

# Oracle® Fusion Middleware

## Java Persistence API (JPA) Extensions

### Reference for Oracle TopLink



12c (12.2.1.4.0)

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Oracle Fusion Middleware Java Persistence API (JPA) Extensions Reference for Oracle TopLink, 12c (12.2.1.4.0)

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# Preface

Oracle TopLink's JPA implementation is provided by EclipseLink.

EclipseLink JPA provides specific annotations (*EclipseLink extensions*) in addition to supporting the standard Java Persistence Architecture (JPA) annotations. You can use these EclipseLink extensions to take advantage of EclipseLink's extended functionality and features within your JPA entities.

## Audience

This document is intended for application developers who want to develop applications using Oracle TopLink with Java Persistence Architecture (JPA). This document does not include details about related common tasks, but focuses on Oracle TopLink functionality.

Developers should be familiar with the concepts and programming practices of

- Java SE and Java EE.
- Java Persistence Architecture 2.1 specification (<http://jcp.org/en/jsr/detail?id=338>)
- EclipseLink (<http://www.eclipse.org/eclipselink>)
- Eclipse IDE (<http://www.eclipse.org>)

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## Related Documents

For more information, see the following documents:

- *Understanding Oracle TopLink*
- *Solutions Guide for Oracle TopLink*
- *Java API Reference for Oracle TopLink*

- *Release Notes for Oracle TopLink*
- EclipseLink Documentation Center at <http://www.eclipse.org/eclipselink/documentation/>

## Conventions

The following text conventions are used in this document:

Convention	Meaning
<b>boldface</b>	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
<i>italic</i>	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

# 1

## Introduction

This chapter introduces EclipseLink. Oracle TopLink is an advanced, object-persistence and object-transformation framework that provides development tools and run-time capabilities that reduce development and maintenance efforts, and increase enterprise application functionality.

This chapter includes the following sections:

- [About Oracle TopLink](#)
- [About This Documentation](#)

## About Oracle TopLink

TopLink is suitable for use with a wide range of Java Enterprise Edition (Java EE) and Java application architectures. Use TopLink to design, implement, deploy, and optimize an advanced object-persistence and object-transformation layer that supports a variety of data sources and formats, including the following:

- JPA – For object-relational persistence, supporting the JPA (Java Persistence API) specification and a native API
- NoSQL – For object persistence of non-relational NoSQL and EIS databases through JPA and a native API
- JAXB – For object-XML transformation, supporting the JAXB (Java Architecture for XML Binding) specification and a native API
- JSON – For object-JSON (JavaScript Object Notation) transformation
- DBWS – For generation of web services from database tables and stored procedures

The TopLink native API includes:

- Relational – For transactional persistence of Java objects to a relational database accessed using Java Database Connectivity (JDBC) drivers.
- Object-Relational Data Type – For transactional persistence of Java objects to special-purpose structured data source representations optimized for storage in object-relational data type databases such as Oracle Database.
- Enterprise information system (EIS) – For transactional persistence of Java objects to a non-relational data source accessed using a Java EE Connector architecture (JCA) adapter and any supported EIS record type, including indexed, mapped, or XML.
- XML – For non-transactional, non-prescription (in-memory) conversion between Java objects and XML Schema Document (XSD)-based XML documents using Java Architecture for XML Binding (JAXB).

Oracle TopLink includes support for EJB 3.0 and the Java Persistence API (JPA) in Java EE and Java SE environments including integration with a variety of application servers including:

- Oracle WebLogic Server
- Oracle Glassfish Server
- JBoss Web Server
- IBM WebSphere application server
- SAP NetWeaver
- Oracle Containers for Java EE (OC4J)
- Various other web containers, such as Apache Tomcat, Eclipse Gemini, IBM WebSphere CE, and SpringSource tcServer

Oracle TopLink lets you quickly capture and define object-to-data source and object-to-data representation mappings in a flexible, efficient metadata format.

The Oracle TopLink runtime lets your application exploit this mapping metadata with a simple session facade that provides in-depth support for standard APIs such as JPA, and JAXB as well as TopLink-specific extensions to those standards.

Review *Understanding Oracle TopLink* for more information about TopLink.

## About This Documentation

Oracle TopLink includes EclipseLink, the reference implementation of the Java Persistence Architecture (JPA) 2.0 specification, as its persistence provider. It also includes many enhancements and extensions.

EclipseLink is the reference implementation of the Java Persistence Architecture (JPA) 2.0 specification. It also includes many enhancements and extensions.

This document explains the TopLink enhancements and extensions to JPA. Please refer to the JPA specification for full documentation of core JPA. Where appropriate, this documentation provides links to the pertinent section of the specification.

## Other Resources

For more information, see:

- Oracle TopLink on the Oracle Technology Network (OTN). <http://www.oracle.com/technetwork/middleware/toplink/overview/index.html>
- Java Persistence specification for complete information about JPA <http://jcp.org/en/jsr/detail?id=338>
- EclipseLink Documentation Center for more information about EclipseLink support of JPA. <http://www.eclipse.org/eclipselink/documentation/>
- The EclipseLink API reference documentation (Javadoc) for complete information on core JPA plus the EclipseLink enhancements <http://www.eclipse.org/eclipselink/api/>
  - The schema for the JPA persistence configuration file [https://www.oracle.com/webfolder/technetwork/jsc/xml/ns/persistence/persistence\\_2\\_1.xsd](https://www.oracle.com/webfolder/technetwork/jsc/xml/ns/persistence/persistence_2_1.xsd)
  - The schema for the persistence object/relational mapping file [https://www.oracle.com/webfolder/technetwork/jsc/xml/ns/persistence/orm\\_2\\_1.xsd](https://www.oracle.com/webfolder/technetwork/jsc/xml/ns/persistence/orm_2_1.xsd)

- The schema for the native EclipseLink mapping file [http://www.eclipse.org/eclipselink/xsds/eclipselink\\_orm\\_2\\_2.xsd](http://www.eclipse.org/eclipselink/xsds/eclipselink_orm_2_2.xsd)
- Examples that display the use of a number of EclipseLink JPA features <http://wiki.eclipse.org/EclipseLink/Examples>
- JavaEE and JPA tutorial. Although this tutorial does not include TopLink-specific information, it does contain useful information to help you implement JPA 2.1 applications. <https://docs.oracle.com/javaee/7/tutorial/partpersist.htm#BNBPY>
- Java Persistence, a wiki-based "open book" about JPA 2.1 [https://en.wikibooks.org/wiki/Java\\_Persistence/What\\_is\\_new\\_in\\_JPA\\_2.1%3F](https://en.wikibooks.org/wiki/Java_Persistence/What_is_new_in_JPA_2.1%3F)



# 2

## Annotation Extensions Reference

This chapter includes information on the EclipseLink extensions to the Java Persistence API (JPA) annotations. EclipseLink supports the Java Persistence API (JPA) 2.0 specification. It also includes many enhancements and extensions. This chapter includes the following sections:

- [Functional Listing of Annotation Extensions](#)
- [Alphabetical Listing of Annotation Extensions](#)

### Functional Listing of Annotation Extensions

The following lists the EclipseLink annotation extensions, categorized by function:

- [Mapping Annotations](#)
- [Entity Annotations](#)
- [Converter Annotations](#)
- [Caching Annotations](#)
- [Customization and Optimization Annotations](#)
- [Copy Policy Annotations](#)
- [Returning Policy Annotations](#)
- [Stored Procedure and Function Annotations](#)
- [Partitioning Annotations](#)
- [Non-relational \(NoSQL\) Annotations](#)

### Mapping Annotations

TopLink includes the following annotation extensions for mappings:

- [@PrivateOwned](#)
- [@JoinFetch](#)
- [@Mutable](#)
- [@Property](#)
- [@Transformation](#)
- [@ReadTransformer](#)
- [@WriteTransformer](#)
- [@WriteTransformers](#)

## Entity Annotations

TopLink includes the following annotation extensions for entities:

- [@AdditionalCriteria](#)
- [@ExcludeDefaultMappings](#)
- [@Multitenant](#)
- [@OptimisticLocking](#)
- [@ReadOnly](#)
- [@SerializedObject](#)
- [@TenantDiscriminatorColumns](#)
- [@TenantDiscriminatorColumn](#)
- [@TenantTableDiscriminator](#)
- [@Struct](#)

## Converter Annotations

TopLink includes the following annotation extensions for converting data:

- [@Convert](#)
- [@Converter](#)
- [@Converters](#)
- [@TypeConverter](#)
- [@TypeConverters](#)
- [@ObjectTypeConverter](#)
- [@ObjectTypeConverters](#)
- [@StructConverter](#)
- [@StructConverters](#)

## Caching Annotations

TopLink includes the following annotation extensions for caching:

- [@Cache](#)
- [@CacheIndex](#)
- [@CacheIndexes](#)
- [@CacheInterceptor](#)
- [@TimeOfDay](#)
- [@ExistenceChecking](#)

## Customization and Optimization Annotations

TopLink includes the following annotation extensions for customization and optimization.

- [@Customizer](#)
- [@ChangeTracking](#)

## Copy Policy Annotations

TopLink includes the following annotation extensions for copy policies:

- [@CloneCopyPolicy](#)
- [@CopyPolicy](#)
- [@InstantiationCopyPolicy](#)

## Returning Policy Annotations

TopLink includes the following annotation extensions for returning policies:

- [@ReturnInsert](#)
- [@ReturnUpdate](#)

## Stored Procedure and Function Annotations

TopLink includes the following annotation extensions for stored procedures and stored functions:

- [@NamedPLSQLStoredFunctionQueries](#)
- [@NamedPLSQLStoredFunctionQuery](#)
- [@NamedPLSQLStoredProcedureQueries](#)
- [@NamedPLSQLStoredProcedureQuery](#)
- [@NamedStoredFunctionQueries](#)
- [@NamedStoredFunctionQuery](#)
- [@NamedStoredProcedureQueries](#)
- [@NamedStoredProcedureQuery](#)
- [@OracleArray](#)
- [@OracleArrays](#)
- [@OracleObject](#)
- [@OracleObjects](#)
- [@PLSQLParameter](#)
- [@PLSQLRecord](#)
- [@PLSQLRecords](#)
- [@PLSQLTable](#)

- [@PLSQLTables](#)
- [@StoredProcedureParameter](#)

## Partitioning Annotations

TopLink includes the following annotation extensions for using partitions:

- [@HashPartitioning](#)
- [@Partitioned](#)
- [@Partitioning](#)
- [@PinnedPartitioning](#)
- [@RangePartition](#)
- [@RangePartitioning](#)
- [@ReplicationPartitioning](#)
- [@RoundRobinPartitioning](#)
- [@UnionPartitioning](#)
- [@ValuePartitioning](#)

## Non-relational (NoSQL) Annotations

TopLink includes the following annotation extensions for non-relational datasources:

- [@Field](#)
- [@JoinField](#)
- [@JoinFields](#)
- [@NoSql](#)

## Alphabetical Listing of Annotation Extensions

The following lists the EclipseLink annotation extensions:

- [@AdditionalCriteria](#)
- [@Array](#)
- [@BatchFetch](#)
- [@Cache](#)
- [@CacheIndex](#)
- [@CacheIndexes](#)
- [@CacheInterceptor](#)
- [@CascadeOnDelete](#)
- [@ChangeTracking](#)
- [@ClassExtractor](#)
- [@CloneCopyPolicy](#)

- @CompositeMember
- @ConversionValue
- @Convert
- @Converter
- @Converters
- @CopyPolicy
- @Customizer
- @DeleteAll
- @DiscriminatorClass
- @ExcludeDefaultMappings
- @ExistenceChecking
- @FetchAttribute
- @FetchGroup
- @FetchGroups
- @Field
- @HashPartitioning
- @Index
- @Indexes
- @InstantiationCopyPolicy
- @JoinFetch
- @JoinField
- @JoinFields
- @MapKeyConvert
- @Multitenant
- @Mutable
- @NamedPLSQLStoredFunctionQueries
- @NamedPLSQLStoredProcedureQuery
- @NamedStoredFunctionQueries
- @NamedStoredFunctionQuery
- @NamedStoredProcedureQueries
- @NamedStoredProcedureQuery
- @Noncacheable
- @NoSql
- @ObjectTypeConverter
- @ObjectTypeConverters
- @OptimisticLocking
- @OracleArray

- [@OracleArrays](#)
- [@OracleObject](#)
- [@OracleObjects](#)
- [@OrderCorrection](#)
- [@Partitioned](#)
- [@Partitioning](#)
- [@PinnedPartitioning](#)
- [@PLSQLParameter](#)
- [@PLSQLRecord](#)
- [@PLSQLRecords](#)
- [@PLSQLTable](#)
- [@PLSQLTables](#)
- [@PrimaryKey](#)
- [@PrivateOwned](#)
- [@Properties](#)
- [@Property](#)
- [@QueryRedirectors](#)
- [@RangePartition](#)
- [@RangePartitioning](#)
- [@ReadOnly](#)
- [@ReadTransformer](#)
- [@ReplicationPartitioning](#)
- [@ReturnInsert](#)
- [@ReturnUpdate](#)
- [@RoundRobinPartitioning](#)
- [@SerializedObject](#)
- [@StoredProcedureParameter](#)
- [@Struct](#)
- [@StructConverter](#)
- [@StructConverters](#)
- [@Structure](#)
- [@TenantDiscriminatorColumns](#)
- [@TenantDiscriminatorColumn](#)
- [@TenantTableDiscriminator](#)
- [@TimeOfDay](#)
- [@Transformation](#)
- [@TypeConverter](#)

- [@TypeConverters](#)
- [@ValuePartition](#)
- [@ValuePartitioning](#)
- [@UuidGenerator](#)
- [@UnionPartitioning](#)
- [@VariableOneToOne](#)
- [@VirtualAccessMethods](#)
- [@WriteTransformer](#)
- [@WriteTransformers](#)

## @AdditionalCriteria

Use `@AdditionalCriteria` to define parameterized views on data.

You can define additional criteria on entities or mapped superclass. When specified at the mapped superclass level, the additional criteria definition applies to all inheriting entities, unless those entities define their own additional criteria, in which case those defined for the mapped superclass are ignored.

### Annotation Elements

Table 2-1 describes this annotation's elements.

**Table 2-1 @AdditionalCriteria Annotation Elements**

Attribute	Description	Default
value	(Required) The JPQL fragment to use as the additional criteria	

### Usage

Additional criteria can provide an additional filtering mechanism for queries. This filtering option, for example, allows you to use an existing additional `JOIN` expression defined for the entity or mapped superclass and allows you to pass parameters to it.

Set additional criteria parameters through properties on the entity manager factory or on the entity manager. Properties set on the entity manager override identically named properties set on the entity manager factory. Properties must be set on an entity manager before executing a query. Do not change the properties for the lifespan of the entity manager.

#### Note:

Additional criteria are not supported with native SQL queries.

## Examples

Specify additional criteria using the `@AdditionalCriteria` annotation or the `<additional-criteria>` element. The additional criteria definition supports any valid JPQL string and must use `this` as an alias to form the additional criteria. For example:

```
@AdditionalCriteria("this.address.city IS NOT NULL")
```

[Example 2-1](#) shows additional criteria defined for the entity `Employee` and then shows the parameters for the additional criteria set on the entity manager.

[Example 2-2](#) illustrates the same example as before, but uses the `<additional-criteria>` element in the `eclipselink-orm.xml` mapping file.

### Uses for Additional Criteria

Uses for additional criteria include:

- [Multitenancy](#)
- [Soft Delete](#)
- [Data History](#)
- [Temporal Filtering](#)
- [Shared Table](#)

### Example 2-1 Using @AdditionalCriteria Annotation

Define additional criteria on `Employee`, as follows:

```
package model;

@AdditionalCriteria("this.company=:COMPANY")
public class Employee {

    ...
}
```

Set the property on the `EntityManager`. This example returns all employees of `MyCompany`.

```
entityManager.setProperty("COMPANY", "MyCompany");
```

### Example 2-2 Using <additional-criteria> XML

```
<additional-criteria>
  <criteria>this.address.city IS NOT NULL</criteria>
</additional-criteria>
```

## Multitenancy

In a multitenancy environment, tenants (users, clients, organizations, applications) can share database tables, but the views on the data are restricted so that tenants have access only to their own data. You can use additional criteria to configure such restrictions.



 **Note:**

In most cases, you use the `@Multitenant` annotation in multitenancy environments instead, as shown.

When the tenant acquires its `EntityManagerFactory` or `EntityManager`, the persistence/entity manager property `tenant` is set to the name of the tenant acquiring it. For example,

```
Map properties = new HashMap();
properties.put("tenant", "ACME");
EntityManagerFactory emf = Persistence.createEntityManagerFactory(properties);
```

Or

```
Map properties = new HashMap();
properties.put("tenant", "ACME");
EntityManager em = factory.createEntityManager(properties);
```

### Example 2-3 Multitenancy Example 1

The following example restricts the data for a **Billing** client, such as a billing application or billing organization:

```
@AdditionalCriteria("this.tenant = 'Billing'")
```

### Example 2-4 Multitenancy Example 2

The following example could be used in an application used by multiple tenants at the same time. The additional criteria is defined as:

```
@AdditionalCriteria("this.tenant = :tenant")
```

### Soft Delete

The following example filters data that is marked as deleted (but which still exists in the table) from a query:

```
@AdditionalCriteria("this.isDeleted = false")
```

### Data History

The following example returns the current data from a query, thus filtering out any out-of-date data, for example data stored in a history table.

```
@AdditionalCriteria("this.endDate is null")
```

 **Note:**

EclipseLink also provides specific history support, via `HistoryPolicy`. See [Tracking Changes Using History Policy](http://wiki.eclipse.org/EclipseLink/Examples/JPA/History) at <http://wiki.eclipse.org/EclipseLink/Examples/JPA/History>.

`TopLink` also provides specific history support, via `HistoryPolicy`. See "History Policy in *Understanding Oracle TopLink* for more information.

### Temporal Filtering

The following example filters on a specific date:

```
@AdditionalCriteria("this.startDate <= :viewDate and this.endDate >= :viewDate")
```

### Shared Table

For a shared table, there may be inheritance in the table but not in the object model. For example, a `SavingsAccount` class may be mapped to an `ACCOUNT` table, but the `ACCOUNT` table contains both savings account data (`SAVINGS`) and checking account (`CHECKING`) data. You can use additional criteria to filter out the checking account data.

### See Also

For more information, see:

- ["COLUMN"](#)
- ["@Multitenant"](#)

## @Array

Use `@Array` to define object-relational data types supported by specific databases, such as Oracle `VARRAY` types or PostgreSQL JDBC `Array` types.

### Annotation Elements

[Table 2-2](#) describes this annotation's elements.

**Table 2-2 @Array Annotation Elements**

Annotation Element	Description	Default
<code>databaseType</code>	(Required) The name of the database array structure type	
<code>targetClass</code>	(Optional only if the collection field or property is defined using Java generics; otherwise Required) The class (basic or embeddable) that is the element type of the collection	Parameterized type of the collection.

### Usage

Use `@Array` on a collection attribute that is persisted to an `Array` type. The collection can be of basic types or embeddable class mapped using a `Struct`.

## Examples

[Example 2-5](#) shows how to use this annotation with an Oracle `VARRAY` type.

[Example 2-6](#) shows how to use this annotation with an PostgreSQL `Struct` type.

### Example 2-5 Using `@Array` with Oracle `VARRAY`

```
VARRAY DDL:  
CREATE TYPE TASKS_TYPE AS VARRAY(10) OF VARCHAR(100)
```

```
@Struct  
@Entity  
public class Employee {  
    @Id  
    private long id;  
    @Array(databaseType="TASKS_TYPE")  
    private List<String> tasks;  
}
```

### Example 2-6 Using `@Array` with PostgreSQL `Struct`

```
DDL:  
CREATE TABLE EMPLOYEE (ID BIGINT, TASKS TEXT[])
```

```
@Struct  
@Entity  
public class Employee {  
    @Id  
    private long id;  
    @Array(databaseType="TEXT[]")  
    private List<String> tasks;  
}
```

## See Also

For more information, see the following:

- ["@Struct"](#)
- [Understanding Oracle TopLink](#)
- [Solutions Guide for Oracle TopLink](#)

# @BatchFetch

Use `@BatchFetch` to read objects related to a relationship mapping (such as `@OneToOne`, `@OneToMany`, `@ManyToMany`, and `@ElementCollection`) to be read in a single query.

## Annotation Elements

[Table 2-3](#) describes this annotation's elements.

Table 2-3 @BatchFetch Annotation Elements

Annotation Element	Description	Default
size	Default size of the batch fetch, used only when BatchFetchType=IN to define the number of keys in each IN clause	256 or the query's pageSize (for cursor queries)
BatchFetchType	(Optional) The type of batch fetch to use: <ul style="list-style-type: none"> <li>JOIN – The original query's selection criteria is joined with the batch query</li> <li>EXISTS – Uses an SQL EXISTS clause and a sub-select in the batch query instead of a JOIN</li> <li>IN – Uses an SQL IN clause in the batch query, passing in the source object IDs.</li> </ul>	JOIN

### Usage

Batch fetching allows for the optimal loading of a tree. Setting the @BatchFetch annotation on a *child* relationship of a tree structure causes EclipseLink to use a *single* SQL statement for each level. For example, consider an object with an EMPLOYEE and PHONE table in which PHONE has a foreign key to EMPLOYEE. By default, reading a list of employees' addresses by default requires *n* queries, for each employee's address. With batch fetching, you use *one query* for all the addresses.

Using BatchFetchType=EXISTS does not require an SQL DISTINCT statement (which may cause issues with LOBs) and may be more efficient for some types of queries or on specific databases.

When using BatchFetchType=IN, EclipseLink selects only objects not already in the cache. This method may work better with cursors or pagination, or in situations in which you cannot use a JOIN. On some databases, this may only work for singleton IDs.

### Examples

The following examples show how to use this annotation (and XML) with different batch fetch types.

#### Example 2-7 Using JOIN BatchFetch Type

```
@OneToOne
@BatchFetch(BatchFetchType.JOIN)
private Address address;

<one-to-one name="address">
  <batch-fetch type="JOIN" />
</one-to-one>
```

#### Example 2-8 Using EXISTS BatchFetch Type

```
@BatchFetch(BatchFetchType.EXISTS)
@OneToOne
public Map<String, String> getStringMap() {
```

```
return stringMap;
}

<one-to-one name="StringMap">
  <batch-fetch type="EXISTS"/>
</one-to-one>
```

### Example 2-9 Using IN BatchFetch Type

```
@BatchFetch(BatchFetchType.IN, size=50)
@OneToOne
public Map<String, String> getStringMap() {
return stringMap;
}
```

```
<one-to-one name="StringMap">
  <batch-fetch type="IN" size="50" />
</one-to-one>
```

### See Also

For more information, see:

- ["@JoinFetch"](#)
- *Understanding Oracle TopLink*
- *Solutions Guide for Oracle TopLink*

## @Cache

Use @Cache (in place of the JPA @Cachable annotation) to configure the EclipseLink object cache. By default, EclipseLink uses a shared object cache to cache all objects. You can configure the caching type and options on a per class basis to allow optimal caching.

### Annotation Elements

[Table 2-4](#) describes this annotation's elements.

Table 2-4 @Cache Annotation Elements

Annotation Element	Description	Default
type	<p>(Optional) Set this attribute to the type (<code>org.eclipse.persistence.annotations.CacheType</code> enumerated type) of the cache that you will be using:</p> <ul style="list-style-type: none"> <li>• FULL</li> <li>• WEAK</li> <li>• SOFT</li> <li>• SOFT_WEAK</li> <li>• HARD_WEAK</li> <li>• CACHE (not recommended)</li> <li>• NONE (not recommended, use <code>isolation=ISOLATED</code> instead)</li> </ul> <p>You can override this attribute with these persistence unit properties:</p> <ul style="list-style-type: none"> <li>• <code>eclipselink.cache.type.&lt;ENTITY&gt;</code></li> <li>• <code>eclipselink.cache.type.default</code></li> </ul>	<code>CacheType.SOFT_WEAK</code>
size	(Optional) Set this attribute to an int value to define the size of cache to use (number of objects).	100
isolation	<p>(Optional) The caching level of the Entity:</p> <ul style="list-style-type: none"> <li>• <code>shared</code> – Entity instances will be cached within the <code>EntityManagerFactory/ServerSession</code> level</li> <li>• <code>isolated</code> – The Entity and its data is not stored in the shared cache, but is isolated to the <code>PersistenceContext/UnitOfWork</code> or <code>IsolatedClientSession</code></li> <li>• <code>protected</code> – Entity state information will be cached in the shared cache, but Entity instances will not be shared</li> </ul>	<code>shared</code>
expiry	(Optional) The int value to enable the expiration of the cached instance after a fixed period of time (milliseconds). Queries executed against the cache after this will be forced back to the database for a refreshed copy.	no expiry
expiryTimeOfDay	(Optional) Specific time of day ( <code>org.eclipse.persistence.annotations.TimeOfDay</code> ) when the cached instance will expire. Queries executed against the cache after this will be forced back to the database for a refreshed copy.	no expiry
alwaysRefresh	(Optional) Set to a boolean value of true to force all queries that go to the database to always refresh the cache	false

Table 2-4 (Cont.) @Cache Annotation Elements

Annotation Element	Description	Default
<code>refreshOnlyIfNewer</code>	<p>(Optional) Set to a boolean value of <code>true</code> to force all queries that go to the database to refresh the cache only if the data received from the database by a query is newer than the data in the cache (as determined by the optimistic locking field)</p> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>This option only applies if one of the other refreshing options, such as <code>alwaysRefresh</code>, is already enabled.</li> <li>A version field is necessary to apply this feature.</li> </ul>	<code>false</code>
<code>disableHits</code>	(Optional) Set to a boolean value of <code>true</code> to force all queries to bypass the cache for hits, but still resolve against the cache for identity. This forces all queries to hit the database.	<code>false</code>
<code>coordinationType</code>	<p>(Optional) Set this attribute to the cache coordination mode (<code>org.eclipse.persistence.annotations.CacheCoordinationType</code> enumerated type).</p> <ul style="list-style-type: none"> <li><code>SEND_OBJECT_CHANGES</code> – Sends a list of changed objects, including data about the changes. This data is merged into the receiving cache.</li> <li><code>INVALIDATE_CHANGED_OBJECTS</code> – Sends a list of the identities of the objects that have changed. The receiving cache invalidates the objects (rather than changing any of the data).</li> <li><code>SEND_NEW_OBJECTS_WITH_CHANGES</code> – Same as <code>SEND_OBJECT_CHANGES</code> excepts it also includes any newly-created objects from the transaction</li> <li><code>NONE</code> – Does not cache coordination</li> </ul> <p>You must also configure cache coordination in your persistence unit properties. See "<a href="#">Caching</a>".</p>	<code>SEND_OBJECT_CHANGES</code>
<code>databaseChangeNotificationType</code>	<p>(Optional) The database change notification mode:</p> <ul style="list-style-type: none"> <li><code>Invalidate</code> – Invalidates the TopLink cache when a database change event is received for an object.</li> <li><code>None</code> – No database change events will be processed. The database event listener must also be configured for the persistence unit/session.</li> </ul>	<code>INVALIDATE</code>

### Usage

Use the `@Cache` annotation instead of the JPA `@Cacheable` annotation to provide additional caching configuration.

You can define the `@Cache` annotation on the following:

- `@Entity`
- `@MappedSuperclass`
- the root of the inheritance hierarchy (if applicable)

If you define the @Cache annotation on an inheritance subclass, the annotation will be ignored. If you define the @Cache annotation on @Embeddable EclipseLink will throw an exception.

### Caching in EclipseLink

The Oracle TopLink cache is an in-memory repository that stores recently read or written objects based on class and primary key values. EclipseLink uses the cache to do the following:

- Improve performance by holding recently read or written objects and accessing them in-memory to minimize database access.
- Manage locking and isolation level.
- Manage object identity.

For more information about the EclipseLink cache and its default behavior, see:

- Caching examples:  
<http://wiki.eclipse.org/EclipseLink/Examples/JPA/Caching>
- "Understanding Caching" in the *Understanding Oracle TopLink*
- "Object Caching" in *Solutions Guide for Oracle TopLink*

EclipseLink defines the following entity caching annotations:

- @Cache
- @TimeOfDay
- @ExistenceChecking

EclipseLink also provides a number of persistence unit properties that you can specify to configure the cache. These properties may compliment or provide an alternative to the usage of annotations.

For more information, see "Caching".

### Examples

[Example 2-10](#) illustrates an @Cache annotation.

[Example 2-11](#) shows how to use this annotation in the eclipselink-orm.xml file.

