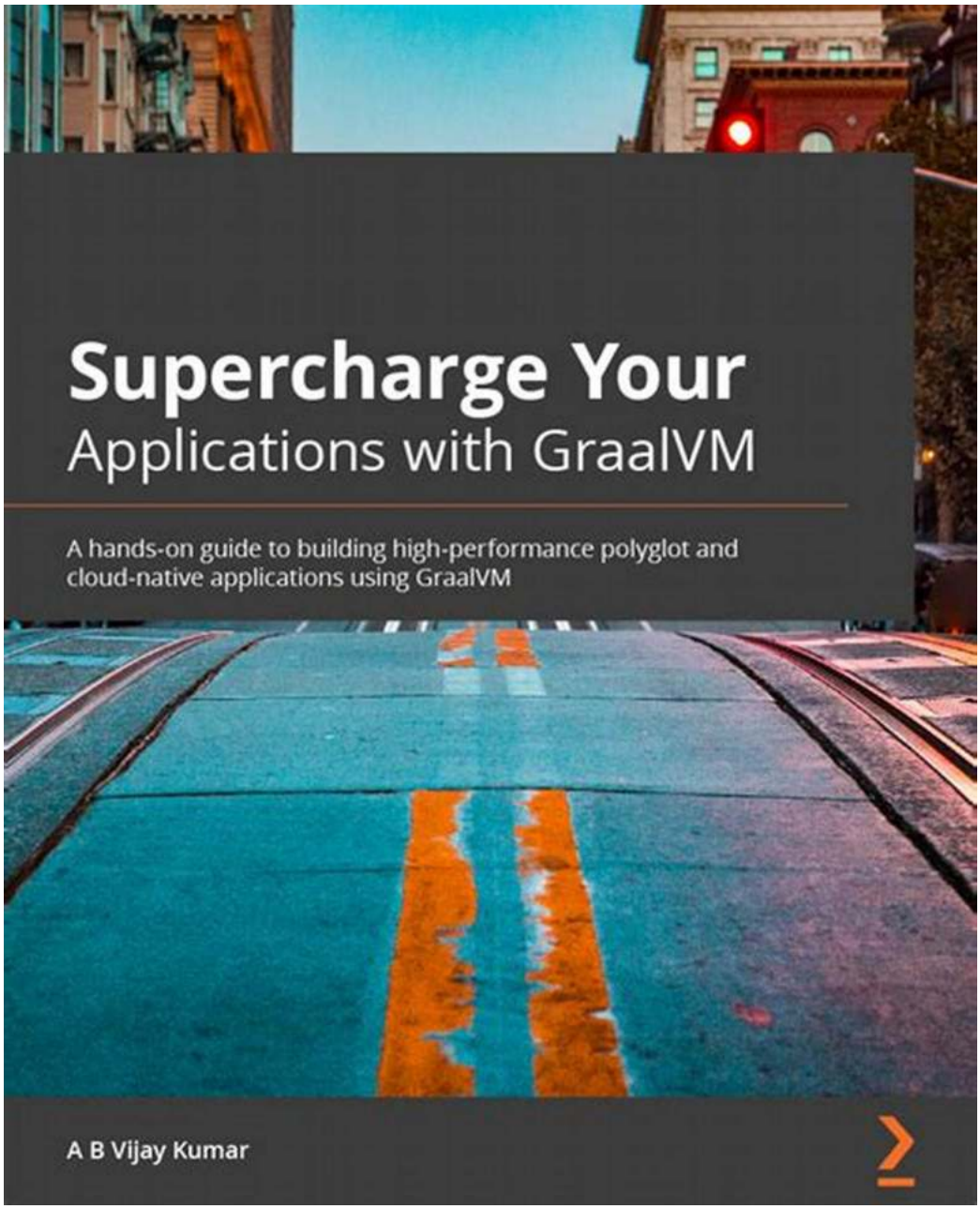
Supercharge Your Applications With GraalVM: Unlocking the Power of High-Performance Java

Java has long been a popular choice for building powerful and scalable applications, but as technology evolves, developers are constantly in search of ways to improve performance and efficiency. Enter GraalVM – an open-source project developed by Oracle Labs that promises to take your Java applications to the next level.

