

ORACLE®

Jaroslav Tulach

- 1 NetBeans Founder
- 2 NetBeans Initial Architect
- 3 Practical API Design book
- 4 Oracle Labs: Graal/Truffle



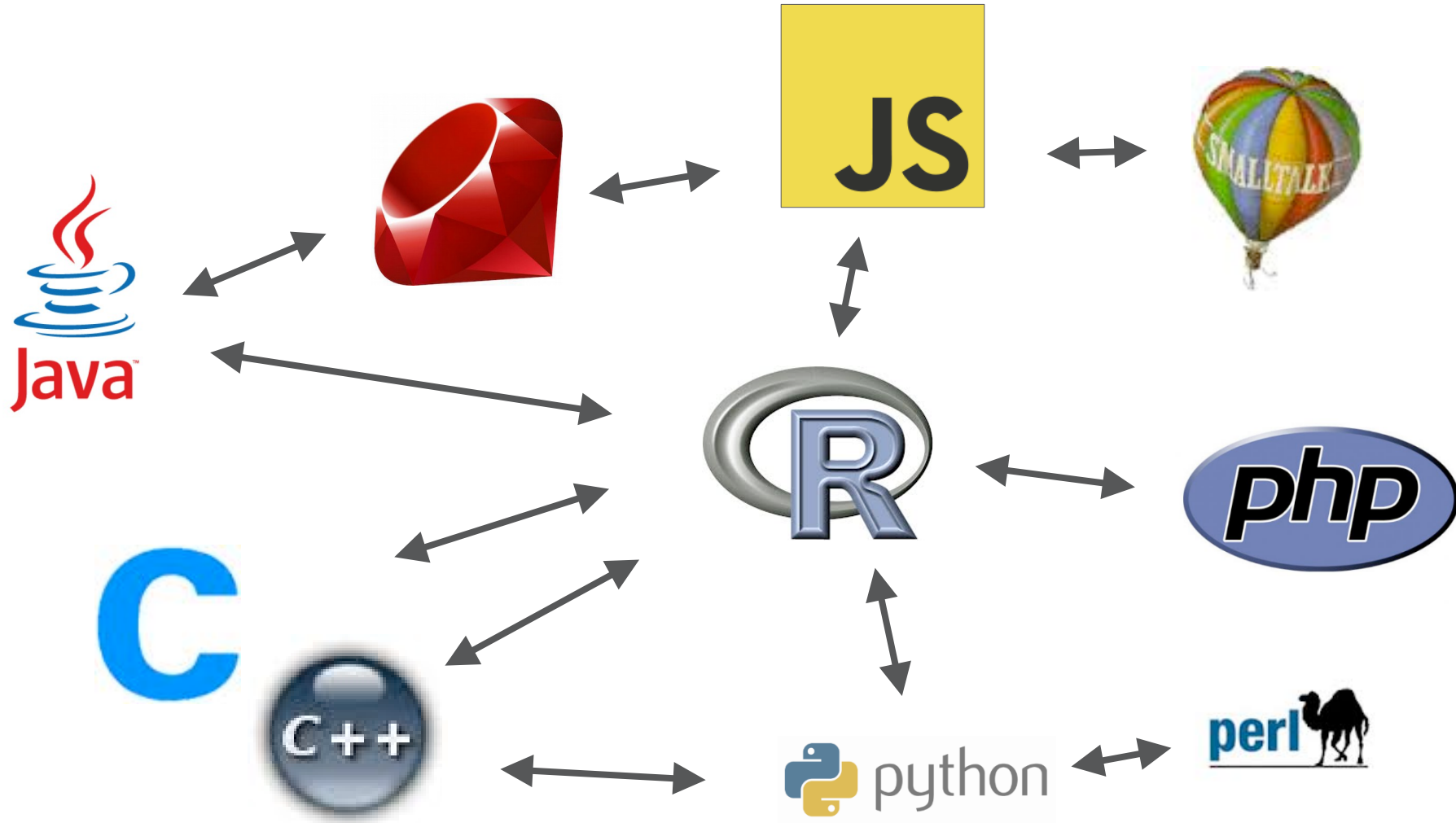
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Program Agenda

- 1 The Polyglot World
- 2 Graal VM
- 3 Truffle Languages
- 4 References & Discussion

