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Eclipse JPA

Building JPA Applications with EclipseLink and Dali

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Agenda

- JPA Primer
- EclipseLink JPA
- WTP's JPA Tooling Project : Dali
- Eclipse JPA in action … the demo

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JPA—in a Nutshell

- A Java standard that defines:
  - how Java objects are stored in relational databases (specified using a standard set of mappings)
  - a programmer API for reading, writing, and querying persistent Java objects (“Entities”)
  - a full featured query language
  - a container contract that supports plugging any JPA runtime in to any compliant container.

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JPA—POJO Entities

- Concrete classes
- No required interfaces
  - No required business interfaces
  - No required callback interfaces
- new() for instance creation
- Direct access or getter/setter methods
  - Can contain logic (e.g. for validation, etc.)
- “Managed” by an EntityManager
- Can leave the Container (become “detached”)

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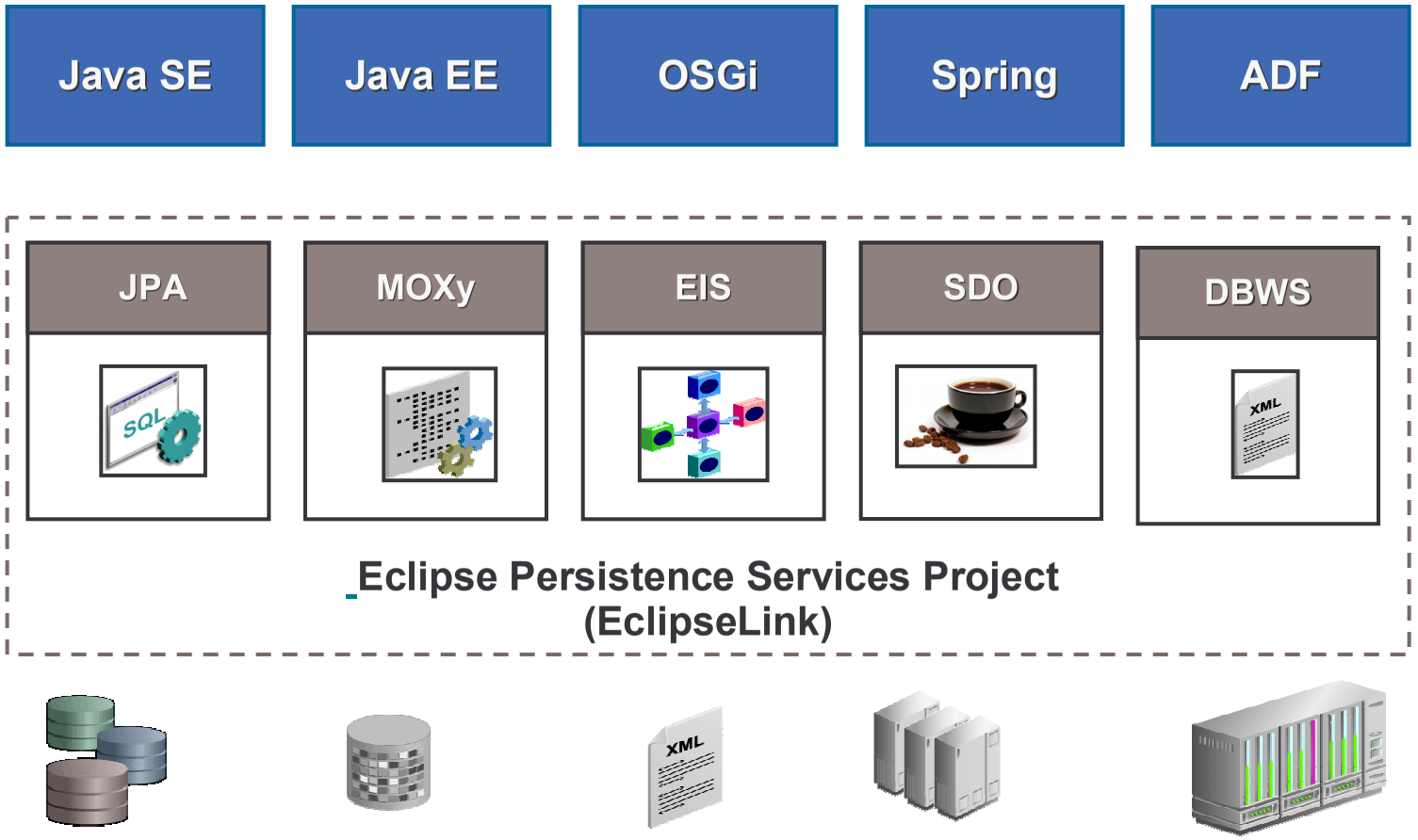
Eclipse Persistence Services Project – *"EclipseLink"*



