

Essential EJB 3.0 Java Persistence

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Java Persistence API (JPA)

- Part of the EJB 3.0 (JSR 220)
- Specification for Object-Relational Persistence
- Based on successful commercial products and major vendor support
 - Oracle TopLink, JBoss Hibernate, JDO & EJB
- Provides integrated support with EJB container and outside container

Unanimously Passed as part of Java EE 5.0

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Terminology

- EJB 3.0 Java Persistence API == JPA
- Entity == Persistent POJO
 - Metadata = [Annotations] + [ORM XML] + Defaults
 - Can be detached (Serializable)
- EntityManager
 - Primary Persistence API
- Persistence Unit
 - Packaged set of entities
 - Persistence.XML defines 1 or more

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Key Features of JPA

- Configuration
 - Metadata configuration using annotations and/or XML
 - Configuration by exception - defaults
- Querying
 - Rich query language (JP QL) based on entity model
 - Ability to use native SQL when needed
- Transactions
 - JTA or RESOURCE_LOCAL
 - Extend context beyond transaction boundaries

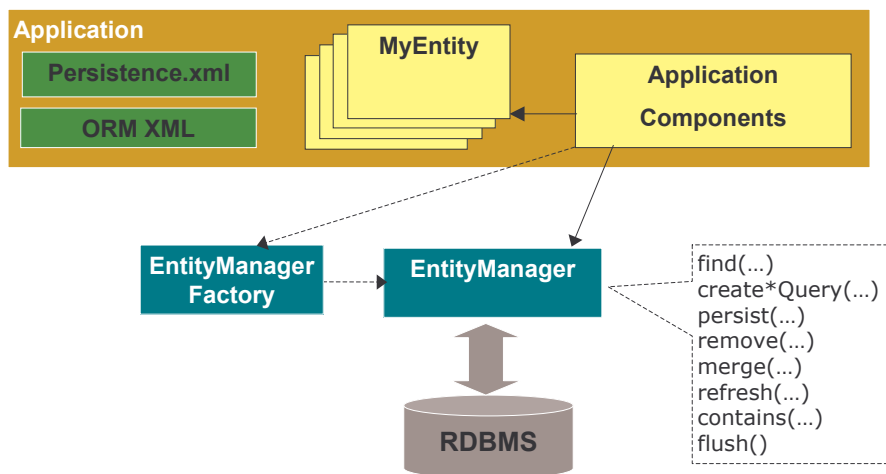
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... Key Features of JPA

- Relational database aware
 - Concurrency Protection = Optimistic locking
 - Schema can be captured in metadata
- Architecture Flexibility
 - Container and Application Managed usage
 - Java EE, Java SE, Web Containers, Spring, Oracle ADF...
- Vendor extensible
 - Query hints
 - Persistence.XML properties
 - Additional annotations and/or XML mapping

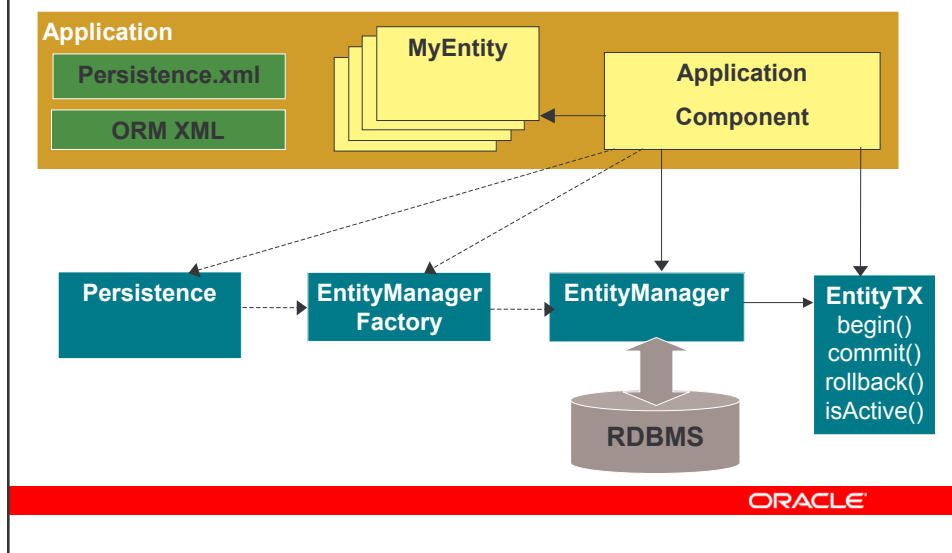
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JPA in Java EE Container