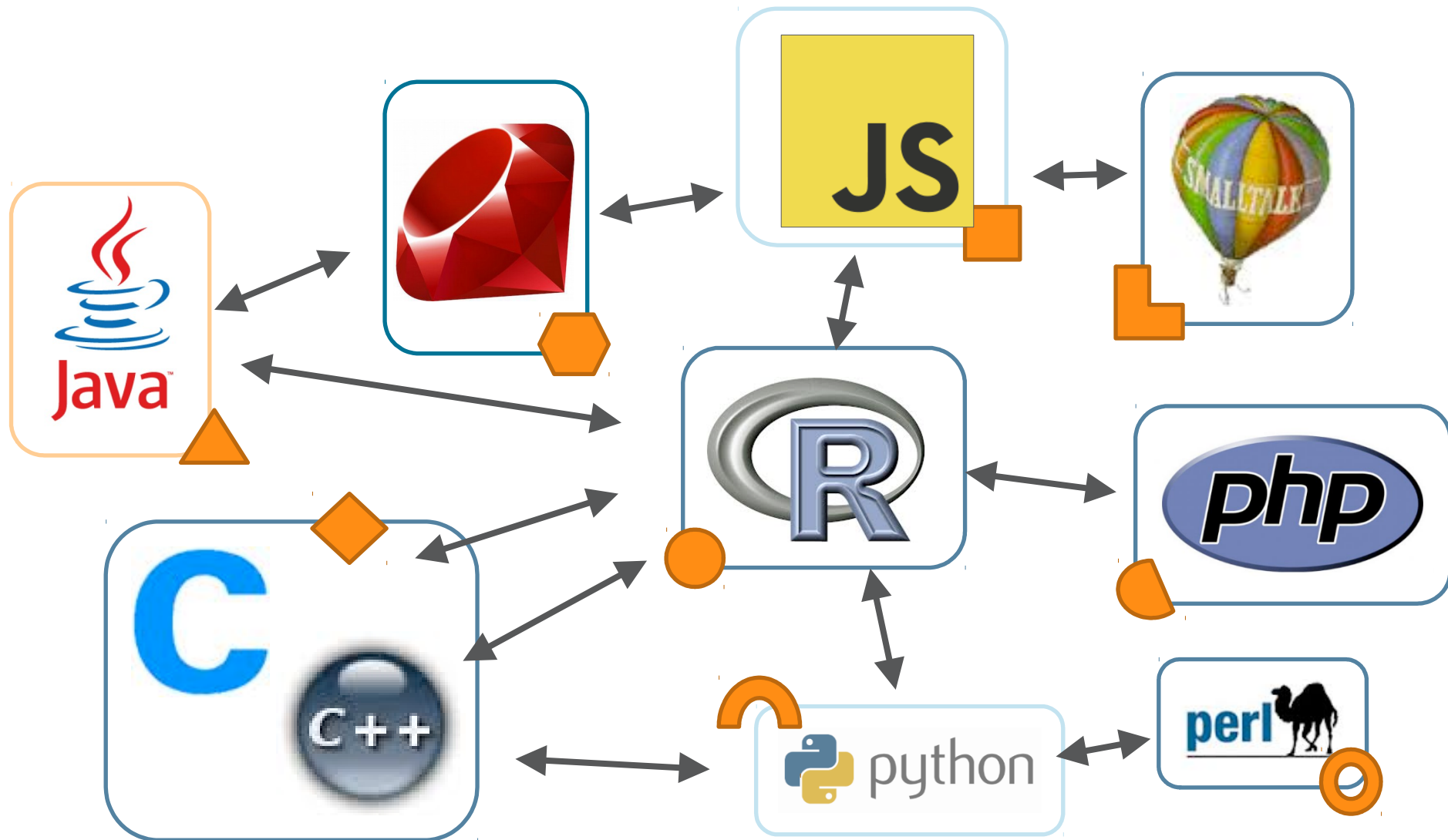
Aren't you Already a Polyglot?