GraalVM is a runtime that boasts impressive capabilities, including the ability to run applications written in various languages, such as Java, JavaScript, Python, and more. But what sets GraalVM apart is its ability to optimize application performance through Just-In-Time (JIT) compilation and Ahead-of-Time (AOT) compilation.



Supercharge Your Applications with GraalVM: Hands-on examples to optimize and extend your code using GraalVM's high performance and polyglot capabilities

by A B Vijay Kumar (1st Edition, Kindle Edition)

4.9 out of 5

Language	: English
File size	: 22757 KB

Text-to-Speech	: Enabled
Screen Reader	: Supported
Enhanced typesetting	: Enabled
Print length	: 356 pages

Unlocking the Power of JIT Compilation

The Just-In-Time (JIT) compilation provided by GraalVM helps in dynamically optimizing Java applications while they are running. This means that instead of relying solely on traditional compilation techniques, GraalVM analyzes your code at runtime to identify hot spots and apply the necessary optimizations.

By doing so, GraalVM can significantly improve the performance of your Java applications. This is achieved by reducing the time spent on interpretation, as GraalVM compiles frequently executed code paths into highly optimized machine code.

Moreover, GraalVM offers concurrent and speculative optimizations, which allow for better utilization of available resources. The concurrent optimization feature optimizes the code on secondary threads, taking advantage of multicore architectures and reducing the impact on the main application thread. Speculative optimizations, on the other hand, leverage runtime profiling to make educated guesses about potential optimizations.

Ahead-of-Time Compilation for Enhanced Performance

In addition to JIT compilation, GraalVM also offers an Ahead-of-Time (AOT) compilation option. This feature allows developers to compile their Java applications into native executables, eliminating the need for a Java Virtual Machine (JVM) at runtime.

AOT compilation can bring several benefits to your application, including faster startup times, reduced memory footprint, and improved overall performance. The absence of a JVM removes the need for just-in-time compilation, interpretation, and other runtime overheads, resulting in faster and more efficient execution.

Expanding Language Support with Polyglot

GraalVM's Polyglot feature enables the seamless integration of multiple programming languages in a single application. This means that you can write different parts of your application in different languages while still maintaining high performance and interoperability.

For example, you can leverage the power of JavaScript for front-end development, Python for data analysis, and Java for backend services – all within the same GraalVM-powered application. This flexibility allows developers to choose the most suitable language for their specific task and take advantage of its unique features.

Boosting Efficiency with Native Image

GraalVM's Native Image feature provides the ability to convert your Java code into a standalone executable that starts up almost instantly – without the need for a JVM. This allows for rapid deployment and improved efficiency, especially in cloud-native, serverless, and microservices-oriented architectures.

By utilizing Native Image, you can package your application with only the required Java classes, drastically reducing its memory footprint. Additionally, the absence of a JVM greatly simplifies the deployment process, as you no longer need to install Java on your target system.

Case Study: GraalVM in Action

To truly understand the impact of GraalVM, let's take a look at a real-world example. One company, ABC Corporation, was struggling with slow server startup times and high memory usage in their Java-based microservices architecture.

Upon adopting GraalVM and utilizing its Native Image feature, ABC Corporation experienced significant improvements in their application's performance. The reduced startup times allowed them to respond quickly to customer requests, while the optimized memory footprint resulted in cost savings and better resource utilization.

In

GraalVM opens up new possibilities for developers looking to supercharge their Java applications. Whether you want to optimize performance through JIT compilation, improve startup times and efficiency with AOT compilation, or leverage multiple languages with Polyglot, GraalVM has you covered.

The ability to produce native images and streamline deployment with Native Image is especially valuable in modern architectures, making GraalVM a game-changer in cloud-native and microservices environments.

So why wait? Supercharge your applications with GraalVM and unleash the true potential of your Java code.

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Understand the internals and architecture of GraalVM with the help of hands-on experiments and gain deep knowledge that you can apply to improve your application's performance, interoperability, and throughput.

Key Features

- Generate faster and leaner code with minimum computing resources for high performance
- Compile Java applications faster than ever to a standalone executable called native images
- Create high-performance polyglot applications that are compatible across various JVM and non-JVM languages

Book Description

GraalVM is a universal virtual machine that allows programmers to compile and run applications written in both JVM and non-JVM languages. It improves the performance and efficiency of applications, making it an ideal companion for cloud-native or microservices-based applications.