You can also specify caching properties at the persistence unit level (in the persistence.xml file) as shown here:

#### Example 2-10 Using @Cache Annotation

```
...
@Entity
@Cache(
    type=CacheType.SOFT, // Cache everything until the JVM decides memory is low.
    size=64000 // Use 64,000 as the initial cache size.
    expiry=36000000, // 10 minutes
    coordinationType=CacheCoordinationType.INVALIDATE_CHANGED_OBJECTS // if cache
coordination is used, only send invalidation messages.
)
public class Employee {
    ...
}
```



**Example 2-11 Using <cache> XML**

```

<entity-mappings
  xmlns="http://www.eclipse.org/eclipselink/xsds/persistence/orm"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.eclipse.org/eclipselink/xsds/persistence/orm
  http://www.eclipse.org/eclipselink/xsds/eclipselink_orm_2_4.xsd"
  version="2.4">
  <entity name="Employee" class="org.acme.Employee" access="FIELD">
    <cache type="SOFT" size="64000" expiry="36000000" coordination-
type="INVALIDATE_CHANGED_OBJECTS"/>
  </entity>
</entity-mappings>

```

**Example 2-12 Specifying Caching in persistence.xml**

```

<persistence xmlns="http://java.sun.com/xml/ns/persistence"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://java.sun.com/xml/ns/persistence persistence_2_0.xsd"
  version="2.0">
  <persistence-unit name="acme" transaction-type="RESOURCE_LOCAL">
    <provider>org.eclipse.persistence.jpa.PersistenceProvider</provider>
    <exclude-unlisted-classes>>false</exclude-unlisted-classes>
    <properties>
      <property name="eclipselink.cache.shared.default" value="false"/>
      <property name="eclipselink.cache.shared.Employee" value="true"/>
      <property name="eclipselink.cache.type.Employee" value="SOFT"/>
      <property name="eclipselink.cache.size.Employee" value="64000"/>
    </properties>
  </persistence-unit>
</persistence>

```

**See Also**

For more information, see:

- ["@ExistenceChecking"](#)
- ["@TimeOfDay"](#)
- ["@CacheInterceptor"](#)
- "Understanding Caching" in the *Understanding Oracle TopLink*
- "Object Caching" in *Solutions Guide for Oracle TopLink*
- EclipseLink Caching examples: <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Caching>

## @CacheIndex

Use @CacheIndex to define a cached index. Cache indexes are used only when caching is enabled.

**Annotation Elements**

[Table 2-5](#) describes this annotation's elements.

Table 2-5 @CacheIndex Annotation Elements

Annotation Element	Description	Default
columnNames	(Optional) The set of columns on which to define the index. Not required when annotated on a field/method.	
updateable	(Optional) Specify if the indexed field is updateable. If true, the object will be re-indexed on each update or refresh.	true

### Usage

A cache index allows `singleResult` queries to obtain a cache hit when querying on the indexed fields. A `resultList` query cannot obtain cache hits, as it is unknown if all of the objects are in memory, (unless the cache usage query hint is used).

The index should be unique. If it is not, the first indexed object will be returned.

You can use `@CacheIndex` on an Entity class or on an attribute. The column is defaulted when defined on a attribute.

### Examples

[Example 2-13](#) shows an example of using the `@CacheIndex` annotation.

[Example 2-14](#) shows an example of using the `<cache-index>` XML element in the `eclipselink-orm.xml` file.

[Example 2-15](#) shows an example query using a cache index.

#### Example 2-13 Using @CacheIndex Annotation

```
@Entity
@CacheIndex(columnNames={"F_NAME", "L_NAME"}, updateable=true)
public class Employee {
    @Id
    private long id;
    @CacheIndex
    private String ssn;
    @Column(name="F_NAME")
    private String firstName;
    @Column(name="L_NAME")
    private String lastName;
}
```

#### Example 2-14 Using <cache-index> XML

```
<?xml version="1.0"?>
<entity-mappings
  xmlns="http://www.eclipse.org/eclipselink/xsds/persistence/orm"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.eclipse.org/eclipselink/xsds/persistence/orm http://www.eclipse.org/eclipselink/xsds/eclipselink_orm_2_4.xsd"
  version="2.4">
  <entity name="Employee" class="org.acme.Employee" access="FIELD">
    <cache-index updateable="true">
      <column-name>F_NAME</column-name>
      <column-name>L_NAME</column-name>
    </cache-index>
  </entity>
</entity-mappings>
```

```

<attributes>
  <id name="id"/>
  <basic name="ssn">
    <cache-index/>
  </basic>
  <basic name="firstName">
    <column name="F_NAME"/>
  </basic>
  <basic name="lastName">
    <column name="L_NAME"/>
  </basic>
</attributes>
</entity>
</entity-mappings>

```

### Example 2-15 Caching an Index Query

```

Query query = em.createQuery("Select e from Employee e where e.firstName
= :firstName and e.lastName = :lastName");
query.setParameter("firstName", "Bob");
query.setParameter("lastName", "Smith");
Employee employee = (Employee)query.getSingleResult();

```

#### See Also

For more information, see:

- ["@Cache"](#)
- "About Cache Indexes" in *Understanding Oracle TopLink*

## @CacheIndexes

Use @CacheIndexes to define a set of @CacheIndex on an entity.

#### Annotation Elements

[Table 2-6](#) describes this annotation's elements.

**Table 2-6 @CacheIndexes Annotation Elements**

Annotation Element	Description	Default
CacheIndex[ ]	An array of cache indexes	

#### Examples

See ["@CacheIndex"](#) for examples of using the @CacheIndexes annotation.

#### See Also

For more information, see:

- ["@CacheIndex"](#)
- "About Cache Indexes" in *Understanding Oracle TopLink*

# @CacheInterceptor

Use `@CacheInterceptor` on an entity to intercept all EclipseLink cache access to the entity instead of responding to cache operations through an event.

## Annotation Elements

[Table 2-7](#) describes this annotation's elements.

**Table 2-7 @CacheInterceptor Annotation Elements**

Annotation Element	Description	Default
value	The class to be used to intercept EclipseLink's cache access	

## Usage

Once set, the specified class will receive all caching calls. Existing EclipseLink cache settings will continue to be used, any calls allowed to continue to the EclipseLink cache will execute against the configured cache.

When using with an entity in inheritance, you should define the `@CacheInterceptor` on the *root* of the inheritance hierarchy.

## Examples

[Example 2-16](#) shows how to integrate an external cache with EclipseLink.

[Example 2-17](#) shows an example of using the `<cache-interceptor>` XML element in the `eclipselink-orm.xml` file.

### Example 2-16 Using @CacheInterceptor Annotation

In this example, the `Employee` class intercepts all Oracle TopLink calls to the internal EclipseLink cache and redirects them to the Oracle Coherence Grid cache (`CoherenceInterceptor`).

```
import oracle.eclipselink.coherence.integrated.cache.CoherenceInterceptor;
import org.eclipse.persistence.annotations.Customizer;

@Entity
@CacheInterceptor(value = CoherenceInterceptor.class)
public class Employee {
    ...
}
```

### Example 2-17 Using <cache-interceptor> XML

```
<entity class="Employee">
    <cache-interceptor class="CoherenceInterceptor"/>
    ...
</entity>
```

## See Also

For more information, see:

- *Understanding Oracle TopLink*
- *Oracle Coherence Integration Guide for Oracle TopLink with Coherence Grid*
- "@Cache"

## @CascadeOnDelete

Use the `@CascadeOnDelete` annotation to specify that a delete operation performed on a database object is cascaded on secondary or related tables.

`ON DELETE CASCADE` is a database foreign key constraint option that automatically removes the dependent rows.

### Annotation Elements

There are no elements for this annotation.

### Usage

You can place `@CascadeOnDelete` on any relationship in which the target is defined as foreign key to the source Entity.

Add the annotation on the source relationship: `@OneToOne`, `@OneToMany`, `@ManyToMany`, and `@ElementCollection`. You can also add `@CascadeOnDelete` to an Entity with a `@SecondaryTable` or `JOINED` inheritance. [Table 2-8](#) describes the affect of placing `@CascadeOnDelete` on these different elements

**Table 2-8 Using @Cascade on Different Elements**

Element	Effect of @CascadeOnDelete
Entity	Defines that secondary or joined inheritance tables should cascade the delete on the database
OneToOne mapping	The deletion of the related object is cascaded on the database. This is only allowed for <code>mappedBy/target</code> -foreign key <code>OneToOne</code> mappings (because of constraint direction).
OneToMany mapping	For a <code>OneToMany</code> using a <code>mappedBy</code> or <code>JoinColumn</code> , the deletion of the related objects is cascaded on the database. For a <code>OneToMany</code> using a <code>JoinTable</code> , the deletion of the join table is cascaded on the database (target objects cannot be cascaded even if private because of constraint direction).
ManyToMany mapping	The deletion of the join table is cascaded on the database (target objects cannot be cascaded even if private because of constraint direction).
ElementCollection mapping	The deletion of the collection table is cascaded on the database.

`@CascadeOnDelete` has the following behavior:

- **DDL generation:** If DDL generation is used, the generated constraint will include the cascade deletion option.
- **Entity:** Remove will not execute SQL for deletion from secondary or joined inheritance tables (as constraint will handle deletion).

- OneToOne: If the mapping uses cascading or orphanRemoval, SQL will not be executed to delete target object.
- OneToMany: If the mapping uses cascading or orphanRemoval, SQL will not be executed to delete target objects.
- ManyToMany: SQL will not be executed to delete from the join table.
- ElementCollection: SQL will not be executed to delete from the collection table.
- Cache: Cascaded objects will still be removed from the cache and persistence context.
- Version locking: Version will not be verified on deletion of cascaded object.
- Events: Deletion events may not be executed on the cascaded objects if the objects are not loaded.
- Cascading: The remove operation should still be configured to cascade in the mapping if using CascadeOnDelete.

### Examples

[Example 2-18](#) shows the cascading deletion of the Employee secondary table and all of its owned relationships.

In the `eclipselink-orm.xml` descriptor file, specify cascade on delete as shown in [Example 2-19](#)

#### Example 2-18 Using @CascadeOnDelete Annotation

```
@Entity
@SecondaryTable(name="EMP_SALARY")
@CascadeOnDelete
public class Employee{
    @Id
    private long id;
    private String firstName;
    private String lastName;
    @Column(table="EMP_SALARY")
    private String salary;
    @OneToOne(mappedBy="owner", orphanRemoval=true, cascade={CascadeType.ALL})
    @CascadeOnDelete
    private Address address;
    @OneToMany(mappedBy="owner", orphanRemoval=true, cascade={CascadeType.ALL})
    @CascadeOnDelete
    private List<Phone> phones;
    @ManyToMany
    @JoinTable(name="EMP_PROJ")
    @CascadeOnDelete
    private List<Project> projects;
    ...
}
```

#### Example 2-19 Using <cascade-on-delete> XML

```
...
<cascade-on-delete>true</cascade-on-delete>
...
```

## See Also

For more information, see:

- EclipseLink example: <http://wiki.eclipse.org/EclipseLink/Examples/JPA/DeleteCascade>
- "@CascadeOnDelete" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/Schema\\_Generation/CascadeOnDelete](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/Schema_Generation/CascadeOnDelete)
- "Enhancing Performance" in *Solutions Guide for Oracle TopLink*

# @ChangeTracking

Use `@ChangeTracking` to specify the `org.eclipse.persistence.descriptors.changetracking.ObjectChangePolicy`. This policy computes change sets for the EclipseLink commit process and optimizes the transaction by including objects in the change set calculation that have at least one changed attribute.

## Annotation Elements

Table 2-9 describes this annotation's elements.

**Table 2-9 @ChangeTracking Annotation Elements**

Annotation Element	Description	Default
<code>ChangeTrackingType</code>	(Optional) The change tracking policy to use: <ul style="list-style-type: none"> <li>• <b>ATTRIBUTE</b> – The object's <code>set</code> method is weaved to raise change events to collect changes as they are made. Requires usage of weaving, and <b>LAZY</b> collection relationships, or eager weaving.</li> <li>• <b>OBJECT</b> – The object's <code>set</code> method is weaved to mark the object as <i>dirty</i>. Any dirty objects are compared against a copy of their original state for changes on commit or flush operations. Requires usage of weaving, and <b>LAZY</b> collection relationships, or eager weaving.</li> <li>• <b>DEFERRED</b> – All managed objects are compared against a copy of their original state for changes on commit or flush. Does not require weaving.</li> <li>• <b>AUTO</b> – Does not set any change tracking policy; change tracking will be determined at runtime.</li> </ul>	<code>AUTO</code>

## Usage

Use this annotation to configure an alternative change policy, if the automatic policy is having issues with your application. Using `@ChangeTracking` may improve commit performance for objects with few attributes or objects with many changed attributes.

 **Note:**

When using change tracking with `ATTRIBUTE` or `OBJECT`, if you modify an object's field through reflection, EclipseLink *will not* detect the change. However, if you use `DEFERRED`, EclipseLink *will* detect the change.

## Examples

[Example 2-20](#) shows how to use `@ChangeTracking` to set the unit of work's change policy.

[Example 2-21](#) shows how to use the `<change-tracking>` element in the `eclipselink-orm.xml` file.

[Example 2-22](#) shows how to configure change tracking in the persistence unit `persistence.xml` file or by importing a property map.

### Example 2-20 Using `@ChangeTracking` Annotation

```
@ChangeTracking(DEFERRED)
@Entity
public class Employee {
    ...
}
```

### Example 2-21 Using `<change-tracking>` XML

```
<entity class="Employee"
    <change-tracking type="DEFERRED"/>
...
</entity>
```

### Example 2-22 Specifying Change Tracking in `persistence.xml`

Using `persistence.xml` file:

```
<property name="eclipselink.weaving.changetracking" value="false"/>
```

Using property map:

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.WEAVING_CHANGE_TRACKING, "false");
```

## See Also

For more information, see:

- ["weaving"](#)
- "Enhancing Performance" in *Solutions Guide for Oracle TopLink*



## @ClassExtractor

Use `@ClassExtractor` to define a custom class indicator in place of providing a discriminator column.

### Annotation Elements

[Table 2-10](#) describes this annotation's elements.

**Table 2-10** @ClassExtractor Annotation Elements

Annotation Element	Description	Default
<code>java.lang.Class</code>	(Required) The name of the class extractor to apply to the entity's descriptor	

### Usage

If you are mapping to an existing database, and the tables do not have a discriminator column you can still define inheritance using the `@ClassExtractor` annotation or `<class-extractor>` element. The class extractor takes a class that implements the `ClassExtractor` interface. An instance of this class is used to determine the class type to use for a database row. The class extractor must define a `extractClassFromRow` method that takes the database `Record` and `Session`.

If a class extractor is used with `SINGLE_TABLE` inheritance, the rows of the class type must be able to be filtered in queries. This can be accomplished by setting an `onlyInstancesExpression` or `withAllSubclassesExpression` for branch classes. These can be set to `Expression` objects using a `DescriptorCustomizer`.

### Examples

[Example 2-23](#) shows an example of using `ClassExtractor` to define inheritance.

[Example 2-24](#) shows how to use the `<class-extractor>` element in the `eclipselink-orm.xml` file.

#### Example 2-23 Using @ClassExtractor Annotation

```

@Entity
@Table(name="MILES_ACCOUNT")
@Inheritance(strategy=InheritanceType.SINGLE_TABLE)
@ClassExtractor(AirMilesClassExtractor.class)
@Customizer(AirMilesCustomizer.class)
public class AirMilesAccount implements Serializable {
    @Id
    private Long id;
    @Basic
    private String totalMiles;
    @Basic
    private String milesBalance;
    ...
}

@Entity
@Customizer(PreferredCustomizer.class)
public class PreferredAccount extends AirMilesAccount {

```

```

    ...
}

public class AirMilesClassExtractor implements ClassExtractor {
    public void extractClassFromRow(Record row, Session session) {
        if (row.get("TOTALMILES").lessThan(100000)) {
            return AirMilesAccount.class;
        } else {
            return PreferredAccount.class;
        }
    }
}

public class AirMilesCustomizer implements DescriptorCustomizer {
    public void customize(ClassDescriptor descriptor) {
        ExpressionBuilder account = new ExpressionBuilder();
        Expression expression = account.getField("TOTALMILES").lessThan(100000);
        descriptor.getInheritancePolicy().setOnlyInstancesExpression(expression);
    }
}

public class PreferredCustomizer implements DescriptorCustomizer {
    public void customize(ClassDescriptor descriptor) {
        ExpressionBuilder account = new ExpressionBuilder();
        Expression expression =
account.getField("TOTALMILES").greaterThanEqual(100000);
        descriptor.getInheritancePolicy().setOnlyInstancesExpression(expression);
    }
}

```

### Example 2-24 Using <class-extractor> XML

```

<entity class="AirMilesAccount">
    <table name="MILES_ACCOUNT"/>
    <inheritance strategy="SINGLE_TABLE"/>
    <class-extractor class="AirMilesClassExtractor"/>
    ...
</entity>

<entity class="PreferredAccount">
    <customizer class="PreferredCustomizer"/>
    ...
</entity>

```

### See Also

For more information, see:

- "Entities" in *Understanding Oracle TopLink*
- "@Customizer"

## @CloneCopyPolicy

Use @CloneCopyPolicy to specify an  
org.eclipse.persistence.descriptors.copying.CloneCopyPolicy on an Entity.

## Annotation Elements

Table 2-11 describes this annotation's elements.

**Table 2-11 @CloneCopyPolicy Annotation Elements**

Annotation Element	Description	Default
method	(Optional) The method that will be used to create a clone for comparison with EclipseLink's DeferredChangeDetectionPolicy	
workingCopyMethod	(Optional) The workingCopyMethod that will be used to create a clone that will be used when registering an object in an EclipseLink UnitOfWork	

### Note:

You must specify either a method or workingCopyMethod.

### Usage

The clone method should perform a shallow clone of the object. This can be used to clone non-persistent fields from an instance in the shared cache.

You can specify @CloneCopyPolicy on an Entity, MappedSuperclass, or Embeddable class.

### Examples

Example 2-25 and Example 2-26 show several examples of the @CloneCopyPolicy annotation and <clone-copy-policy> XML element, respectively.

#### Example 2-25 Using @CloneCopyPolicy Annotation

```
@CloneCopyPolicy(method="myClone")

@CloneCopyPolicy(method="myClone", workingCopyMethod="myWorkingCopyClone")

@CloneCopyPolicy(workingCopyMethod="myWorkingCopyClone")
```

#### Example 2-26 Using <clone-copy-policy> XML

```
<clone-copy-policy type="copy" method="myClone"
workingCopyMethod="myWorkingCopyClone" />

<clone-copy-policy type="copy" workingCopyMethod="myWorkingCopyClone" />

<clone-copy-policy type="copy" method="myClone" />
```

**See Also**

For more information, see:

- *Understanding Oracle TopLink*
- "[@CopyPolicy](#)"
- "[@InstantiationCopyPolicy](#)"

## @CompositeMember

Use `@CompositeMember` to indicate that a class belongs to a composite persistence unit.

It should be used if target type is a primitive type and `@CollectionTable` designates the table that belongs to composite member persistence unit other than the source composite member persistence unit. This allows the source and target to be mapped to different databases.

**Annotation Elements**

[Table 2-12](#) describes this annotation's elements.

**Table 2-12 @CompositeMember Annotation Elements**

Annotation Element	Description	Default
value	The name of a target composite member persistence unit to which element table belongs (if differs from source composite member persistence unit)	

**Usage**

The `@CompositeMember` annotation is ignored unless it is in a composite member persistence unit. It may be used in conjunction with `@ElementCollection` and `@CollectionTable` annotations.

**Examples**

You can configure the `CompositeMember` using annotations or the `eclipselink-orm.xml` file, as shown in these examples.

**Example 2-27 Using @CompositeMember Annotation**

```
@ElementCollection()
@CollectionTable(name = "MBR1_RESPONS", joinColumns=@JoinColumn(name="EMP_ID"))
@CompositeMember("branch-database")
@Column(name = "DESCRIPTION")
public Collection<String> getResponsibilities() {
    return responsibilities;
}
```

**Example 2-28 Using <composite-member> XML**

```
<element-collection name="responsibilities" composite-member="branch-database">
  <column name="DESCRIPTION"/>
  <collection-table name="XML_MBR3_RESPONS">
```

```

    <join-column name="EMP_ID" />
  </collection-table>
</element-collection>

```

### See Also

For more information, see:

- "Using Multiple Databases with a Composite Persistence Unit" in *Solutions Guide for Oracle TopLink*
- "[composite-unit](#)"
- "[composite-unit.member](#)"
- "Composite Persistence Units" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/Composite\\_Persistence\\_Units](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/Composite_Persistence_Units)

## @ConversionValue

Use `@ConversionValue` to specify the database and object values for an `ObjectTypeConverter`.

### Annotation Elements

[Table 2-13](#) describes this annotation's elements.

**Table 2-13 @ConversionValue Annotation Elements**

Annotation Element	Description	Default
<code>dataValue</code>	(Required) The database value	
<code>objectValue</code>	(Required) The object value	

### Usage

The JPA specification allows you to map an `Enum` to database columns using the `@Enumerated` annotation, when the database value is either the name of the `Enum` or its ordinal value. With EclipseLink, you can also map an `Enum` to a coded value, using a converter.

### Examples

In [Example 2-29](#), the enum `Gender(MALE, FEMALE)` is mapped to a single character in the database where M=MALE and F=FEMALE.

[Example 2-30](#) illustrates the same function using XML.

#### Example 2-29 Using @ConversionValue Annotation

```

@ObjectTypeConverter(name = "gender", objectType = Gender.class, dataType =
String.class, conversionValues = {
    @ConversionValue(objectValue = "Male", dataValue = "M"),
    @ConversionValue(objectValue = "Female", dataValue = "F") })

```

...

@Basic

```
@Convert("gender")
private Gender gender = Gender.Male;
```

### Example 2-30 Using <conversion-value> XML

```
<object-type-converter name="gender" object-type="model.Gender" data-
type="java.lang.String">
  <conversion-value object-value="Male" data-value="M" />
  <conversion-value object-value="Female" data-value="F" />
</object-type-converter>

...

<basic name="gender">
  <column name="GENDER" />
  <convert>gender</convert>
</basic>
```

### See Also

For more information, see:

- ["@ObjectTypeConverter"](#)
- *Understanding Oracle TopLink*

## @Convert

Use @Convert to specify that a named converter should be used with the corresponding mapped attribute.

### Annotation Elements

Table 2-14 describes this annotation's elements.

**Table 2-14** @Convert Annotation Elements

Annotation Element	Description	Default
value	(Optional) The String name for your converter	none

### Usage

The @Convert has the following reserved names:

- **serialized** – Places the `org.eclipse.persistence.mappings.converters.SerializedObjectConverter` on the associated mapping.
- **class-instance** – Uses an `ClassInstanceConverter` on the associated mapping. When using a `ClassInstanceConverter`, the database representation is a String representing the Class name and the object-model representation is an instance of that class built with a no-args constructor
- **none** – Does not place a converter on the associated mapping.

## Examples

[Example 2-31](#) shows how to use the `@Convert` annotation to define the `gender` field.

### Example 2-31 Using the @Convert Annotation

```

@Entity
@Table(name="EMPLOYEE")
@Converter(
    name="genderConverter",
    converterClass=org.myorg.converters.GenderConverter.class
)
public class Employee implements Serializable{
    ...
    @Basic
    @Convert("genderConverter")
    public String getGender() {
        return gender;
    }
    ...
}

```

### See Also

For more information, see:

- ["@Converter"](#)
- ["@ObjectTypeConverter"](#)
- ["@TypeConverter"](#)
- [Understanding Oracle TopLink](#)

## @Converter

Use the `@Converter` annotation to specify a custom converter for modification of the data value(s) during the reading and writing of a mapped attribute.

### Annotation Elements

[Table 2-15](#) describes this annotation's elements.

**Table 2-15 @Converter Annotation Elements**

Annotation Element	Description	Default
<code>name</code>	The String name for your converter, must be unique across the persistence unit	none
<code>converterClass</code>	The class of your converter. This class must implement the <code>org.eclipse.persistence.mappings.converters.Converter</code> interface.	none

## Usage

Use `@Converter` to define a named converter that can be used with mappings. A converter can be defined on an entity class, method, or field. Specify a converter with the `@Convert` annotation on a Basic or ElementCollection mapping.

## Using non-JPA Converter Annotations

EclipseLink provides a set of non-JPA converter annotations (in addition to the JPA default type mappings):

- `@Converter`
- `@TypeConverter`
- `@ObjectTypeConverter`
- `@StructConverter`
- `@Convert`

The persistence provider searches the converter annotations in the following order:

1. `@Convert`
2. `@Enumerated`
3. `@Lob`
4. `@Temporal`
5. Serialized (automatic)

Specify the converters on the following classes:

- `@Entity`
- `@MappedSuperclass`
- `@Embeddable`

Use the converters with the following mappings:

- `@Basic`
- `@Id`
- `@Version`
- `@ElementCollection`

An exception is thrown if a converter is specified with any other type of mapping annotation.

## Examples

[Example 2-32](#) shows how to use the `@Converter` annotation to specify a converter class for the `gender` field.

[Example 2-33](#) shows how to use the `<converter>` element in the `eclipselink-orm.xml` file.

### Example 2-32 Using the `@Converter` Annotation

```
@Entity
public class Employee implements Serializable{
```



```

...
@Basic
@Converter (
    name="genderConverter",
    converterClass=org.myorg.converters.GenderConverter.class
)
@Convert("genderConverter")
public String getGender() {
    return gender;
}
...
}

```

### Example 2-33 Using <converter> XML

```

<entity class="Employee">
...
  <attributes>
    ...
    <basic name="gender">
      <convert>genderConverter</convert>
      <converter name="genderConverter"
class="org.myorg.converters.GenderConverter"/>
    </basic>
    ...
  </attributes>
</entity>

```

#### See Also

For more information, see:

- ["@Converters"](#)
- ["@Convert"](#)
- ["@MapKeyConvert"](#)
- *Understanding Oracle TopLink*

## @Converters

Use @Converters annotation to define multiple @Converter elements.

#### Annotation Elements

[Table 2-16](#) describes this annotation's elements.

**Table 2-16 @Converters Annotation Elements**

Annotation Element	Description	Default
Converter[]	(Required) An array of converters	

#### Examples

See ["@Converter"](#) for an example of this annotation.

**See Also**

For more information, see:

- ["@Converter"](#)
- *Understanding Oracle TopLink*
- 

## @CopyPolicy

Use `@CopyPolicy` to set an `org.eclipse.persistence.descriptors.copying.CopyPolicy` on an entity to produce a copy of the persistent element.

**Annotation Elements**

[Table 2-17](#) describes this annotation's elements.

**Table 2-17 @CopyPolicy Annotation Elements**

Annotation Element	Description	Default
<code>java.lang.Class</code>	(Required) The class of the copy policy. The class must implement <code>org.eclipse.persistence.descriptors.copying.CopyPolicy</code> .	

**Usage**

You can specify `@CopyPolicy` on an Entity, `MappedSuperclass`, or `Embeddable` class.

**Examples**

[Example 2-34](#) shows how to use this annotation.

[Example 2-35](#) shows how to use the `<copy-policy>` element in the `eclipselink-orm.xml` file.

**Example 2-34 Using @CopyPolicy Annotation**

```
@Entity
@Table(name="EMPLOYEE")
@CopyPolicy(mypackage.MyCopyPolicy.class)
public class Employee implements Serializable {
    ...
}
```

**Example 2-35 Using <copy-policy> XML**

```
<entity class="Employee">
  <table name="EMPLOYEE"/>
  <copy-policy class="mypackage.MyCopyPolicy"/>
  ...
</entity>
```

**See Also**

For more information, see:

- ["@CloneCopyPolicy"](#)
- ["@InstantiationCopyPolicy"](#)
- [Understanding Oracle TopLink](#)

## @Customizer

Use `@Customizer` to specify a class that implements `org.eclipse.persistence.config.DescriptorCustomizer` and is to run against an entity's class descriptor after all metadata processing has been completed.

### Annotation Elements

[Table 2-18](#) describes this annotation's elements.

**Table 2-18** @Customizer Annotation Elements

Annotation Element	Description	Default
<code>java.lang.Class</code>	(Required) The name of the descriptor customizer to apply to the entity's descriptor	

### Usage

Use this annotation to customize or extend the mapping metadata through the TopLink native API. With `@Customizer`, you can access additional TopLink functionality and configurations.

You can specify `@Customizer` on an Entity, MappedSuperclass, or Embeddable class.

#### Note:

A `@Customizer` is not inherited from its parent classes.

### Examples

[Example 2-36](#) show how to use the `@Customizer` annotation with the following `DescriptorCustomer`:

