JAV500 : Advanced Java Programming

Code :	JAV500	**Duration :**	4 days	**Category :**	Java

Audience :

Experienced Java developers who want to learn more advanced aspects of Java.

Prerequisites :

Knowledge of the Java language and syntax and basic experience in Java programming is required to participate in this course.

Realization :

The theory is treated on the basis of presentation slides and is interspersed with exercises. Demos are used to clarify the theory. The course material is in English.

Advanced Java Programming

Contents :

In the course Advanced Java Programming a series of advanced aspects of Java are on the agenda. The various ways in which Java applications can communicate over the network are discussed. In particular the subjects sockets and Remote Method Invocation (RMI) are treated. Moreover attention is paid to the advanced multithreading and synchronization capabilities such as those in the concurrency package introduced since Java 5. Also the JMX API for local and remote management and monitoring of Java applications is addressed. Furthermore the reflection feature by which compiled Java classes can be analyzed programmatically and various aspects of Java performance improvement are discussed. Next database access with Java Database Connectivity with JDBC is treated and also how Java applications can call C and C++ code via the Java Native Interface (JNI). Various aspects of memory management and logging are discussed as well. And after the discussion of the new IO API, the interaction between Java and XML is on the schedule. Attention is paid to the streaming API (Stax) where the application has control over the XML access and to the static Java API for XML Binding (JAXB) where Java binding classes are generated for specific XML documents. Finally Web Services, possible since Java 6 in the Standard Edition, will be discussed. This course is a good preparation for the Java 7 Programmer Exam Part II (1Z0-804). In combination with the course Java Programming Fundamentals the course also prepares for the Java 7 or Java 8 Programmer Exam Part I (1Z0-803) or (1Z1-808).

Module 1 : Java Networking	**Module 2 : Concurrency**	**Module 3 : Java Management Extensions**
Java Networking Intro	Concurrency Package	What is JMX?
Network Protocols	Concurrency Package Benefits	JMX Goal
Using URL Class	Contents Concurrency Package	JMX Usage
Reading from an URL	Task Scheduling Framework	Managed Beans
InetAddress Class	Executor Interface	MBean Flavors
Sockets	ExecutorService	JMX Architecture Levels
Socket Communication	Executors Class	JMX Architecture
Socket Types	Callables and Futures	MBeans Instrumenting JVM
Socket Ports	ScheduledExecutorService	Accessing JMX Agent
ServerSocket Class	Synchronizers	Standard MBeans
Socket Class	Semaphores	Naming MBeans
Datagram Sockets	CountdownLatch	MBean Server
DatagramPacket Class	CyclicBarrier	MBean Server Interface
Multicast Sockets	Exchanger	Registering MBeans
Socket Programming	Concurrent Collections	JMX Notifications
	BlockingQueue Interface	Notification Class
	Lock Interface	Notification Listeners
	Atomic Variables	

Module 4 : Reflection	**Module 5 : Performance**	**Module 6 : Remote Method Invocation**
What is Reflection?	Influences on Performance	What is RMI?
Reflection Classes	History of Java Performance	RMI Characteristics
Class Loading	JIT Compilation	RMI Architecture
Creating Objects	Hotspot JVM	Remote Interface
Reflection Methods in Class	Garbage Collection	Stubs and Skeletons
Field Class	Benchmarks	Remote Object
Field Class Usage	Monitoring, Profiling, Tuning	Remote Object Registration
Constructor Class	String Types	RMI Client
Constructor Class Usage	Buffered and New I/O	Exporting Objects
Method Class	Synchronization	Locating Remote Objects
Method Class Usage	Concurrency Package	RMI Control Flow
AccessibleObject Class	Primitives versus Wrappers	Serialization
Dynamic Proxies	Collections	Parameter Passing
Invocation Handler	Exception Handling	Dynamic Class Loading
	Serialization	Activation
	Native methods	
	Lazy Loading	
	Object Reuse	

Module 7 : Database Access with JDBC	**Module 8 : Memory Management**	**Module 9 : Java Native Interface (JNI)**
JDBC Architecture	JVM Internal Architecture	Java Native Interface
JDBC Drivers and URL's	Java Memory Management	Java to C
Database Connections	Object Lifecycle	C to Java
Executing Statements	Strong Object References	JNI Boundary
Querying Databases	Invisible and Unreachable	Header Files
Update Statements	Circular References	Required Parameters
Retrieving Results	Garbage Collection	Java Language
Handling Errors	Generational GC	Writing Native Methods
Prepared Statements	Heap Space Organization	Declaring Native Methods
Database Metadata	GC Algorithms	JNIEnv Interface Pointer
Transactions	Serial Collector	Mapping Table
Commit and Rollback	Parallel Collector	Accessing Java Strings
Rowset Interfaces	Reference Objects	JNI Functions
Using RowsetProvider	Soft and Weak References	Accessing Arrays
	Phantom References	
	Finalization	

Module 10 : Java Logging

Logging
Logging in Java
Java Util Logging
Levels and Log Methods
Logging Configuration
log4j Characteristics
log4j Configuration
Loggers
Logger Output Hierarchy
Inheriting Logging Levels
Logger Names
Log Levels
Appenders and Layouts
Log Analyzer Tools

Module 11 : New IO

What is NIO?
Synchronous I/O Processing
Asychronous I/O Processing
Working with Buffers
IO Channels
Selectable Channels
Selectors
Selection Keys
Character Sets
Using Path Class
Directory Traversing
PathMatcher class
Using WatchService

Module 12 : Java API XML Binding (JAXB)

XML Processing Options
What is JAXB?
JAXB versus DOM and SAX
JAXB Design Goals
Building JAXB Applications
JAXB Architecture
JAXB Binding Life Cycle
Role of Binding Compiler
XML tot Java Mapping Rules
Mapping of XML Schema Types
Binding Elements and Attributes
Named Complex Types
Customized Mappings
Adapter Classes
JAXB Annotations Types
JAXB API

Module 13 : StaX

Streaming API for XML
Building a Dom Tree
SAX Callbacks
Pull versus Push Parsing
Advantages of Pull Parsing
Why StaX?
Iterator API
XMLEventReader
XMLEventWriter
Cursor API
XMLStreamReader
XMLStreamWriter
Choosing considerations

Module 14 : Web Services

What is a Web Service?
Web Service Stack
What is SOAP?
What is WSDL?
What is JAX-WS
Web Service Support on Java 7
Service Programming Model
Publishing an Endpoint
Client Programming Model