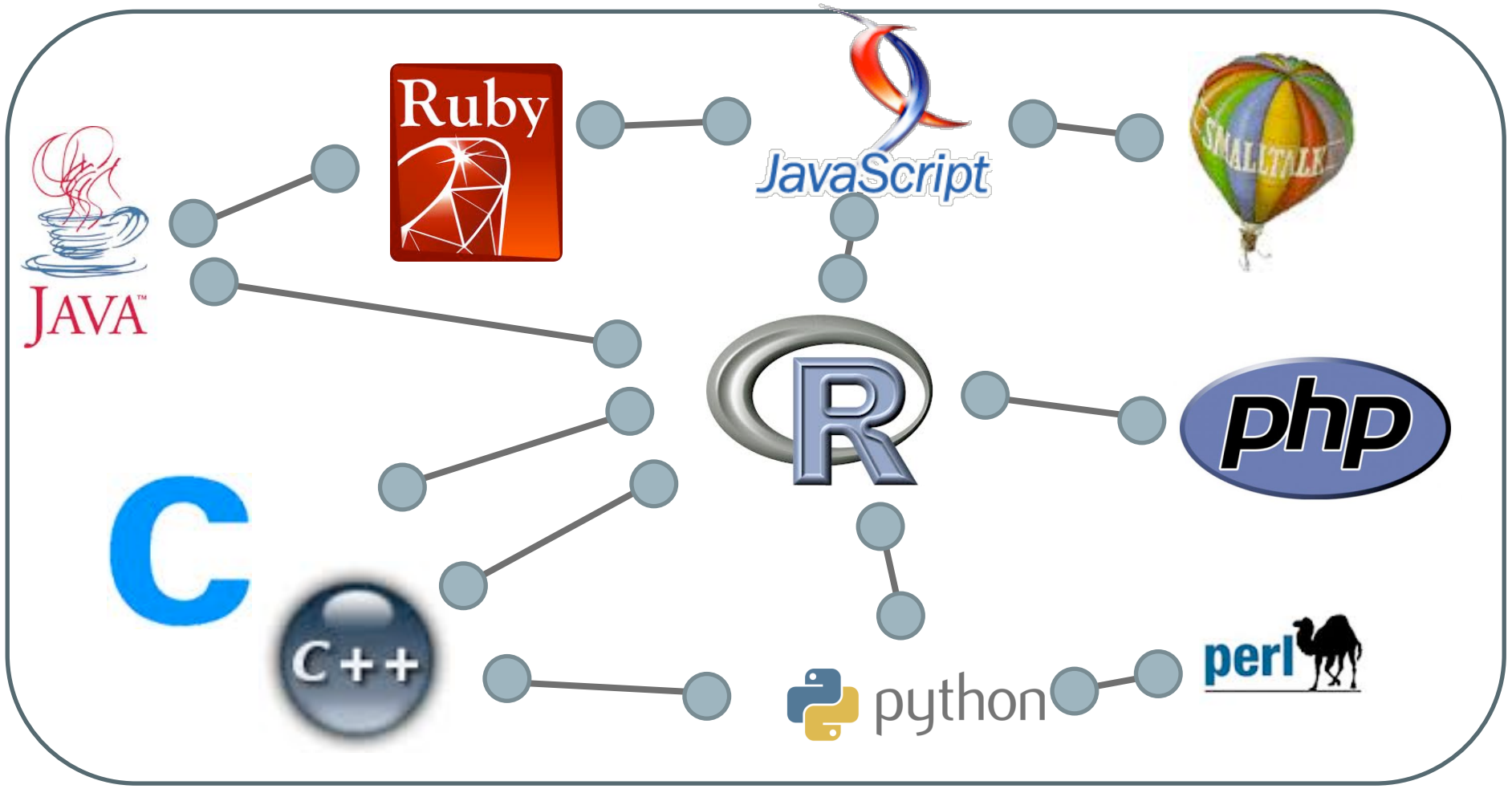


„The Polyglot World“

From 1,000 feet



„The Polyglot World“



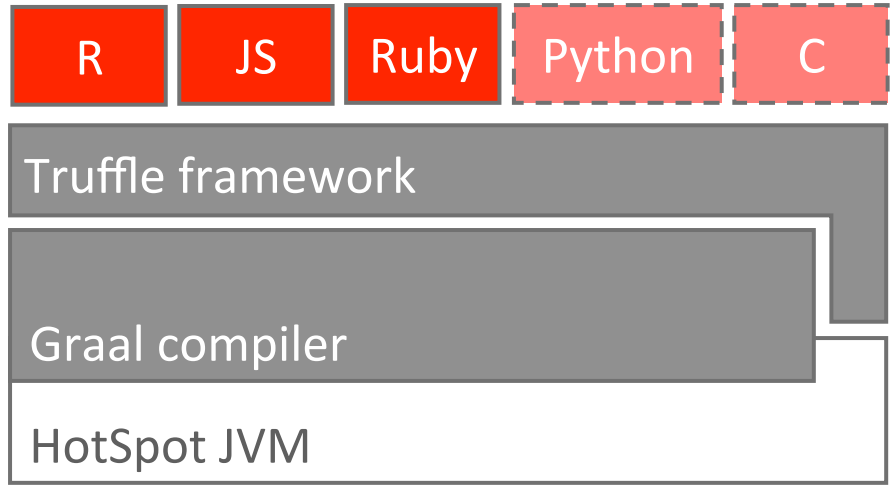
The Graal/Truffle Technology Stack

World's first competitive-performance multilingual runtime stack

Oracle Labs' Graal/Truffle Technology Stack

Components

- Language implementations:
  - R ("FastR", https://bitbucket.org/allr/fastr)
  - 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
  - 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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