This book is a hands-on guide, with step-by-step instructions on how to work with GraalVM. Starting with a quick to the GraalVM architecture and how things work under the hood, you'll discover the performance benefits of running your Java applications on GraalVM. You'll then learn how to create native images and understand how AOT (ahead-of-time) can improve application performance significantly. The book covers examples of building polyglot applications that will help you explore the interoperability between languages running on the same VM. You'll also see how you can use the Truffle framework to implement any language of your choice to run optimally on GraalVM.

By the end of this book, you'll not only have learned how GraalVM is beneficial in cloud-native and microservices development but also how to leverage its capabilities to create high-performing polyglot applications.

What you will learn

- Gain a solid understanding of GraalVM and how it works under the hood
- Work with GraalVM's high performance optimizing compiler and see how it can be used in both JIT (just-in-time) and AOT (ahead-of-time) modes
- Get to grips with the various optimizations that GraalVM performs at runtime
- Use advanced tools to analyze and diagnose performance issues in the code
- Compile, embed, run, and interoperate between languages using Truffle on GraalVM
- Build optimum microservices using popular frameworks such as Micronaut and Quarkus to create cloud-native applications

Who this book is for

This book is for JVM developers looking to optimize their application's performance. You'll also find this book useful if you're a JVM developer looking to explore options to develop polyglot applications using tools from the Python, R, Ruby, or Node.js ecosystem. A solid understanding of software development concepts and prior experience working with programming languages is necessary to get started.

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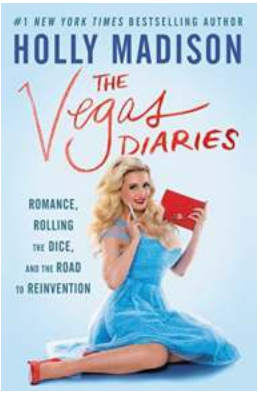

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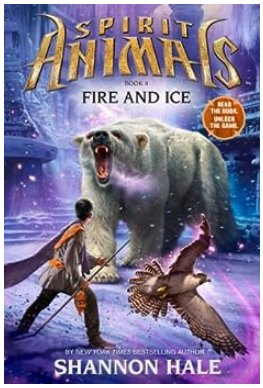

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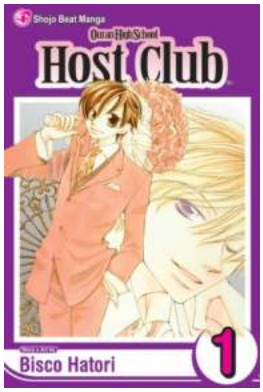

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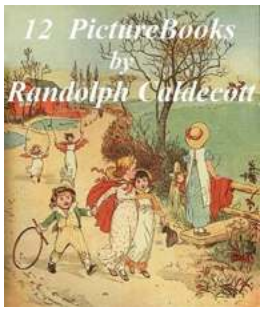

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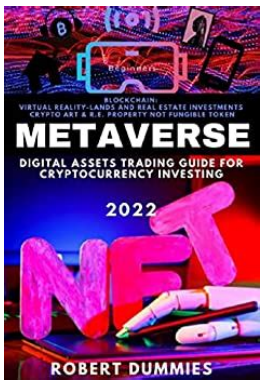

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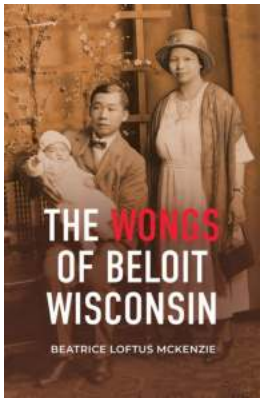

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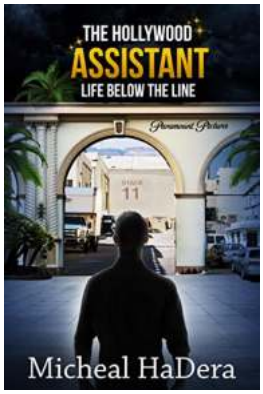

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