Training: Capstone Courseware
161-HB JPA with Hibernate

FORM OF TRAINING	MATERIALS	PRICE	DURATION
Traditional	Hardcopy	1150 EUR	5 days
Traditional	CTAB Tablet	1250 EUR	5 days
Distance learning	Hardcopy	1150 EUR	5 days
Distance learning	CTAB Tablet	1150 EUR	5 days

LOCATIONS

Krakow - 5 Tatarska Street, II floor, hours: 9:00 am - 4:00 pm
Warsaw - 17 Bielska Street, hours: 9:00 am - 4:00 pm

TRAINING GOALS:

Version 2.1

This course offers a comprehensive and detail-oriented treatment of **Hibernate®** and the **Java Persistence API** (**JPA**) for developers interested in implementing persistence tiers for enterprise applications. We cover JPA basics including simple object/relational concepts and annotations, persistence contexts and entity managers, and configuration via persistence.xml. We get a good grounding in the **Java Persistence Query Language** (**JPQL**), working with a JPQL console. The course then moves into advanced mapping techniques, the Criteria API, lifecycle hooks, validation, locking, and caching. Students will complete the course with a firm understanding of JPA architecture and plenty of hands-on experience.

This version of the course supports JPA 2.1 with Hibernate 5.0. EclipseLink 2.6 is deployed with the course software as well; switching providers is just a matter of moving a few lines in and out of XML comments in the relevant persistence.xml file, and we encourage instructors to demonstrate both providers, to illustrate portability and for comparison of some finer points.

The course also supports either the Derby or Oracle RDBMS. Derby is bundled with the course software and is pre-configured; a script is included to change over to Oracle configurations for all exercises and schema-creation scripts are available for both.

Learning Objectives

- Understand the value of object/relational mapping and JPA's role as a standard for ORM

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implementations.

- Develop JPA entities using JPA annotations to align the Java classes, properties, and types to relational tables, columns, and types.
- Create entity managers and instantiate persistence contexts to perform create/retrieve/update/delete (CRUD) operations.
- Implement entity relationships of all cardinalities, including unidirectional and bidirectional relationships.
- Map composite primary keys, inheritance relationships, eager/lazy fetching, and cascading operations.
- Use JPQL to write object-oriented queries, and process query results.
- Use the Criteria API to define queries programmatically, and take advantage of type safety using the Metamodel API.
- Build reusable façades that encapsulate simpler and more complex persistence operations.
- Implement persistence lifecycle event handlers.
- Define JSR-303 validation constraints on JPA entities and see them enforced by the JPA provider.
- Manage concurrent opertaions via optimistic or pessimistic locking strategies.
- Understand the actions of the local and shared entity caches, and use them appropriately while avoiding over-caching pitfalls.

CONSPECT:

- Introduction to JPA
  - Object/Relational Mapping
  - Mismatches Between Relational and Object Models
  - The Java Persistence API
  - Hibernate
  - Architecture
  - Entity Metadata
  - The Entity Manager
- Single-Table Mapping
  - Annotations
  - JavaBean Standards
  - Property, Field, and Mixed Access
  - Table and Column Mapping
  - Primary Keys and Key Generation
  - Type Mappings
  - Temporal and Enumerated Types
  - Embedded Types

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- Converters
- Mapping Associations
  - @Embeddable Types
  - Entity Relationships
  - @ManyToOne Relationships
  - @OneToOne Relationships
  - @OneToMany Relationships
  - @ManyToMany Relationships
  - Eager and Lazy Loading
- Entity Managers
  - Putting Entities to Work
  - persistence.xml
  - Entity State and Transitions
  - Managing Transactions
  - Persistence Operations
  - Creating Queries
  - Named Queries
  - Query Parameters
  - Native Queries
  - Stored-Procedure Queries
- JPQL
  - The Java Persistence Query Language
  - HQL and JPQL
  - Query Structure
  - Path Expressions
  - Filtering
  - Scalar Functions
  - Using Native Functions
  - Operators and Precedence
  - between, like, in
  - is null, is empty
  - Ordering
  - Aliases
  - Grouping
  - Aggregate Functions
  - Joins

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- Fetch Joins
- Constructors
- Updates and Deletes

- Persistence Components
  - Encapsulating Persistence Logic
  - Design Considerations
  - Testability
  - Transaction Control
  - Exception Handling
  - Generic Types
- Advanced Mappings
  - Inheritance Strategies
  - Single-Table Strategy
  - Joined-Table Strategy
  - Table-Per-Concrete-Class Strategy
  - Querying Over Inheritance Relationships
  - Type Identification with .class
  - Secondary Tables
  - Composite Primary Keys
  - @IdClass and @EmbeddedId
  - Derived Identifiers
  - @ElementCollection
  - Default Values
  - @Version Fields
  - Cascading and Orphan Removal
  - Detachment and Merging
  - Hibernate Extensions
  - The @Type Annotation
- The Criteria API
  - History of the Criteria API
  - Criteria Query Structure
  - The MetaModel API and Query Type Safety
  - Tuples
  - Joins
  - Predicates
  - Building Expressions

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- Ordering
- Grouping
- Encapsulating Persistence Logic
- Façades
- Range Queries
- Updates and Deletes

- Lifecycle
  - Lifecycle Events
  - Method Annotations
  - Entity Listeners
- Validation
  - JSR-303 Validation
  - Constraint Annotations
  - Validation Modes
  - Validation Groups
  - Handling Validation Exceptions
- Locking
  - Concurrency
  - Updates to the Same and Related Entities
  - Pessimistic Locking
  - Lock Types
  - Who Blocks Whom
  - Deadlocking and Timeouts
  - Optimistic Locking
  - The @Version Annotation
  - Optimistic Read and Write Locking
  - Error Handling
  - Combining Locking Strategies
- Caching
  - Caching
  - Persistence Context as Transactional Cache
  - Shared (2nd-Level) Cache
  - Pros and Cons
  - Cache Configuration
  - Eviction
  - Effects of Locking on Caching

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REQUIREMENTS:

- A strong Java programming background is essential for this course -- consider Course 103
- Knowledge of relational database concepts and SQL is recommended -- consider Course 301 Introduction to SQL -- but is not strictly required.
- Prior experience with JDBC will be a plus but is not required.

Difficulty level

CERTIFICATE:

The participants will obtain certificates signed by Capstone Courseware.

TRAINER:

Authorized Capstone Courseware Trainer.

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