OracleLabs Vision

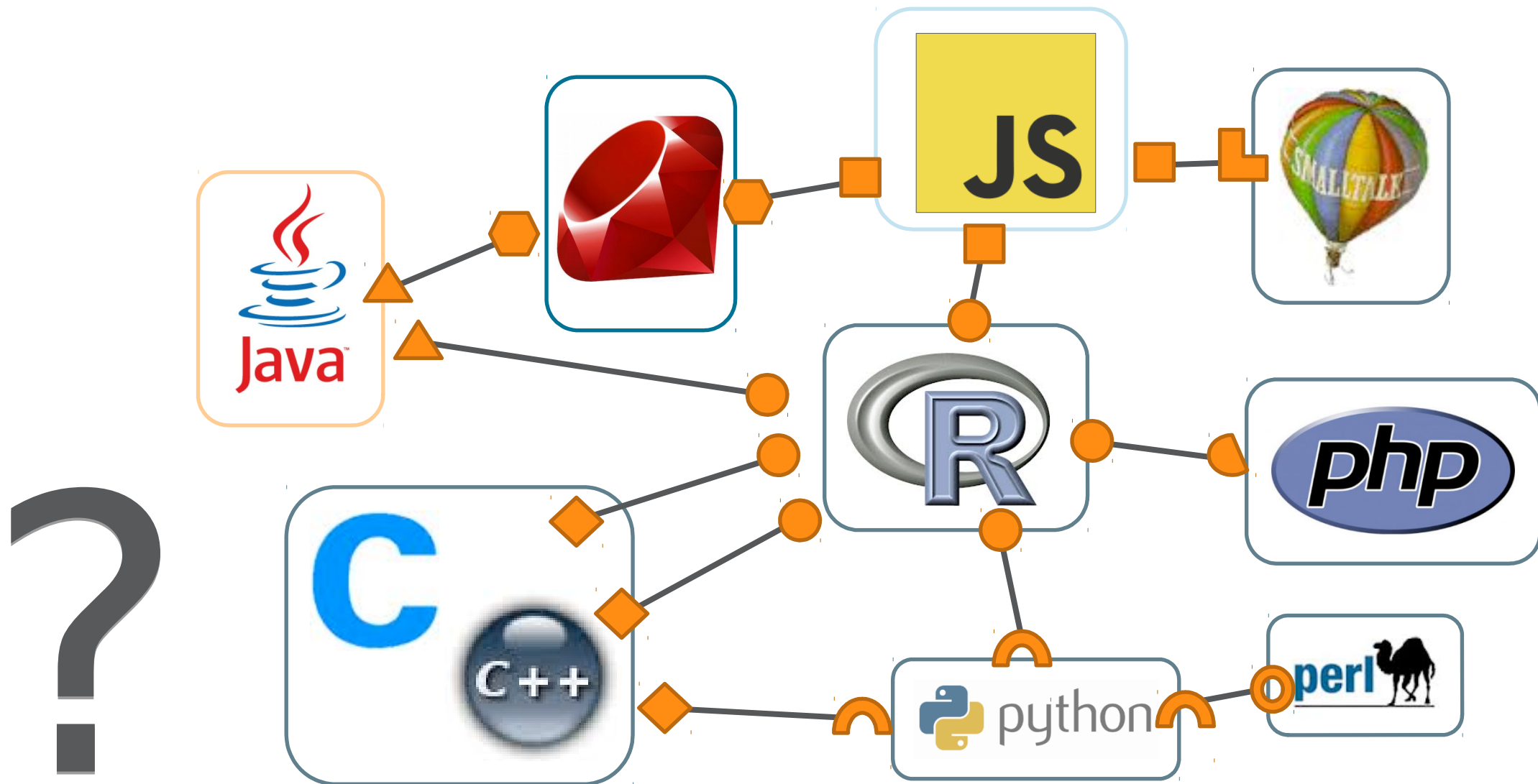
- Vision without speculation would be today's reality
 - Radical innovation
 - New approach to existing technologies
 - Research + Engineering
- Hardware & Software
 - Engineered to work together
 - Java/bytecode/IR/assembly/processors/memory

Systems come with Various Interfaces



You can execute any language on the JVM / CLR
- as long as it looks like Java / C#.

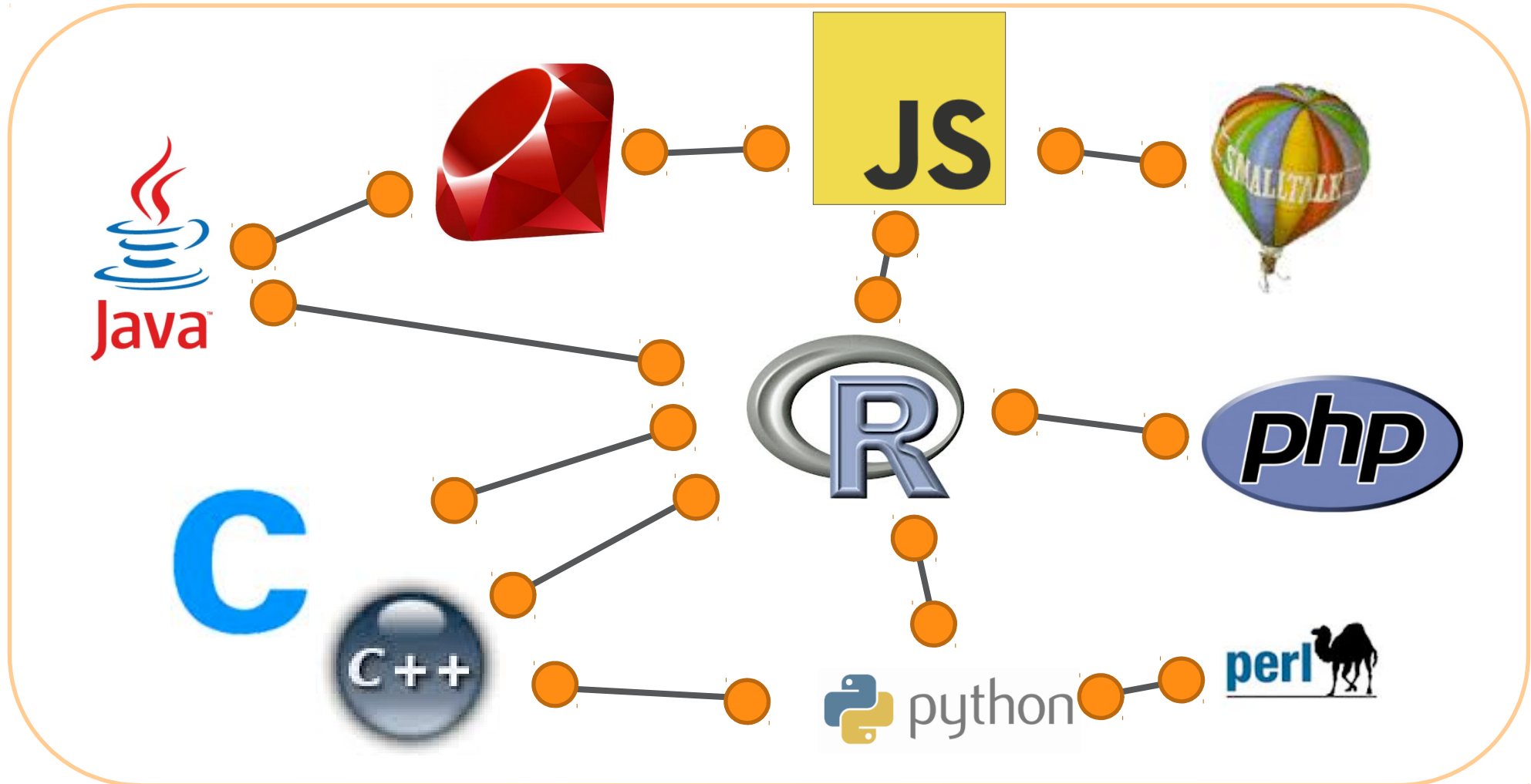
Can we Connect the Polyglots... Easily!?