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EclipseLink 1.0.1

- JPA: Object-Relational
  - JPA 1.0 with many advanced features
  - Simplified configuration of using annotations and/or XML
  - All leading RDMS with platform specific features
    - Best ORM for the Oracle Database
- MOXy: Object-XML Binding (JAXB)
- SDO: Service Data Objects
- EIS using JCA Resource Adapters
- Containers
  - WebLogic, OracleAS, WebSphere, GlassFish/SunAS, JBoss

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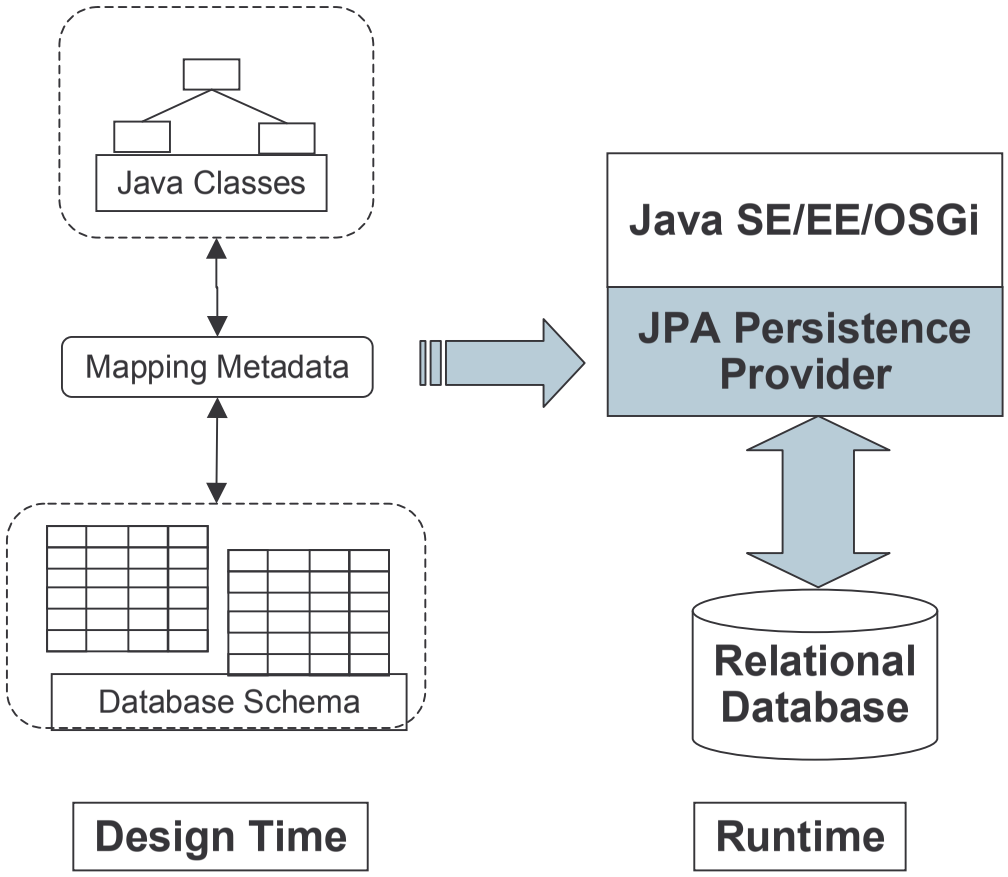
Where does EclipseLink JPA fit?



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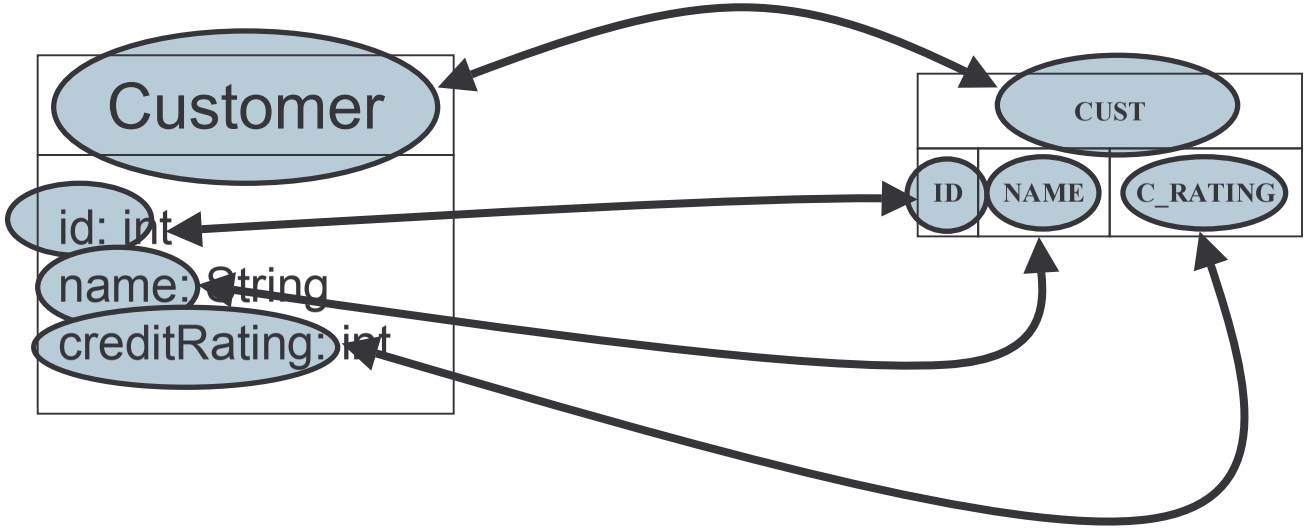
Mapping