```
public class MyCustomizer implements DescriptorCustomizer {
    public void customize(ClassDescriptor descriptor) {
        DirectToFieldMapping genderMapping =
        (DirectToFieldMapping)descriptor.getMappingForAttributeName("gender");
        ObjectTypeConverter converter = new ObjectTypeConverter();
        convert.addConversionValue("M", Gender.MALE);
        convert.addConversionValue("F", Gender.FEMALE);
        genderMapping.setConverter(converter);
    }
}
```

[Example 2-37](#) show how to use the `<customizer>` element in the `eclipselink-orm.xml` file.

### Example 2-36 Using @Customizer Annotation

```
@Entity
@Table(name="EMPLOYEE")
@Customizer(mypackage.MyCustomizer.class)
public class Employee implements Serializable {
    ...
}
```

### Example 2-37 Using <customizer> XML

```
<entity class="Employee">
  <table name="EMPLOYEE"/>
  <customizer class="mypackage.MyCustomizer"/>
  ...
</entity>
```

### See Also

For more information, see:

- ["descriptor.customizer"](#)
- "Binding JPA Entities to XML" in *Solutions Guide for Oracle TopLink*
- EclipseLink Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/MappingSelectionCriteria>
- "Customizers" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/Customizers](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/Customizers)

## @DeleteAll

Use @DeleteAll to indicate that when an relationship is deleted, EclipseLink should use a delete all query. This typically happens if the relationship is PrivateOwned and its owner is deleted. In that case, the members of the relationship will be deleted without reading them in.

### Annotation Elements

There are no elements for this annotation.

### Usage

#### WARNING:

Use this annotation with caution. EclipseLink will not validate whether the target entity is mapped in such a way as to allow the delete all to work.

### Examples

[Example 2-38](#) shows how to use @DeleteAll on a relationship mapping.

[Example 2-38](#) shows how to use the `<delete-all>` element in the `eclipselink-orm.xml` file.

### Example 2-38 Using @DeleteAll Annotation

```
@Entity
public class Department {
    ...
    @OneToMany(mappedBy = "department")
    @PrivateOwned
    @DeleteAll
    public List<Equipment> getEquipment() {
        return equipment;
    }
    ...
}
```

### Example 2-39 Using <delete-all> XML

```
<entity class="Department">
    ...
    <attributes>
        <one-to-many name="equipment" target-entity="Equipment" mapped-by="department">
            <private-owned/>
            <delete-all/>
        </one-to-many>
    ...
</attributes>
</entity>
```

#### See Also

For more information, see:

- ["@PrivateOwned"](#)

## @DiscriminatorClass

Use `@DiscriminatorClass` with a `@VariableOneToOne` annotation to determine which entities will be added to the list of types for the mapping.

#### Annotation Elements

[Table 2-19](#) describes this annotation's elements.

**Table 2-19 @DiscriminatorClass Annotation Elements**

Annotation Element	Description	Default
<code>discriminator</code>	(Required) The discriminator to be stored in the database	
<code>value</code>	(Required) The class to be instantiated with the <code>discriminator</code>	

#### Usage

The `@DiscriminatorClass` annotation can be specified only within a [@VariableOneToOne](#) mapping.

### Examples

See "[@VariableOneToOne](#)" for an example of a variable one-to-one mapping with `@DiscriminatorClass`.

### See Also

For more information, see:

- "[@VariableOneToOne](#)"
- *Understanding Oracle TopLink*

## @ExcludeDefaultMappings

Use `@ExcludeDefaultMappings` to specify that no default mapping should be added to a specific class. Instead, EclipseLink will use only mappings that are explicitly defined by annotations or the XML mapping file.

### Annotation Elements

There are no elements for this annotation.

### Usage

You can specify `@ExcludeDefaultMappings` on an Entity, MappedSuperclass, or Embeddable class.

### Examples

[Example 2-40](#) shows how to use the `@ExcludeDefaultMapping` annotation.

#### Example 2-40 Using the @ExcludeDefaultMappings Annotation

```
@ExcludeDefaultMappings
@Entity
public class Dealer {
    @Id
    private long id;
    @Basic
    private String name;
    // These would be ignored
    private List<Card> deck;
    private List<Card> hand;
    ...
}
```

### See Also

For more information, see:

- "Building Blocks for a Oracle TopLink Project" in *Understanding Oracle TopLink*

## @ExistenceChecking

Use `@ExistenceChecking` to specify how `TopLink` should check to determine if an entity is new or exists.

On `merge()` operations, use `@ExistenceChecking` to specify if `TopLink` uses only the cache to determine if an object exists, or if the object should be read (from the database or cache). By default the object will be read from the database.

### Annotation Elements

Table 2-20 describes this annotation's elements.

**Table 2-20 @ExistenceChecking Annotation Elements**

Annotation Element	Description	Default
ExistenceType	(Optional) Set the existence checking type: <ul style="list-style-type: none"> <li>• ASSUME_EXISTENCE</li> <li>• ASSUME_NON_EXISTENCE</li> <li>• CHECK_CHACHE</li> <li>• CHECK_DATABASE</li> </ul>	CHECK_CACHE

### Usage

You can specify `@ExistenceChecking` on an Entity or MappedSuperclass.

EclipseLink supports the following existence checking types:

- `ASSUME_EXISTENCE` – If the object's primary key does not include `null` then it must exist. You may use this option if the application guarantees or does not care about the existence check.
- `ASSUME_NON_EXISTENCE` – Assume that the object does not exist. You may use this option if the application guarantees or does not care about the existence check. This will always force an `INSERT` operation.
- `CHECK_CHACHE` – If the object's primary key does not include `null` and it is in the cache, then it must exist.
- `CHECK_DATABASE` – Perform a `SELECT` on the database.

### Examples

Example 2-41 shows how to use this annotation.

#### Example 2-41 Using @ExistenceChecking Annotation

```
@Entity
@Cache(type=CacheType.HARD_WEAK, expiryTimeOfDay=@TimeOfDay(hour=1))
@ExistenceChecking(ExistenceType.CHECK_DATABASE)
public class Employee implements Serializable {
    ...
}
```

### See Also

For more information, see:

- "[@Cache](#)"
- "Enhancing Performance" in *Solutions Guide for Oracle TopLink*

## @FetchAttribute

Use `@FetchAttribute` to improve performance within a fetch group; it allows on-demand loading of a group of an object's attributes. As a result, the data for an attribute might not be loaded from the datasource until an explicit access call occurs.

This avoids loading all the data of an object's attributes if the user requires only some of the attributes.

### Annotation Elements

[Table 2-21](#) describes this annotation's elements.

**Table 2-21** @FetchAttribute Annotation Elements

Annotation Element	Description	Default
name	(Required) Name of the fetch attribute	

### Usage

EclipseLink provides two types of fetch groups:

- Pre-defined fetch groups at the Entity or MappedSuperclass level
- Dynamic (use case) fetch groups at the query level

You should extensively review your use cases when using fetch groups. In many cases, additional round-trips will offset any gains from deferred loading.

### Examples

[Example 2-42](#) shows how to use `@FetchAttribute` within a `@FetchGroup` annotation.

#### Example 2-42 Using @FetchAttribute Annotation

```
@Entity
@FetchGroup(name="basic-fetch-group", attributes={
    @FetchAttribute(name="id"),
    @FetchAttribute(name="name"),
    @FetchAttribute(name="address")})
public class Person {

    @Id
    private int id;

    private String name;

    @OneToOne(fetch=LAZY)
```



```
private Address address;

@ManyToOne(fetch=EAGER)
private ContactInfo contactInfo;
```

### Example 2-43 Using <fetch-group> XML

```
<fetch-group name="basic-fetch-group">
  <attribute name="id"/>
  <attribute name="name"/>
  <attribute name="address"/>
</fetch-group>
```

### See Also

For more information, see:

- *Understanding Oracle TopLink*
- "[@FetchGroup](#)"

## @FetchGroup

Use `@FetchGroup` to load a group of attributes on demand, as needed.

This avoids wasteful practice of loading all data of the object's attributes, if the user is interested in only partial of them. However, it also means that the data for an attribute might not be loaded from the underlying data source until an explicit access call for the attribute first occurs.

### Annotation Elements

[Table 2-22](#) describes this annotation's elements.

**Table 2-22** @FetchGroup Annotation Elements

Annotation Element	Description	Default
<code>FetchAttribute[] attributes</code>	(Required) The list of attributes to fetch	none
<code>java.lang.String name</code>	(Required) The fetch group name	none
<code>boolean load</code>	(Optional) Indicates whether all relationship attributes specified in the fetch group should be loaded.	false

### Usage

You should perform a careful use case analysis when using `@FetchGroup`; any gains realized from the deferred loading could be offset by the extra round-trip.

EclipseLink supports fetch groups at two levels:

- Pre-defined fetch groups at the Entity or MappedSuperclass level
- Dynamic (use case) fetch groups at the query level

You can use fetch groups only when using weaving or when individual classes that define them explicitly implement the `org.eclipse.persistence.queries.FetchGroupTracker` interface.

When using a fetch group, you can define a subset of an object's attributes and associate the fetch group with a query. When you execute the query, EclipseLink retrieves only the attributes in the fetch group. EclipseLink automatically executes a query to fetch all the attributes excluded from this subset when and if you call a get method on any one of the excluded attributes.

You can define more than one fetch group for a class. You can optionally designate at most one such fetch group as the default fetch group. If you execute a query without specifying a fetch group, EclipseLink will use the default fetch group, unless you configure the query otherwise.

Before using fetch groups, it is recommended that you perform a careful analysis of system use. In many cases, the extra queries required to load attributes not in the fetch group could well offset the gain from the partial attribute loading.

### Examples

[Example 2-44](#) shows how to use this annotation.

[Example 2-45](#) shows how to use this feature in the `eclipselink-orm.xml` file.

You can also use a named fetch group with a query, as shown in [Example 2-46](#).

#### Example 2-44 Using @FetchGroup Annotation

```
@FetchGroup(name="names", attributes={
    @FetchAttribute(name="firstName"),
    @FetchAttribute(name="lastName")})
```

#### Example 2-45 Using <fetch-group> XML

```
<entity class="model.Employee">
  <secondary-table name="SALARY" />
  <fetch-group name="names">
    <attribute name="firstName" />
    <attribute name="lastName" />
  </fetch-group>
  ...
```

#### Example 2-46 Using a Named Fetch Group on a Query

```
TypedQuery query = em.createQuery("SELECT e FROM Employee e", Employee.class);

query.setHint(QueryHints.FETCH_GROUP_NAME, "names");
```

### See Also

For more information, see:

- *Understanding Oracle TopLink*
- "[@FetchAttribute](#)"
- "[@FetchGroups](#)"

## @FetchGroups

Use `@FetchGroups` to define a group of `@FetchGroup`.

## Annotation Elements

[Table 2-23](#) describes this annotation's elements.

**Table 2-23** @FetchGroups Annotation Elements

Annotation Element	Description	Default
FetchGroup	(Required) An array of fetch groups (@FetchGroup)	

### Usage

You can specify @FetchGroups on an Entity or MappedSuperclass.

You can also enable or disable fetch groups through weaving for the persistence unit.

### Examples

See "[@FetchGroup](#)" for an example of using fetch groups.

[Example 2-47](#) shows how to configure fetch groups in the persistence unit persistence.xml file or by importing a property map.

#### Example 2-47 Specifying Fetch Groups in persistence.xml

Using persistence.xml file:

```
<property name="eclipselink.weaving.fetchgroups" value="false"/>
```

Using property map:

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.WEAVING_FETCHGROUPS, "false");
```

### See Also

For more information, see:

- "[@FetchGroup](#)"
- "[@FetchAttribute](#)"
- "[weaving](#)"

## @Field

Use @Field to define a structured data type's field name for an object mapped to NoSql data.

### Annotation Elements

[Table 2-24](#) describes this annotation's elements.

**Table 2-24 @Field Annotation Elements**

Annotation Element	Description	Default
name	(Optional) The data type's name of the field	

**Usage**

The @Field annotation is a generic form of the @Column annotation, which is not specific to relational databases. You can use @Field to map EIS and NoSQL data.

**Examples**

See "@NoSql" for an example of the @Field annotation.

**See Also**

For more information, see:

- "@NoSql"

## @HashPartitioning

Use @HashPartitioning to partition access to a database cluster by the hash of a field value from the object (such as the object's location or tenant). The hash indexes into the list of connection pools.

**Annotation Elements**

Table 2-25 describes this annotation's elements.

**Table 2-25 @HashPartitioning Annotation Elements**

Annotation Element	Description	Default
name	(Required) The name of the partition policy. The name must be unique within the persistence unit.	
partitionColumn	(Required) The database column or query parameter by which to partition queries	
connectionPools	(Optional) List of connection pool names across which to partition	All defined pools in the ServerSession
unionUnpartitionableQueries	(Optional) Specify if queries that <i>do not</i> contain the partition hash should be sent to every database and union the result.	False

**Usage**

All write or read requests for objects with the hash value are sent to the server. Queries that do not include the field as a parameter will be:

- Sent to all servers and unioned
- or

- Handled based on the session's default behavior.

You can enable partitioning on an Entity, relationship, query, or session/persistence unit. Partition policies are globally named (to allow reuse) and must set using the `@Partitioned` annotation.

The persistence unit properties support adding named connection pools in addition to the existing configuration for read/write/sequence. A named connection pool must be defined for each node in the database cluster.

If a transaction modifies data from multiple partitions, you should use JTA to ensure proper two-phase commit of the data. You can also configure an exclusive connection in the `EntityManager` to ensure that only a single node is used for a single transaction.

### Examples

See "[@Partitioned](#)" for an example of partitioning with EclipseLink.

### See Also

For more information, see:

- "Data Partitioning"[http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/Data\\_Partitioning](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/Data_Partitioning)
- "[@Partitioned](#)"

## @Index

An index is a database structure defined for a table, to improve query and look-up performance for a set of columns. Use the `@Index` annotation in code or the `<index>` element in the `eclipselink-orm.xml` descriptor to create an index on a table.

An index can be defined on an entity or on an attribute. For the entity it must define a set of columns to index.

Index creation is database specific. Some databases may not support indexes. Most databases auto-index primary key and foreign key columns. Some databases support advanced index DDL options. To create more advanced index DDL, a DDL script or native query can be used.

### Annotation Elements

[Table 2-26](#) describes this annotation's elements.

**Table 2-26 @Index Annotation Elements**

Annotation Element	Description	Default
<code>java.lang.String catalog</code>	(Optional) The catalog of the <code>INDEX</code>	Default catalog
<code>java.lang.String[] columnNames</code>	(Not required when annotated on a field or method) Specify the set of columns to define the index on.	For an Entity, none. For an attribute, the attribute's column.
<code>java.lang.String name</code>	(Optional) The name of the <code>INDEX</code>	<code>&lt;table&gt;_&lt;column&gt;_INDEX</code> (but a name should be provided)

Table 2-26 (Cont.) @Index Annotation Elements

Annotation Element	Description	Default
java.lang.String schema	(Optional) The schema of the INDEX	Default schema
java.lang.String table	(Optional) The table to define the index on; defaults to entities primary table.	The entity's primary table.
boolean unique	(Optional) Specify whether the index is unique or non-unique.	false

### Usage

Use @Index annotation to index any attributes or columns that will commonly be used in queries.

### Examples

This example defines three indexes, one on **first name**, one on **last name**, and a multiple column index on **first name and last name**.

You can also create an index in the `eclipselink-orm.xml` descriptor using `<index>`, as shown in the following example. Define columns using the `<column>` subelement. All the attributes supported in the @Index annotation are also supported in the `<index>` element.

#### Example 2-48 Using @Index Annotation

```
@Entity
@Index(name="EMP_NAME_INDEX", columns={"F_NAME","L_NAME"})
public class Employee{
    @Id
    private long id;
    @Index
    @Column(name="F_NAME")
    private String firstName;
    @Index
    @Column(name="L_NAME")
    private String lastName;
    ...
}
```

#### Example 2-49 Using <index> XML

```
<index name="EMP_NAME_INDEX" table="EMPLOYEE" unique="true">
  <column>F_NAME</column>
  <column>L_NAME</column>
</index>
```

### See Also

For more information see:

- ["@Indexes"](#)

## @Indexes

Use @Indexes to define a set of database indexes for an Entity.

## Annotation Elements

[Table 2-27](#) describes this annotation's elements.

**Table 2-27** @Indexes Annotation Elements

Annotation Element	Description	Default
<code>Index[ ]</code>	An array of database indexes	

### Examples

See "[@Index](#)" for an example of using the `@Index` annotation.

### See Also

For more information see:

- "[@CopyPolicy](#)"
- "[@CloneCopyPolicy](#)"
- "[@Index](#)"

## @InstantiationCopyPolicy

Use `@InstantiationCopyPolicy` to set an `org.eclipse.persistence.descriptors.coping.InstantiationCopyPolicy` on an Entity.

### Annotation Elements

There are no elements for this annotation.

### Usage

The copy policy specifies how EclipseLink clones objects to and from the shared cache. With `@InstantiationCopyPolicy`, in order to clone an object EclipseLink will create a new instance of the object and copy each persistent attribute. Alternative methods include [@CloneCopyPolicy](#), which clones the object.

Cloning is more efficient than creating a new instance and maintains transient or non-persistent attribute values. If you do not need transient or non-persistent attribute values in the shared cache, then use `@InstantiationCopyPolicy`.

The default TopLink copy policy depends on your configuration:

- When using [weaving.internal](#) (and field access), EclipseLink generates a specialized clone method to copy objects.
- Without weaving, EclipseLink uses instantiation to copy objects.

You can specify `@InstantiationCopyPolicy` on an Entity, MappedSuperclass, or Embeddable entity.

### Examples

[Example 2-50](#) shows how to use this annotation.

[Example 2-51](#) shows how to use this extension in the `eclipselink-orm.xml` file.

### Example 2-50 Using `@InstantiationCopyPolicy` Annotation

```
@Entity
@InstantiationCopyPolicy
public class Employee {
    ...
    transient List events = new ArrayList();
}
```

### Example 2-51 Using `<instantiation-copy-policy>` XML

```
<entity name="Employee" class="org.acme.Employee" access="FIELD">
    <instantiation-copy-policy/>
    ...
</entity>
```

### See Also

For more information, see:

- ["@CopyPolicy"](#)
- ["@CloneCopyPolicy"](#)
- ["weaving.internal"](#)

## @JoinFetch

Use the `@JoinFetch` annotation to enable the joining and reading of the related objects in the same query as the source object.



### Note:

You should set join fetching at the query level, as not all queries require joining.

### Annotation Elements

[Table 2-28](#) describes this annotation's elements.



**Table 2-28 @JoinFetch Annotation Elements**

Annotation Element	Description	Default
value	<p>(Optional) Set this attribute to the <code>org.eclipse.persistence.annotations.JoinFetchType</code> enumerated type of the fetch that you will be using.</p> <p>The following are the valid values for the <code>JoinFetchType</code>:</p> <ul style="list-style-type: none"> <li>INNER—This option provides the inner join fetching of the related object. <b>Note:</b> Inner joining does not allow for null or empty values.</li> <li>OUTER—This option provides the outer join fetching of the related object. <b>Note:</b> Outer joining allows for null or empty values.</li> </ul>	<code>JoinFetchType.INNER</code>

### Usage

You can specify the `@JoinFetch` annotation for the following mappings:

- `@OneToOne`
- `@OneToMany`
- `@ManyToOne`
- `@ManyToMany`
- `@ElementCollection`

Alternatively, you can use batch fetching which is more efficient, especially for collection relationships.

### Examples

The following example shows how to use the `@JoinFetch` annotation to specify Employee field `managedEmployees`.

[Example 2-53](#) shows how to use this extension in the `eclipselink-orm.xml` file.

#### Example 2-52 Using @JoinFetch Annotation

```
@Entity
public class Employee implements Serializable {
    ...
    @OneToMany(cascade=ALL, mappedBy="owner")
    @JoinFetch(value=OUTER)
    public Collection<Employee> getManagedEmployees() {
        return managedEmployees;
    }
    ...
}
```

#### Example 2-53 Using <join-fetch> in XML

```
<one-to-many name="managedEmployees">
  <join-fetch>OUTER</join-fetch>
</one-to-many>
```

**See Also**

For more information, see:

- *Understanding Oracle TopLink*
- "Enhancing Performance" in *Solutions Guide for Oracle TopLink*
- "[@BatchFetch](#)"

## @JoinField

Use @JoinField to define a structured data type's foreign key field for an object mapped to NoSql data.

**Annotation Elements**

[Table 2-29](#) describes this annotation's elements.

**Table 2-29 @JoinField Annotation Elements**

Annotation Element	Description	Default
name	(Optional) The name of the foreign key/ID reference field in the source record	
referencedFieldName	(Optional) The name of the ID field in the target record	

**Usage**

The @JoinField annotation is a generic form of the @JoinColumn annotation, which is not specific to relational databases. You can use @JoinField to map EIS and NoSQL data.

**Examples**

These examples show how to use this extension as an annotation and in XML.

**Example 2-54 Using @JoinField Annotation**

```
@Entity
@NoSql
public class Order {
    ...
    @ManyToOne
    @JoinField(name="customerId")
    private Customer customer;
}
```

**Example 2-55 Using <join-field> in XML**

```
<entity name="Order" class="org.acme.Order">
  <no-sql/>
  ...
  <many-to-one name="customer">
    <join-field name="customerId"/>
  </many-to-one>
</entity>
```

**See Also**

For more information, see:

- "Mappings"[http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/NoSQL/Mappings](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/NoSQL/Mappings)
- "@JoinFields"

## @JoinFields

Use `@JoinFields` to define a set of `@JoinField` annotations on a relationship.

**Annotation Elements**

[Table 2-30](#) describes this annotation's elements.

**Table 2-30 @JoinFields Annotation Elements**

Annotation Element	Description	Default
<code>JoinField[]</code>	An array of join fields	

**Examples**

See "[@JoinField](#)" for an example of using the `@Index` annotation.

**See Also**

For more information, see:

- "[@JoinField](#)"

## @MapKeyConvert

Use `@MapKeyConvert` to specify a named converter to be used with the corresponding mapped attribute key column.

**Annotation Elements**

[Table 2-31](#) describes this annotation's elements.

**Table 2-31 @MapKeyConvert Annotation Elements**

Annotation Element	Description	Default
<code>value</code>	(Optional) Name of the converter to use: <ul style="list-style-type: none"> <li>• <code>serialized</code></li> <li>• <code>class-instance</code></li> <li>• <code>none</code></li> <li>• <code>custom converter</code></li> </ul>	<code>none</code>

## Usage

Use `@MapKeyConvert` to convert the key value used in a `@MapKeyColumn` to have a different type or value than the database column.

The `@MapKeyConvert` annotation has the following reserved names:

- `serialized`: Will use a `SerializedObjectConverter` on the associated mapping. When using a `SerializedObjectConverter` the database representation is a binary field holding a serialized version of the object and the object-model representation is a the actual object
- `class-instance`: Will use an `ClassInstanceConverter` on the associated mapping. When using a `ClassInstanceConverter` the database representation is a `String` representing the Class name and the object-model representation is an instance of that class built with a no-args constructor
- `none` - Will place no converter on the associated mapping. This can be used to override a situation where either another converter is defaulted or another converter is set.

If you do not use one of these reserved names, you must define a custom converter, using the `@Converter` annotation.

## Examples

[Example 2-56](#) shows using a `@MapKeyConvert` annotation to apply a converter to a map's key.

[Example 2-57](#) shows how to use the `<map-key-convert>` element in the `eclipselink-orm.xml` file.

### Example 2-56 Using @MapKeyConvert Annotation

```

@Entity
public class Entity
...
    @ElementCollection
    @MapKeyColumn(name="BANK")
    @Column(name="ACCOUNT")
    @Convert("Long2String")
    @MapKeyConvert("CreditLine")
    public Map<String,Long> getCreditLines() {
        return creditLines;
    }

```

### Example 2-57 Using <map-key-convert> XML

```

<element-collection name="creditLines">
  <map-key-convert>CreditLine</map-key-convert>
  <map-key-column name="BANK"/>
  <column name="ACCOUNT"/>
  <convert>Long2String</convert>
  <object-type-converter name="CreditLine">
    <conversion-value data-value="RBC" object-value="RoyalBank"/>
    <conversion-value data-value="CIBC" object-value="CanadianImperial"/>
    <conversion-value data-value="SB" object-value="Scotiabank"/>
    <conversion-value data-value="TD" object-value="TorontoDominion"/>
  </object-type-converter>
  <type-converter name="Long2String" data-type="String" object-type="Long"/>

```

```

    <collection-table name="EMP_CREDITLINES">
      <join-column name="EMP_ID" />
    </collection-table>
  </element-collection>

```

### See Also

For more information, see:

- ["@Converter"](#)
- ["@Convert"](#)

## @Multitenant

The `@Multitenant` annotation specifies that a given entity is shared among multiple tenants of an application. The multitenant type specifies how the data for these entities are to be stored on the database for each tenant. Multitenancy can be specified at the entity or mapped superclass level.

### Annotation Elements

[Table 2-32](#) describes this annotation's elements.

**Table 2-32 @Multitenant Annotation Elements**

Annotation Element	Description	Default
boolean <code>includeCriteria</code>	Indicates if the database requires the tenant criteria to be added to the <code>SELECT</code> , <code>UPDATE</code> , and <code>DELETE</code> queries.	<code>true</code>
MultitenantType value	Specifies the multitenant strategy to use: <code>SINGLE_TABLE</code> , <code>SINGLE_TABLE</code> , <code>TABLE_PER_TENANT</code> , or <code>VPD</code> .	<code>SINGLE_TABLE</code>

### Usage

To use the `@Multitenant` annotation, include the annotation with an `@Entity` or `@MappedSuperclass` annotation. For example:

```

@Entity
@Multitenant
...
public class Employee() {
    ...
}

```

Three types of multitenancy are available:

- [Single-Table Multitenancy](#)
- [Table-Per-Tenanat Multitenancy](#)
- [VPD Multitenancy](#)

### Example

[Example 2-58](#) shows a simple example of a `@Multitenant` annotation. In this example, the **Player** entity has rows for multiple tenants stored in its default `PLAYER` table and

that the default `TENANT_ID` column is used as a discriminator along with the default context property `eclipselink.tenant-id`.

Review "[Single-Table Multitenancy](#)", "[Table-Per-Tenant Multitenancy](#)", and "[VPD Multitenancy](#)" for more detailed examples.

### Example 2-58 Minimal @Multitenant Annotation

```
@Entity
@Multitenant
public class Player {
}
```

To have your application use a shared `EntityManagerFactory` and have the `EntityManager` be tenant specific, your runtime code might be:

```
Map<String, Object> emProperties = new HashMap<String, Object>();

emProperties.set("eclipselink.tenant-id", "HTHL");

EntityManager em = emf.createEntityManager(emProperties);
```

## Single-Table Multitenancy

The `SINGLE_TABLE` multitenant type specifies that any table to which an entity or mapped superclass maps can include rows for multiple tenants. Access to tenant-specific rows is restricted to the tenant.

Tenant-specific rows are associated with the tenant by using tenant discriminator columns. The discriminator columns are used with application context values to limit what a persistence context can access.

The results of queries on the mapped tables are limited to the tenant discriminator value(s) provided as property values. This applies to all insert, update, and delete operations on the table. When multitenant metadata is applied at the mapped superclass level, it is applied to all subtentities unless they specify their own multitenant metadata.



#### Note:

In the context of single-table multitenancy, "single-table" means multiple tenants can share a single table, and each tenant's data is distinguished from other tenants' data via the discriminator column(s). It is possible to use multiple tables with single-table multitenancy; but in that case, an entity's persisted data is stored in multiple tables (`Table` and `SecondaryTable`), and multiple tenants can share all the tables.

For more information how to use tenant discriminator columns to configure single-table multitenancy, see "[@TenantDiscriminatorColumn](#)".

## Examples

The following example uses `@Multitenant`, `@TenantDiscriminatorColumn`, and a context property to define single-table multitenancy on an entity:

**Example 2-59 Example Using @Multitenant**

```
@Entity
@Table(name="EMP")
@Multitenant(SINGLE_TABLE)
@TenantDiscriminatorColumn(name = "TENANT_ID",
    contextProperty = "employee-tenant.id")
```

The following example uses the `<multitenant>` element to specify a minimal single-table multitenancy. `SINGLE_TABLE` is the default value and therefore does not have to be specified.

**Example 2-60 Example Using <multitenant>**

```
<entity class="model.Employee">
  <multitenant/>
  <table name="EMP"/>
  ...
</entity>
```

## Table-Per-Tenant Multitenancy

The `TABLE_PER_TENANT` multitenant type specifies that the table(s) (`Table` and `SecondaryTable`) for an entity are tenant-specific tables based on the tenant context. Access to these tables is restricted to the specified tenant. Relationships within an entity that use a join or collection table are also assumed to exist within that context.

As with other multitenant types, table-per-tenant multitenancy can be specified at the entity or mapped superclass level. At the entity level, a tenant context property must be provided on each entity manager after a transaction has started.

