Advanced Java 7, Performance and Tuning

Course Summary

Description

Advanced Java 7, Performance and Tuning is a lab-intensive advanced Java training course geared for experienced software developers who are looking to expand their knowledge and skills in the Java world. This course is highly customizable and draws from the extensive knowledge and content base to tune the course itself to the student needs.

Objectives

At the end of this course, students will be able to:

- Explore the Java Virtual Machine (JVM)
- Effectively choose exceptions types
- Design custom exceptions
- Understand best practices for handling exceptions
- Handle chains of exceptions over multiple coding contexts
- Understand multi-threading in Java
- Work with concurrent collections to easily leverage threading in projects
- Understand how to protect data in a multi-threaded program
- Understand how to structure and the advantages of jar files
- Work with tools to package applications
- Effectively authenticate packaged Java applications
- Work with advanced features of Java Database Connectivity (JDBC)
- Use security and performance features to enhance JDBC enabled applications
- Understand how reflection can be implemented
- Understand and implement Internationalization and Localization techniques
- Work with the new Java SE 7 collections
- List possible metrics for measuring software performance
- Explain the effect of OO design on software performance
- List and describe types of benchmarks and the criteria that should be considered when constructing a benchmark plan
- Explore the most useful targets for profiling, and the most common tools/techniques for profiling
- Describe two strategies for improving performance as a result of profiling data
- List and explain the five most common problem areas for good performance with Java
- Use the JDK to collect runtime profiling data
- Successfully read the profiling data generated by the JDK to detect performance bottlenecks
- Instrument your own code to collect method execution time data
- Learn code optimization techniques relating to object management, exceptions, threads, and serialization
- Understand the JVM Architecture from the perspective of performance
- Examine and work with Java language features that can impact performance
- Understand optimizing data structures in Java
- Choose the correct Collection for the task
- Leverage the built in Collections algorithms to enhance your code performance and security
- Best practices for improving web services performance
- Impact of security and application defenses on performance
- Tradeoff between defense and performance

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Course Summary (cont'd)

Topics

- Java Virtual Machine
- Exception Handling Best Practices
- Threading and Concurrency
- Networking
- Packaging Applications
- Advanced JDBC
- Java 7 Collection Framework
- Advanced Developer Features
- Effective Java

- Data Structures
- Java Security Fundamentals
- Cryptography Overview
- Code Location-Based Security
- User-based J2SE Security
- Java Network Security
- Code Level Security Best Practices
- Writing High Performance Applications
- JEE Tuning

Audience

This is an **intermediate and beyond- level** Java course, designed for experienced Java developers who wish to get up and running with advanced skills immediately. This is a hands-on programming class.

Prerequisites

Students should have practical skills equivalent to or should have received training in the following topic(s) as a pre-requisite: *Mastering Java for OO Developers*

Duration

Four days

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Course Outline

I. Java Virtual Machine
   A. Architecture of the JVM
   B. Application Execution
   C. Reference Objects

II. Exception Handling Best Practices
   A. Choosing an Exception Type
   B. Designing Custom Exceptions
   C. Managing Thrown Exceptions
   D. Exception Chains

III. Threading and Concurrency
   A. Multithreading
   B. Working with Locks and Executors
   C. Concurrent Collections
   D. Atomic Variables

IV. Networking
   A. Socket Based Servers

V. Packaging Applications
   A. JAR Files
   B. Versioning
   C. Sealing Packages
   D. Signing and Verification of JARs
   E. Enhancements for JAR processing

VI. Advanced JDBC
   A. Recent JDBC Enhancements
   B. Working with ResultSet
   C. Working with RowSet
   D. Connection Pooling
   E. Resource Management
   F. Security Concerns

VII. Java 7 Collection Framework
   A. Deque & BlockingDeque
   B. NavigableSet
   C. NavigableMap
   D. Updated and Modified Collection Classes

VIII. Advanced Developer Features
   A. Reflection
   B. Working with Java Security Enhancements

IX. Effective Java
   A. Creating and Destroying Objects

   B. Factory Methods
   C. Impact of Finalizers
   D. Classes and Interfaces
   E. Immutability
   F. Composition vs. Inheritance
   G. Exceptions
   H. Threading Constructs to Avoid

X. Data Structures
   A. Efficient Strings and Arrays
   B. Efficient Use of Collections
   C. Choosing a Collection
   D. Tuning Collection Constructors

XI. Java Security Fundamentals
   A. Perimeter Defenses
   B. Java Security Architecture
   C. JVM Defenses
   D. Extending the defenses

XII. Cryptography Overview
   A. Strong Encryption
   B. Ciphers and algorithms
   C. Message digests
   D. Keys and key management
   E. Key management in Java
   F. Certificate management in Java
   G. Encryption/Decryption

XIII. Code Location-Based Security
   A. Work with Java 2 Security
   B. Signing code
   C. Trusted code
   D. Java permission management
   E. Extending Java permissions

XIV. User-based J2SE Security
   A. JAAS Overview
   B. JAAS Authentication
   C. Extending JAAS authentication
   D. JAAS Authorization

XV. Java Network Security
   A. SSL Support
   B. HTTPS
   C. GSS
   D. SASL protocols

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Course Outline (cont'd)

XVI. Code Level Security Best Practices
    A. Preventing remote hacking
    B. Preventing accessing of restricted resources
    C. Retaining credibility with Java code
    D. Optional: Internationalization
    E. Fundamentals of Localization
    F. Localizing Strings
    G. Localizing Numbers
    H. Localizing Dates

XVII. Writing High Performance Applications
    A. Memory Management Issues
    B. CPU Performance Issues
    C. Threading Issues
    D. Profiling and Benchmarking
    E. Code Optimization Techniques
    F. Design Optimization Techniques

XVIII. JEE Tuning
    A. The Performance Tuning Guide
    B. Basic Tuning Principles and Concepts
    C. Establishing Performance Bounds
    D. Server Tuning Options