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Java Performance Tuning

1-Day Intensive / 2-Day Standard Training Outline

FA-0272

Software Development

Introduction

Java, a widely-used programming language, powers numerous mission-critical systems, from enterprise applications to mobile apps. However, as applications grow in complexity, ensuring they run efficiently becomes a challenge. This is where Java performance tuning comes into play.

By optimizing your Java code and understanding the intricacies of the Java Virtual Machine (JVM), you can significantly enhance the speed and responsiveness of your applications.

This intensive 1-day training course aims to equip you with the essential skills and knowledge needed to identify performance bottlenecks and apply effective tuning techniques.

Whether you're a seasoned developer or just starting out, mastering Java performance tuning can give you a competitive edge in the software development landscape.

Learning outcomes

By the end of this training, participants will be able to:

- Understand the importance and fundamentals of Java performance tuning.
- Identify common performance bottlenecks in Java applications.
- Utilize profiling tools to analyze and diagnose performance issues.
- Apply effective tuning techniques to optimize Java applications.
- Configure and fine-tune the JVM for better performance.
- Implement best practices for efficient memory management and garbage collection.
- Enhance application performance through code optimization and concurrency management.

Prerequisites

- Basic knowledge of Java programming.
- Familiarity with object-oriented programming concepts.
- Understanding of fundamental programming constructs (loops, conditionals, data structures).
- Basic experience with integrated development environments (IDEs) like IntelliJ IDEA or Eclipse.

Training outline

1. Introduction to Java Performance Tuning

1. Importance of performance tuning
2. Common performance issues in Java applications
3. Overview of the Java Virtual Machine (JVM) architecture

2. Performance Analysis and Profiling Tools

1. Introduction to profiling and monitoring tools
2. Using VisualVM for performance analysis
3. Profiling with JProfiler
4. Analyzing heap dumps and thread dumps

3. Understanding and Tuning the JVM

1. JVM memory model and structure
2. Configuring JVM memory settings
3. Understanding garbage collection (GC) mechanisms
4. Tuning GC parameters for optimal performance
5. Using the Garbage Collection (GC) logs for analysis

4. Memory Management and Optimization

1. Identifying memory leaks and memory bloats
2. Techniques for efficient memory allocation
3. Optimizing object creation and destruction
4. Using weak references and soft references

5. Garbage Collection Tuning

1. Deep dive into different types of garbage collectors
2. Choosing the right garbage collector for your application
3. Tuning garbage collector parameters
4. Minimizing GC pauses and optimizing throughput

6. Benchmarking with JMH (Java Microbenchmark Harness)

1. Introduction to JMH
2. Setting up JMH for benchmarking
3. Writing and running JMH benchmarks
4. Interpreting JMH benchmark results
5. Best practices for benchmarking with JMH

7. Code Optimization Techniques

1. Writing efficient and performant Java code
2. Avoiding common performance pitfalls in Java
3. Optimizing loops and data structures
4. Effective use of caching strategies

8. Concurrency and Multithreading

1. Basics of Java concurrency and multithreading
2. Identifying and solving synchronization issues
3. Optimizing thread management and thread pools
4. Using Java concurrency utilities effectively

By the end of this intensive training, participants will have gained a comprehensive understanding of Java performance tuning and will be equipped with practical skills to enhance the performance of their Java applications.

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