Table-per-tenant entities can be mixed with other multitenant-type entities within the same persistence unit.

All read, insert, update, and delete operations for the tenant apply only to the tenant's table(s).

Tenants share the same server session by default. The table-per-tenant identifier must be set or updated for each entity manager. ID generation is assumed to be unique across all the tenants in a table-per-tenant strategy.

To configure table-per-tenant multitenancy, you must specify:

- A table-per-tenant property to identify the user. This can be set per entity manager, or it can be set at the entity manager factory to isolate table-per-tenant per persistence unit.)
- A tenant table discriminator to identify and isolate the tenant's tables from other tenants' tables. The discriminator types are `SCHEMA`, `SUFFIX`, and `PREFIX`. For more information about tenant discriminator types, see "[@TenantTableDiscriminator](#)".

## Examples

The following example shows the `@Multitenant` annotation used to define table-per-tenant multitenancy on an entity. `@TenantTableDiscriminator(SCHEMA)` specifies that the discriminator table is identified by schema.

**Example 2-61 Example Using @Multitenant with @TenantTableDiscriminator**

```

@Entity
@Table(name="EMP")
@Multitenant(TABLE_PER_TENANT)
@TenantTableDiscriminator(SCHEMA)
public class Employee {
    ...
}

```

The following example shows the `<multitenant>` element and the `<tenant-table-discriminator>` elements used to define a minimal table-per-tenant multitenancy.

**Example 2-62 Example Using <multitenant> with <tenant-table-discriminator>**

```

<entity class="Employee">
  <multitenant type="TABLE_PER_TENANT">
    <tenant-table-discriminator type="SCHEMA"/>
  </multitenant>
  <table name="EMP">
    ...
  </table>
</entity>

```

## VPD Multitenancy

The VPD (Virtual Private Database) multitenancy type specifies that the database handles the tenant filtering on all SELECT, UPDATE and DELETE queries. To use this type, the platform used with the persistence unit must support VPD.

To use TopLink VPD multitenancy, you must first configure VPD in the database and then specify multitenancy on the entity or mapped superclass, using `@Multitenant` and `@TenantDiscriminatorColumn`:

## Examples

[Example 2-63](#) shows VPD multitenancy defined on an entity. As noted above, VPD in the database must also be configured to enable VPD multitenancy. In this case, the VPD database was configured to use the `USER_ID` column to restrict access to specified rows by specified clients. Therefore, `USER_ID` is also specified as the tenant discriminator column for the TopLink multitenant operations.

**Example 2-63 Example Using @Multitenant(VPD)**

The following example shows

```

@Entity
@Multitenant(VPD)
@TenantDiscriminatorColumn(name = "USER_ID", contextProperty = "tenant.id")
@Cacheable(false)

public class Task implements Serializable {
    ...
}

```

The following example shows...



**Example 2-64 Example Using <multitenant>**

```

<entity class="model.Employee">
  <multitenant type="VPD">
    <tenant-discriminator-column name="USER_ID" context-property="tenant.id"/>
  </multitenant>
  <table name="EMPLOYEE"/>
  ...
</entity>

```

**See Also**

- "[@TenantDiscriminatorColumn](#)"
- "[@TenantDiscriminatorColumns](#)"
- "Using Multitenancy" in *Solutions Guide for Oracle TopLink*
- Multitenant Examples at <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Multitenant>

## @Mutable

Use `@Mutable` on a `@Basic` mapping to specify if the value of a complex field type can be *changed* (or not changed) instead of being *replaced*. Mutable mappings may affect the performance of change tracking; attribute change tracking can only be weaved with non-mutable mappings.

**Annotation Elements**

[Table 2-33](#) describes this annotation's elements.

**Table 2-33 @Mutable Annotation Elements**

Annotation Element	Description	Default
boolean value	(Optional) Specifies if the mapping is mutable.	true

**Usage**

Most basic types (such as `int`, `long`, `float`, `double`, `String`, and `BigDecimal`) are not mutable.

By default, `Date` and `Calendar` types are assumed to be not mutable. To make these types mutable, use the `@Mutable` annotation. You can also use the global persistence property `eclipselink.temporal.mutable` to set the mappings as mutable.

By default, serialized types are assumed to be mutable. You can set the `@Mutable` annotation to `false` to make these types not mutable.

You can also configure mutable mappings for `Date` and `Calendar` fields in the persistence unit in the `persistence.xml` file.

**Examples**

[Example 2-65](#) shows how to use the `@Mutable` annotation to specify `Employee` field `hireDate`.

[Example 2-66](#) shows how to configure mutable mappings in the persistence unit `persistence.xml` file or by importing a property map.

### Example 2-65 Using @Mutable Annotation

```
@Entity
public class Employee implements Serializable {

    ...

    @Temporal(DATE)
    @Mutable
    public Calendar getHireDate() {
        return hireDate;
    }

    ..
}
```

### Example 2-66 Specifying Mutable Mappings in persistence.xml

Using `persistence.xml` file:

```
<property name="eclipselink.temporal.mutable" value="true"/>
```

Using property map:

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.TEMPORAL_MUTABLE, "false");
```

#### See Also

For more information, see:

- ["Mapping Annotations"](#)

## @NamedPLSQLStoredFunctionQueries

Use the `@NamedPLSQLStoredFunctionQueries` annotation to define multiple `NamedPLSQLStoredFunctionQuery` items.

#### Annotation Elements

[Table 2-34](#) describes this annotation's elements.

**Table 2-34 @NamedPLSQLStoredFunctionQueries Annotation Elements**

Annotation Element	Description	Default
<code>NamedStoredFunctionQuery[]</code>	(Required) An array of named stored procedure query	

#### See Also

For more information, see:

- ["@NamedPLSQLStoredFunctionQueries"](#)

## @NamedPLSQLStoredFunctionQuery

Use the `@NamedPLSQLStoredFunctionQuery` annotation to define queries that call Oracle PLSQL stored functions as named queries

### Annotation Elements

[Table 2-36](#) describes this annotation's elements.

**Table 2-35** @NamedPLSQLStoredFunctionQuery Annotation Elements

Annotation Element	Description	Default
<code>functionName</code>	(Required) The name of the stored function	
<code>name</code>	(Required) The unique name that references this stored function query	
<code>returnParamter</code>	(Required) The return value of the stored function	
<code>hints</code>	(Optional) Query hints	
<code>parameters</code>	(Optional) The parameters for the stored function	
<code>resultSetMapping</code>	(Optional) The name of the <code>SQLResultSetMapping</code>	

### Usage

This annotation adds support for complex PLSQL types such as `RECORD` and `TABLE`, that are not accessible from JDBC.

You can specify `@NamedPLSQLStoredFunctionQuery` on an Entity or `MappedSuperclass`.

### Examples

[Example 2-67](#) shows how to use this annotation.

#### Example 2-67 Using @NamedPLSQLStoredFunctionQuery Annotation

```

@NamedPLSQLStoredFunctionQuery(
    name="getEmployee",
    functionName="EMP_PKG.GET_EMP",
    returnParameter=@PLSQLParameter(
        name="RESULT",
        databaseType="EMP_PKG.EMP_TABLE"
    )
)
@Embeddable
@Struct(name="EMP_TYPE", fields={"F_NAME", "L_NAME", "SALARY"})
@PLSQLRecord(
    name="EMP_PKG.EMP_REC",
    compatibleType="EMP_TYPE",
    javaType=Employee.class,
    fields={
        @PLSQLParameter(name="F_NAME"),
        @PLSQLParameter(name="L_NAME"),
        @PLSQLParameter(
            name="SALARY",
            databaseType="NUMERIC_TYPE"
        )
    }
)

```

```

    }
)

public class Employee { ...}

```

**See Also**

For more information, see:

- Oracle PL/SQL <http://www.oracle.com/technetwork/database/features/plsql/index.html>

## @NamedPLSQLStoredProcedureQueries

Use the @NamedPLSQLStoredProcedureQueries annotation to define multiple NamedPLSQLStoredProcedureQuery items.

**Annotation Elements**

[Table 2-36](#) describes this annotation's elements.

**Table 2-36 @NamedPLSQLStoredProcedureQueries Annotation Elements**

Annotation Element	Description	Default
value	(Required) An array of named stored procedure query	

**Examples**

[Example 2-68](#) shows how to use this annotation.

**Example 2-68 Using @NamedPLSQLStoredProcedureQueries Annotation**

```

@NamedPLSQLStoredProcedureQueries({
    @NamedPLSQLStoredProcedureQuery(name="getEmployee",
        functionName="EMP_PKG.GET_EMP",
        parameters={ @PLSQLParameter( name="EMP_OUT", direction=:Direction.OUT,
            databaseType="EMP_PKG.EMP_REC" ) } )
})

```

**See Also**

For more information, see:

- "[@NamedPLSQLStoredProcedureQuery](#)"
- "Stored Procedures" in *Understanding Oracle TopLink*
- Oracle PL/SQL <http://www.oracle.com/technetwork/database/features/plsql/index.html>
- PLSQL Stored Procedure Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/PLSQLStoredFunction>

# @NamedPLSQLStoredProcedureQuery

Use the @NamedPLSQLStoredProcedureQuery annotation to define queries that call Oracle PLSQL stored procedures as named queries.

## Annotation Elements

Table 2-37 describes this annotation's elements.

**Table 2-37 @NamedPLSQLStoredProcedureQuery Annotation Elements**

Annotation Element	Description	Default
procedureName	(Required) The name of the stored procedure	
name	(Required) The unique name that references this stored procedure query	
resultClass	(Optional) The class of the result	
hints	(Optional) Query hints	
parameters	(Optional) The parameters for the stored procedure	
resultSetMapping	(Optional) The name of the SQLResultSetMapping	

## Usage

This annotation adds support for complex PLSQL types such as RECORD and TABLE, that are not accessible from JDBC.

You can specify @NamedPLSQLStoredProcedureQuery on an Entity, Embeddable, or MappedSuperclass.

## Examples

Example 2-69 shows how to use this annotation.

### Example 2-69 Using @NamedPLSQLStoredProcedureQuery Annotation

```
@NamedPLSQLStoredProcedureQuery(
    name="getEmployee",
    procedureName="MyStoredProcedure",
    functionName="EMP_PKG.GET_EMP",
    parameters={
        @PLSQLParameter(
            name="EMP_OUT",
            direction=Direction.OUT,
            databaseType="EMP_PKG.EMP_REC"
        )
    }
)
@Embeddable
@Struct(name="EMP_TYPE", fields={"F_NAME", "L_NAME", "SALARY"})
@OracleObject(
    name="EMP_PKG.EMP_REC",
    compatibleType="EMP_TYPE",
    javaType=Employee.class,
    fields={
        @PLSQLParameter(name="F_NAME"),
        @PLSQLParameter(name="L_NAME"),
```

```

        @PLSQLParameter(
            name="SALARY",
            databaseType="NUMERIC_TYPE"
        )
    }
)

public class Employee { ...}

```

**See Also**

For more information, see:

- "Stored Procedures" in *Understanding Oracle TopLink*
- Oracle PL/SQL <http://www.oracle.com/technetwork/database/features/plsql/index.html>
- PLSQL Stored Procedure Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/PLSQLStoredFunction>

## @NamedStoredFunctionQueries

Use the `@NamedStoredFunctionQueries` annotation to define multiple `NamedStoredFunctionQuery` items.

**Annotation Elements**

[Table 2-38](#) describes this annotation's elements.

**Table 2-38 @NamedStoredFunctionQueries Annotation Elements**

Annotation Element	Description	Default
<code>NamedStoredFunctionQuery[]</code>	(Required) An array of named stored procedure query	

**Examples**

[Example 2-70](#) shows how to use this annotation.

To define multiple named stored procedures in the `eclipselink-orm.xml` file, create a list of multiple `<named-stored-function_query>` elements.

**Example 2-70 Using @NamedStoredFunctionQueries Annotation**

```

@NamedStoredFunctionQueries{(
    @NamedStoredFunctionQuery(
        name="StoredFunction_In",
        functionName="StoredFunction_In",
        parameters={
            @StoredProcedureParameter(direction=IN, name="P_IN",
queryParameter="P_IN", type=Long.class)
        },
        returnParameter=@StoredProcedureParameter(queryParameter="RETURN",
type=Long.class)
    )
)}

```

**See Also**

For more information, see:

- ["@NamedStoredFunctionQuery"](#)

## @NamedStoredFunctionQuery

Use `@NamedStoredFunctionQuery` to define queries that call stored functions as named queries.

**Annotation Elements**

[Table 2-39](#) describes this annotation's elements.

**Table 2-39 @NamedStoredFunctionQuery Annotation Elements**

Annotation Element	Description	Default
<code>functionName</code>	(Required) The name of the stored function	
<code>name</code>	(Required) The unique name that references this stored function query	
<code>returnParamter</code>	(Required) The return value of the stored function	
<code>callByIndex</code>	(Optional) Specifies if the stored function should be called by <b>index</b> or by <b>name</b> . <ul style="list-style-type: none"> <li>• If by index, the parameters must be defined in the same order as the procedure on the database.</li> <li>• If by name, you must use the database platform support naming procedure parameters.</li> </ul>	false
<code>hints</code>	(Optional) Query hints	
<code>parameters</code>	(Optional) The parameters for the stored function	
<code>resultSetMapping</code>	(Optional) The name of the SQLResultMapping	

**Usage**

You can specify `@NamedStoredFunctionQuery` on an Entity or MappedSuperclass.

**Examples**

[Example 2-71](#) shows how to use this annotation.

[Example 2-72](#) shows how to use the `<named-stored-function-query>` element in the `eclipselink-orm.xml` file.

**Example 2-71 Using @NamedStoredFunctionQuery Annotation**

```
@Entity
@Table(name="CMP3_ADDRESS")

@NamedStoredFunctionQuery(
    name="StoredFunction_In",
    functionName="StoredFunction_In",
    parameters={
        @StoredProcedureParameter(direction=IN, name="P_IN", queryParameter="P_IN",
        type=Long.class)
```

```

    },
    returnParameter=@StoredProcedureParameter(queryParameter="RETURN", type=Long.class)
)
public class Address implements Serializable {
    ...
}

```

### Example 2-72 Using <named-stored-function-query> XML

```

<named-stored-function-query name="StoredFunction_In" procedure-
name="StoredFunction_In">
    <parameter direction="IN" name="P_IN" query-parameter="P_IN" type="Long"/>
</named-stored-function-query>

```

### See Also

For more information, see:

- ["@NamedStoredFunctionQueries"](#)

## @NamedStoredProcedureQueries

Use the `@NamedStoredProcedureQueries` annotation to define multiple `NamedStoredProcedureQuery` items.

### Annotation Elements

[Table 2-40](#) describes this annotation's elements.

**Table 2-40 @NamedStoredProcedureQueries Annotation Elements**

Annotation Element	Description	Default
value	(Required) An array of named stored procedure query	

### Examples

[Example 2-73](#) shows how to use this annotation.

To define multiple named stored procedure queries in the `eclipselink-orm.xml` file, simply create a list of multiple `<named-stored-procedure_query>` elements.

### Example 2-73 Using @NamedStoredProcedureQueries Annotation

```

@Entity
@Table(name="EMPLOYEE")
@NamedStoredProcedureQueries({
    @NamedStoredProcedureQuery(
        name="ReadEmployeeInOut",

resultClass=org.eclipse.persistence.testing.models.jpa.customfeatures.Employee.class,
        procedureName="Read_Employee_InOut",
        parameters={
            @StoredProcedureParameter(direction=IN_OUT, name="employee_id_v",
queryParameter="ID", type=Integer.class),
            @StoredProcedureParameter(direction=OUT, name="nchar_v",
queryParameter="NCHARTYPE", type=Character.class)}

```



```

    ),
    @NamedStoredProcedureQuery(
        name="ReadEmployeeCursor",

        resultClass=org.eclipse.persistence.testing.models.jpa.customfeatures.Employee.class,
        procedureName="Read_Employee_Cursor",
        parameters={
            @StoredProcedureParameter(direction=IN, name="employee_id_v",
                queryParameter="ID", type=Integer.class),
            @StoredProcedureParameter(direction=OUT_CURSOR,
                queryParameter="RESULT_CURSOR")})
    })
    public class Employee implements Serializable {

```

### See Also

For more information, see:

- ["@NamedStoredProcedureQuery"](#)
- "Stored Procedures" in *Understanding Oracle TopLink*

## @NamedStoredProcedureQuery

Use the `@NamedStoredProcedureQuery` annotation to define queries that call stored procedures as named queries.

### Annotation Elements

[Table 2-41](#) describes this annotation's elements.

**Table 2-41** @NamedStoredProcedureQuery Annotation Elements

Annotation Element	Description	Default
name	(Required) Unique name that references this stored procedure query	
procedureName	(Required) Name of the stored procedure	
callByIndex	(Optional) Specifies if the stored procedure should be called by name. <ul style="list-style-type: none"> <li>• If <b>true</b>, the <code>StoredProcedureParameters</code> must be defined in the same order as the procedure on the database.</li> <li>• If <b>false</b>, the database platform must support naming procedure parameters.</li> </ul>	false
hints	(Optional) An array of query hints	
multipleResultSets	(Optional) Specifies if the stored procedure returns multiple result sets. This applies only for databases that support multiple result sets from stored procedures.	false
parameters	(Optional) An array of parameters for the stored procedure	
resultClass	(Optional) The class of the result	void.class
resultSetMapping	(Optional) Name of the <code>SQLResultMapping</code>	

Table 2-41 (Cont.) @NamedStoredProcedureQuery Annotation Elements

Annotation Element	Description	Default
returnsResultSet	(Optional) Specifies if the stored procedure retains a result set. This applies only for databases that support result sets from stored procedures.	false

### Usage

You can specify @NamedStoredProcedureQuery on an Entity or MappedSuper class.

### Examples

[Example 2-74](#) shows how to use @NamedStoredProcedureQuery to define a stored procedure.

[Example 2-75](#) shows how to use the <named-stored-procedure-query> element in the eclipselink-orm.xml file.

#### Example 2-74 Using @NamedStoredProcedureQuery Annotation

```
@NamedStoredProcedureQuery(name="findAllEmployees", procedureName="EMP_READ_ALL",
resultClass=Employee.class, parameters={
    @StoredProcedureParameter(queryParameter="result", name="RESULT_CURSOR",
direction=Direction.OUT_CURSOR})
@Entity
public class Employee {
    ...
}
```

#### Example 2-75 Using <named-stored-procedure-query> XML

```
<named-stored-procedure-query name="SProcXMLInOut" result-class="Address" procedure-
name="SProc_Read_XMLInOut">
  <parameter direction="IN_OUT" name="address_id_v" query-parameter="ADDRESS_ID"
type="Long"/>
  <parameter direction="OUT" name="street_v" query-parameter="STREET"
type="String"/>
</named-stored-procedure-query>
```

### See Also

For more information, see:

- "[@NamedStoredProcedureQueries](#)"
- "Stored Procedures" in *Understanding Oracle TopLink*
- "Stored Procedures Examples" <http://wiki.eclipse.org/EclipseLink/Examples/JPA/StoredProcedures>

## @Noncacheable

Use @Noncacheable to configure caching behavior for relationships. If used on a relationship, that relationship *will not* be cached, even though the parent Entity may be cached.

## Annotation Elements

There are no elements for this annotation.

## Usage

Each time EclipseLink retrieves the Entity, the relationship will be reloaded from the datasource. This may be useful for situations where caching of relationships is not desired or when using different EclipseLink cache types and having cached references extends the cache lifetime of related Entities using a different caching scheme. For instance Entity A references Entity B, Entity A is Full and Entity B is Weak. Without removing the caching of the relationship the Entity B's cache effectively become Full.

## Examples

[Example 2-76](#) shows how to use @Noncacheable to create a protected cache.

[Example 2-77](#) shows using the <noncacheable> XML element in the eclipselink-orm.xml file.

### Example 2-76 Using @Noncacheable Annotation

```
@Entity
@Cache(
    isolation=CacheIsolationType.PROTECTED
)
public class Employee {
    @Id
    private long id;
    ...
    @OneToMany(mappedBy="manager")
    @Noncacheable
    private List<Employee> managedEmployees;
    ...
}
```

### Example 2-77 Using <noncacheable> XML

```
<?xml version="1.0"?>
<entity-mappings
    xmlns="http://www.eclipse.org/eclipselink/xsds/persistence/orm"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.eclipse.org/eclipselink/xsds/persistence/orm
http://www.eclipse.org/eclipselink/xsds/eclipselink_orm_2_4.xsd"
    version="2.4">
    <entity name="Employee" class="org.acme.Employee" access="FIELD">
        <cache isolation="PROTECTED"/>
        <attributes>
            <id name="id"/>
            <one-to-many name="managedEmployees" mapped-by="manager">
                <noncacheable/>
            </one-to-many>
        </attributes>
    </entity>
</entity-mappings>
```

## See Also

For more information, see:

- "Caching"[http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Caching](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Caching)
- "TopLink Caches" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## @NoSql

Use `@NoSql` to specify a non-relational (that is, no SQL) data source. EclipseLink can map non-relational data to objects and access that data through JPA.

### Annotation Elements

Table 2-42 describes this annotation's elements.

**Table 2-42 @NoSql Annotation Elements**

Annotation Element	Description	Default
<code>dataType</code>	<p>The name of the entities structure. The purpose of the <code>dataType</code> depends on the NoSQL platform used:</p> <ul style="list-style-type: none"> <li>• For MongoDB, it is the collection name that the JSON documents are stored to.</li> <li>• For Oracle NoSQL, it is the first part of the major key value.</li> <li>• For XML files, it is the file name. and XML messaging, use XML.</li> </ul>	
<code>dataFormat</code>	<p>(Optional) The type structure (data format) in which the data is stored within the database:</p> <ul style="list-style-type: none"> <li>• INDEXED – Maps a class to an array of values.</li> <li>• MAPPED – Maps a class to a set of nested key/value pairs, a value can be an embedded map or list.</li> </ul> <p>Use to map to key/value stores, JSON databases, and other structured data systems.</p> <ul style="list-style-type: none"> <li>• XML – Maps a class to an XML document.</li> </ul> <p>Use with XML data-stores, XML files, XML messaging systems, and other XML systems.</p>	XML

### Usage

The `dataFormat` depends on the NoSQL platform used:

- For MongoDB, use `MAPPED`.
- For Oracle NoSQL, use `MAPPED` (for key/value data) or `XML` (for a single XML document).
- For XML files and XML messaging, use `XML`.

### Supported Datasources

EclipseLink supports several NoSQL and EIS platforms, as well as generic NoSQL and EIS datasources through the JavaEE Connector Architecture CCI (Common Client Interface) API. You can also define your own `EISPlatform` subclass and JCA adapter

EclipseLink supports the following datasources:

- MongoDB

- Oracle NoSQL
- XML Files
- JMS
- Oracle AQ

### Examples

[Example 2-78](#) shows using @NoSql with an XML data source.

[Example 2-79](#) shows using @NoSql with a JSON data source.

#### Example 2-78 Using @NoSql Annotation with XML

```
@Entity
@NoSql(dataType="order")
public class Order {
    @Id
    @GeneratedValue
    @Field(name="@id")
    private long id;
    @Basic
    @Field(name="@description")
    private String description;
    @Embedded
    @Field(name="delivery-address")
    private Address deliveryAddress
    @ElementCollection
    @Field(name="orderLines/order-line")
    private List<OrderLine> orderLines;
    @ManyToOne
    @JoinField(name="customer-id")
    private Customer customer;
}

@Embeddable
@NoSql
public class OrderLine {
    @Field(name="@line-number")
    private int lineNumber;
    @Field(name="@item-name")
    private String itemName;
    @Field(name="@quantity")
    private int quantity;
}
```

This would produce the following XML data:

```
<order id="4F99702B271B1948027FAF06" description="widget order">
  <deliveryAddress street="1712 Hasting Street" city="Ottawa" province="ON"
postalCode="L5J1H5"/>
  <order-lines>
    <order-line lineNumber="1" itemName="widget A" quantity="5"/>
    <order-line lineNumber="2" itemName="widget B" quantity="1"/>
    <order-line lineNumber="3" itemName="widget C" quantity="2"/>
  </order-lines>
  <customer-id>4F99702B271B1948027FAF08</customer-id>
</order>
```

**Example 2-79 Using @NoSql Annotation with JSON**

```

@Entity
@NoSql(dataType="orders", dataFormat=DataFormatType.MAPPED)
public class Order {
    @Id
    @GeneratedValue
    @Field(name="_id")
    private long id;
    @Basic
    @Field(name="description")
    private String description;
    @Embedded
    @Field(name="deliveryAddress")
    private Address deliveryAddress
    @ElementCollection
    @Field(name="orderLines")
    private List<OrderLine> orderLines;
    @ManyToOne
    @JoinField(name="customerId")
    private Customer customer;
}

@Embeddable
@NoSql(dataFormat=DataFormatType.MAPPED)
public class OrderLine {
    @Field(name="lineNumber")
    private int lineNumber;
    @Field(name="itemName")
    private String itemName;
    @Field(name="quantity")
    private int quantity;
}

```

This would produce the following JSON document:

```

{
  "_id": "4F99702B271B1948027FAF06",
  "description": "widget order",
  "deliveryAddress": {
    "street": "1712 Hasting Street",
    "city": "Ottawa",
    "province": "ON",
    "postalCode": "L5J1H5",
  },
  "orderLines": [
    {"lineNumber": "1", "itemName": "widget A", "quantity": "5"},
    {"lineNumber": "2", "itemName": "widget B", "quantity": "1"},
    {"lineNumber": "3", "itemName": "widget C", "quantity": "2"}
  ],
  "customerId": "4F99702B271B1948027FAF08",
}

```

**See Also**

For more information, see:

- **@NoSQL** [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/NoSQL](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/NoSQL)

- NoSQL Persistence Units [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/NoSQL/Persistence\\_Units](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/NoSQL/Persistence_Units)
- Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/NoSQL>
- *Oracle Coherence Integration Guide for Oracle TopLink with Coherence Grid*
- "Using Non-SQL Databases" in *Understanding Oracle TopLink*
- "Using NoSQL Databases" in *Understanding Oracle TopLink*
- "Using TopLink with Nonrelational Databases" in *Solutions Guide for Oracle TopLink*
- "nosql.property"
- EclipseLink Platform Incubator <http://wiki.eclipse.org/EclipseLink/Development/Incubator/Platform>
- Supported NoSQL and EIS Datasources [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/NoSQL/Supported\\_Data-sources](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/NoSQL/Supported_Data-sources)

## @ObjectTypeConverter

The @ObjectTypeConverter annotation specifies an `org.eclipse.persistence.mappings.converters.ObjectTypeConverter` that converts a fixed number of database data value(s) to Java object value(s) during the reading and writing of a mapped attribute.

### Annotation Elements

Table 2-43 describes this annotation's elements.

**Table 2-43 @ObjectTypeConverter Annotation Elements**

Annotation Element	Description	Default
name	Set this attribute to the <code>String</code> name for your converter. Ensure that this name is unique across the persistence unit.	none
dataType	(Optional) Set this attribute to the type stored in the database.	<code>void.class</code> <sup>1</sup>
objectType	(Optional) Set the value of this attribute to the type stored on the entity.	<code>void.class</code> <sup>1</sup>
conversionValues	Set the value of this attribute to the array of conversion values (instances of <code>ConversionValue</code> : <code>String</code> <code>objectValue</code> and <code>String</code> <code>dataValue</code> ).	none
defaultObjectValue	Set the value of this attribute to the default object value. Note that this argument is for dealing with legacy data if the data value is missing.	Empty <code>String</code>

<sup>1</sup> The default is inferred from the type of the persistence field or property.

### Usage

EclipseLink also includes [@TypeConverter](#) and [@StructConverter](#) converters.

## Examples

[Example 2-80](#) shows how to use the `@ObjectTypeConverter` annotation to specify object converters for the `gender` field.

### Example 2-80 Using the @ObjectTypeConverter Annotation

```
public class Employee implements Serializable{
    ...
    @ObjectTypeConverter (
        name="genderConverter",
        dataType=java.lang.String.class,
        objectType=java.lang.String.class,
        conversionValues={
            @ConversionValue(dataValue="F", objectValue="Female"),
            @ConversionValue(dataValue="M", objectValue="Male")}
    )
    @Convert("genderConverter")
    public String getGender() {
        return gender;
    }
    ...
}
```

You can use the `<object-type-converter>` element in the deployment descriptor as an alternative to using the `@ObjectTypeConverter` annotation in the source code, as shown in [Example 2-81](#).

### Example 2-81 Using <object-type-converter> XML

