

Oracle GraalVM Enterprise Edition

# Run Programs Faster Anywhere

Currently, 80 percent of corporate IT spending is reportedly devoted to simply keeping existing systems running, leaving very little room for innovation<sup>1</sup>. GraalVM Enterprise was designed to overcome this challenge on two levels: by allowing companies do more with their existing infrastructure, this way releasing time and resources for innovation, and providing tools for applications to be modernized and built faster, as well as keeping up to the latest standards, such as cloud native and serverless architecture.

## IMPROVE EFFICIENCY OF ENTERPRISE APPLICATIONS

GraalVM Enterprise is built on the global standard for enterprise-class application development, Oracle Java Standard Edition. It's a multilingual virtual machine, which delivers even higher efficiency, better isolation and greater agility for enterprises in cloud and hybrid environments.

GraalVM Enterprise contains optimization algorithms that look for specific ways to accelerate application processes by rearranging compiled code, such as [path duplication](#), [aggressive method inlining and escape analysis](#), advanced vectorization and more.

GraalVM Enterprise shows up to 3x performance improvements on a wide variety of measurements in the new JVM benchmark called "Renaissance", maintained by Charles University in Prague.

## ENHANCE SECURITY

GraalVM Enterprise also includes security features to address some of the common sources of security application vulnerabilities, including buffer overflows in native code. Most real-world applications today in managed languages like Java, JavaScript or Python include native libraries for performance reasons on compute-intensive code. However, these native libraries form a back-door bypassing VM-level isolation features like bounds-checks and garbage collection, which increases the potential for security vulnerabilities for your application.

## Key Features

- Enterprise-grade, embeddable, **multilingual virtual machine**
- Leverages new optimization algorithms to improve performance of enterprise applications;
- Compiles Java applications ahead of time into native images to improve startup and memory footprint;
- Enables combining languages like Java/JVM, JavaScript, Python, Ruby, R and native languages in one polyglot application;
- Extends applications with libraries from other supported languages without performance penalties;
- Runs native languages like C/C++ in a safe mode on the JVM;
- Can be embedded in database.

<sup>1</sup>: Oracle's Mark Hurd: Expect to see a 'dramatic flip' in IT spending: <https://www.zdnet.com/article/oracles-mark-hurd-expect-to-see-a-dramatic-flip-in-it-spending/>

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To address those issues, GraalVM Enterprise includes a “safe mode” for native libraries based on LLVM bitcode interpreter, which will compile even C code to use managed memory, garbage collection and bounds-checks. In addition, GraalVM Native Image, available as an early adopter feature, improves security by reducing your application attack surface by only putting code needed by your application into the runtime, removing unused code that expands the attack surface.

## MAKE YOUR BUSINESS MORE AGILE

The multilingual capabilities of GraalVM allow existing applications to be modernized and new ones to be built faster. The open source library ecosystem for ANY supported GraalVM language is available to your app, not just the one for the language in which you wrote the app. Legacy applications can be rewritten one piece at a time rather than all-at-once and new cloud microservices can mix multiple languages with no performance overhead. Developers can use diagnostic tools, including GraalVM Visual VM, NetBeans and Chrome debugging across the language barrier, resulting in faster diagnosis and development. GraalVM Enterprise is also integrated into in Oracle Netsuite and the Oracle RDBMS Multilingual Engine.

