JAV550 : Java Performance Improvement

**Code:** JAV550  
**Duration:** 2 days  
**Category:** Java

**Audience:** Experienced Java developers who want to improve the performance of Java software.

**Prerequisites:** Knowledge of and experience with Java programming is required to join this course.

**Realization:** The course has a hands-on nature. The theory is treated on the basis of presentation slides and is interspersed with practical exercises. The course material is in English.

**Contents:**
This course will teach you how to analyze and improve the performance of Java applications. In the first place various aspects of performance in general are treated, such as perceived performance and memory footprint and of Java performance in particular such as the hotspot JVM and garbage collection. Next attention is paid to the different benchmarks for Java and the various phases of the performance process such as performance monitoring, profiling and tuning. Also a number of specific performance techniques that can be applied to Java code are discussed. The performance impact of various constructs in the Java language and various classes of the Java API are discussed as well. Furthermore, you learn how to deal with performance tools such as a profiler in order to identify performance bottlenecks. In this respect attention is paid to profiling points, time measurements and the detection of memory leaks. Stress testing Web Applications is discussed as well. Finally, special attention goes to performance issues with JDBC and performance in a Java EE environment. Herewith the configuration of pools, caches and the use of load balancing and clustering techniques are treated.

**Module 1 : Java Performance Intro**
- What is Performance?
- Influences on Performance
- Important Performance Aspects
- History of Java Performance
- JIT Compilation and JIT Compiler
- Client and Server Hotspot VM
- Garbage Collection
- Garbage Collection Algorithms
- Java Performance Myths
- Perceived Performance
- BenchMarking
- Monitoring and Profiling
- Performance Tuning
- Heap Tuning
- Application Performance Process
- Heap Activity Monitoring
- Common Performance Problems
- Java Performance Tips

**Module 2 : Java API Performance**
- Java API Performance Pitfalls
- String Handling
- Buffered I/O
- New I/O
- Synchronization
- Concurrency Package
- Primitives versus Wrappers
- Collections
- Array Copying
- Exception Handling
- Serialization
- Native methods
- Lazy Loading
- Object Reuse

**Module 3 : Performance Profiling**
- Profiling tools
- Netbeans Profiler
- Sun Studio Analyzer
- CPU profiling
- CPU Profiling Approach
- Profiling a subset
- Profiling Points
- Type of Profiling Points
- Monitoring Threads
- Lock contention
- Identifying problematic patterns
- Stress Testing

**Module 4 : Tuning Garbage Collection**
- GC and Performance
- Java Object Behavior
- Heap Space Organisation
- Heap Area Characteristics
- Young Generation Layout
- GC Performance Metrics
- Performance Considerations
- Serial collector
- Parallel collector
- Parallel compact collector
- Concurrent Mark-Sweep (CMS)
- Ergonomics

**Module 5 : JDBC and Java EE Performance**
- JDBC Optimization
- Optimization Techniques
- Single Batch Transactions
- Smart Queries
- Tuning Servlets and JSP’s
- HTTP Session Tuning
- Web Server Tuning
- Clustering
- Clustering Types
- Load Balancing
- Sticky Sessions