```
<object-type-converter name="gender-converter" object-type="model.Gender" data-
type="java.lang.String">
    <conversion-value object-value="Male" data-value="M" />
    <conversion-value object-value="Female" data-value="F" />
</object-type-converter>
```

## See Also

For more information, see:

- ["@TypeConverter"](#)
- ["@StructConverter"](#)
- ["@ConversionValue"](#)

# @ObjectTypeConverters

Use `@ObjectTypeConverters` to define multiple `ObjectTypeConverter` items.

## Annotation Elements

[Table 2-44](#) describes this annotation's elements.



Table 2-44 @ObjectTypeConverters Annotation Elements

Annotation Element	Description	Default
ObjectTypeConverter	(Required) An array of @ObjectTypeConverter	

### Examples

[Example 2-82](#) shows how to use this annotation.

To define multiple object type converts in the `eclipselink-orm.xml` file, simply create a list of multiple `<object-type-converter>` elements.

### Example 2-82 Using @ObjectTypeConverters Annotation

```
@Entity(name="Employee")
@Table(name="CMP3_FA_EMPLOYEE")
@ObjectTypeConverters({
    @ObjectTypeConverter(
        name="sex",
        dataType=String.class,

        objectType=org.eclipse.persistence.testing.models.jpa.fieldaccess.advanced.Employee.G
ender.class,
        conversionValues={
            @ConversionValue(dataValue="F", objectValue="Female"),
            @ConversionValue(dataValue="M", objectValue="Male")
        }
    )
})
```

### See Also

For more information, see:

- "[@ObjectTypeConverter](#)"

## @OptimisticLocking

Use `@OptimisticLocking` to specify the type of optimistic locking EclipseLink should use when updating or deleting entities.

### Annotation Elements

[Table 2-45](#) describes this annotation's elements.

Table 2-45 @OptimisticLocking Annotation Elements

Annotation Element	Description	Default
<code>cascade</code>	(Optional) Specify where the optimistic locking policy should cascade lock. When changing <b>private owned</b> and <b>delete orphan</b> object, TopLink will update the version.  This element is currently only supported with <code>VERSION_COLUMN</code> locking.	<code>false</code>

Table 2-45 (Cont.) @OptimisticLocking Annotation Elements

Annotation Element	Description	Default
selectedColumns	(Optional) Specify a list of columns that will be optimistically locked. This element is required when <code>type=SELECTED_COLUMNS</code> .	
type	(Optional) The type of optimistic locking policy to use: <ul style="list-style-type: none"> <li>• <code>ALL_COLUMNS</code> – EclipseLink compares every field in the table with the <code>WHERE</code> clause, when performing an update or delete operation.</li> <li>• <code>CHANGED_COLUMNS</code> – EclipseLink compares only the changed fields in the <code>WHERE</code> clause when performing an update.</li> <li>• <code>SELECTED_COLUMNS</code> – EclipseLink compares the selected field in the <code>WHERE</code> clause when performing an update or delete operation on the <code>SelectedColumns</code>.</li> <li>• <code>VERSION_COLUMN</code> – EclipseLink compares a single version number in the <code>WHERE</code> clause when performing an update.</li> </ul>	<code>VERSION_COLUMN</code>

### Usage

You can specify `@OptimisticLocking` on an Entity or MappedSuperclass.

### Examples

[Example 2-83](#) shows how to use the `@OptimisticLocking` annotation for all columns

[Example 2-83](#) shows how to use the `<optimistic-locking>` element in the `eclipselink-orm.xml` file for a single column.

#### Example 2-83 Using @OptimisticLocking Annotation

```
@Table(name = "EMPLOYEES")
@OptimisticLocking(type=OptimisticLockingType.ALL_COLUMNS)
public class Employee implements Serializable {
    ...
}
```

#### Example 2-84 Using <optimistic-locking> XML

```
<entity name="Employee" class="my.Employee" access="PROPERTY" change-
tracking="DEFERRED">
    ...
    <optimistic-locking type="SELECTED_COLUMNS" cascade="false">
        <selected-column name="id"/>
        <selected-column name="firstName"/>
    </optimistic-locking>
    ...
</entity>
```

### See Also

For more information, see:

- "Scaling Oracle TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## @OracleArray

Use the `@OracleArray` annotation to define an Oracle database `VARRAY` type, which you can use within PLSQL procedure calls.

### Annotation Elements

[Table 2-46](#) describes the annotation's elements.

**Table 2-46 @OracleArray Annotation Elements**

Element	Description	Default
name	(Required) The name of the <code>VARRAY</code> in the database	
nestedType	(Required) The name of the database type that the <code>VARRAY</code> holds	<code>VARCHAR_TYPE</code>
javaType	(Optional) The Java Collection class to which the <code>VARRAY</code> is mapped	<code>ArrayList</code>

### Examples

[Example 2-85](#) shows how to use the `@OracleArray` annotation to define a `VARRAY` type.

Please review this example and let me know what needs to be changed.

#### Example 2-85 Using the @OracleArray Annotation

```
@NamedPLSQLStoredFunctionQuery(
name="getEmployee",
functionName="EMP_PKG.GET_EMP",
parameters={
    @PLSQLParameter(
        name="EMP_OUT",
        direction=Direction.OUT,
        databaseType="EMP_PKG.EMP_REC"
    )
}
)
@Embeddable
@Struct(name="EMP_TYPE", fields={"F_NAME",
"L_NAME", "SALARY"})
@OracleArray(
    name="EMP_PKG.EMP_REC",
    nestedType=VARCHAR_TYPE
    javaType=Employee.class,
)
public class Employee{...}
```

### See Also

For more information, see:

- ["@NamedPLSQLStoredProcedureQuery"](#)
- ["@OracleArrays"](#)

## @OracleArrays

Use the `@OracleArrays` annotation to define multiple `VARRAY` types.

### Annotation Elements

[Table 2-47](#) describes the annotation's elements.

**Table 2-47 @OracleArrays Attribute Elements**

Element	Description	Default
value	(Required) An array of Oracle <code>VARRAY</code> types	

### Examples

See "[@OracleArray](#)" for an example of how to use this annotation.

### See Also

For more information, see:

- "[@OracleArray](#)"

## @OracleObject

Use the `@OracleObject` annotation to define an Oracle database `OBJECT` type, which you can use within PLSQL procedure calls.

### Annotation Elements

[Table 2-48](#) describes the annotation's elements.

**Table 2-48 @OracleObject Annotation Elements**

Element	Description	Default
name	(Required) The name of the <code>OBJECT</code> type in the database	
javaType	(Optional) The Java type to which you want to map the <code>OBJECT</code> type. This class must be mapped using an <code>@STRUCT</code> annotation	void
fields	(Required) Defines the parameter fields in the record type	

### Examples

[Example 2-86](#) shows how to use the `@OracleObject` annotation to define an Oracle `OBJECT` type.

#### Example 2-86 Using the @OracleObject Annotation

```
@NamedPLSQLStoredFunctionQuery(
name="getEmployee",
functionName="EMP_PKG.GET_EMP",
parameters={
    @PLSQLParameter(
```

```

        name="EMP_OUT",
        direction=Direction.OUT,
        databaseType="EMP_PKG.EMP_REC"
    )
}
)
@Embeddable
@Struct(name="EMP_TYPE", fields={"F_NAME",
"L_NAME", "SALARY"})
@OracleObject(
    name="EMP_PKG.EMP_REC",
    javaType=Employee.class,
    fields={
        @PLSQLParameter(name="F_NAME"),
        @PLSQLParameter(name="L_NAME"),
        @PLSQLParameter(
            name="SALARY",
            databaseType="NUMERIC_TYPE"
        )
    }
)
public class Employee{...}

```

**See Also**

For more information, see:

- ["@NamedPLSQLStoredProcedureQuery"](#)
- ["@OracleObjects"](#)

## @OracleObjects

Use the `@OracleObjects` annotation to define multiple Oracle `OBJECT` types.

**Annotation Elements**

[Table 2-49](#) describes the annotation's elements.

**Table 2-49 @OracleObjects Annotation Elements**

Element	Description	Default
value	(Required) An array of Oracle <code>OBJECT</code> types	

**Examples**

See ["@OracleObject"](#) for an example of how to use this annotation.

**See Also**

For more information, see:

- ["@OracleObject"](#)

## @OrderCorrection

Use `@OrderCorrection` to specify a strategy to use if the order list read from the database is invalid (for example, it has nulls, duplicates, negative values, or values greater than or equal to the list size).

To be valid, an order list of  $n$  elements must be  $\{0, 1, \dots, n-1\}$

### Annotation Elements

Table 2-50 describes this annotation's elements.

**Table 2-50 @OrderCorrection Annotation Elements**

Annotation Element	Description	Default
value	(Optional) Specify a strategy to use if the order list read from the database is invalid: <ul style="list-style-type: none"> <li>• EXCEPTION</li> <li>• READ</li> <li>• READ_WRITE</li> </ul>	READ_WRITE

### Usage

When using `@OrderCorrection`, you can specify how Oracle TopLink should handle invalid list orders:

- **EXCEPTION** – When `OrderCorrectionType=EXCEPTION`, Oracle TopLink will not correct the list. Instead, Oracle TopLink will throw a `QueryException` with error code `QueryException.LIST_ORDER_FIELD_WRONG_VALUE`

For example, given the following list of three objects in the database:

```
{null, objectA}; {2, objectB}, {5, ObjectC};
```

When read into the application, Oracle TopLink will throw an exception.

- **READ** – When `OrderCorrectionType=READ`, Oracle TopLink corrects the list read into application, but does not retain any information about the invalid list order that remains in the database. Although this is not an issue in read-only uses of the list, if the list is modified and then saved into the database, the order will most likely differ from the cache and be invalid.

The **READ** mode is used as the default when the mapped attribute is not a `List`.

For example, given the following list of three objects in the database:

```
{null, objectA}; {2, objectB}, {5, ObjectC}
```

- When read as a list: `{objectA, objectB, objectC}`
- When adding a new element to the list: `{objectA, objectB, objectC, objectD}`
- When saving the updated list to the database: `{null, objectA}, {2, objectB}, {5, objectC}, {3, objectD}`
- When reading the list again: `{objectA, objectB, objectD, objectC}`

- **READ\_WRITE** – When `OrderCorrectionType=READ_WRITE`, Oracle TopLink corrects the order of the list read into application *and* remembers the invalid list order left in the database. If the list is updated and saved to the database, the order indexes are saved ensuring that the list order in the data base will be exactly the same as in cache (and therefore valid).

The `READ_WRITE` mode is used as the default when the mapped attribute is either a `List` or `Vector` (that is, it is assignable from the Oracle TopLink internal class `IndirectList`). In JPA, if the mode is not specified, `READ_WRITE` is used by default.

For example, given the following list of three objects in the database:

```
{null, objectA}; {2, objectB}, {5, ObjectC}
```

- When read as a list: {objectA, objectB, objectC}
- When adding a new element to the list: {objectA, objectB, objectC, objectD}
- When saving the updated list to the database: {0, objectA}, {1, objectB}, {2, objectC}, {3, objectD}
- When reading the list again: {objectA, objectB, objectC, objectD}

### Examples

[Example 2-87](#) shows how to use this annotation.

[Example 2-88](#) shows how to use this extension in the `eclipselink-orm.xml` file.

#### Example 2-87 Using @OrderCorrection Annotation

```
@OrderColumn(name="ORDER_COLUMN")
@OrderCorrection(EXCEPTION)
List<String> designations;
```

#### Example 2-88 Using <element-collection> in XML

```
<element-collection name="designations">
  <order-column name="ORDER_COLUMN" correction-type="EXCEPTION"/>
</element-collection>
```

### See Also

For more information see:

- ["Entity Annotations"](#)

## @Partitioned

Use `@Partitioned` to specify a partitioning policy to use for an Entity or relationship.

### Annotation Elements

[Table 2-51](#) describes this annotation's elements.

Table 2-51 @Partitioned Annotation Elements

Annotation Element	Description	Default
value	(Required) Name of the partitioning policy	

### Usage

Use partitioning to partition the data for a class across multiple databases or a database cluster (such as Oracle RAC). Partitioning can provide improved scalability by allowing multiple database machines to service requests.

You can specify @Partitioned on an Entity, relationship, query, or session/persistence unit.

### Partitioning Policies

To configure data partitioning, use the @Partitioned annotation and one or more partitioning policy annotations. The annotations for defining the different kinds of policies are:

- **@HashPartitioning**: Partitions access to a database cluster by the hash of a field value from the object, such as the object's ID, location, or tenant. The hash indexes into the list of connection pools/nodes. All write or read request for objects with that hash value are sent to the same server. If a query does not include the hash field as a parameter, it can be sent to all servers and unioned, or it can be left to the session's default behavior.
- **@PinnedPartitioning**: Pins requests to a single connection pool/node. This allows for vertical partitioning.
- **@RangePartitioning**: Partitions access to a database cluster by a field value from the object, such as the object's ID, location, or tenant. Each server is assigned a range of values. All write or read requests for objects with that value are sent to the same server. If a query does not include the field as a parameter, then it can either be sent to all server's and unioned, or left to the session's default behavior.
- **@ReplicationPartitioning**: Sends requests to a set of connection pools/nodes. This policy is for replicating data across a cluster of database machines. Only modification queries are replicated.
- **@RoundRobinPartitioning**: Sends requests in a round-robin fashion to the set of connection pools/nodes. It is for load balancing read queries across a cluster of database machines. It requires that the full database be replicated on each machine, so it does not support partitioning. The data should either be read-only, or writes should be replicated.
- **@UnionPartitioning**: Sends queries to all connection pools and unions the results. This is for queries or relationships that span partitions when partitioning is used, such as on a ManyToMany cross partition relationship.
- **@ValuePartitioning**: Partitions access to a database cluster by a field value from the object, such as the object's location or tenant. Each value is assigned a specific server. All write or read requests for objects with that value are sent to the same server. If a query does not include the field as a parameter, then it can be sent to all servers and unioned, or it can be left to the session's default behavior.



- `@Partitioning`: Partitions access to a database cluster by a custom partitioning policy. A `PartitioningPolicy` class must be provided and implemented.

Partitioning policies are globally-named objects in a persistence unit and are reusable across multiple descriptors or queries. This improves the usability of the configuration, specifically with JPA annotations and XML.

The persistence unit properties support adding named connection pools in addition to the existing configuration for `read/write/sequence`. A named connection pool must be defined for each node in the database cluster.

If a transaction modifies data from multiple partitions, JTA should be used to ensure 2-phase commit of the data. An exclusive connection can also be configured in the `EntityManager` to ensure only a single node is used for a single transaction.

### Clustered Databases and Oracle RAC

Some databases support clustering the database across multiple machines. Oracle RAC allows for a single database to span multiple different server nodes. Oracle RAC also supports table and node partitioning of data. A database cluster allows for any of the data to be accessed from any node in the cluster. However, it is generally more efficient to partition the data access to specific nodes, to reduce cross node communication.

`TopLink` partitioning can be used in conjunction with a clustered database to reduce cross node communication, and improve scalability.

To use partitioning with a database cluster the following is required:

- Partition policy should not enable replication, as database cluster makes data available to all nodes.
- Partition policy should not use unions, as database cluster returns the complete query result from any node.
- A data source and `TopLink` connection pool should be defined for each node in the cluster.
- The application's data access and data partitioning should be designed to have each transaction only require access to a single node.
- Usage of an exclusive connection for an `EntityManager` is recommended to avoid having multiple nodes in a single transaction and avoid 2-phase commit.

### Examples

[Example 2-89](#) shows how to partition `Employee` data by location. The two primary sites, **Ottawa** and **Toronto** are each stored on a separate database. All other locations are stored on the default database. `Project` is range partitioned by its ID, as shown in [Example 2-90](#). Each range of ID values are stored on a different database. The `employee/project` relationship is an example of a cross partition relationship. To allow the `employees` and `projects` to be stored on different databases a union policy is used and the join table is replicated to each database.

#### Example 2-89 Using Partitioning

```
@Entity
@IdClass(EmployeePK.class)
@UnionPartitioning(
    name="UnionPartitioningAllNodes",
```

```

        replicateWrites=true)
@ValuePartitioning(
    name="ValuePartitioningByLOCATION",
    partitionColumn=@Column(name="LOCATION"),
    unionUnpartitionableQueries=true,
    defaultConnectionPool="default",
    partitions={
        @ValuePartition(connectionPool="node2", value="Ottawa"),
        @ValuePartition(connectionPool="node3", value="Toronto")
    })
@Partitioned("ValuePartitioningByLOCATION")
public class Employee {
    @Id
    @Column(name = "EMP_ID")
    private Integer id;

    @Id
    private String location;
    ...

    @ManyToMany(cascade = { PERSIST, MERGE })
    @Partitioned("UnionPartitioningAllNodes")
    private Collection<Project> projects;
    ...
}

```

### Example 2-90 Using @RangePartitioning

```

@Entity
@RangePartitioning(
    name="RangePartitioningByPROJ_ID",
    partitionColumn=@Column(name="PROJ_ID"),
    partitionValueType=Integer.class,
    unionUnpartitionableQueries=true,
    partitions={
        @RangePartition(connectionPool="default", startValue="0",
endValue="1000"),
        @RangePartition(connectionPool="node2", startValue="1000",
endValue="2000"),
        @RangePartition(connectionPool="node3", startValue="2000")
    })
@Partitioned("RangePartitioningByPROJ_ID")
public class Project {
    @Id
    @Column(name="PROJ_ID")
    private Integer id;
    ...
}

```

### See Also

For more information, see:

- ["@Partitioning"](#)
- ["@HashPartitioning"](#)
- ["@PinnedPartitioning"](#)
- ["@RangePartitioning"](#)
- ["@ReplicationPartitioning"](#)

- "[@RoundRobinPartitioning](#)"
- "[@UnionPartitioning](#)"
- "[@ValuePartitioning](#)"
- "Data Partitioning"[http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/Data\\_Partitioning](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/Data_Partitioning)
- Partitioning Examples<http://wiki.eclipse.org/EclipseLink/Examples/JPA/Partitioning>

## @Partitioning

Use `@Partitioning` to configure a custom `PartitioningPolicy`.

### Annotation Elements

[Table 2-52](#) describes this annotation's elements.

**Table 2-52 @Partitioning Annotation Elements**

Annotation Element	Description	Default
<code>name</code>	Name of the partition policy. Names must be unique for the persistence unit.	
<code>partitioningClass</code>	(Required) Full <code>package.class</code> name of a subclass of <code>PartitioningPolicy</code>	

### Usage

Data partitioning allows for an application to scale its data across more than a single database machine. TopLink supports data partitioning at the Entity level to allow a different set of entity instances for the same class to be stored in a different physical database or different node within a database cluster. Both regular databases and clustered databases are supported. Data can be partitioned both horizontally and vertically.

Partitioning can be enabled on an entity, a relationship, a query, or a persistence unit.

### Examples

[Example 2-91](#) shows a custom partitioning policy.

#### Example 2-91 Using @Partitioning Annotation

```
@Entity
@Partitioning(name="order", partitioningClass=OrderPartitioningPolicy.class)
@public class Order {
    ...
}

public class OrderPartitioningPolicy extends PartitioningPolicy {

    public List<Accessor> getConnectionsForQuery(AbstractSession session,
DatabaseQuery query, AbstractRecord arguments) {

        List<Accessor> accessors = new ArrayList<Accessor>(1);
```

```

        accessors.add(getAccessor(ACMEPool.leastBusy(), session, query, false));
        return accessors;
    }
}

```

### See Also

For more information, see:

- "[@Partitioned](#)"
- "[@HashPartitioning](#)"
- "[@PinnedPartitioning](#)"
- "[@RangePartitioning](#)"
- "[@ReplicationPartitioning](#)"
- "[@RoundRobinPartitioning](#)"
- "[@UnionPartitioning](#)"
- "[@ValuePartitioning](#)"
- "[partitioning](#)"
- "Data Partitioning" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/Data\\_Partitioning](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/Data_Partitioning)
- EclipseLink Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Partitioning>

## @PinnedPartitioning

Use `@PinnedPartitionPolicy` to pin requests to a single connection pool, allowing for vertical partitioning (that is, having an entity, query, or session always access a single database).

### Annotation Elements

[Table 2-53](#) describes this annotation's elements.

**Table 2-53 @PinnedPartitioning Annotation Elements**

Annotation Element	Description	Default
<code>connectionPool</code>	Connection pool name to which to pin queries	
<code>name</code>	Name of the partition policy. Names must be unique for the persistence unit.	

### Usage

Partition policies are globally named, to allow reuse. You must also set the partitioning policy with the `@Partitioned` annotation.

You can specify `@PinnedPartitioning` on an Entity, relationship, query, or session/persistence unit.

The persistence unit properties support adding named connection pools in addition to the existing configuration for read/write/sequence. A named connection pool must be defined for each node in the database cluster.

If a transaction modifies data from multiple partitions, you should use JTA ensure proper two-phase commit of the data. You can also configure an exclusive connection in the EntityManager to ensure that only a single node is used for a single transaction.

### Examples

See "Example 2-89" for an example of partitioning with Oracle TopLink.

### See Also

For more information, see:

- "Data Partitioning"[http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/Data\\_Partitioning](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/Data_Partitioning)
- "@Partitioned"

## @PLSQLParameter

Use @PLSQLParameter within a NamedPLSQLStoredProcedureQuery or PLSQLRecord annotation.

### Annotation Elements

Table 2-54 describes this annotation's elements.

**Table 2-54 @PLSQLParameter Annotation Elements**

Annotation Element	Description	Default
name	(Required) The query parameter name	
direction	(Optional) The direction of the stored procedure parameter: <ul style="list-style-type: none"> <li>• IN – Input parameter</li> <li>• IN_OUT – Input and output parameters</li> <li>• OUT – Output parameter</li> <li>• OUT_CURSOR – Output cursor</li> </ul>	IN
databaseType	(Optional) Database data type for the parameter. This either one of the type constants defined in OraclePLSQLTypes, or JDBCTypes, or a custom record or table type name.	
length	(Optional) Maximum length of the field value	
name	(Optional) Stored procedure parameter name	
optional	(Optional) Specify if the parameter is required, or optional and defaulted by the procedure.	false
scale	(Optional) Maximum precision value	
precision	(Optional) Maximum precision value	

## Usage

Use the `@PLSQLParameter` annotation to configure the parameter and type for Oracle PLSQL stored procedures and record types that use extended PLSQL types instead of regular SQL types. They support PLSQL RECORD, TABLE, BOOLEAN and other extend PLSQL types.

## Examples

See "[@NamedPLSQLStoredProcedureQuery](#)" for an example using the `@PLSQLParameter` annotation.

## See Also

For more information:

- "[@NamedPLSQLStoredProcedureQuery](#)"
- "[@PLSQLRecord](#)"
- PLSQL Stored Procedure Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/PLSQLStoredFunction>

# @PLSQLRecord

Use `@PLSQLRecord` to define a database PLSQL RECORD type for use within PLSQL procedures.

## Annotation Elements

[Table 2-55](#) describes this annotation's elements.

**Table 2-55 @PLSQLRecord Annotation Elements**

Annotation Element	Description	Default
name	(Required) The name of the table in the database	
compatibleType	(Required) Name of the database OBJECTTYPE that mirror's the record's structure	
fields	(Required) The fields in the record type	
javaType	(Optional) The class of the object type. You must map this class with the <a href="#">@Struct</a> annotation.	

## Usage

Oracle PLSQL RECORD types are *structured* database types. Although JDBC does not provide a mechanism for returning these types, TopLink provides support to translate these types into OBJECT types. You must create an OBJECT type on the database to mirror the RECORD type and provide it as the `compatibleType` in the `@PLSQLRecord`.

You can then map the RECORD to a Java class, map the Java class as an `@Embeddable`, use the `@Struct` annotations to map the Java class to the OBJECT type that mirrors the RECORD type.

You can then call and return the Java class as parameters to the PLSQL stored procedure query.

### Examples

[Example 2-92](#) shows how to use this annotation.

#### Example 2-92 Using @PLSQLRecord Annotation

```
@NamedPLSQLStoredFunctionQuery(name="getEmployee", functionName="EMP_PKG.GET_EMP",
    returnParameter=@PLSQLParameter(name="RESULT", databaseType="EMP_PKG.EMP_REC"))
@Embeddable
@Struct(name="EMP_TYPE", fields={"F_NAME", "L_NAME", "SALARY"})
@PLSQLRecord(name="EMP_PKG.EMP_REC", compatibleType="EMP_TYPE",
    javaType=Employee.class,
    fields={@PLSQLParameter(name="F_NAME"), @PLSQLParameter(name="L_NAME"),
    @PLSQLParameter(name="SALARY", databaseType="NUMERIC_TYPE")})
public class Employee {
    ...
}
```

### See Also

For more information, see:

- "Stored Procedures" in *Understanding Oracle TopLink*
- "[@NamedPLSQLStoredProcedureQuery](#)"
- "[@PLSQLRecords](#)"
- Oracle PL/SQL <http://www.oracle.com/technetwork/database/features/plsql/index.html>
- PLSQL Stored Procedure Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/PLSQLStoredFunction>

## @PLSQLRecords

Use `@PLSQLRecords` to define multiple `PLSQLRecord`.

### Annotation Elements

[Table 2-56](#) describes this annotation's elements.

**Table 2-56 @PLSQLRecords Annotation Elements**

Annotation Element	Description	Default
value	(Required) An array of named PLSQL records	

### Examples

See "[@PLSQLRecord](#)" for an example of how to use this annotation.

### See Also

For more information, see:

- "Stored Procedures" in *Understanding Oracle TopLink*

- "@NamedPLSQLStoredProcedureQuery"
- "@PLSQLRecord"
- Oracle PL/SQL <http://www.oracle.com/technetwork/database/features/plsql/index.html>
- PLSQL Stored Procedure Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/PLSQLStoredFunction>

## @PLSQLTable

Use the @PLSQLTable annotation to define a database PLSQL TABLE type, which you can use within PLSQL procedure calls.

### Annotation Elements

Table 2-57 describes this annotation's elements.

**Table 2-57 @PLSQLTable Annotation Elements**

Element	Description	Default
name	(Required) The name of the table type in the database	
compatibilityType	(Required) The name of the database VARRAY type that mirrors the structure of the table. The table is converted to and from this type so that it can be passed through JDBC.	
nestedType	(Required) The type of table, e.g. TABLE of EMP_REC	VARCHAR_TYPE
javaType	(Optional) The Java Collection class to which the VARRAY is mapped. This class can be any valid Collection implementation.	ArrayList
isNestedTable	(Optional) Indicates a non-associative (nested) table. Typically, you use this method when generating a constructor for the collection in PL/SQL; the constructors for associative (VARRAY) arrays and non-associative (nested) tables differ.	false

### Examples

#### Example 2-93 Using the @PLSQLTable Annotation

```
@Named PLSQLStoredProcedureQuery(
name="getEmployee",
functionName="EMP_PKG.GET_EMP",
parameters={
    @PLSQLParamter(
        name="EMP_OUT",
        direction=Direction.OUT,
        databaseType="EMP_TABLE"
    )
}
)
@Embeddable
@Struct(name="EMP_TYPE", fields={"F_NAME",
"L_NAME", "SALARY"})
@PLSQLTable(
name="EMP_PKG.EMP_TABLE",
compatibilityType="EMP_VARRAY",
nestedType="EMP_REC"
```



```
)
public class Employee{...}
```

### See Also

For more information, see:

- ["@NamedPLSQLStoredProcedureQuery"](#)

## @PLSQLTables

Use the @PLSQLTables annotation to define mutiple PLSQL tables.

### Annotation Elements

[Table 2-58](#) describes this annotation's elements.

**Table 2-58 @PLSQLTables Annotation Elements**

Annotation	Description	Default
value	(Required) An array of named PLSQL tables	

### Examples

See "[@PLSQLTable](#)" for examples of how to use this annotation.

### See Also

For more information, see:

- ["@PLSQLTable"](#)

## @PrimaryKey

Use @PrimaryKey to allow advanced configuration of the ID.

A validation policy can be given that allows specifying if zero is a valid ID value. The set of primary key columns can also be specified precisely.

### Annotation Elements

[Table 2-59](#) describes this annotation's elements.

**Table 2-59 @PrimaryKey Annotation Elements**

Annotation Element	Description	Default
<code>cacheKeyType</code>	(Optional) Configures the cache key type to store the object in the cache. This type can be the basic ID value for simple singleton IDs or an optimized <code>CachedId</code> type. This element can take the following values: <ul style="list-style-type: none"><li><code>ID_VALUE</code> – This value can only be used for simple singleton IDs, such as <code>long/int/String</code>. This is the default for simple singleton IDs.</li><li><code>CACHE_ID</code> – Optimized cache key type that allows composite and complex values. This is the default for composite or complex IDs.</li><li><code>AUTO</code> – The cache key type is automatically configured depending on what is optimal for the class.</li></ul>	<code>AUTO</code>
<code>columns</code>	(Optional) Directly specifies the primary key columns. This can be used instead of <code>@Id</code> if the primary key includes a non basic field, such as a foreign key, or an inheritance discriminator, embedded, or transformation mapped field.	
<code>validation</code>	(Optional) Configures what ID validation is done: <ul style="list-style-type: none"><li><code>NULL</code> – EclipseLink interprets zero values as zero. This permits primary keys to use a value of zero.</li><li><code>ZERO</code> (default) – EclipseLink interprets zero as null.</li><li><code>NEGATIVE</code> – EclipseLink interprets negative values as null.</li><li><code>NONE</code> – EclipseLink does not validate the ID value.</li></ul> By default 0 is not a valid ID value, this can be used to allow 0 ID values.	<code>ZERO</code>

### Usage

By default, EclipseLink interprets zero as `null` for primitive types that cannot be null (such as `int` and `long`), causing zero to be an invalid value for primary keys. You can modify this setting by using the `@PrimaryKey` annotation to configure an `IdValidation` for an entity class. Use the `eclipselink.id-validation` property to configure an `IdValidation` for the entire persistence unit.

Setting the `validation` element also affects how TopLink generates IDs: new IDs are generated only for IDs that are not valid (`null` or `0`, by default); setting to `NONE` disables ID generation.

### Examples

[Example 2-94](#) shows how to use this annotation.

[Example 2-95](#) shows how to use the `<primary-key>` element in your `eclipselink-orm.xml` file.

#### Example 2-94 Using @PrimaryKey Annotation

