

## Mastering EJB 3.0 Applications

### Course Summary

#### Description

Our training is "technology centric". Although a specific application server product will be used throughout the course, the comprehensive labs and lessons geared towards teaching advanced JPA programming techniques, rather than focusing on the finer points of the tools in use.

This course can be offered using any EJB 3.0 compliant application server. Our dedicated curriculum development team can easily customize our offerings to best suit your specific requirements.

#### Topics

- Enterprise JavaBeans 3.0
- Writing EJB 3.0 Session Beans
- Entities
- Transaction Management
- Security
- Messaging

#### Audience

This an intermediate level JavaEE training course, designed for developers who need to get up and running with EJB3 programming skills immediately.

#### Prerequisites

Students should have at least one year of application development experience, preferably in two and three tier distributed application, as well as some familiarity with the architecture of client-server systems. Students should have prior experience with or in-depth exposure to EJB 3.0.

#### Duration

Five days

## Mastering EJB 3.0 Applications

### Course Outline

#### I. Session : Enterprise JavaBeans 3.0 9

- A. Lesson: Introducing Enterprise JavaBeans™ 3.0
  - 1. Defining Enterprise JavaBeans™
  - 2. EJB Development Stages
  - 3. Core Services Provided to EJB
  - 4. Benefits of an EJB Environment
  - 5. Key Features
  - 6. Roles in the EJB Environment
  - 7. EJB and Distributed Access Protocols
- B. Lesson: Components of the EJB Architecture
  - 1. Client Views
  - 2. EJB Architecture Overview
  - 3. EJB Server
  - 4. Services Provided by EJB Server
  - 5. EJB Container
  - 6. Enterprise Bean
  - 7. Session Beans
  - 8. Entities
  - 9. Message-Driven Beans
  - 10. The Decorator
  - 11. Deployment Information
  - 12. EJB-Jar File

- 4. Handling Container Callback Exceptions
- 5. Handling RuntimeExceptions
- 6. Handling Application Exceptions
- 7. How Exceptions Effect Transactions
- C. Lesson: Configuration and Deployment
  - 1. Dependencies and Deployment
  - 2. Overview of Deployment Descriptors
  - 3. Purposes of Deployment Descriptors
  - 4. Format and Schema Makes DD Portable
  - 5. Contents of Deployment Descriptor
  - 6. Declaring Basic Bean Information
  - 7. Example of EJB Deployment Descriptor
  - 8. Bean Environment Namespace
  - 9. Accessing the EJB's Namespace
  - 10. Defining Environment Variables
  - 11. Accessing Environment Variables
  - 12. Types of Resource References
  - 13. Declared Using resource-ref Element
  - 14. resource-env-ref Used for JMS Destinations
  - 15. Using Dependency Injection (DI)
  - 16. Limitations of DI
  - 17. Bean References
  - 18. Notes on Bean References
  - 19. Using the Level of Indirection for Bean References
  - 20. Using Dependency Injection (DI)
  - 21. Resolving Bean References
- D. Lesson: Interceptors
  - 1. Introduction
  - 2. Assigning Interceptors: @Interceptors
  - 3. Assigning Interceptors: DD
  - 4. Overriding Class Interceptors
  - 5. Assigning Default Interceptors
  - 6. Overriding Default Interceptors
  - 7. Matching Interceptors to Methods
  - 8. Defining Interceptors With DD
  - 9. Defining Interceptors With Annotations
  - 10. Signature of Method Interceptor
  - 11. Transactions and Interceptor Exceptions
  - 12. InvocationContext
  - 13. Working with Interceptor Chain
  - 14. Handling Exceptions

#### II. Session : Writing EJB 3.0 Session Beans

- A. Lesson: Writing the Business Interface and Implementation
  - 1. Life Cycle: Session Bean
  - 2. Life Cycle of a Stateful Session Bean
  - 3. Client Views of a Session Bean
  - 4. Specifying the Business Interfaces
  - 5. Writing a Business Interface
  - 6. Writing the Session Bean Implementation
  - 7. Life Cycle Callback Methods
  - 8. Swapping Notifications
  - 9. Summary of Life Cycle Methods
  - 10. The SessionContext Object
  - 11. The SessionContext Methods
  - 12. Passing "this"
- B. Lesson: Exception Handling
  - 1. Business Methods and Related Exceptions
  - 2. Callback Methods and Related Exceptions
  - 3. Types of Exceptions

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### Course Outline (cont'd)

