



ORACLE



# GraalVM

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## Safe harbor statement

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The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, timing, and pricing of any features or functionality described for Oracle's products may change and remains at the sole discretion of Oracle Corporation.

GraalVM Native Image technology (including SubstrateVM) is Early Adopter technology. It is available only under an early adopter license and remains subject to potentially significant further changes, compatibility testing and certification.

# GraalVM™



OpenJDK™



ORACLE®  
Database



Native Image



# What is Graal VM?

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- Drop-in replacement for Oracle Java 8 and Java 11
  - Run your Java application faster
- Ahead-of-time compilation for Java
  - Create standalone binaries with low footprint
- High-performance JavaScript, Python, Ruby, R, ...
  - The first VM for true polyglot programming
  - Implement your own language or DSL





**JIT**

**GraalVM™**

**AOT**

java MyMainClass

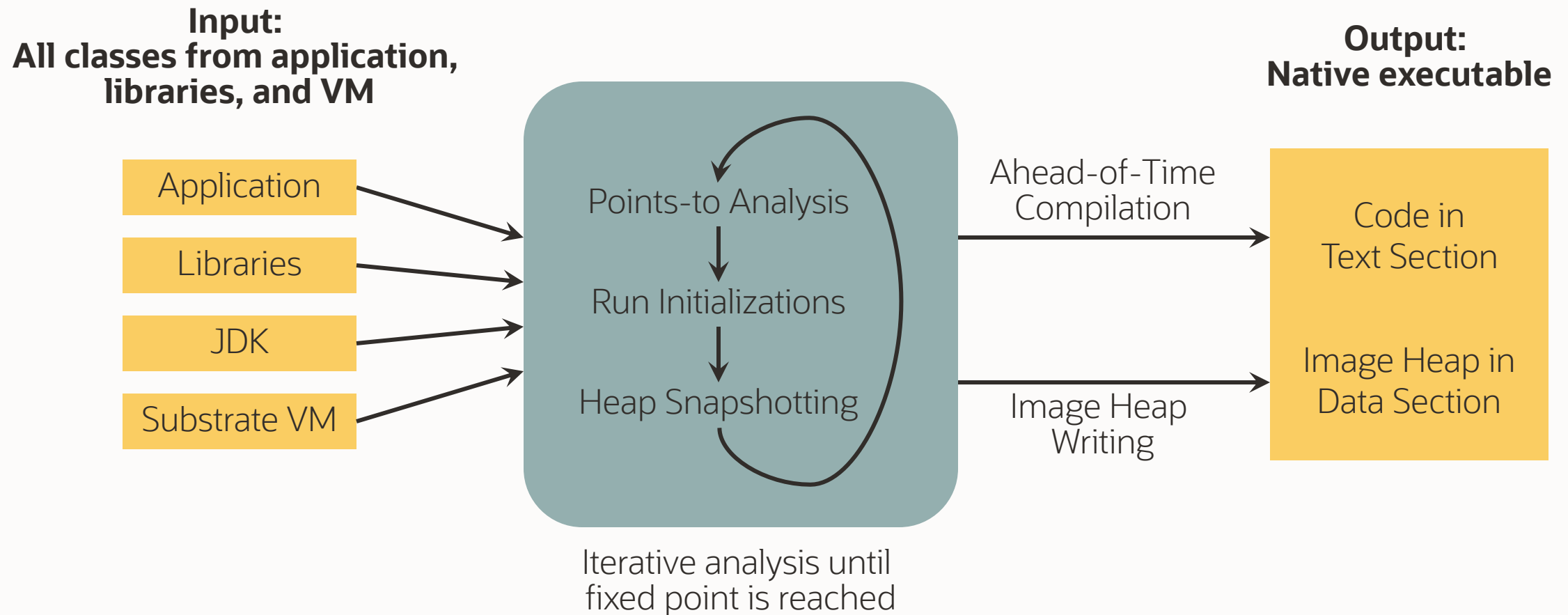
**OpenJDK™**

native-image MyMainClass

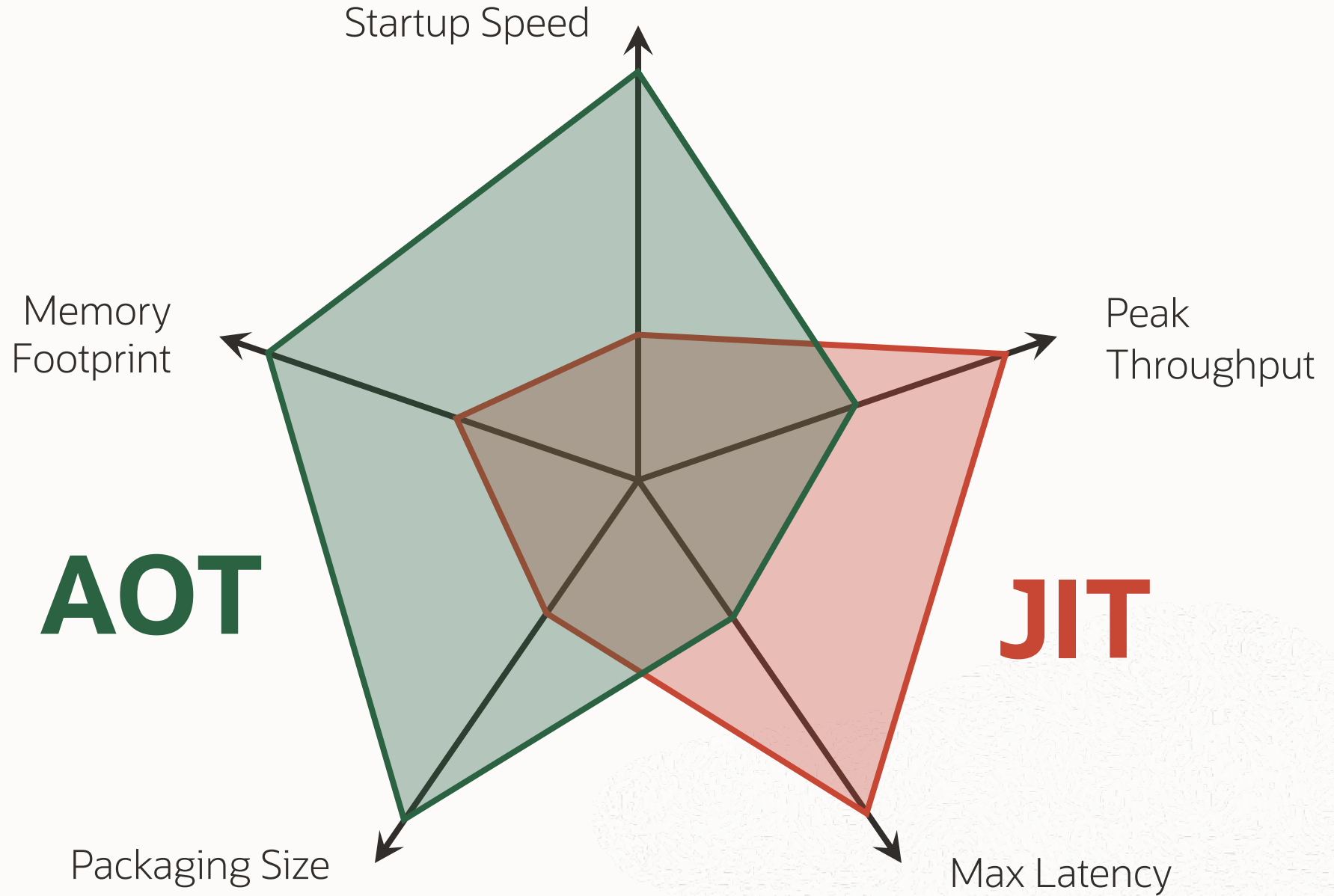
./mymainclass



# Native Image Architecture



# Currently



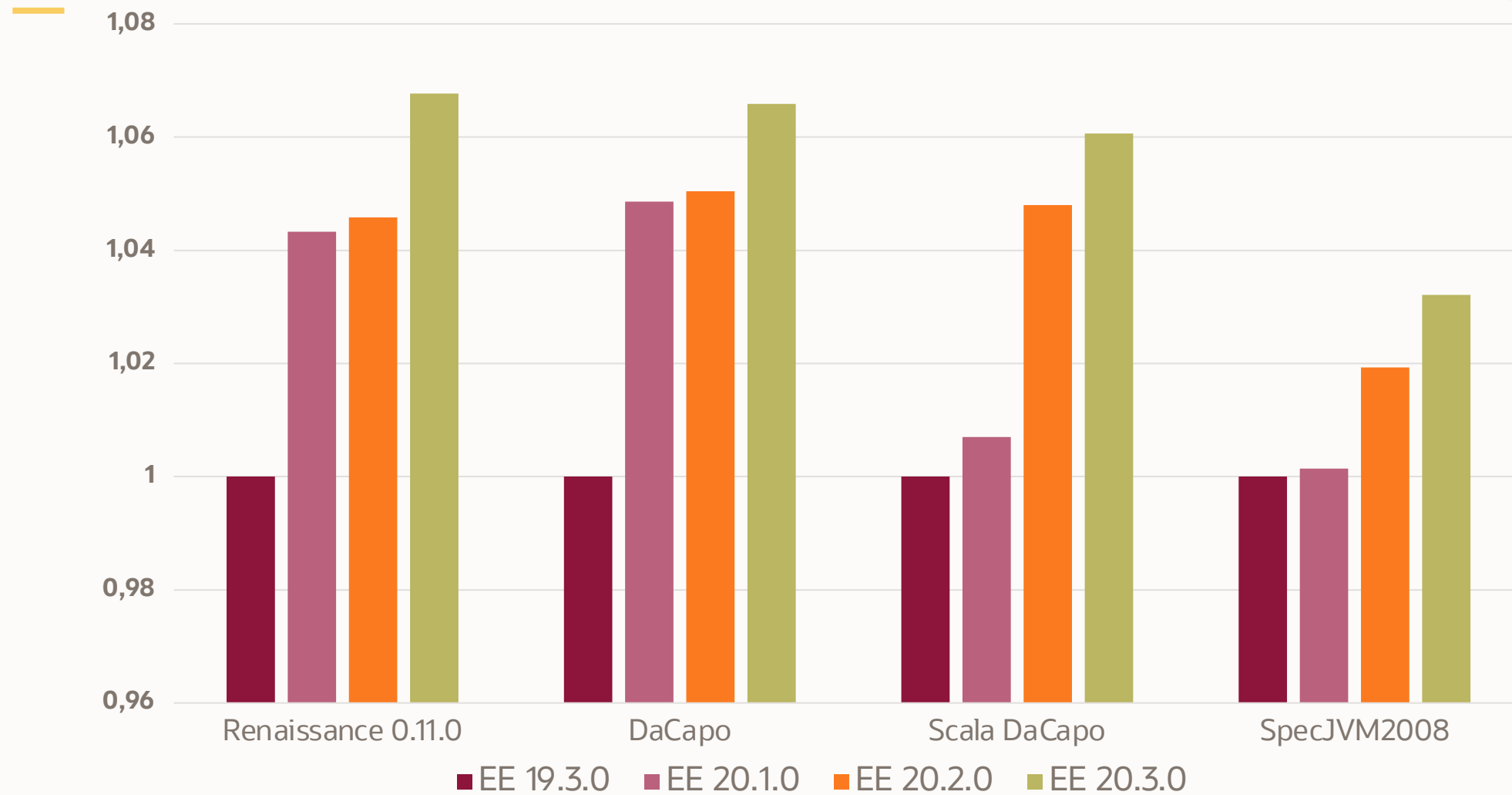
**AOT**

**JIT**



# Speed-Up, normalized to GraalVM EE 19.3.0 JDK11

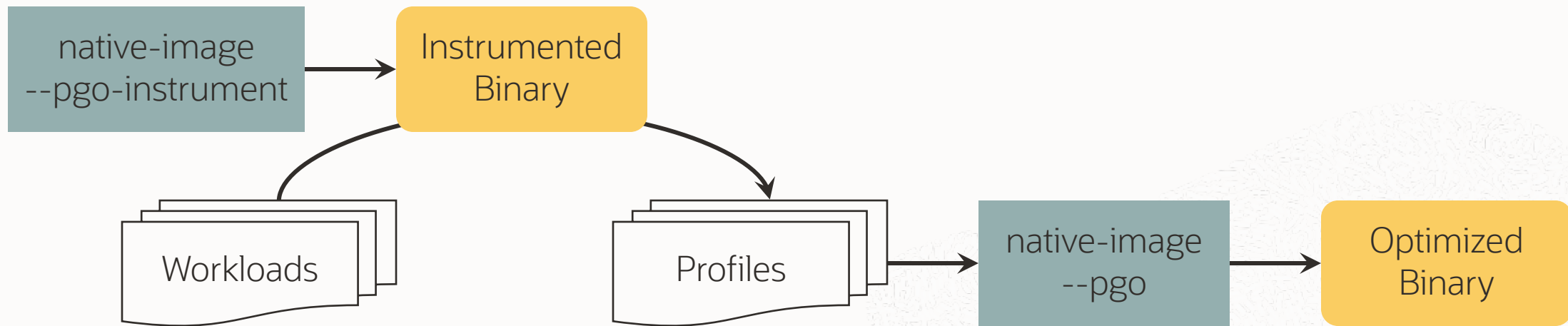
~6% improvements across all workloads





# Addressing Peak Throughput & Max Latency

- G1 Garbage Collector option for native image for better max latency
- Profile-guided optimizations (PGO) for better peak performance