```
@PrimaryKey(validation=IdValidation.ZERO)
public class Employee implements Serializable, Cloneable {
    ...
}
```

**Example 2-95 Using @<primary-key> XML**

```
<entity name="Employee" class="foo.Employee" access="PROPERTY">
  <primary-key validation="ZERO"/>
  ...
</entity>
```

**See Also**

For more information, see:

- "[@Id](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Entities/Ids/Id)"
- "[id-validation](#)"
- "[Entity Annotations](#)"

## @PrivateOwned

Use @PrivateOwned to specify that a relationship is privately owned; target object is a dependent part of the source object and is not referenced by any other object and cannot exist on its own.

**Annotation Elements**

The @PrivateOwned annotation does not have attributes.

**Usage**

Using @PrivateOwned causes many operations to be cascaded across the relationship including delete, insert, refresh, and lock (when cascaded). It also ensures that private objects removed from collections are deleted and that objects added are inserted.

You can specify @PrivateOwned on with @OneToOne, @OneToMany and @VariableOneToOne annotations. Private ownership is implied with the @BasicCollection and @BasicMap annotations.

When the referenced object is privately owned, the referenced child object cannot exist without the parent object.

**Additional Information**

When indicating that a relationship is privately owned, you are specifying the following:

- If the source of a privately owned relationship is deleted, then Oracle TopLink will delete the target. This is equivalent of setting [@CascadeOnDelete](#).
- If you remove the reference to a target from a source, then Oracle TopLink will delete the target.

Normally, do not configure privately owned relationships on objects that might be shared. An object should not be the target in more than one relationship if it is the target in a privately owned relationship.

 **Note:**

Referencing a privately owned object may produce undesired effects, as it is the application's responsibility to "clean up" references to the privately owned object.

If the object becomes de-referenced and is deleted, other objects in the cache that continue to reference the deleted object may cause constraint violations, they may resurrect the object (if using cascade persist), or they may simply not reflect what is in the database.

**Examples**

[Example 2-96](#) shows using `@PrivateOwned` to specify `Employee` field `phoneNumbers` . .

**Example 2-96 Using @PrivateOwned Annotation**

```
@Entity
public class Employee implements Serializable {
    ...
    @OneToMany(cascade=ALL, mappedBy="employee")
    @PrivateOwned
    public Collection<PhoneNumber> getPhoneNumbers() {
        return phoneNumbers;
    }
    ...
}
```

**See Also**

For more information, see:

- ["@CascadeOnDelete"](#)

## @Properties

Use `@Property` to specify a single user-defined property on a mapped attribute or its `get/set` method. Use the `@Properties` annotation to wrap multiple properties.

Although not used by TopLink, you can specify mapping properties if an application or extension needs to extend TopLink metadata.

**Annotation Elements**

[Table 2-60](#) describes this annotation's elements.

**Table 2-60 @Properties Annotation Elements**

Annotation Element	Description	Default
Property	Array of <code>Property</code> elements	

## Usage

You can specify `@Property` on a mapped attribute (or its `get/set` method) within an Entity, MappedSuperclass, or Embeddable class. You can also specify this annotation on an Entity, MappedSuperclass, or Embeddable class.

Properties defined in MappedSuperclass are passed to all inheriting Entities and MappedSuperclasses. In case of a conflict, property values defined directly on a class always override values inherited from a class's parent.

When using an `orm.xml` mapping file, TopLink ignores `@Property` and `@Properties` specified in annotations on mapped attributes; annotations on classes are merged with those specified in the `orm.xml` file, with the latter taking precedence in case of conflicts.

## Examples

[Example 2-120](#) shows how to use the `@Properties` annotation within a `@Transformation` mapping. [Example 2-121](#) shows how to use the `<properties>` XML element within the `orm.xml` file.

## See Also

For more information, see:

- ["@Property"](#)

# @Property

Use `@Property` to specify a single user-defined property on a mapped attribute or its `get/set` method. Use the `@Properties` annotation to wrap multiple properties.

## Annotation Elements

[Table 2-61](#) describes this annotation's elements.

**Table 2-61 @Property Annotation Elements**

Annotation Element	Description	Default
<code>name</code>	(Required) Name of the property	
<code>value</code>	(Required) String representation of the property value, converted to an instance of <code>valueType</code>	
<code>valueType</code>	(Optional) Property value type, converted to <code>valueType</code> by <code>ConversionManager</code> . This must be a simple type that can be handled by the <code>ConversionManager</code> .	<code>String</code>

## Usage

You can specify `@Property` on a mapped attribute (or its `get/set` method) within an Entity, MappedSuperclass, or Embeddable class. You can also specify this annotation on an Entity, MappedSuperclass, or Embeddable class.

Properties defined in MappedSuperclass are passed to all inheriting Entities and MappedSuperclasses. In case of a conflict, property values defined directly on a class always override values inherited from a class's parent.

When using an `orm.xml` mapping file, TopLink ignores `@Property` and `@Properties` annotations on mapped attributes; annotations on classes are merged with those specified in the `orm.xml` file, with the latter taking precedence in case of conflicts.

### Examples

[Example 2-120](#) shows how to use the `@Property` annotation within a `@Transformation` mapping. [Example 2-121](#) shows how to use the `<property>` XML element within the `orm.xml` file.

### See Also

For more information, see:

- ["@Properties"](#)

## @QueryRedirectors

Use `@QueryRedirectors` to intercept TopLink queries for pre- and post-processing, redirection, or performing some side effect such as auditing.

### Annotation Elements

[Table 2-62](#) describes this annotation's elements.

**Table 2-62 @QueryRedirectors Annotation Elements**

Annotation Element	Description	Default
<code>allQueries</code>	This <code>AllQueries</code> Query Redirector will be applied to any executing object query that does not have a more precise redirector (like the <code>ReadObjectQuery</code> Redirector) or a redirector set directly on the query.	<code>void.class</code>
<code>delete</code>	A Default <code>Delete</code> Object Query Redirector will be applied to any executing <code>DeleteObjectQuery</code> or <code>DeleteAllQuery</code> that does not have a redirector set directly on the query.	<code>void.class</code>
<code>insert</code>	A Default <code>Insert</code> Query Redirector will be applied to any executing <code>InsertObjectQuery</code> that does not have a redirector set directly on the query.	<code>void.class</code>
<code>readAll</code>	A Default <code>ReadAll</code> Query Redirector will be applied to any executing <code>ReadAllQuery</code> that does not have a redirector set directly on the query.  For users executing a JPA Query through the <code>getResultList()</code> , API this is the redirector that will be invoked	<code>void.class</code>
<code>readObject</code>	A Default <code>ReadObject</code> Query Redirector will be applied to any executing <code>ReadObjectQuery</code> that does not have a redirector set directly on the query.  For users executing a JPA Query through the <code>getSingleResult()</code> API or <code>EntityManager.find()</code> , this is the redirector that will be invoked	<code>void.class</code>

**Table 2-62 (Cont.) @QueryRedirectors Annotation Elements**

Annotation Element	Description	Default
report	A Default ReportQuery Redirector will be applied to any executing ReportQuery that does not have a redirector set directly on the query.  For users executing a JPA Query that contains aggregate functions or selects multiple entities this is the redirector that will be invoked	void.class
update	A Default Update Query Redirector will be applied to any executing UpdateObjectQuery or UpdateAllQuery that does not have a redirector set directly on the query. In Oracle TopLink an UpdateObjectQuery is executed whenever flushing changes to the datasource.	void.class

### Usage

Use @QueryRedirectors to extend the standard TopLink query functionality.

You can set a QueryRedirector through the Query Hint `eclipselink.query.redirector` or set as a default Redirector on an Entity.

QueryRedirectors are used when integrating TopLink Grid to redirect queries to the Coherence grid.

### Examples

[Example 2-97](#) shows how to use this annotation.

#### Example 2-97 Using @QueryRedirectors Annotation

```
@QueryRedirectors(
    allQueries=org.queryredirectors.AllQueriesForEntity.class)
@Entity
public class
...

```

### See Also

For more information, see:

- "Database Queries" in the *Understanding Oracle TopLink*

## @RangePartition

Use @RangePartition to create a specific range partition for a connection pool. Values within the range will be routed to the specified connection pool.

### Annotation Elements

[Table 2-63](#) describes this annotation's elements.

**Table 2-63 @RangePartition Annotation Elements**

Annotation Element	Description	Default
connectionPool	The connection pool to which to route queries for the specified range	
startValue	The String representation of the range start value	
endValue	The String representation of the range end value	

**Examples**

See "Example 2-90" for an example of partitioning with Oracle TopLink.

**See Also**

For more information, see:

- "Data Partitioning"[http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/Data\\_Partitioning](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/Data_Partitioning)
- "@Partitioned"

## @RangePartitioning

Use @RangePartitioning to partitions access to a database cluster by a field value from the object (such as the object's ID, location, or tenant).

Oracle TopLink assigns each server a range of values. All write or read request for objects with a server's value are sent to that specific server. If a query does not include the field as a parameter, then it can either be sent to all server's and unioned, or left to the session's default behavior.

**Annotation Elements**

Table 2-64 describes this annotation's elements.

**Table 2-64 @RangePartitioning Annotation Elements**

Annotation Element	Description	Default
name	(Required) The name of the partition policy; must be unique for the persistence unit.	
partitionColumn	(Required) The database column or query parameter to partition queries by. This is the <i>table column name</i> , not the class attribute name. The column value must be included in the query and should normally be part of the object's ID. This can also be the name of a query parameter. If a query does not contain the field the query will not be partitioned.	
partitions	(Required) List of connection pool names to partition across	
partitionValueType	The type of the start and end values	String



Table 2-64 (Cont.) @RangePartitioning Annotation Elements

Annotation Element	Description	Default
<code>unionunpartitionableQueries</code>	Defines if queries that do not contain the partition field should be sent to every database and have the result unioned.	false

### Usage

Partitioning can be enabled on an Entity, relationship, query, or session/persistence unit.

Partition policies are globally named to allow reuse, the partitioning policy must also be set using the `@Partitioned` annotation to be used.

The persistence unit properties support adding named connection pools in addition to the existing configuration for read/write/sequence. A named connection pool must be defined for each node in the database cluster.

If a transaction modifies data from multiple partitions, you should use JTA ensure proper two-phase commit of the data. You can also configure an exclusive connection in the EntityManager to ensure that only a single node is used for a single transaction.

### Examples

[Example 2-98](#) shows how to use the `@RangePartitioning` annotation

[Example 2-98](#) shows how to use the `<range-partitioning>` element in the `eclipselink-orm.xml` file.

#### Example 2-98 Using @RangePartitioning Annotation

```
@Entity
@Table(name="PART_PROJECT")
@RangePartitioning(
    name="RangePartitioningByPROJ_ID",
    partitionColumn=@Column(name="PROJ_ID"),
    partitionValueType=Integer.class,
    unionUnpartitionableQueries=true,
    partitions={
        @RangePartition(connectionPool="default", startValue="0", endValue="1000"),
        @RangePartition(connectionPool="node2", startValue="1000", endValue="2000"),
        @RangePartition(connectionPool="node3", startValue="2000")
    })
@Partitioned("RangePartitioningByPROJ_ID")
public class Project implements Serializable {
    ...
}
```

#### Example 2-99 Using <range-partitioning> XML

```
<entity name="Project" class="Project" access="FIELD">
  <table name="PART_PROJECT"/>
  <range-partitioning name="RangePartitioningByPROJ_ID" partition-value-type="java.lang.Integer" union-unpartitionable-queries="true">
    <partition-column name="PROJ_ID"/>
    <partition connection-pool="default" start-value="0" end-value="1000"/>
    <partition connection-pool="node2" start-value="1000" end-value="2000"/>
  </range-partitioning>
</entity>
```

```

    <partition connection-pool="node3" start-value="2000"/>
  </range-partitioning>
  <partitioned>RangePartitioningByPROJ_ID</partitioned>
</entity>

```

### See Also

For more information, see:

- ["@RangePartition"](#)
- ["@Partitioned"](#)

## @ReadOnly

Use `@ReadOnly` to specify that a class is read-only.

### Annotation Elements

This annotation contains no elements.

### Usage

It may be defined on an Entity or MappedSuperclass.

In the case of inheritance, a `@ReadOnly` annotation can only be defined on the root of the inheritance hierarchy .

You can also use `@ReadOnly` to bypass Oracle TopLink's persistence context to save heap space (such as if you need to load a large dataset).

#### Note:

You should not modify read-only entities. Doing so can corrupt the TopLink cache. To modify a read-only entity, it must be cloned or serialized.

### Examples

[Example 2-100](#) shows how to use this annotation.

[Example 2-101](#) shows how to use the `<read-only>` element in the `eclipselink-orm.xml` file.

#### Example 2-100 Using @ReadOnly Annotation

```

@ReadOnly
@Entity
@Table(name = "TMP_READONLY")
public class ReadOnlyEntity {
    ...
}

```

#### Example 2-101 Using <read-only> XML

```

<entity name="XMLReadOnlyClass" class="ReadOnlyClass" access="PROPERTY" read-
only="true">

```

**See Also**

For more information, see:

- ["Entity Annotations"](#)

## @ReadTransformer

Use `@ReadTransformer` with Transformation mappings to define the transformation of the database column values into attribute values (unless the mapping is write-only).

**Annotation Elements**

[Table 2-65](#) describes this annotation's elements.

**Table 2-65 @ReadTransformer Annotation Elements**

Annotation Element	Description	Default
method	The mapped class must have a method with this name which returns a value to be assigned to the attribute (not assigns the value to the attribute).	
transformerClass	User-defined class that implements the <code>org.eclipse.persistence.mappings.transformers.AttributeTransformer</code> interface  The class will be instantiated, its <code>buildAttributeValue</code> will be used to create the value to be assigned to the attribute.	<code>void.class</code>

 **Note:**

You must specify **either** a method or `transformerClass`, but not both.

**Usage**

Also unless it's a read-only mapping, either `@WriteTransformer` annotation or `@WriteTransformers` annotation should be specified. Each `WriteTransformer` defines transformation of the attribute value to a single database column value (column is specified in the `WriteTransformer`).

**Examples**

See ["Example 2-120"](#) for an example of how to use the `@WriteTransformer` annotation with a Transformation mapping.

**See Also**

For more information, see:

- ["@Transformation"](#).
- ["@WriteTransformer"](#)

## @ReplicationPartitioning

Use `@ReplicationPartitioning` to send requests to a set of connection pools. It is for replicating data across a cluster of database machines. Only modification queries are replicated.

### Annotation Elements

Table 2-66 describes this annotation's elements.

**Table 2-66 @ReplicationPartitioning Annotation Elements**

Annotation Element	Description	Default
<code>name</code>	The name of the partition policy; must be unique for the persistence unit	
<code>connectionPools</code>	List of connection pool names to replicate across	All defined pools in the <code>ServerSession</code>

### Usage

Partitioning can be enabled on an Entity, relationship, query, or session/persistence unit.

Partition policies are globally named to allow reuse, the partitioning policy must also be set using the `@Partitioned` annotation to be used.

The persistence unit properties support adding named connection pools in addition to the existing configuration for read/write/sequence. A named connection pool must be defined for each node in the database cluster.

If a transaction modifies data from multiple partitions, you should use JTA ensure proper two-phase commit of the data. You can also configure an exclusive connection in the `EntityManager` to ensure that only a single node is used for a single transaction.

### Examples

See "Example 2-89" for an example of partitioning with Oracle TopLink.

### See Also

For more information, see:

- "Data Partitioning"[http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/Data\\_Partitioning](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/Data_Partitioning)
- "`@Partitioned`"

## @ReturnInsert

Use `@ReturnInsert` to cause `INSERT` operations to return values back into the object being written. This allows for table default values, trigger or stored procedures computed values to be set back into the object.

 **Note:**

Returning is only supported with an Oracle Database and requires an `INSERT RETURNING` clause.

To use returning with other databases, a stored procedure with output parameters is used for the insert query.

**Annotation Elements**

Table 2-67 describes this annotation's elements.

**Table 2-67 @ReturnInsert Annotation Elements**

Annotation Element	Description	Default
<code>returnOnly</code>	(Optional) If specified (true), the mapping field will be excluded from the <code>INSERT</code> clause during SQL generation.	false

**Usage**

A `@ReturnInsert` annotation can only be specified on a `Basic` mapping.

**Examples**

Example 2-102 shows how to use the `@ReturnInsert` annotation. If you do not use an argument, Oracle TopLink accepts the default value, `false`.

Example 2-103 shows how to use the `<return-insert>` element in the `eclipselink-orm.xml` file.

**Example 2-102 Using @ReturnInsert Annotation**

```
@ReturnInsert(returnOnly=true)
public String getFirstName() {
    return firstName;
}
```

**Example 2-103 Using <return-insert> XML**

```
<basic name="firstName">
  <column name="FIRST_NAME"/>
  <return-insert read-only="true"/>
</basic>
```

**See Also**

For more information, see:

- ["@ReturnUpdate"](#)
- *Understanding Oracle TopLink*

# @ReturnUpdate

Use `@ReturnUpdate` to cause `UPDATE` operations to return values back into the object being written. This allows for table default values, trigger or stored procedures computed values to be set back into the object.



## Note:

Returning is only supported with an Oracle Database and requires an `INSERT RETURNING` clause.

To use returning with other databases, a stored procedure with output parameters is used for the insert query.

## Annotation Elements

This annotation contains no elements.

## Usage

A `@ReturnUpdate` annotation can only be specified on a `Basic` mapping.

## Examples

[Example 2-104](#) shows how to use the `@ReturnUpdate` annotation. The annotation does not accept any arguments.

### Example 2-104 Using @ReturnUpdate Annotation

```
@ReturnUpdate
public String getFirstName() {
    return firstName;
}
```

[Example 2-105](#) illustrates the same example as before, but uses the `<return-update>` element in the `eclipselink-orm.xml` mapping file.

### Example 2-105 Using <return-update> XML

```
<basic name="firstName">
  <column name="F_NAME"/>
  <return-update/>
</basic>
```

## See Also

For more information, see:

- ["@ReturnInsert"](#)
- *Understanding Oracle TopLink*

## @RoundRobinPartitioning

Use `@RoundRobinPartitioning` to send requests in a "round robin" fashion to the set of connection pools.

### Annotation Elements

[Table 2-68](#) describes this annotation's elements.

**Table 2-68 @RoundRobinPartitioning Annotation Elements**

Annotation Element	Description	Default
<code>name</code>	(Required) Name of the partition policy. Names must be unique for the persistence unit.	
<code>connectionPools</code>	(Optional) List of connection pool names to load balance across	All defined pools in the <code>ServerSession</code>
<code>replicateWrite</code>	(Optional) This allows for a set of database to be written to and kept in sync, and have reads load-balanced across the databases.	<code>false</code>

### Usage

Use the `@RoundRobinPartitioning` annotation for load-balancing read queries across a cluster of database machines. Using `@RoundRobinPartitioning` requires that the full database be replicated on each machine.

The data should either be read-only, or writes should be replicated on the database.

The persistence unit properties support adding named connection pools in addition to the existing configuration for read/write/sequence. A named connection pool must be defined for each node in the database cluster.

If a transaction modifies data from multiple partitions, you should use JTA ensure proper two-phase commit of the data. You can also configure an exclusive connection in the `EntityManager` to ensure that only a single node is used for a single transaction.

### Examples

See "[@Partitioned](#)" for an example of partitioning with Oracle TopLink.

### See Also

For more information, see:

- "Data Partitioning"[http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/Data\\_Partitioning](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/Data_Partitioning)
- "[@Partitioned](#)"

## @SerializedObject

Use an `@SerializedObject` annotation to set an `org.eclipse.persistence.descriptors.SerializedObjectPolicy` instance on an

Entity object or `MappedSuperClass` object. If a serialized object policy is specified, a whole entity object is written with its privately-owned (and nested, privately-owned) entities and element collections into an additional field in the database.

### Annotation Elements

Table 2-69 describes this annotation's elements.

**Table 2-69 @SerializedObject Attribute Elements**

Annotation Element	Description	Default
column	(Optional) The column that holds the serialized object	BLOB column named SOP in the entity's main table.
value	(Required) The Class that implements the <code>SerializedObjectPolicy</code> interface	

### Usage

Use an `@SerializedObject` annotation to read data from the database faster. The drawback to this usage is that writing to the database is slower. Use a serialized object policy for read-only and read-mostly applications for entities and element collections.

If the serialized object column contains `null` or an obsolete version of the object, then a query using a serialized object policy would either throw an exception or, if all other fields have been read as well, build the object using these fields (exactly as in the case where a serialized object policy is not used).



#### Note:

Currently, no default implementation of the `SerializedObjectPolicy` interface is available. You must provide this class.

### Examples

[Example 2-106](#) demonstrates how to use the `@SerializedObject` annotation to specify a serialized object policy and how to override the default column name.

If an `@SerializedObject` annotation is set on an entity object, then read queries (in addition to find and refresh) that return the object use the serialized object policy by default.

[Example 2-107](#) demonstrates how to prevent using the serialized object policy in a query.

[Example 2-108](#) demonstrates how to use a serialized object policy property to prevent searching for a serialized object. .

#### Example 2-106 Specifying a Serialized Object Policy

```
@Entity
@SerializedObject(MySerializedPolicy.class);
public class Employee {...

@Entity
```



```
@SerializedObject(value = MySerializedObjectPolicy.class, column = @Column(name =
"SERIALIZED"));
public class Address (...
```

### Example 2-107 Preventing the Use of a Serialized Object Policy in a Query

```
Query query = em.createQuery("SELECT e FROM Employee e")
.setHint(QueryHints.SERIALIZED_OBJECT, "false");
```

### Example 2-108 Preventing Search Using a Serialized Object Policy Property

```
Map hints = new HashMap();
hints.put("eclipselink.serialized-object", "false");
Address address = em.find(Address.class, id, hints);
```

### See Also

For more information:

- SerializedObjectPolicy

## @StoredProcedureParameter

Use `@StoredProcedureParameter` within a `NamedStoredProcedureQuery` annotation.

### Annotation Elements

Table 2-70 describes this annotation's elements.

**Table 2-70** @StoredProcedureParameter Annotation Elements

Annotation Element	Description	Default
<code>queryParameter</code>	(Required) The query parameter name	
<code>direction</code>	(Optional) The direction of the stored procedure parameter: <ul style="list-style-type: none"> <li>IN – Input parameter</li> <li>IN_OUT – Input and output parameters</li> <li>OUT – Output parameter</li> <li>OUT_CURSOR – Output cursor</li> </ul>	IN
<code>jdbcType</code>	(Optional) JDBC type code. This depends on the type returned from the procedure.	-1
<code>jdbcTypeName</code>	(Optional) JDBC type name. This may be required for ARRAY or STRUCT types.	
<code>name</code>	(Optional) Stored procedure parameter name	
<code>optional</code>	(Optional) Specify if the parameter is required, or optional and defaulted by the procedure.	false
<code>type</code>	(Optional) Type of Java class desired back from the procedure. This depends on the type returned from the procedure.	<code>void.class</code>

### Examples

See "[@NamedStoredProcedureQuery](#)" for an example using the `@StoredProcedureParameter` annotation.

## See Also

For more information:

- "[@NamedStoredProcedureQuery](#)"
- Stored Procedure Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/StoredProcedures>

## @Struct

Use @Struct to define a class to map to a database `Struct` type. The class should normally be an `Embeddable`, but could also be an `Entity` if stored in a object table.

### Annotation Elements

Table 2-71 describes this annotation's elements.

**Table 2-71 @Struct Annotation Elements**

Annotation Element	Description	Default
name	(Required) The database name of the database structure type	
fields	(Optional) Defines the order of the fields contained in the database structure type.	

### Usage

`Struct` types are extended object-relational data-types supported by some databases. `Struct` types are user define types in the database such as `OBJECT` types on Oracle. `Structs` normally contain `Arrays` (`VARRAY`) or other `Struct` types, and can be stored in a column or a table.

You can also use `Struct` types to call PL/SQL stored procedures that use `RECORD` types in an Oracle Database.

### Examples

[Example 2-109](#) shows using the @Struct annotation to define a Java class to map to an `OBJECT` type.

[Example 2-110](#) shows how to use the <struct> element in the `eclipselink-orm.xml` file.

#### Example 2-109 Using @Struct Annotation

```

@Embeddable
@Struct(name="EMP_TYPE", fields={"F_NAME", "L_NAME", "SALARY"})
public class Employee {
    @Column(name="F_NAME")
    private String firstName;
    @Column(name="L_NAME")
    private String lastName;
    @Column(name="SALARY")
    private BigDecimal salary;
}

```

```
...
}
```

### Example 2-110 Using <struct> XML

```
<embeddable class="Address" access="FIELD">
  <struct name="PLSQL_P_PLSQL_ADDRESS_REC">
    <field>ADDRESS_ID</field>
    <field>STREET_NUM</field>
    <field>STREET</field>
    <field>CITY</field>
    <field>STATE</field>
  </struct>
  <attributes>
    <basic name="id">
      <column name="ADDRESS_ID"/>
    </basic>
    <basic name="number">
      <column name="STREET_NUM"/>
    </basic>
  </attributes>
</embeddable>
```

### See Also

For more information, see:

- ["@Structure"](#)

## @StructConverter

Use `@StructConverter` to enable custom processing of `java.sql.Struct` types to process complex database types, such as spatial datatypes.

Oracle TopLink includes the `JGeometryConverter` class to convert the Oracle `JGeometry` spatial datatype.

### Note:

Unlike other converters, `@StructConverter` has its own interface.

### Annotation Elements

[Table 2-72](#) describes this annotation's elements.

**Table 2-72 @StructConverter Annotation Elements**

Annotation Element	Description	Default
<code>name</code>	The <code>String</code> name for your converter. Ensure that this name is unique across the persistence unit.	<code>none</code>
<code>converter</code>	The converter class as a <code>String</code> . This class must implement the <code>org.eclipse.persistence.platform.database.converters.StructConverter</code> interface.	<code>none</code>

## Usage

You can use the existing `@Convert` annotation with its value attribute set to the `StructConverter` name – in this case, the appropriate settings are applied to the mapping. This setting is required on all mappings that use a type for which a `StructConverter` has been defined. Failing to configure the mapping with the `@Convert` will cause an error.

Oracle TopLink also includes additional converters, such as [@ObjectTypeConverter](#) and [@TypeConverter](#).

## Examples

[Example 2-111](#) shows how to define the `@StructConverter` annotation.

You can specify the `@StructConverter` annotation anywhere in an Entity with the scope being the whole session. An exception is thrown if you add more than one `StructConverter` annotation that affects the same Java type. An `@StructConverter` annotation exists in the same namespaces as `@Converter`. A validation exception is thrown if you add an `@Converter` and an `@StructConverter` of the same name.

### Example 2-111 Using @StructConverter Annotation

```
@StructConverter(
    name="JGeometryConverter"
    converter=JGeometryConverter.class.getName())
```

## See Also

For more information, see:

- "[@StructConverters](#)"
- "Default Conversions and Converters" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Mapping/Basic\\_Mappings/Default\\_Conversions\\_and\\_Converters/StructConverter](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Mapping/Basic_Mappings/Default_Conversions_and_Converters/StructConverter)

# @StructConverters

Use `@StructConverters` to define multiple `@StructConverter` annotations.

## Annotation Elements

[Table 2-73](#) describes this annotation's elements.

**Table 2-73 @StructConverters Annotation Elements**

Annotation Element	Description	Default
<code>StructConverter[]</code>	(Required) An array of struct converter	

## Examples

[Example 2-112](#) shows how to use the `@StructConverters` annotation to define multiple `@StructConverter` elements.

[Example 2-113](#) shows how to use the `<struct-converters>` element in the `eclipselink-orm.xml` file.

#### Example 2-112 Using @StructConverters Annotation