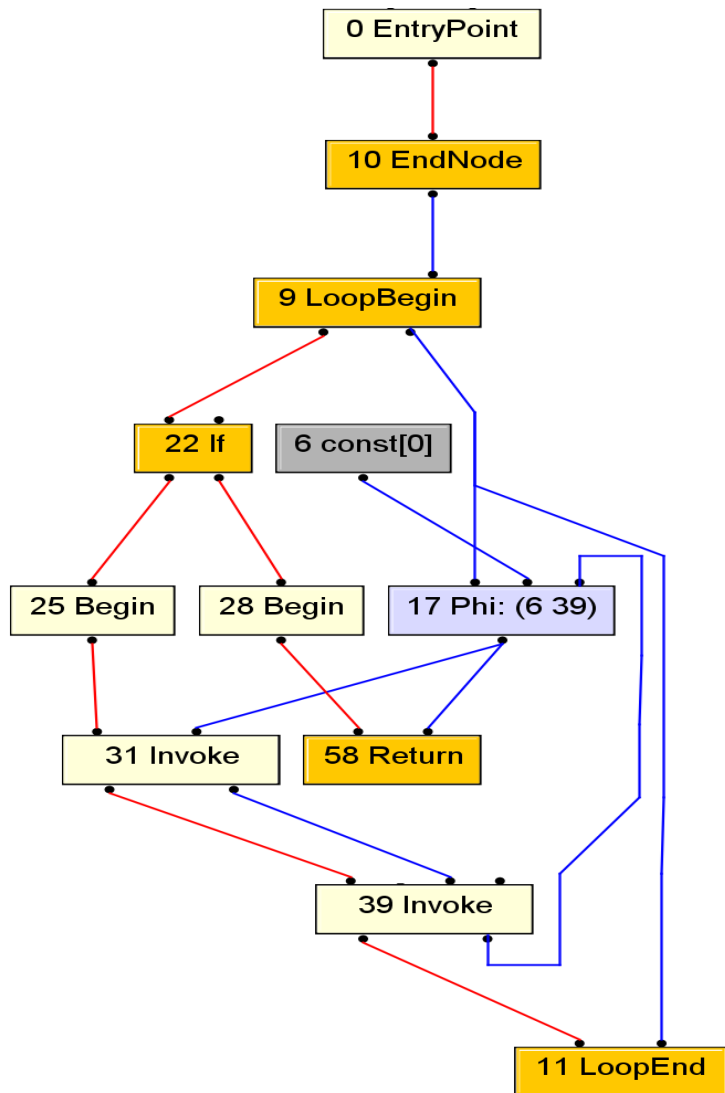
Demo

Sieve of Eratosthenes with many Polyglot Flavors

GraalVM: One VM to Rule them all!



Graal Virtual Machine



- Modern alternative to HotSpot C2
 - Maintainable code base
 - Toolable, approachable
 - Ready for today's code
 - JEP 243: Java Compiler Interface
- Partial evaluation
- Aggressive speculations
- Smooth de-optimizations

Truffle: Write your own language!

Current situation

Prototype a new language

Parser and language work to build
syntax tree (AST), AST Interpreter

Write a “real” VM

In C/C++, still using AST interpreter,
spend a lot of time implementing
runtime system, GC, ...