# Java Microservice Frameworks with GraalVM Native Image Support

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<https://micronaut.io>

<https://helidon.io>

<https://quarkus.io>

Soon also Spring support

<https://github.com/spring-projects-experimental/spring-graal-native>

## Production-Ready

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Java

Scala, Groovy, Kotlin

JavaScript

Node.js

Native Image

VisualVM

## Experimental

Ruby

R

LLVM Toolchain

## Visionary

Python

VSCode Plugin

GPU Integration

Webassembly

LLVM Backend

# Multiplicative Value-Add of GraalVM Ecosystem



**Add your own language or embedding or language-agnostic tools!**

# Download and use it for your application!

- 100% production ready
- <https://www.graalvm.org>
- <https://github.com/graalvm/>
- [@graalvm](#)

## GraalVM

@graalvm Follows you

Universal VM for a polyglot world. Our mission: Make development more productive and run programs faster anywhere.

[graalvm.org](https://www.graalvm.org) Joined September 2016

42 Following 9,781 Followers



Followed by Raphael Mosaner, es4x, and 118 others you follow

The screenshot shows the GitHub repository page for GraalVM. The browser address bar displays the URL <https://github.com/oracle/graal>. The repository name is `oracle / graal`. The page shows 410 watches, 10,312 stars, and 660 forks. The repository description is "GraalVM: Run Programs Faster Anywhere" with a link to <https://www.graalvm.org>. The repository is categorized with tags: polyglot, vm, java, javascript, python, r, ruby, and c. At the bottom, the repository statistics are: 38,039 commits, 11 branches, 139 releases, 134 contributors, and a link to view the license.