```
@StructConverters{{
    @StructConverter(name="StructConverter1", converter="foo.StructConverter1"),
    @StructConverter(name="StructConverter2", converter="foo.StructConverter2")
}}
```

#### Example 2-113 Using <struct-converters> XML

```
<struct-converters>
  <struct-converter name="StructConverter1" converter="foo.StructConverter1"/>
  <struct-converter name="StructConverter2" converter="foo.StructConverter2"/>
</struct-converters>
```

#### See Also

For more information, see:

- "[@StructConverter](#)"

## @Structure

Use `@Structure` on a field/method to define a `StructureMapping` to an embedded `Struct` type. The target `Embeddable` must be mapped using the `Struct` annotation.

#### Annotation Elements

This annotation contains no elements.

#### Usage

`Struct` types are extended object-relational data-types supported by some databases. `Struct` types are user define types in the database such as `OBJECT` types on Oracle. `Structs` can normally contains Arrays (`VARRAY`) or other `Struct` types, and can be stored in a column or a table.

#### Examples

[Example 2-114](#) shows how to use the `@Structure` annotation. See [Example 2-109](#) to an example of using `@Struct` to map the target.

You can also define structure mappings in the `eclipselink-orm.xml` file by using the `<structure>` element.

#### Example 2-114 Using @Structure Annotation

```
@Structure
protected Address address;
```

#### Example 2-115 Using <structure> XML

```
<structure name="address"/>
```

**See Also**

For more information, see:

- ["@Struct"](#)

## @TenantDiscriminatorColumn

The `@TenantDiscriminator` annotation is used with the `@Multitenant` annotation and the `SINGLE-TABLE` multitenant type to limit what a persistence context can access in single-table multitenancy.

**Annotation Elements**

Table 2-74 describes this annotation's elements.

**Table 2-74 @TenantDiscriminatorColumn Properties**

Annotation Element	Description	Default
<code>java.lang.String columnDefinition</code>	(Optional) The SQL fragment that is used when generating the DDL for the discriminator column	The provider-generated SQL to create a column of the specified discriminator type.
<code>java.lang.String contextProperty</code>	(Optional) The name of the context property to apply to the tenant discriminator column	<code>eclipselink.tenant-id</code>
<code>DiscriminatorType discriminatorType</code>	(Optional) The type of object/column to use as a class discriminator	<code>javax.persistence.DiscriminatorType.STRING</code>
<code>int length</code>	(Optional) The column length for String-based discriminator types	The column length for String-based discriminator types. Ignored for other discriminator types.
<code>java.lang.String name</code>	(Optional) The name of column to be used for the tenant discriminator	<code>TENANT_ID</code>
<code>boolean primaryKey</code>	Specifies that the tenant discriminator column is part of the primary key of the tables.	<code>false</code>
<code>java.lang.String table</code>	(Optional) The name of the table that contains the column	The name of the table that contains the column. If absent the column is assumed to be in the primary table. This attribute must be specified if the column is on a secondary table.

**Usage**

To configure single-table multi-tenancy, you must specify both of the following:

- Annotate the entity or mapped superclass to use single-table multi-tenancy, using the `@Multitenant` annotation, for example:

```
@Entity
@Table(name="EMP")
@Multitenant(SINGLE_TABLE)
```

`SINGLE_TABLE` states that the table or tables (`Table` and `SecondaryTable`) associated with the given entity can be shared among tenants.

 **Note:**

The `@Table` annotation is not required, because the discriminator column is assumed to be on the primary table. However, if the discriminator column is defined on a secondary table, you must identify that table using `@SecondaryTable`.

- Specify the column or columns to be used as the discriminator column, using the `@TenantDiscriminatorColumn` annotation, for example:

```
@Entity
@Table(name="EMP")
@Multitenant(SINGLE_TABLE)
@TenantDiscriminatorColumn(name = "TENANT_ID")
```

You can specify multiple discriminator columns by using the `@TenantDiscriminatorColumns` annotation, for example:

```
@Entity
@Table(name = "EMPLOYEE")
@Multitenant(SINGLE_TABLE)
@TenantDiscriminatorColumns({
    @TenantDiscriminatorColumn(name = "TENANT_ID")
    @TenantDiscriminatorColumn(name = "TENANT_CODE"
    contextProperty="eclipselink.tenant-code")})
```

### Using Discriminator Columns

The following characteristics apply to discriminator columns:

- On persist, the values of tenant discriminator columns are populated from their associated context properties.
- Tenant discriminator columns are application definable. That is, the discriminator column is not tied to a specific column for each shared entity table. You can use `TENANT_ID`, `T_ID`, etc.
- There is no limit on how many tenant discriminator columns an application can define.
- Any name can be used for a discriminator column.
- Tenant discriminator column(s) must always be used with `@Multitenant(SINGLE_TABLE)`. You cannot specify the tenant discriminator column(s) only.
- Generated schemas can include specified tenant discriminator columns.
- Tenant discriminator columns can be mapped or unmapped:
  - When a tenant discriminator column is mapped, its associated mapping attribute must be marked as read only. With this restriction in place, a tenant discriminator column cannot be part of the entity identifier; it can only be part of the primary key specification on the database.
- Both mapped and unmapped properties are used to form the additional criteria when issuing a `SELECT` query.

## Using Single-Table Multi-Tenancy in an Inheritance Hierarchy

Inheritance strategies are configured by specifying the inheritance type (see `@javax.persistence.Inheritance`). Single-table multi-tenancy can be used in an inheritance hierarchy, as follows:

- Multi-tenant metadata can be applied only at the root level of the inheritance hierarchy when using a `SINGLE_TABLE` or `JOINED` inheritance strategy.
- You can also specify multi-tenant metadata within a `TABLE_PER_CLASS` inheritance hierarchy. In this case, every entity has its own table, with all its mapping data (which is not the case with `SINGLE_TABLE` or `JOINED` strategies). Consequently, in the `TABLE_PER_CLASS` strategy, some entities of the hierarchy may be multi-tenant, while others may not be. The other inheritance strategies can only specify multi-tenancy at the root level, because you cannot isolate an entity to a single table to build only its type.

### Examples

[Example 2-116](#) shows a number of uses of tenant discriminator columns.

[Example 2-117](#) shows the same mappings, using the `<tenant-discriminator-column>` XML element in the `eclipselink-orm.xml` file.

### Example 2-116 Using @TenantDiscriminatorColumn Annotation

```
/** Single tenant discriminator column */

@Entity
@Table(name = "CUSTOMER")
@Multitenant
@TenantDiscriminatorColumn(name = "TENANT", contextProperty = "multi-tenant.id")
public Customer() {
    ...
}

/** Multiple tenant discriminator columns using multiple tables */

@Entity
@Table(name = "EMPLOYEE")
@SecondaryTable(name = "RESPONSIBILITIES")
@Multitenant(SINGLE_TABLE)
@TenantDiscriminatorColumns({
    @TenantDiscriminatorColumn(name = "TENANT_ID", contextProperty = "employee-tenant.id", length = 20)
    @TenantDiscriminatorColumn(name = "TENANT_CODE", contextProperty = "employee-tenant.code", discriminatorType = STRING, table = "RESPONSIBILITIES")
})
public Employee() {
    ...
}

/** Tenant discriminator column mapped as part of the primary key on the database */

@Entity
```



```

@Table(name = "ADDRESS")
@Multitenant
@TenantDiscriminatorColumn(name = "TENANT", contextProperty = "tenant.id",
primaryKey = true)
public Address() {
    ...
}

/** Mapped tenant discriminator column */

@Entity
@Table(name = "Player")
@Multitenant
@TenantDiscriminatorColumn(name = "AGE", contextProperty = "tenant.age")
public Player() {
    ...

    @Basic
    @Column(name="AGE", insertable="false", updatable="false")
    public int age;
}

```

**Example 2-117 Using <tenant-discriminator-column> XML**

```

<!-- Single tenant discriminator column -->

<entity class="model.Customer">
  <multitenant>
    <tenant-discriminator-column name="TENANT context-property="multi-tenant.id"/>
  </multitenant>
  <table name="CUSTOMER"/>
  ...
</entity>

<!-- Multiple tenant discriminator columns using multiple tables -->

<entity class="model.Employee">
  <multitenant type="SINGLE_TABLE">
    <tenant-discriminator-column name="TENANT_ID" context-property="employee-
tenant.id" length="20"/>
    <tenant-discriminator-column name="TENANT_CODE" context-property="employee-
tenant.id" discriminator-type="STRING" table="RESPONSIBILITIES"/>
  </multitenant>
  <table name="EMPLOYEE"/>
  <secondary-table name="RESPONSIBILITIES"/>
  ...
</entity>

<!-- Tenant discriminator column mapped as part of the primary key on the database --
>

<entity class="model.Address">
  <multitenant>
    <tenant-discriminator-column name="TENANT" context-property="multi-tenant.id"
primary-key="true"/>
  </multitenant>
  <table name="ADDRESS"/>

```

```

...
</entity>

<!-- Mapped tenant discriminator column -->

<entity class="model.Player">
  <multi-tenant>
    <tenant-discriminator-column name="AGE" context-property="tenant.age"/>
  </multi-tenant>
  <table name="PLAYER"/>
  ...
  <attributes>
    <basic name="age" insertable="false" updatable="false">
      <column name="AGE"/>
    </basic>
    ...
  </attributes>
  ...
</entity>

```

**See Also**

- "[@Multitenant](#)"
- "[@TenantDiscriminatorColumns](#)"
- "[@TenantTableDiscriminator](#)"
- "Using Multitenancy" in *Solutions Guide for Oracle TopLink*
- Multitenant Examples at <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Multitenant>

## @TenantDiscriminatorColumns

Specify multiple discriminator columns for single-table multitenancy by using the `@TenantDiscriminatorColumns` annotation to contain multiple `@TenantDiscriminatorColumn` annotations.

**Annotation Elements**

[Table 2-75](#) describes this annotation's elements.

**Table 2-75 @TenantDiscriminatorColumns Annotation Elements**

Annotation Element	Description	Default
TenantDiscriminatorColumn value	(Optional) One or more <code>TenantDiscriminatorColumn</code> annotations	none

**Usage**

You must use the `@TenantDiscriminatorColumns` annotation to contain multiple `@TenantDiscriminatorColumn` annotations. The `@TenantDiscriminatorColumns` annotation cannot be used alone, and multiple the `@TenantDiscriminatorColumn` annotations cannot be used alone, without `@TenantDiscriminatorColumns`.

## Examples

```

@Entity
@Table(name = "EMPLOYEE")
@Multitenant(SINGLE_TABLE)
@TenantDiscriminatorColumns({
    @TenantDiscriminatorColumn(name = "TENANT_ID", contextProperty = "tenant-id")
    @TenantDiscriminatorColumn(name = "TENANT_CODE", contextProperty = "tenant-code")})

```

See "[@TenantDiscriminatorColumn](#)" for more examples of [@TenantDiscriminatorColumns](#).

## See Also

- "[@Multitenant](#)"
- "[@TenantDiscriminatorColumn](#)"
- "[@TenantTableDiscriminator](#)"

# @TenantTableDiscriminator

Table-per-tenant multitenancy allows multiple tenants of an application to isolate their data in one or more tenant-specific tables. The tenant table discriminator specifies how to discriminate the tenant's tables from the other tenants' tables in a table-per-tenant multitenancy strategy.

## Annotation Elements

[Table 2-76](#) describes this annotation's elements.

**Table 2-76** @TenantTableDiscriminator Annotation Elements

Annotation Element	Description	Default
java.lang.String ContextProperty	(Optional) Name of the context property to apply to as tenant table discriminator	eclipselink.tenant-id
TenantTableDiscriminator type	(Optional) Type of tenant table discriminator to use with the tables of the persistence unit: <ul style="list-style-type: none"> <li>• SCHEMA</li> <li>• SUFFIX</li> <li>• PREFIX</li> </ul>	SUFFIX

## Usage

In table-per-tenant multitenancy, tenants' tables can be in the same schema, using a prefix or suffix naming pattern to distinguish them; or they can be in separate schemas. The tenant table discriminator identifies whether to use the prefix or suffix naming pattern or to use a separate schema to identify and isolate the tenant's tables from other tenants' tables. The types are:

- **Schema:** Applies the tenant table discriminator as a schema to all multitenant tables. This strategy requires appropriate database provisioning.

- **Suffix:** Applies the tenant table discriminator as a suffix to all multitenant tables. This is the default strategy.
- **Prefix:** Applies the tenant table discriminator as a prefix to all multitenant tables.

Tenant table discriminator can be specified at the entity or mapped superclass level and must always be used with `Multitenant(TABLE_PER_TENANT)`. It is not sufficient to specify only a tenant table discriminator.

For more information about using `@TenantTableDiscriminator` and table-per-tenant multitenancy, see "[@Multitenant](#)".

### Examples

The following example shows a `SCHEMA`-type table discriminator.

#### Example 2-118 Using `@TenantTableDiscriminator` Annotation

```
@Entity
@Table(name="EMP")
@Multitenant(TABLE_PER_TENANT)
@TenantTableDiscriminator(type=SCHEMA, contextProperty="eclipselink.tenant-id")
public class Employee {
    ...
}
```

#### Example 2-119 Using `<tenant-table-discriminator>` XML

```
<entity class="Employee">
  <multitenant type="TABLE_PER_TENANT">
    <tenant-table-discriminator type="SCHEMA" context-property="eclipselink.tenant-id"/>
  </multitenant>
  <table name="EMP">
    ...
  </table>
</entity>
```

### See Also

- "[@Multitenant](#)"
- "[@TenantDiscriminatorColumn](#)"
- "[@TenantDiscriminatorColumns](#)"
- "Using Multitenancy" in *Solutions Guide for Oracle TopLink*
- Multitenant Examples at <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Multitenant>

## @TimeOfDay

Use `@TimeOfDay` to specify a specific time of day using a `Calendar` instance which is to be used within an `@Cache` annotation.

### Annotation Elements

[Table 2-77](#) describes this annotation's elements.

**Table 2-77 @TimeOfDay Annotation Elements**

Annotation Element	Description	Default
hour	(Optional) Hour of the day	0
millisecond	(Optional) Millisecond of the day	0
minute	(Optional) Minute of the day	0
second	(Optional) Second of the day	0
specified	For internal use – do not modify	true

**Examples**

See "[@Cache](#)" for examples of using @TimeOfDay.

**See Also**

For more information, see:

- "[@Cache](#)"

## @Transformation

Use @Transformation with a Transformation mapping to define the transformation of database columns into attribute values (unless the Transformation mapping is write-only, in which case it should have a @ReadTransformer annotation).

**Annotation Elements**

[Table 2-78](#) describes this annotation's elements.

**Table 2-78 @Transformation Annotation Elements**

Annotation Element	Description	Default
fetch	(Optional) Defines whether the value of the field or property should be lazily loaded or must be eagerly fetched. <ul style="list-style-type: none"> <li>• The EAGER strategy is a requirement on the persistence provider runtime that the value must be eagerly fetched.</li> <li>• The LAZY strategy is a hint to the persistence provider runtime.</li> </ul>	EAGER
optional	(Optional) A hint as to whether the value of the field or property may be null. It is disregarded for primitive types, which are considered non-optional.	true

**Usage**

Unless it's a read-only mapping, either WriteTransformer annotation or WriteTransformers annotation should be specified. Each WriteTransformer defines transformation of the attribute value to a single database column value (column is specified in the WriteTransformer).

**Examples**

[Example 2-120](#) shows how to use the @Transformation annotation.

Example 2-121 shows the same mapping, using the <transformation> XML element in the eclipselink-orm.xml file.

### Example 2-120 Using @Transformation Annotation

```
@Transformation(fetch=FecthType.LAZY, optional="true")
@ReadTransformer(class=package.MyNormalHoursTransformer.class)
@WriteTranformers({
    @WriteTranformer(column=@Column(name="START_TIME"),
        method="getStartDate"),
    @WriteTranformer(column=@Column(name="END_TIME"),
        class=package.MyTimeTransformer.class)
})
@Mutable
@ReturnUpdate
@Access(AccessType.PROPERTY)
@AccessMethods(get="getNormalHours", set="setNormalHours")
@Properties({
    @Property(name="x", value="y")
})
```

### Example 2-121 Using <transformation> XML

```
<transformation name="normalHours" fetch="LAZY" optional="true">
  <read-transformer method="buildNormalHours"/>
  <write-transformer method="getStartTime">
    <column name="START_TIME"/>
  </write-transformer>
  <write-transformer class="package.MyTimeTransformer">
    <column name="END_TIME"/>
  </write-transformer>
  <mutable/>
  <return-update/>
  <access type="PROPERTY"/>
  <access-methods get="getNormalHours" set="setNormalHours"/>
  <properties>
    <property name="x" value="y"/>
  </properties>
</transformation>
```

#### See Also

For more information, see:

- ["@WriteTransformer"](#)
- ["@ReadTransformer"](#)

## @TypeConverter

Use @TypeConverter to modify data values during the reading and writing of a mapped attribute.

#### Annotation Elements

Table 2-79 describes this annotation's elements.

**Table 2-79 @TypeConverter Annotation Elements**

Annotation Element	Description	Default
name	(Required) The <code>String</code> name for your converter. This name must be unique across the persistence unit.	none
dataType	(Optional) The type stored in the database	<code>void.class</code> <sup>1</sup>
objectType	(Optional) The type stored on the entity	<code>void.class</code> <sup>1</sup>

<sup>1</sup> The default is inferred from the type of the persistence field or property.

### Usage

Each `TypeConverter` must be uniquely named and can be defined at the class, field and property level and can be specified within an `Entity`, `MappedSuperclass` and `Embeddable` class. A `TypeConverter` is always specified by using an `@Convert` annotation

You can place a `@TypeConverter` on a `Basic`, `BasicMap` or `BasicCollection` mapping.

Oracle TopLink also includes `@ObjectTypeConverter` and `@StructConverter` converters.

### Examples

[Example 2-122](#) shows how to use the `@TypeConverter` annotation to convert the `Double` value stored in the database to a `Float` value stored in the entity.

#### Example 2-122 Using the @TypeConverter Annotation

```
@Entity
public class Employee implements Serializable{

    ...

    @TypeConverter (
        name="doubleToFloat",
        dataType=Double.class,
        objectType=Float.class,
    )
    @Convert("doubleToFloat")
    public Number getGradePointAverage() {
        return gradePointAverage;
    }

    ...
}
```

### See Also

For more information, see:

- ["@Convert"](#)
- ["@TypeConverters"](#)
- ["@ConversionValue"](#)

# @TypeConverters

Use `@TypeConverters` to define multiple `TypeConverter` elements.

## Annotation Elements

[Table 2-80](#) describes this annotation's elements.

**Table 2-80** @TypeConverters Annotation Elements

Annotation Element	Description	Default
<code>TypeConverter[]</code>	(Required) An array of type converter	

## Examples

[Example 2-123](#) shows how to use this annotation.

[Example 2-123](#) shows how to use the `<type-converters>` element in the `eclipselink-orm.xml` file.

### Example 2-123 Using @TypeConverters Annotation

```

@Entity
@TypeConverters({

    @TypeConverter(name="BigIntegerToString",dataType=String.class,objectType=BigInteger.
class)
    })
public class Parameters implements Serializable {
    private static final long serialVersionUID = -1979843739878183696L;
    @Column(name="maxValue", nullable=false, length=512)
    @Convert("BigIntegerToString")
    private BigInteger maxValue;
    ...
}

```

### Example 2-124 Using <type-converters> XML

```

<type-converters>
  <type-converter name="Long2String" data-type="String" object-type="Long"/>
  <type-converter name="String2String" data-type="String" object-type="String"/>
</type-converters>
<entity class="Employee">
  ...
</entity>

```

## See Also

For more information, see:

- "[@TypeConverter](#)"
- "[@Convert](#)"



## @UnionPartitioning

Use `@UnionPartitioning` to send queries to all connection pools and then union the results. This can be used for queries or relationships that span partitions when partitioning is used, such as on a ManyToMany cross partition relationship.

### Annotation Elements

Table 2-81 describes this annotation's elements.

**Table 2-81 @UnionPartitioning Annotation Elements**

Annotation Element	Description	Default
<code>name</code>	Name of the partition policy. Names must be unique for the persistence unit.	
<code>connectionPools</code>	List of connection pool names to load balance across	Defaults to all defined pools in the <code>ServerSession</code>
<code>replicateWrite</code>	Defines if write queries should be replicated. Writes are normally not replicated when unioning, but can be for ManyToMany relationships, when the join table needs to be replicated.	<code>false</code>

### Usage

Partitioning can be enabled on an Entity, relationship, query, or session/persistence unit. Partition policies are globally named to allow reuse, the partitioning policy must also be set using the `@Partitioned` annotation to be used.

The persistence unit properties support adding named connection pools in addition to the existing configuration for read/write/sequence. A named connection pool must be defined for each node in the database cluster.

If a transaction modifies data from multiple partitions, you should use JTA ensure proper two-phase commit of the data. You can also configure an exclusive connection in the `EntityManager` to ensure that only a single node is used for a single transaction.

### Examples

See "Example 2-89" for an example of partitioning with Oracle TopLink.

### See Also

For more information, see:

- "Data Partitioning"[http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/Data\\_Partitioning](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/Data_Partitioning)
- "`@Partitioned`"

## @UuidGenerator

Use `@UuidGenerator` to defines a primary key generator that may be referenced by name when a generator element is specified for the `@GeneratedValue` annotation. A

UUID (universally unique identifier) generator may be specified on the entity class or on the primary key field or property.

The generator name is global to the persistence unit (that is, across all generator types).

### Annotation Elements

Table 2-82 describes this annotation's elements.

**Table 2-82 @UuidGenerator Annotation Elements**

Annotation Element	Description	Default
name	Name of the UUID generator, which must be unique for the persistence unit	

### Examples

Example 2-125 shows how to use this annotation.

You can also specify the `SessionCustomizer` and configure the named sequence in your `eclipselink-orm.xml` file, as shown in Example 2-126.

You can also specify the named sequence at the persistence unit level (in the `persistence.xml` file) as shown in Example 2-127.

#### Example 2-125 Using @UuidGenerator Annotation

```
@Entity
@UuidGenerator(name="EMP_ID_GEN")
public class Employee {
    @Id
    @GeneratedValue(generator="EMP_ID_GEN")
    private String id;
}
```

#### Example 2-126 Using <generated-value> XML

```
<id name="id">
    <column name="PROJ_ID" />
    <generated-value generator="system-uuid"/>
</id>
```

#### Example 2-127 Specifying Generator in persistence.xml

```
<property name="eclipselink.session.customizer"
value="eclipselink.example.UUIDSequence"/>
```

### See Also

For more information, see:

- [@GeneratedValue](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Entities/Ids/GeneratedValue)[http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Entities/Ids/GeneratedValue](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Entities/Ids/GeneratedValue)
- "Entity Annotations"

## @UnionPartitioning

Use `@UnionPartitioning` to send queries to all connection pools and then union the results. This can be used for queries or relationships that span partitions when partitioning is used, such as on a ManyToMany cross partition relationship.

### Annotation Elements

[Table 2-81](#) describes this annotation's elements.

**Table 2-83 @UnionPartitioning Annotation Elements**

Annotation Element	Description	Default
<code>name</code>	Name of the partition policy. Names must be unique for the persistence unit.	
<code>connectionPools</code>	List of connection pool names to load balance across	Defaults to all defined pools in the <code>ServerSession</code>
<code>replicateWrite</code>	Defines if write queries should be replicated. Writes are normally not replicated when unioning, but can be for ManyToMany relationships, when the join table needs to be replicated.	<code>false</code>

### Usage

Partitioning can be enabled on an Entity, relationship, query, or session/persistence unit. Partition policies are globally named to allow reuse, the partitioning policy must also be set using the `@Partitioned` annotation to be used.

The persistence unit properties support adding named connection pools in addition to the existing configuration for read/write/sequence. A named connection pool must be defined for each node in the database cluster.

If a transaction modifies data from multiple partitions, you should use JTA ensure proper two-phase commit of the data. You can also configure an exclusive connection in the `EntityManager` to ensure that only a single node is used for a single transaction.

### Examples

See "[Example 2-89](#)" for an example of partitioning with Oracle TopLink.

### See Also

For more information, see:

- "Data Partitioning"[http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/Data\\_Partitioning](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/Data_Partitioning)
- "[@Partitioned](#)"

## @ValuePartition

Use `@ValuePartition` to represent a specific value partition that will be routed to a specific connection pool.

## Annotation Elements

Table 2-84 describes this annotation's elements.

**Table 2-84 @ValuePartition Annotation Elements**

Annotation Element	Description	Default
connectionPool	The connection pool to which to route queries to for the value	
value	The String representation of the value	

### Examples

[Example 2-128](#) shows how to use the `@ValuePartition` and `@ValuePartitioning` annotations.

[Example 2-129](#) shows how to use the `<partition>` element in the `eclipselink-orm.xml` file.

#### Example 2-128 Using @ValuePartition Annotation

```
@Entity
@Table(name = "PART_EMPLOYEE")
@IdClass(EmployeePK.class)
@ValuePartitioning(
    name="ValuePartitioningByLOCATION",
    partitionColumn=@Column(name="LOCATION"),
    unionUnpartitionableQueries=true,
    defaultConnectionPool="default",
    partitions={
        @ValuePartition(connectionPool="node2", value="Ottawa"),
        @ValuePartition(connectionPool="node3", value="Toronto")
    })
@Partitioned("ValuePartitioningByLOCATION")
public class Employee implements Serializable, Cloneable {
    ...
}
```

#### Example 2-129 Using <partition> XML

```
<entity name="Employee" class="Employee" access="FIELD">
  <table name="PART_EMPLOYEE"/>
  <id-class class="EmployeePK"/>
  <value-partitioning name="ValuePartitioningByLOCATION" union-unpartitionable-
queries="true" default-connection-pool="default">
    <partition-column name="LOCATION"/>
    <partition connection-pool="node2" value="Ottawa"/>
    <partition connection-pool="node3" value="Toronto"/>
  </value-partitioning>
</partitioned>ValuePartitioningByLOCATION</partitioned>
```

### See Also

For more information, see:

- ["@Partitioned"](#)
- ["@ValuePartitioning"](#)

## @ValuePartitioning

Use `@ValuePartitioning` to partition access to a database cluster by a field value from the object (such as the object's location or tenant). Each value is assigned a specific server. All write or read request for object's with that value are sent to the server. If a query does not include the field as a parameter, then it can either be sent to all server's and unioned, or left to the session's default behavior.

### Annotation Elements

[Table 2-85](#) describes this annotation's elements.

**Table 2-85 @ValuePartitioning Annotation Elements**

Annotation Element	Description	Default
name	(Required) Name of the partition policy. Names must be unique for the persistence unit.	
partitionColumn	(Required) The database column or query parameter to partition queries by  This is the table column name, not the class attribute name. The column value must be included in the query and should normally be part of the object's ID. This can also be the name of a query parameter.  If a query does not contain the field the query will not be partitioned.	
partitions	(Required) Store the value partitions. Each partition maps a value to a <code>connectionPool</code> .	
defaultConnectionPool	(Optional) The default connection pool is used for any unmapped values	
partitionValueType	(Optional) The type of the start and end values	String
unionUnpartitionableQueries	(Optional) Defines if queries that do not contain the partition field should be sent to every database and have the result unioned.	false

### Usage

Partitioning can be enabled on an Entity, relationship, query, or session/persistence unit. Partition policies are globally named to allow reuse, the partitioning policy must also be set using the `@Partitioned` annotation to be used.

The persistence unit properties support adding named connection pools in addition to the existing configuration for read/write/sequence. A named connection pool must be defined for each node in the database cluster.

If a transaction modifies data from multiple partitions, you should use JTA ensure proper two-phase commit of the data. You can also configure an exclusive connection in the `EntityManager` to ensure that only a single node is used for a single transaction.

### Examples

See "[Example 2-89](#)" for an example of partitioning with Oracle TopLink.

**See Also**

For more information, see:

- "Data Partitioning" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/Data\\_Partitioning](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/Data_Partitioning)
- "@Partitioned"

## @VariableOneToOne

Use `@VariableOneToOne` to represent a pointer references between a java object and an implementer of an interface. This mapping is usually represented by a single pointer (stored in an instance variable) between the source and target objects. In the relational database tables, these mappings are normally implemented using a foreign key and a type code.

**Annotation Elements**

Table 2-86 describes this annotation's elements.

**Table 2-86 @VariableOneToOne Annotation Elements**

Annotation Element	Description	Default
<code>CascadeType</code>	(Optional) Array of operations that must be cascaded to the target of the association	
<code>DiscriminatorClasses</code>	(Optional) Array of discriminator types that can be used with this mapping	If none are specified, <code>TopLink</code> adds entities within the persistence unit that implement the target interface. If <code>DiscriminatorColumn</code> is <code>STRING</code> , <code>TopLink</code> uses <code>Entity.name()</code> . If <code>DiscriminatorColumn</code> is <code>CHAR</code> , <code>TopLink</code> uses the first letter of the entity class. If <code>DiscriminatorColumn</code> is <code>INTEGER</code> , <code>TopLink</code> uses the next integer after the highest integer explicitly stated.
<code>DiscriminatorColumn</code>	(Optional) The discriminator column that contains the type identifiers	<code>DTYPE</code>
<code>FetchType</code>	(Optional) Specify how the value of the field or property should be loaded: <ul style="list-style-type: none"> <li>• <b>Eager:</b> Requires that the persistence provider runtime must eagerly fetch the value</li> <li>• <b>Lazy:</b> Hints that the persistence provider should lazily load the value</li> </ul>	<code>Eager</code>
<code>Optional</code>	(Optional) Specify if the association is optional.	
<code>OrphanRemoval</code>	(Optional) Specify if interface class that is the target of this mapping.	

**Table 2-86 (Cont.) @VariableOneToOne Annotation Elements**

Annotation Element	Description	Default
TargetInterface	(Optional) The interface class that is the target of this mapping	If none is specified, TopLink will infer the interface class based on the type of object being referenced.

### Usage

You can specify @VariableOneToOne on an Entity, MappedSuperclass, or Embeddable class.

### Examples

[Example 2-130](#) shows how to use the @VariableOneToOne annotation.

[Example 2-131](#) shows the same mapping using the <variable-one-to-one> XML element in the eclipselink-orm.xml file.

#### Example 2-130 Using @VariableOneToOne Annotation