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Outside Java EE Container



Mapping Basics

- Minimal Requirements
 - Which classes are my entities?
 - `@Entity`
 - How is the entity uniquely defined?
 - `@Id`, `@IdClass`, `@EmbeddedId`
- Configuration by exception (defaults)
 - Basic attributes are assumed persistent
 - Entity name, Table, Column, FKs
 - Each configuration option has defaults

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Mapping Relationships

- Relationships must be explicitly mapped
 - @OneToOne, @ManyToOne, @OneToMany, @ManyToMany
- Mapping of Foreign Keys is important
 - FK == @ManyToOne or @OneToOne
- Collections available through inverse of FK
 - Ensure collections are needed by the application
 - Configure 'mappedBy' when using FK
- Up to entities to maintain bidirectional relationships
 - Simple application code in entity required
 - Entities need to behave the same when not managed

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More Mapping...

- @PrimaryKeyJoinColumn - Multi-table
- @Embedded
- @Inheritance
- @GeneratedValue – PK generation
- @Version - Optimistic Locking
- FetchType
- Cascade
- Entity lifecycle event callbacks

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Java Persistence Querying

- Find
 - Simple object lookup by Id or IdClass
- JP QL
 - Domain based literal query language
 - Equivalent functionality to most SQL expressions
 - Sub-queries (correlated and non-correlated)
 - EXISTS, IN
 - Set operators (MEMBER OF, IS EMPTY)
 - Projection and Constructor Expressions
 - Named and dynamic usage
- Use SQL when you need/want to

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JPA Tooling

- Model and Mapping
 - Generate Entities from Tables
 - Generate Schema from Entities
 - Meet in the middle mapping
- Defaults and Diagnostics
 - Show what the values will be through application of defaults
- Control over Annotation versus XML configuration

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Eclipse - Dali Project



Salvador Dalí. [The Persistence of Memory](#). 1931.
© 2005 Salvador Dalí, Gala-Salvador Dalí

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Project Dali

- JPA development within Eclipse
- Leverage and integrate into existing Eclipse platform and projects, esp. WTP, DTP
- Contributions from: TopLink, Hibernate, Kodo, and OpenAccess mapping tools developers
- GOAL: Simplify JPA development

WWW.ECLIPSE.ORG/DALI

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DEMONSTRATION

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What is TopLink Essentials?

- Reference implementation of JPA
- Community edition of TopLink
 - Derived from proven ORM solution. > 10 years
- Developed and available through GlassFish
 - Open source (CDDL)
 - Entity-persistence module
 - Contributors not just Oracle

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What about Oracle TopLink?

- TopLink Essentials and Oracle TopLink share the same core ORM
- Oracle TopLink is a full data services solution
 - Object-XML (JAXB)
 - EIS mapping support using JCA
 - Additional ORM Capabilities
 - Oracle DB advanced features
 - Clustered cache coordination
- Currently offers JPA Preview → Full TopLink JPA

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... beyond JPA

- Java Persistence does cover core ORM requirements
Mapping, Querying, Transactions, Concurrency Protection
- Optional capabilities from specification
 - Auto-discovery of entities outside container
 - Lazy loading of 1:1 relationships
- All vendors will provide additional capabilities
Caching, query hints, additional mappings, clustering features
- Additional TopLink JPA features
Table Generation, Pessimistic Locking, Cache Config, ...

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Summary: What to remember

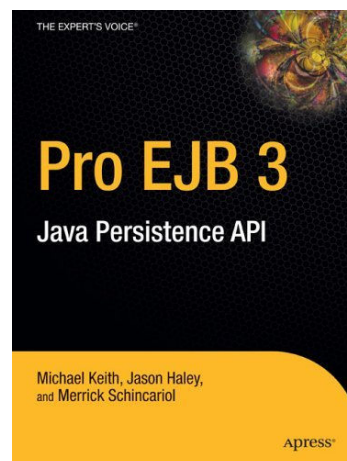
- EJB 3.0 Java Persistence API (JPA)
 - **Standardization**
 - **Easy to use**
 - Supports persistence in **any Java container**
- TopLink Essentials
 - **Reference implementation** of JPA
 - Community edition of **proven TopLink product**
 - **Open source** through GlassFish
 - First and only compliant JPA implementation

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JPA Developer Resources

- Oracle Technology Network (OTN)
 - OTN.ORACLE.COM/EJB3
 - OTN.ORACLE.COM/JPA
- Eclipse
 - WWW.ECLIPSE.ORG/DALI



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