- E. Lesson: Timer Service
  - 1. Timer Service
  - 2. Timer Service and Different Bean Types
  - 3. Creating a Timer
  - 4. The Timer API
  - 5. Handling Timer Notification
- F. Lesson: Exposing A Session Bean As A Web Service
  - 1. Web Services Characteristics
  - 2. Web Services Architecturally
  - 3. SOAP in a Nutshell
  - 4. SOAP Specification Provides
  - 5. Anatomy of a SOAP Message
  - 6. WSDL (Web Services Description Language)
  - 7. WSDL Types
  - 8. WSDL Messages
  - 9. JAXB 2.0 Supports Interoperability
  - 10. JAX-WS 2.0
  - 11. JAX-WS 2.0, SOAP, and WSDL
  - 12. JAX-WS 2.0 Endpoints
  - 13. WSEE
  - 14. WSEE Server Programming Model
  - 15. Server Programming Model
  - 16. Routing SOAP Requests To An EJB
  - 17. Exposing an EJB as a Web Service
  - 18. Defining a Web Service Business Interface
  - 19. Using the @WebService Annotation
  - 20. @WebService Annotation Parameters
  - 21. Defining Exposed Methods
  - 22. Example of a Web Service Interface
  - 23. Defining a Stateless Session Bean as Web Service
  - 24. Deploying the Web Service
  - 25. The WSDL for the Deployed Web Service
  - 26. The Web Service Client
  - 27. Obtaining the Service
  - 28. Obtaining the Service Proxy
  - 29. A Web Service Client
- 3. Overview of Mapping Capabilities
- 4. Illustrative Example of Using ORM
- 5. Processing Without Lazy Loading
- 6. Benefits of EJB3 ORM : Lazy Loading
- 7. Single Point Associations and Collections
- 8. Benefits of EJB3 ORM: Locking & Scalar Queries
- B. Lesson: Getting Started with Entities
  - 1. First Look at Entity Implementation
  - 2. Overview of the Configuration
  - 3. persistence.xml
  - 4. Hibernate Caching Behavior
  - 5. Mapping the Employee Class
  - 6. Providing Mapping Information
  - 7. Using Annotations for Mapping
  - 8. Using File for Mapping
  - 9. Using Annotations with Employee Mapping
  - 10. Mapping the Employee Primary Key
  - 11. Generating Primary Keys
  - 12. Mapping the Employee Properties
  - 13. Setting up Mapping in persistence.xml
  - 14. The EntityManager
  - 15. Obtaining the EntityManager Using DI
  - 16. Attaching and Detaching
  - 17. Persisting an Employee Instance
  - 18. Removing an Employee
  - 19. Merging Copies of the Same Employee
  - 20. Retrieving an Employee
  - 21. Retrieving Using EJB Query Language
  - 22. Using EJB QL
  - 23. Managing the EntityManager and State
- C. Lesson: Basic ORM
  - 1. Entities: Types Mapped to Database
  - 2. Values Represent Simple State
  - 3. EJB 3.0 Supported Value Types
  - 4. Embeddable Classes Represent Aggregates
  - 5. Guidelines in Defining Entity Classes
  - 6. Simple Example of Entity Class Definition
  - 7. Using the Optional @Table Annotation

### III. Session: Entities

- A. Lesson: Introduction to Entities
  - 1. Persistent Manager
  - 2. Approaches to Handling ORM

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### Course Outline (cont'd)

8. Single Value Identifiers
  9. Composite Keys or Identifiers
  10. Composite Key Using an Embeddable
  11. Mapping Attributes
  12. Details of @Column Annotation
  13. Joining Data with @SecondaryTable
  14. Joining Data
  15. Mapping Aggregates (one-to-one)
  16. Approaches to Mapping Aggregates
  17. Aggregates Using Default Approach
  18. Aggregates Using a Separate Table
  19. Example Using a Separate Table
  - D. Lesson: Entity Associations (Relations)
    1. Multiplicity of Object Associations
    2. Navigability of Object Associations
    3. Qualified Object Associations
    4. Shared Aggregate Object Associations
    5. Composite Object Associations
    6. Types of Multiplicity
    7. Strategies for one-to-one Associations
    8. one-to-one: Primary Key Association
    9. one-to-one: Foreign Key Association
    10. one-to-one: Join Table
    11. Strategies for one-to-many or many-to-one
    12. Strategies for one-to-many or many-to-one
    13. one-to-many/many-to-one: Foreign Key
    14. Uses One or Two Mapping Elements
    15. one-to-many/many-to-one: Foreign Key
    16. Bidirectional Associations
    17. one-to-many/many-to-one: Join Table
    18. Unidirectional one-to-many
    19. Bidirectional one-to-many
    20. Mapping many-to-many Associations
    21. Specifying Table and Column Names
    22. Cascading Life-Cycle Operation
    23. Using Cascading Properly
  - E. Lesson: Mapping Inheritance
    1. Inheritance Mapping
    2. Table per Class Hierarchy Strategy
    3. Joined Subclass Strategy
    4. Table per Class Strategy
    5. Additional Notes on Inheritance Mapping
  6. Single Table Inheritance
  7. Configuring Single Table Inheritance
  8. Advantages of Single Table Inheritance
  9. Disadvantages of Single Table Inheritance
  10. Class Table Inheritance
  11. Class Table Inheritance Mapping
  12. Advantages of Class Table Inheritance
  13. Disadvantage of Class Table Inheritance
  14. Requires complex SQL statement to obtain data
  15. Especially true in a large hierarchy
  16. PM needs complex join structures
  17. Statements ARE generated by ORM implementation, so less arduous than when using the "doing-it-yourself-orm"
  18. When the hierarchy becomes large, the number of joins grows to obtain a leaf object
  19. Concrete Table Inheritance
  20. Advantage of Class Table Inheritance
  21. Disadvantage of Class Table Inheritance
  22. Casting and Equality Problems
  23. Proxies and Lazy Loading
  24. Solving the Proxy Problem
  25. Revised Class Hierarchy
  26. Problem Solved...Sort of
- #### IV. Session: Transaction Management
- A. Lesson: Fundamentals of EJB Transactions
    1. Transactions
    2. Transactions: Features and Commands
    3. Isolation Levels
    4. Access Control Through Isolation Level
    5. Working With Isolation Levels
    6. READ\_COMMITTED
    7. REPEATABLE\_READ and SERIALIZABLE
    8. Container-Managed Transactions (CMT)
    9. Bean-Managed Transactions (BMT)