- The activity of ‘Mapping’ is the process of connecting objects/attributes to tables/columns



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Standard JPA Mappings

- Core JPA Mappings
  - Id
  - Basic
  - Relationships
    - OneToOne
    - ManyToOne
    - OneToMany
    - ManyToMany
  - And more…
- Annotations and/or XML

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EclipseLink JPA Config

- JPA (portable)
  - Persistence.xml with EclipseLink properties
  - Mapping: Annotations and/or orm.xml
  - Query hints
- EclipseLink JPA
  - Standard JPA +
  - EclipseLink annotations
  - EclipseLink orm.xml

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Advanced Mapping Example

```
@Entity
@Cache(type=SOFT_WEAK, coordinationType=SEND_OBJECT_CHANGES)
@OptimisticLocking(type=CHANGED_COLUMNS)
@Converter(name="money", converterClass=MoneyConverter.class)
public class Employee {
   @Id
   private int id;

   private String name;

   @OneToMany(mappedBy="owner")
   @PrivateOwned
   private List<PhoneNumbers> phones;

   @Convert("money")
   private Money salary
   …
}
```

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Advanced Mappings

- @BasicCollection - stores a collection of simple types, such as String, Number, Date, etc., in a single table
- @BasicMap - stores a collection of key-value pairs of simple types, such as String, Number, Date, etc., in a single table
- @PrivateOwned - supports orphan management
- @JoinFetch - enables the joining and reading of a referenced object(s) in the same query as the source object
- @Mutable - indicates that the value of a complex field itself can be changed or not changed (instead of being replaced)
- @Transformation - enables the mapping of a single field to to one or more database columns.
- @VariableOneToOne - supports OneToOne mappings to an interface rather than an Entity
- @ReadOnly - makes an Entity read only

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Converters

- New converter mappings for type conversion and user defined types include:
  - @Converter
    - @TypeConverter, @ObjectTypeConverter, @StructConverter
  - @Convert

```
@Entity
@Converter(
     name="Currency",
     converterClass=CurrencyConverter.class)
public class Employee {
    @Convert("Currency")
    private Currency salaryCurrency;
```

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Query Framework

- Queries can be defined using
  - Entity Model: JPQL, Expressions, Query-by-example
  - Native: SQL, Stored Procedures
- Customizable
  - Locking, Cache Usage, Refreshing
  - Optimizations: Joining, Batching, parameter binding
  - Result shaping/conversions
- Static or Dynamic
  - Stored Procedure support

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Stored Procedure Query

- Stored procedure usage has been simplified through the
  - **@NamedStoredProcedureQuery**
  - **@NamedStoredProcedureQueries** annotations.
- These annotations encapsulate stored procedure calls as named queries.
- Client code is unaware that the query they are executing is a stored procedure and not a JP QL or native SQL query

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Additional Query Hints

- Optimized Graph Loading
  - eclipselink.batch
  - eclipselink.join-fetch
- Results & Caching
  - eclipselink.cache-usage
  - eclipselink.read-only
  - eclipselink.result-collection-type
  - eclipselink.refresh
- JDBC
  - eclipselink.jdbc.timeout
  - eclipselink.jdbc.fetch-size
  - eclipselink.jdbc.max-rows
  - eclipselink.jdbc.bind-parameters

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Lazy Loading & Fetch Groups

- Supports lazy loading of relationship and @Basic mappings
- Two default Fetch Groups defined automatically: eagerly loaded fields and lazily loaded fields.
  - Initial Entity select fetches only eager fields.
  - Referencing *any* lazy field will fetch all lazy fields
  - Especially useful with CLOB/BLOB fields to avoid loading until necessary
- Enabled by byte code weaving
- Fetch Groups can be manually defined and added to a query as a hint—overrides default fetch groups.

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Returning Policy

- Return policy options can be configured using:

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ERROR: undefined
OFFENDING COMMAND: G00GFFEncoding

STACK:

/Encoding