People start using it

People complain about performance

Define a bytecode format and
write bytecode interpreter

Performance is still bad

Write a JIT compiler
Improve the garbage collector

How it should be

Prototype a new language in Java

Parser and language work to build
syntax tree (AST)
Execute using AST interpreter

Integrate with VM-building framework

Integrate with Modular VM
Add small language-specific parts

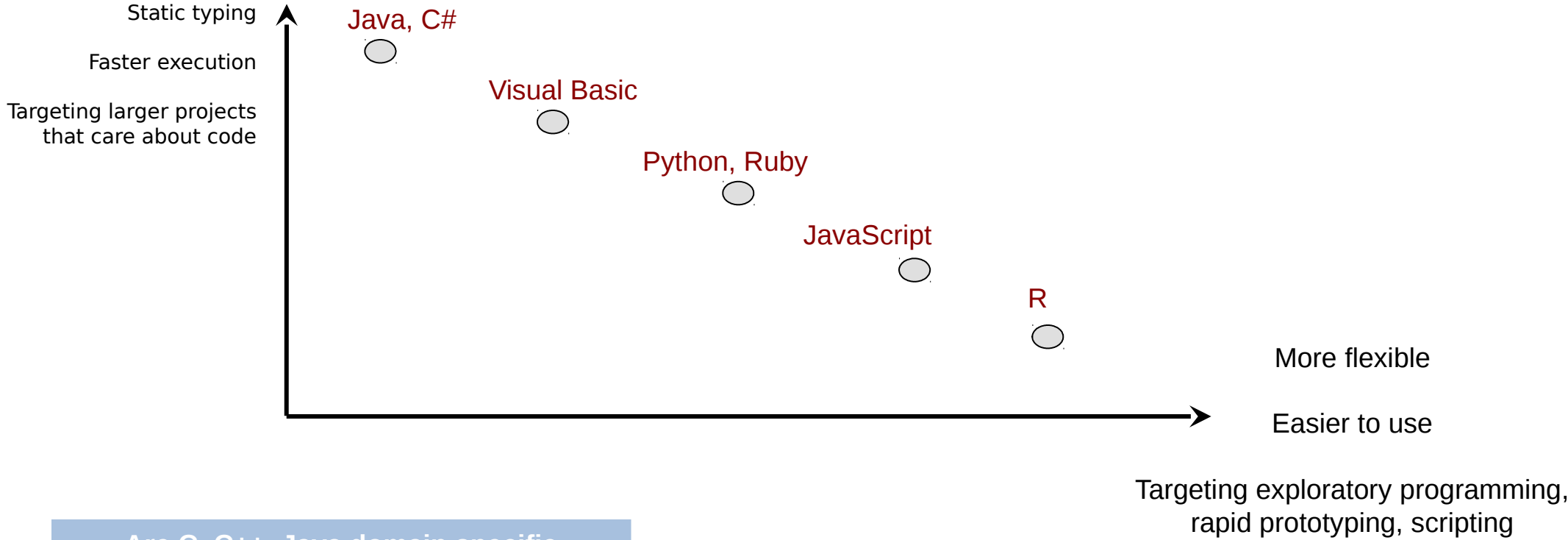
People start using it

And it is already fast

Demo

Debugger, profiler, coverage & other tooling for free

Do you care about code or data?