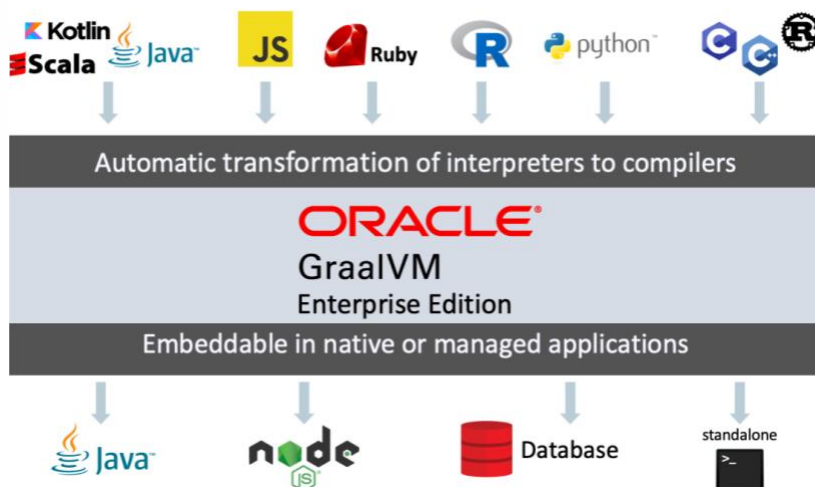


Figure 1. Multilingual capabilities of GraalVM Enterprise

GraalVM is ideal for cloud environments, because it starts services up to 100X faster and reduces memory usage up to 5X by compiling Java ahead-of-time. This prevents services idling and wasting resources such as CPU and memory in the process, making excellent for running microservices, Function-as-a-Service and service mesh.

## GRAALVM ENTERPRISE COMPONENTS

- **GraalVM compiler** is a new compiler, written from scratch, for both dynamic and static compilation. It generates compiled code to run applications on a JVM, standalone, or embedded in another system.
- **Language Implementation Framework** is used for creating languages for GraalVM with smooth interoperability and high performance.

## Key Business Benefits

- Advances the open source version with **greater manageability, higher security, and better performance**
- Helps developers and business executives achieve **greater efficiency, agility and security**
- Supercharges your applications across Java and other technologies by adding an efficient **multilingual compiler** and **native image** compilation
- Delivers **faster innovation** in the cloud and on-premises
- **Provides predictable pricing with a low-co annual subscription** for on-premises and included free on Oracle Cloud

## Related Products

- [Java SE Subscription](#)

## Additional Resources

- GraalVM Enterprise at Oracle.com
- GraalVM Enterprise documentation at Oracle Help Center
- GraalVM developer blog at Medium.com

- **Native-Image** allows ahead-of-time compilation of Java applications under into executables or shared objects.
- **LLVM Runtime** enables running LLVM languages on GraalVM.
- **GraalVM SDK** contains supported APIs of GraalVM.

## ADVANTAGES OF USING GRAALVM

- **For Java and JVM applications**, GraalVM Enterprise provides benefits of improving performance with new advanced compiler optimizations, compiling Java ahead of time for instant startup and low memory footprint, and extending Java applications with libraries and tools from any supported ecosystem.
- **For Node.js applications**, GraalVM offers running JavaScript in the database, using existing Java libraries, easy monitoring and profiling.
- **Ruby, R and Python** developers get access to high-performance runtime and professional developer tools ecosystem;
- **LLVM Runtime** enables running LLVM languages, such as C/C++ and Rust, on GraalVM platform in a safe mode;
- **For native languages**, GraalVM offers benefits of running applications in a safe mode and providing a high-quality development platform.

## Additional Resources

- GraalVM Enterprise at Oracle.com
- GraalVM Enterprise documentation at Oracle Help Center
- GraalVM developer blog at Medium.com

## GRAALVM ENTERPRISE SUBSCRIPTION

GraalVM Enterprise Subscription provides licensing and support for on-premise environments. For Oracle Cloud Infrastructure customers, GraalVM Enterprise is available for free, including support.

GraalVM Enterprise Subscription includes:

- Oracle Premier Support (24x7x365);
- Access to Performance, Stability and Security Updates;
- MOS (My Oracle Support);
- Annual 1 Year Term Licensing.

## GET STARTED WITH GRAALVM ENTERPRISE

Start using GraalVM Enterprise to increase efficiency of your applications, enhance security and make your business more agile!

[Try GraalVM in Oracle Cloud](#)

[Download](#)

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## Integrated Cloud Applications & Platform Services

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