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### Course Outline (cont'd)

10. Working With CMT and BMT
  11. Client-Managed Transactions
  12. Scope of the EntityManager
  13. Pessimistic Concurrency Explained
  14. Pessimistic Concurrency Timeline
  15. Optimistic Concurrency Explained
  16. Implementing Optimistic Concurrency
  17. Example of Optimistic Locking
  18. Implementing Pessimistic Concurrency
- B. Lesson: Bean-Managed Transactions**
1. Bean-Managed Transactions
  2. Pros and Cons of BMT
  3. Declaring BMT
  4. Obtaining the UserTransaction
  5. Handling Rollbacks
  6. Obtaining the UserTransaction Using DI
  7. UserTransaction Interface
  8. BMT Restrictions For Stateful Session Beans
  9. BMT Restrictions For Stateless Session Beans
- C. Lesson: Container-Managed Transactions**
1. Container-Managed Transactions
  2. Configuring CMT
  3. Transaction (TX) Attributes for CMT
  4. CMT Scenarios
  5. Methods Requiring Transaction Attributes
  6. Declaring CMT Using Annotations
  7. Declaring CMT in DD
  8. Rollback Only
  9. Exception in Own Transaction (CMT)
  10. Exception Using Caller Transaction (CMT)
  11. SessionSynchronization Interface
  12. Using Synchronization Callbacks
- V. Session: Security**
- A. Lesson: Enterprise Java Beans Security**
1. Defining EJB Security Terms
  2. EJB Roles and Security
  3. User Identification – Bean
  4. Method Permissions in DD
  5. Method Permissions with Annotations
  6. Declaring Roles with Annotations
  7. Resolving Role References
  8. Using `getCallerPrincipal()`
- 9. Configuring Resource Managers**
- VI. Session: Messaging**
- A. Lesson: Introduction to JMS**
1. Messaging with Object Method Invocations
  2. Messaging Services
  3. Messaging Services and JMS
  4. JMS Architecture
  5. Features of JMS API
  6. Point-to-Point Messaging Style
  7. Publish-and-Subscribe Messaging Style
  8. Using JMS
  9. JMS Factory Model
  10. JMS Factory Example
  11. Administered Objects
  12. Configuring Destinations
- B. Lesson: Programming JMS**
1. Sending or Receiving Messages
  2. Obtaining the ConnectionFactory
  3. Obtaining a Destination
  4. Obtaining a Connection
  5. Using a Connection
  6. Obtaining and Working with Session
  7. Acknowledgement Modes
  8. Setting Acknowledgement Mode
  9. Using Acknowledge Modes
  10. Code Example
  11. Producers and Consumers
  12. Messages
  13. Message Types
  14. Message Header Fields
  15. Sending Messages
  16. Setting Up to Send a Message
  17. Receiving Messages
  18. Receiving Messages in JMS
  19. Message Acknowledgement
  20. Filtering Messages
  21. Synchronous Delivery
  22. Request/Reply Example
  23. Example Using Manual Acknowledgement
  24. Asynchronous Delivery
  25. Example of JMS Server
  26. Local Transactions
  27. Queue Browser
  28. Topic's Durable Subscribers
  29. Destination-Specific Interfaces

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- VII. Lesson: EJB3.0 Message-Driven Beans
  - 1. Lifecycle: Message Driven Bean
  - 2. Message-Driven Beans
  - 3. Destinations for MDBs
  - 4. Benefits of MDBs
  - 5. Message-Driven Bean Implementation
  - 6. Message-Driven Bean Notes
  - 7. Activation Configuration Using Annotations
  - 8. Activation Configuration Using DD
  - 9. Message Selectors
  - 10. Message Selectors Defined in DD
  - 11. Registering MDB to a Destination
  - 12. Declaring Destination Type: Annotations
  - 13. Declaring Destination Type: DD
  - 14. Destination Types
  - 15. javax.jms.MessageListener Interface
  - 16. Lifecycle Callback Methods for MDBs
  - 17. PostConstruct and PreDestroy
  - 18. PrePassivate and PostActivate
  - 19. MessageDrivenBean Interface
  - 20. The MessageDrivenContext Class
  - 21. Methods of MessageDrivenContext
  - 22. Writing the Message-Driven Bean Class
  - 23. Runtime Environment of an MDB
  - 24. Deployment Descriptor Example