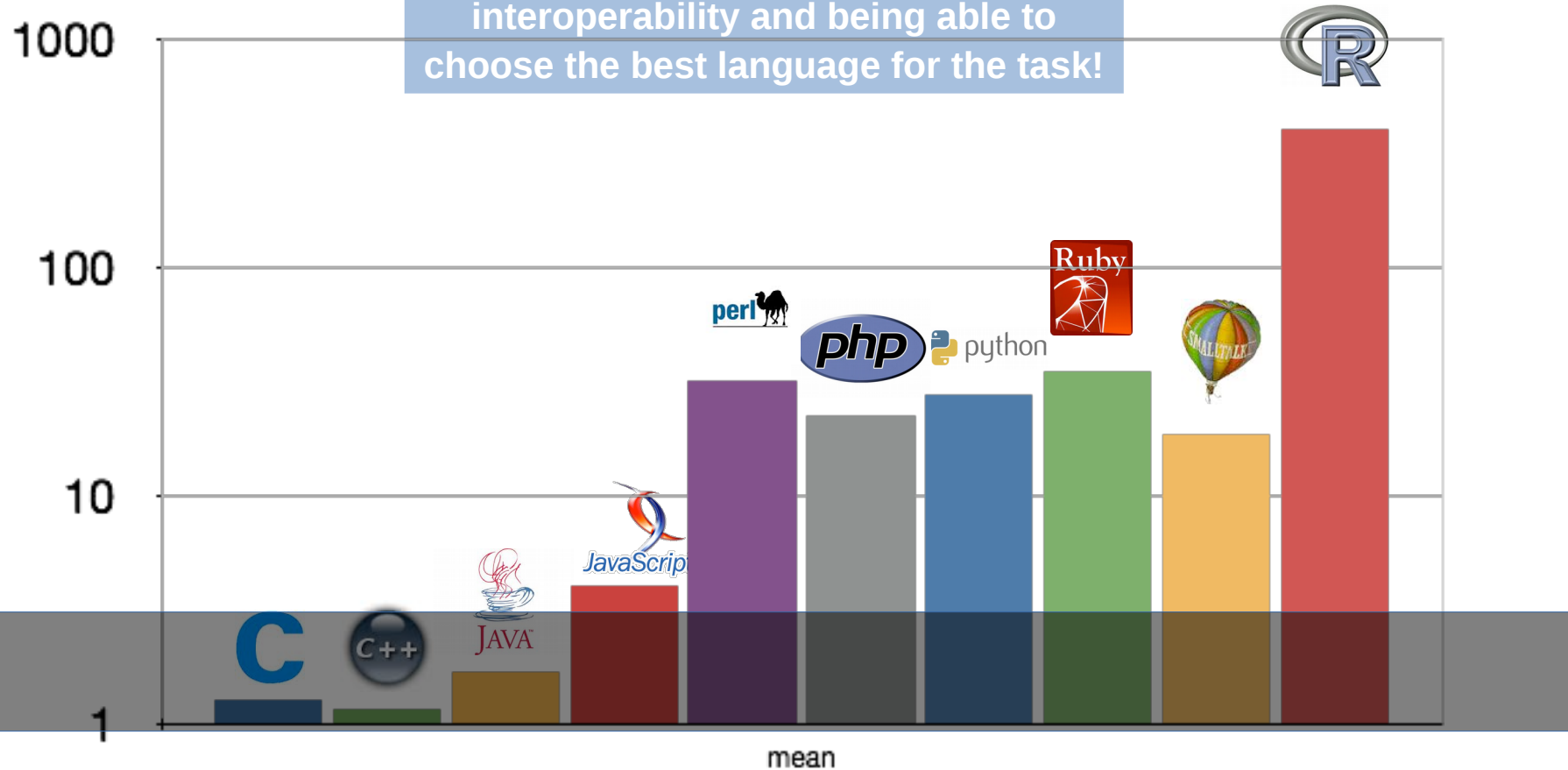


Are C, C++, Java domain specific languages?

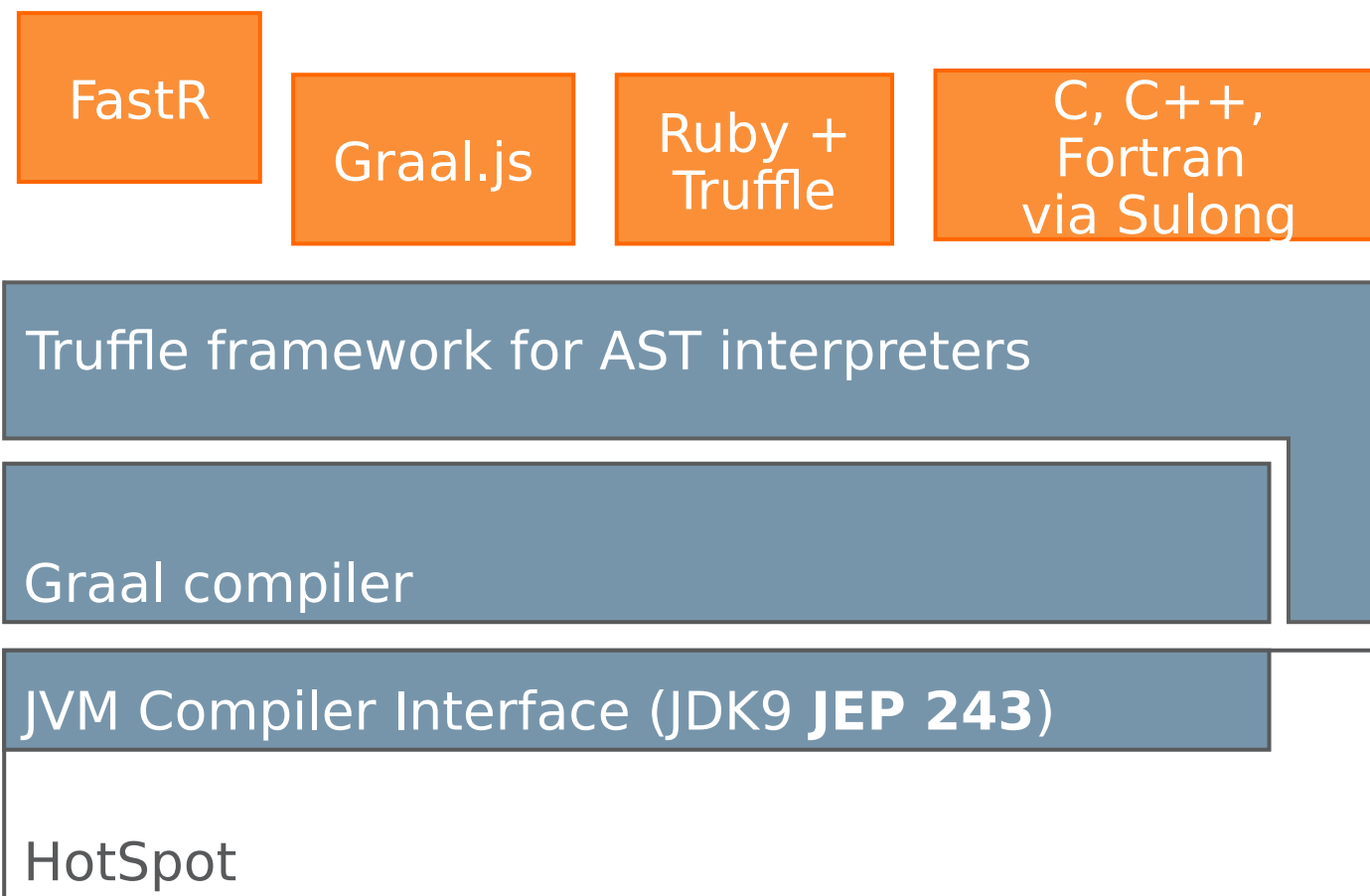
One VM for all languages means interoperability and being able to choose the best language for the task!

Lower is better

The goal:



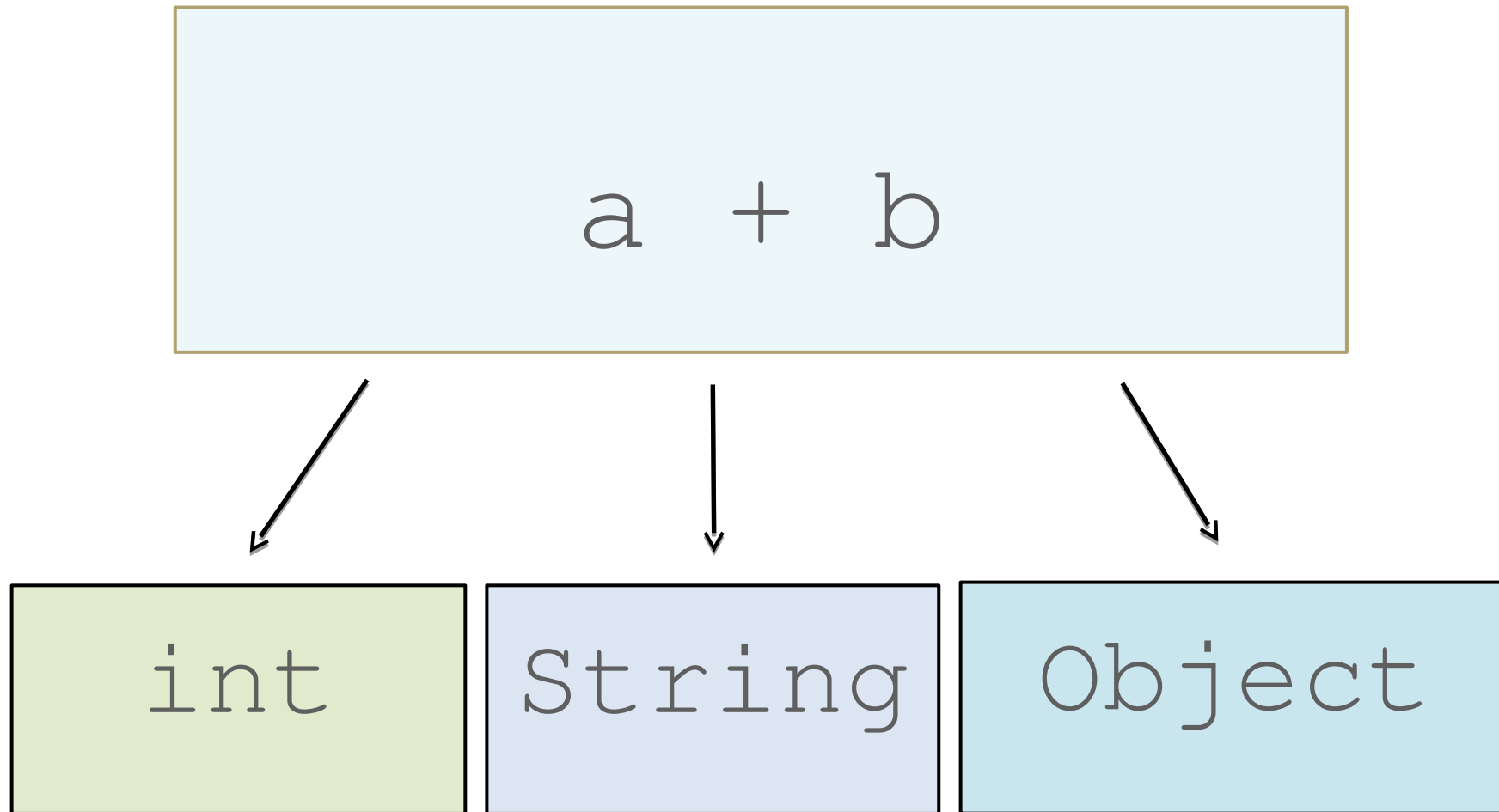
GraalVM: Technology Stack



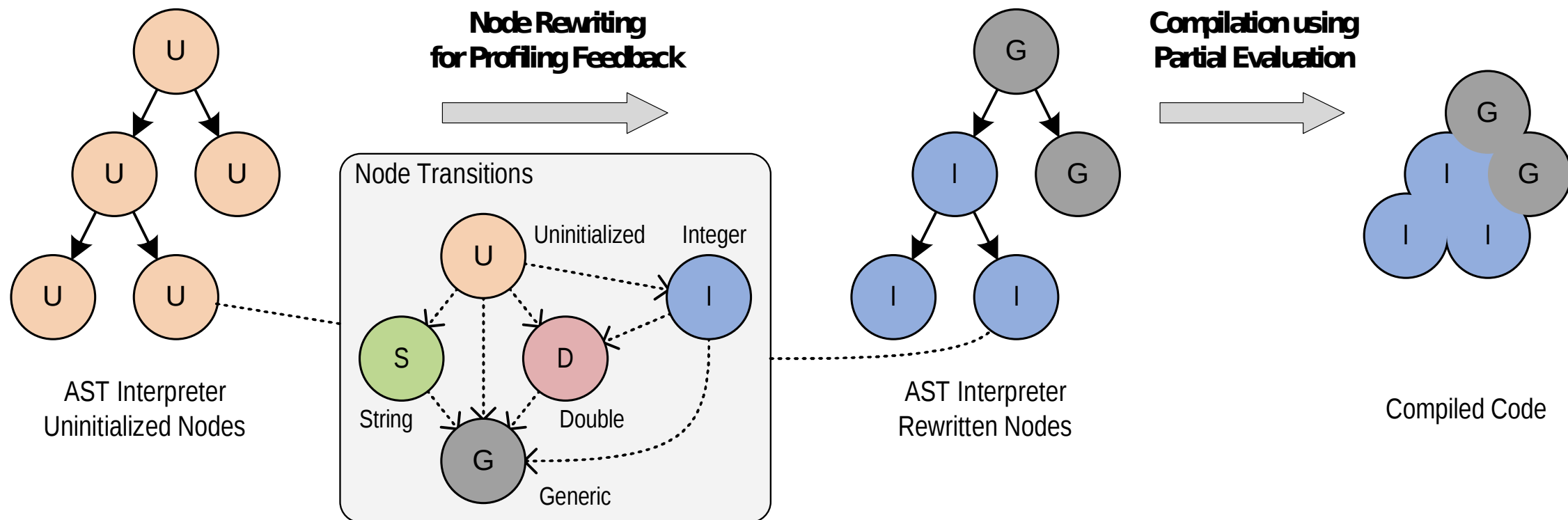
Demo

Polyglot node.js with Java, Ruby, R, JShell and NetBeans

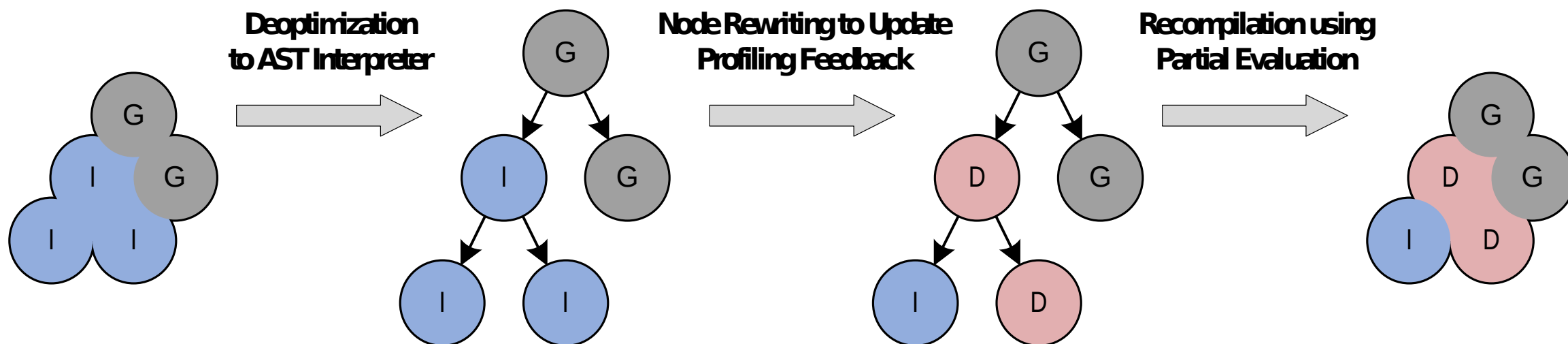
The Biggest Problem of Dynamic Languages



How Does it Work?



In case of Invalid Assumptions...



Become Polyglot!

- Try it now!
 - Download JVM: <http://www.oracle.com/technetwork/oracle-labs/program-languages/>
 - Open source: <https://github.com/graalvm>
- Mix it all!
 - JRuby, Python, JavaScript, R, C, node.js
- Learn (to use) Java
 - The whole polyglot world will be yours!
- We are hiring! Praha, Curych, Linec

Hardware and Software Engineered to Work Together