```
@VariableOneToOne(
    cascade={ALL},
    fetch=LAZY,
    discriminatorColumn=@DiscriminatorColumn(name="CONTACT_TYPE"),
    discriminatorClasses={
        @DiscriminatorClass(discriminator="E", value="Email.class"),
        @DiscriminatorClass(discriminator="P", value="Phone.class")
    }
)
@JoinColumn(name="CONTACT_ID", referencedColumnName="C_ID")
@PrivateOwned
@JoinFetch(INNER)
public Contact getContact() {
    return contact;
}
```

#### Example 2-131 Using <variable-one-to-one> XML

```
<variable-one-to-one name="contact" fetch="LAZY">
    <cascade>
        <cascade-all/>
    </cascade>
    <discriminator-column name="CONTACT_TYPE"/>
    <discriminator-class discriminator="E" value="Email.class"/>
    <discriminator-class discriminator="P" value="Phone.class"/>
    <join-column name="CONTACT_ID" referencedColumnName="C_ID"/>
    <private-owned/>
    <join-fetch>INNER</join-fetch>
</variable-one-to-one>
```

### See Also

For more information, see:

- ["@DiscriminatorClass"](#)
- ["@PrivateOwned"](#)

## @VirtualAccessMethods

Use `@VirtualAccessMethods` to specify that a specific class contains virtual methods.

### Annotation Elements

[Table 2-87](#) describes this annotation's elements.

**Table 2-87** @VirtualAccessMethods Annotation Elements

Annotation Element	Description	Default
<code>get</code>	(Optional) Name of the <code>getter</code> method to use for the virtual property. This method must take a single <code>java.lang.String</code> parameter and return a <code>java.lang.Object</code> . If <code>get</code> is specified, you must also specify <code>set</code> .	<code>get</code>
<code>set</code>	(Optional) Name of the <code>setter</code> method to use for the virtual property. This method must take a <code>java.lang.String</code> parameter and a <code>java.lang.Object</code> parameter. If <code>set</code> is specified, you must also specify <code>get</code> .	<code>set</code>

### Usage

Use the `@VirtualAccessMethods` annotation to define access methods for mappings with in which `accessType=VIRTUAL`.

### Examples

[Table 2-87](#) shows an entity using property access.

In addition to using the `@VirtualAccessMethods` annotation, you can use the `<access>` and `<access-method>` elements in your `eclipselink-orm.xml` file, as shown in [Example 2-133](#).

### Example 2-132 Using @VirtualAccessMethods Annotation

```

@Entity
@VirtualAccessMethods
public class Customer{

    @Id
    private int id;
    ...

    @Transient
    private Map<String, Object> extensions;

    public <T> T get(String name) {
        return (T) extensions.get(name);
    }

    public Object set(String name, Object value) {
        return extensions.put(name, value);
    }
}

```



**Example 2-133 Using <access> and <access-methods> XML**

```
<access>VIRTUAL</access><access-methods get-method="get" set-method="set"/>@Entity
```

**See Also**

For more information, see:

- "Extensible Entities" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/Extensible\\_Entities](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/Extensible_Entities)
- "Making JPA Entities and JAXB Beans Extensible" in *Solutions Guide for Oracle TopLink*

## @WriteTransformer

Use `@WriteTransformer` on a `TransformationMapping` to transform a single attribute value to a single database column value. Use the `@WriteTransformers` annotation to wrap multiple transformations.

**Annotation Elements**

[Table 2-88](#) describes this annotation's elements.

**Table 2-88 @WriteTransformer Annotation Elements**

Annotation Element	Description	Default
column	(Optional) The column into which the value should be written  If a single <code>WriteTransformer</code> annotates an attribute, the attribute's name will be used as the column name.	@javax.persistence.Column
method	(Optional) The <code>String</code> method name that the mapped class must have. This method returns the value to be written into the database column.  <b>Note:</b> To support DDL generation and returning policy, the method should be defined to return a particular type, not just an <code>Object</code> . For example: <code>public Time getStartTime()</code>  The method may require <code>@Transient</code> to avoid being mapped as a <code>Basic</code> by default.	
transformerClass	(Optional) User-defined class that implements the <code>FieldTransformer</code> interface. This will instantiate the class and use its <code>buildFieldValue</code> method to create the value to be written into the database column.  <b>Note:</b> To support DDL generation and returning policy, the method <code>buildFieldValue</code> in the class should be defined to return the relevant Java type, not just <code>Object</code> as defined in the interface. For example: <code>public Time buildFieldValue(Object instance, String fieldName, Session session).</code>	void.class

**Note:**

You must specify either `transformerClass` *or* `method` , but not both.

**Usage**

You cannot define a `@WriteTransformer` for a read-only mapping.

Unless the `TransformationMapping` is write-only, it should include a `ReadTransformer` that defines the transformation of the database column values into attribute values.

**Configuring Field Transformer Associations**

Using a `FieldTransformer` is non-intrusive; your domain object does not need to implement an `EclipseLink` interface or provide a special transformation method.

You can configure a method-based field transformer using `AbstractTransformationMapping` method `addFieldTransformation`, passing in the name of the database field and the name of the domain object method to use.

You can configure a class-based field transformer using `AbstractTransformationMapping` method `addFieldTransformer`, passing in the name of the database field and an instance of `org.eclipse.persistence.mappings.Transformers.FieldTransformer`.

A convenient way to create a `FieldTransformer` is to extend `FieldTransformerAdapter`.

**Examples**

See "[Example 2-120](#)" for an example of how to use the `@WriteTransformer` annotation with a `Transformation` mapping.

**See Also**

For more information, see:

- "[@WriteTransformers](#)"
- "[@Transformation](#)".
- [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Print\\_Version#How\\_to\\_Use\\_the\\_.40Transformation\\_Annotation](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Print_Version#How_to_Use_the_.40Transformation_Annotation)

## @WriteTransformers

Use `@WriteTransformer` ON a `TransformationMapping` to transform a single attribute value to a single database column value. Use the `@WriteTransformers` annotation to wrap multiple transformations.

**Annotation Elements**

[Table 2-89](#) describes this annotation's elements.

**Table 2-89 @WriteTransformers Annotation Elements**

Annotation Element	Description	Default
WriteTransformer	An array of WriteTransformer	

### Usage

You cannot use @WriteTransformers for a read-only mapping.

### Examples

See "[Example 2-120](#)" for an example of how to use the @WriteTransformer annotation with a Transformation mapping.

### See Also

For more information, see:

- "[@WriteTransformer](#)".
- "[@Transformation](#)".
- [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Print\\_Version#How\\_to\\_Use\\_the\\_.40Transformation\\_Annotation](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Print_Version#How_to_Use_the_.40Transformation_Annotation)

# 3

## Java Persistence Query Language Extensions

This chapter describes the extensions EclipseLink provides to the standard JPA Java Persistence Query Language (JPQL). These extensions, referred to as the EclipseLink Query Language (EQL), provide access to additional database features many of which are part of standard SQL, provide access to native database features and functions, and provide access to Oracle TopLink specific features.

This chapter includes the following sections:

- [Special Operators](#)
- [EclipseLink Query Language](#)

For more information on JQPL, see:

- "Query Language" in the JPA Specification (<http://jcp.org/en/jsr/detail?id=317>)
- "The Java Persistence Query Language" in *The Java EE 6 Tutorial* (<http://docs.oracle.com/javaee/6/tutorial/doc/bnbtg.html>)
- "EclipseLink User Guide" ([http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Querying/JPQL](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Querying/JPQL))

### Special Operators

EclipseLink defines the following operators to perform database operations that would not be possible in standard JPQL:

- COLUMN
- FUNCTION
- OPERATOR
- SQL

### EclipseLink Query Language

Oracle TopLink provides access to the following EclipseLink EQL functions:

- CAST
- EXCEPT
- EXTRACT
- INTERSECT
- ON
- REGEXP

- [TABLE](#)
- [TREAT](#)
- [UNION](#)

## CAST

Use `CAST` to convert a value to a specific database type.

### Usage

The `CAST` function is database independent, but requires database support.

### Examples

[Example 3-1](#) shows how to use this JPQL extension.

#### Example 3-1 Using `CAST` EQL

```
CAST(e.salary NUMERIC(10,2))
```

## COLUMN

Use `COLUMN` to access to unmapped columns in an object's table.

### Usage

You can use `COLUMN` to access foreign key columns, inheritance discriminators, or primitive columns (such as `ROWID`). You can also use `COLUMN` in JPQL fragments inside the [@AdditionalCriteria](#) annotation.

### Examples

[Example 3-2](#) shows how to use the `COLUMN` EQL.

In [Example 3-3](#), uses `COLUMN` EQL access a primitive column (`ROWID`).

#### Example 3-2 Using `COLUMN` EQL

```
SELECT e FROM Employee e WHERE COLUMN('MANAGER_ID', e) = :id
```

#### Example 3-3 Using `COLUMN` with a Primitive Column

```
SELECT e FROM Employee e WHERE COLUMN('ROWID', e) = :id
```

### See Also

For more information, see:

- ["@AdditionalCriteria"](#)

## EXCEPT

When performing multiple queries, use `EXCEPT` to remove the results of a second query from the results of a first query.

### Usage

The `EXCEPT` function is database independent, but requires database support.

### Examples

[Example 3-4](#) shows how to use this JPQL extension.

#### Example 3-4 Using EXCEPT EQL

```
SELECT e FROM Employee e
EXCEPT SELECT e FROM Employee e WHERE e.salary > e.manager.salary
```

### See Also

For more information, see:

- ["UNION"](#)
- ["INTERSECT"](#)

## EXTRACT

Use `EXTRACT` to retrieve the date portion of a date/time value.

### Usage

The `EXTRACT` function is database independent, but requires database support

### Examples

[Example 3-5](#) shows how to use this JPQL extension.

#### Example 3-5 Using EXTRACT EQL

```
EXTRACT(YEAR, e.startDate)
```

## FUNCTION

Use `FUNCTION` (formerly `FUNC`) to call database specific functions from JPQL

### Usage

You can use `FUNCTION` to call database functions that are not supported directly in JPQL and to call user or library specific functions.

#### Note:

`FUNCTION` is database specific – it does not translate the function call in any way to support different databases as other JPQL functions do.

Use `FUNCTION` to call functions with normal syntax. Functions that require special syntax cannot be called with `FUNCTION`. Instead, use [OPERATOR](#)

## Examples

[Example 3-6](#) shows how to use this JPQL extension.

[Example 3-7](#) shows how to use FUNCTION with Oracle Spatial queries

### Example 3-6 Using FUNCTION EQL

```
SELECT p FROM Phone p WHERE FUNCTION('TO_NUMBER', e.areaCode) > 613

SELECT FUNCTION('YEAR', e.startDate) AS year, COUNT(e) FROM Employee e GROUP BY year
```

### Example 3-7 Using FUNCTION EQL Oracle Spatial examples

```
SELECT a FROM Asset a, Geography geo WHERE geo.id = :id AND a.id IN :id_list AND
FUNCTION('ST_INTERSECTS', a.geometry, geo.geometry) = 'TRUE'
```

```
SELECT s FROM SimpleSpatial s WHERE FUNCTION('MDSYS.SDO_RELATE',
s.jGeometry, :otherGeometry, :params) = 'TRUE' ORDER BY s.id ASC
```

## See Also

For more information, see:

- ["OPERATOR"](#)

# INTERSECT

When performing multiple queries, use `INTERSECT` to return only results that are found in both queries.

## Examples

[Example 3-8](#) shows how to use this JPQL extension.

### Example 3-8 Using INTERSECT EQL

```
SELECT MAX(e.salary) FROM Employee e WHERE e.address.city = :city1
UNION SELECT MAX(e.salary) FROM Employee e WHERE e.address.city = :city2
SELECT e FROM Employee e JOIN e.phones p WHERE p.areaCode = :areaCode1
INTERSECT SELECT e FROM Employee e JOIN e.phones p WHERE p.areaCode = :areaCode2
SELECT e FROM Employee e
EXCEPT SELECT e FROM Employee e WHERE e.salary > e.manager.salary
```

## See Also

For more information, see:

- ["UNION"](#)
- ["EXCEPT"](#)

# ON

Use the `ON` clause to append additional conditions to a `JOIN` condition, such as for outer joins.

### Usage

Oracle TopLink supports using the `ON` clause between two root level objects.

### Examples

[Example 3-9](#) shows how to use this JPQL extension.

#### Example 3-9 Using ON Clause EQ

```
SELECT e FROM Employee e LEFT JOIN e.address ON a.city = :city
```

```
SELECT e FROM Employee e LEFT JOIN MailingAddress a ON e.address = a.address
```

### See Also

For more information, see:

- "JPQL" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Querying/JPQL](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Querying/JPQL)
- 

## OPERATOR

Use `OPERATION` to call any Oracle TopLink operator.

### Usage

Oracle TopLink supports many database functions using standard operator names that are translated to different databases. Oracle TopLink operators are supported on any database that has an equivalent function (or set of functions). Use the `EclipseLink ExpressionOperator` class to define a custom operator or allow `DatabasePlatform` to override an operator..

`OPERATOR` is similar to `FUNCTION`, but allows the function to be database independent, and you can call functions that require special syntax.

The supported Oracle TopLink operators include:

- `Abs`
- `ToUpperCase`
- `ToLowerCase`
- `Chr`
- `Concat`
- `Coalesce`
- `Case`
- `HexToRaw`
- `Initcap`
- `Instring`
- `Soundex`



- LeftPad
- LeftTrim
- RightPad
- RightTrim
- Substring
- Translate
- Ascii
- Length
- CharIndex
- Cast
- Extract
- CharLength
- Difference
- Reverse
- Replicate
- Right
- Locate
- ToNumber
- ToChar
- AddMonths
- DateToString
- MonthsBetween
- NextDay
- RoundDate
- AddDate
- DateName
- DatePart
- DateDifference
- TruncateDate
- NewTime
- Nvl
- NewTime
- Ceil
- Cos
- Cosh
- Acos
- Asin

- Atan
- Exp
- Sqrt
- Floor
- Ln
- Log
- Mod
- Power
- Round
- Sign
- Sin
- Sinh
- Tan
- Tanh
- Trunc
- Greatest
- Least
- Add
- Subtract
- Divide
- Multiply
- Atan2
- Cot
- Deref
- Ref
- RefToHex
- Value
- ExtractXml
- ExtractValue
- ExistsNode
- GetStringVal
- GetNumberVal
- IsFragment
- SDO\_WITHIN\_DISTANCE
- SDO\_RELATE
- SDO\_FILTER
- SDO\_NN

- Nullif

### Examples

[Example 3-10](#) shows how to use this JPQL extension.

#### Example 3-10 Using OPERATOR EQL

```
SELECT e FROM Employee e WHERE OPERATOR('ExtractXml', e.resume, '@years-experience')  
> 10
```

### See Also

For more information, see:

- "FUNCTION"
- "JPQL" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Querying/JPQL](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Querying/JPQL)

## REGEXP

Use REGEXP to determine if a string matches a regular expression.

### Usage

To use the REGEXP function, your database must support regular expressions.

### Examples

[Example 3-11](#) shows how to use this JPQL extension.

#### Example 3-11 Using REGEXP EQL

```
e.lastName REGEXP '^Dr\.*'
```

### See Also

For more information, see:

- "JPQL" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Querying/JPQL](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Querying/JPQL)

## SQL

Use SQL to integrate SQL within a JPQL statement. This provides an alternative to using native SQL queries simply because the query may require a function not supported in JPQL.

### Usage

The SQL function includes both the SQL string (to inline into the JPQL statement) and the arguments to translate into the SQL string. Use a question mark character ( ? ) to define parameters within the SQL that are translated from the SQL function arguments.

You can use SQL to call database functions with non standard syntax, embed SQL literals, and perform any other SQL operations within JPQL. With SQL, you can still use JPQL for the query.

### Examples

[Example 3-12](#) shows how to use this JPQL extension.

#### Example 3-12 Using SQL EQ

```
SELECT p FROM Phone p WHERE SQL('CAST(? AS CHAR(3))', e.areaCode) = '613'
```

```
SELECT SQL('EXTRACT(YEAR FROM ?)', e.startDate) AS year, COUNT(e) FROM Employee e
GROUP BY year
```

```
SELECT e FROM Employee e ORDER BY SQL('? NULLS FIRST', e.startDate)
```

```
SELECT e FROM Employee e WHERE e.startDate = SQL('(SELECT SYSDATE FROM DUAL)')
```

### See Also

For more information, see:

- "JPQL" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Querying/JPQL](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Querying/JPQL)
- 

## TABLE

Use TABLE to access unmapped tables.

### Usage

With the TABLE function, you use join, collection, history, auditing, or system tables in a JPQL query.

### Examples

[Example 3-13](#) shows how to use an **audit** table (unmapped) within a SELECT statement.

#### Example 3-13 Using TABLE EQL

```
SELECT e, a.LAST_UPDATE_USER FROM Employee e, TABLE('AUDIT') a WHERE a.TABLE =
'EMPLOYEE' AND a.ROWID = COLUMN('ROWID', e)
```

### See Also

For more information, see:

- "JPQL" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Querying/JPQL](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Querying/JPQL)
-

## TREAT

Use `TREAT` to cast an object as its subclass value (that is, downcast related entities with inheritance).

### Examples

[Example 3-14](#) shows how to use this JPQL extension.

#### Example 3-14 Using `TREAT` EQL

```
SELECT e FROM Employee JOIN TREAT(e.projects AS LargeProject)
p WHERE p.budget > 1000000
```

## UNION

Use `UNION` to combine the results of two queries into a single query.

### Usage

With `UNION`, the unique results from both queries will be returned. If you include the `ALL` option, the results found in both queries will be duplicated.

### Examples

[Example 3-15](#) shows how to use this JPQL extension.

#### Example 3-15 Using `UNION` EQL

```
SELECT MAX(e.salary) FROM Employee e WHERE e.address.city = :city1
UNION SELECT MAX(e.salary) FROM Employee e WHERE e.address.city = :city2
```

### See Also

For more information, see:

- "EXCEPT"
- "INTERSECT"
- "JPQL" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Querying/JPQL](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Querying/JPQL)

# 4

## JPA Query Customization Extensions

This chapter describes how to specify EclipseLink query hints (JPA query extensions). You can specify EclipseLink query hints (JPA query extensions) by:

- Using the `@QueryHint` annotation
- Including the hints in the `orm.xml` or `eclipselink-orm.xml` file
- Using the `setHint()` method when executing a named or dynamic query (JPQL or Criteria)

EclipseLink supplies the following query hints:

Oracle TopLink supports the following EclipseLink query hints:

- `batch`
- `batch.size`
- `batch.type`
- `cache-usage`
- `cache-usage.indirection-policy`
- `cursor`
- `composite-unit.member`
- `cursor.initial-size`
- `cursor.page-size`
- `exclusive-connection`
- `flush`
- `history.as-of`
- `history.as-of.scn`
- `inheritance.outer-join`
- `jdbc.bind-parameters`
- `jdbc.cache-statement`
- `jdbc.fetch-size`
- `jdbc.first-result`
- `jdbc.max-rows`
- `jdbc.native-connection`
- `jdbc.parameter-delimiter`
- `jdbc.timeout`
- `join-fetch`
- `left-join-fetch`

- `load-group`
- `load-group.attribute`
- `maintain-cache`
- `pessimistic-lock`
- `prepare`
- `query-results-cache`
- `query-results-cache.expiry`
- `query-results-cache.expiry-time-of-day`
- `query-results-cache.ignore-null`
- `query-results-cache.randomize-expiry`
- `query-results-cache.size`
- `query-results-cache.type`
- `query-type`
- `read-only`
- `refresh`
- `refresh.cascade`
- `result-collection-type`
- `sql.hint`

All EclipseLink query hints are defined in the `QueryHints` class in the `org.eclipse.persistence.config` package. When you set a hint, you can set the value using the public static final field in the appropriate configuration class in `org.eclipse.persistence.config` package, including the following:

- `HintValues`
- `CacheUsage`
- `PessimisticLock`
- `QueryType`

For more information, see Section 10.3.1 "NamedQuery Annotation" in the JPA Specification (<http://jcp.org/en/jsr/detail?id=317>).

For more information, see:

- "Query Hints" in *Understanding Oracle TopLink*
- "Query" in *Solutions Guide for Oracle TopLink*
- Section 10.3.1 "NamedQuery Annotation" in the JPA Specification (<http://jcp.org/en/jsr/detail?id=317>)

## batch

Use `eclipselink.batch` to supply TopLink with batching information so subsequent queries of related objects can be optimized in batches, instead of being retrieved one-by-one or in one large joined read.

## Values

This query hint accepts a single-valued, relationship path expression.

## Usage

Using the `eclipselink.batch` hint is more efficient than joining, because TopLink avoids reading duplicate data.

You can only batch queries that have a single object in the select clause.

Valid values: a single-valued relationship path expression.

### Note:

Use *dot notation* to access nested attributes. For example, to batch-read an employee's manager's address, use `e.manager.address`.

## Examples

[Example 4-1](#) shows how to use this hint in a JPA query.

[Example 4-2](#) shows how to use this hint with the `@QueryHint` annotation.

### Example 4-1 Using batch in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.batch", "e.address");
```

### Example 4-2 Using batch in a @QueryHint Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.BATCH, value="e.address");
```

## See Also

For more information, see:

- "EclipseLink" JPA Query Hints [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Querying/Query\\_Hints](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Querying/Query_Hints)
- "join-fetch"
- "batch.size"
- "batch.type"
- "Querying" in *Solutions Guide for Oracle TopLink*

# batch.size

Use `eclipselink.batch.size` to configure the batch size when using `batch.type` set to IN.



## Values

[Table 4-1](#) describes this persistence property's values.

**Table 4-1 Valid Values for batch.size**

Value	Description
Size	The number of keys in each IN clause Default: <b>256</b> or the query's <code>pageSize</code> (for cursor queries)

## Examples

[Example 4-3](#) shows how to use this hint in a JPA query.

[Example 4-4](#) shows how to use this hint with the `@QueryHint` annotation.

### Example 4-3 Using batch.size in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.BATCH_SIZE", "3");
```

### Example 4-4 Using batch.size in a @QueryHint Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.BATCH_SIZE, value="3");
```

## See Also

For more information, see:

- ["batch"](#)

# batch.type

Use `eclipselink.batch.type` to specify the type of batch fetching the query should use for any batch-fetched relationships.

## Values

[Table 4-2](#) describes this query hint's values.

**Table 4-2 Valid Values for batch.type**

Value	Description
JOIN	(Default) The original query's selection criteria is joined with the batch query.
EXISTS	Uses an SQL <code>EXISTS</code> and a sub-select in the batch query instead of a join.
IN	Uses an SQL <code>IN</code> clause in the batch query passing in the source object IDs.

## Examples

[Example 4-5](#) shows how to use this hint in a JPA query.

[Example 4-6](#) shows how to use this hint with the `@QueryHint` annotation.

#### Example 4-5 Using `batch.type` in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.BATCH_TYPE", "EXISTS");
```

#### Example 4-6 Using `batch.type` in a `@QueryHint` Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.BATCH_TYPE, value="EXISTS");
```

#### See Also

For more information, see:

- ["batch"](#)
- ["@BatchFetch"](#)

## cache-usage

Use `eclipselink.cache-usage` to specify how the query should interact with the Oracle TopLink cache.

#### Values

[Table 4-3](#) describes this query hint's valid values.

**Table 4-3 Valid Values for `org.eclipse.persistence.config.CacheUsage`**

Value	Description
<code>DoNotCheckCache</code>	Always go to the database.
<code>CheckCacheByExactPrimary Key</code>	If a read-object query contains an expression where the primary key is the only comparison, you can obtain a cache hit if you process the expression against the object in memory.
<code>CheckCacheByPrimaryKey</code>	If a read-object query contains an expression that compares at least the primary key, you can obtain a cache hit if you process the expression against the objects in memory.
<code>CheckCacheThenDatabase</code>	You can configure any read-object query to check the cache completely before you resort to accessing the database.
<code>CheckCacheOnly</code>	You can configure any read-all query to check only the parent session cache (shared cache) and return the result from it without accessing the database.
<code>ConformResultsInUnitOfWork</code>	You can configure any read-object or read-all query within the context of a unit of work to conform the results with the changes to the object made within that unit of work. This includes new objects, deleted objects and changed objects.

**Table 4-3 (Cont.) Valid Values for org.eclipse.persistence.config.CacheUsage**

Value	Description
UseEntityDefault	<p>(Default) Use the cache configuration as specified by the EclipseLink descriptor API for this entity.</p> <p><b>Note:</b> The entity default value is to not check the cache (DoNotCheckCache). The query will access the database and synchronize with the cache. Unless refresh has been set on the query, the cached objects will be returned without being refreshed from the database. EclipseLink does not support the cache usage for native queries or queries that have complex result sets such as returning data or multiple objects.</p>

### Usage

Oracle TopLink JPA uses a shared cache assessed across the entire persistence unit. After completing an operation in a particular persistence context, Oracle TopLink merges the results into the shared cache, so that other persistence contexts can use the results *regardless of whether the entity manager and persistence context are created in Java SE or Java EE*.

Any entity persisted or removed using the entity manager will always consistently maintained with the cache.

### Examples

[Example 4-7](#) shows how to use this hint in a JPA query.

[Example 4-8](#) shows how to use this hint with the @QueryHint annotation.

#### Example 4-7 Using cache-usage in a JPA Query

```
import org.eclipse.persistence.config.CacheUsage;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.CACHE_USAGE, CacheUsage.CheckCacheOnly);
```

#### Example 4-8 Using cache-usage in a @QueryHint Annotation

```
import org.eclipse.persistence.config.CacheUsage;
import org.eclipse.persistence.config.TargetDatabase;
@QueryHint(name=QueryHints.CACHE_USAGE, value=CacheUsage.CheckCacheOnly);
```

### See Also

For more information, see:

- "Oracle TopLink Caches" in *Understanding Oracle TopLink*
- "Querying" in *Solutions Guide for Oracle TopLink*
- "Enhancing Performance" in *Solutions Guide for Oracle TopLink*
- ["cache-usage.indirection-policy"](#)

## cache-usage.indirection-policy

Use `eclipselink.cache-usage.indirection-policy` (with `cache-usage`) to configure in-memory querying and conforming's treatment of uninstantiated indirection/lazy relationships.

### Values

[Table 4-4](#) describes this query hint's values.

**Table 4-4 Valid Values for `cache-usage.indirection-policy`**

Value	Description
Conform	If conforming encounters an uninstantiated indirection/lazy object, it is assumed to conform.
Exception	(Default) If conforming encounters an uninstantiated indirection/lazy object an exception is thrown.
NotConform	If conforming encounters an uninstantiated indirection/lazy object it is assumed to not conform.
Trigger	If conforming encounters an uninstantiated indirection/lazy object it is triggered.

### Usage

This hint applies only when the query traverses a `join` across a lazy relationship.

### Examples

[Example 4-9](#) shows how to use this hint in a JPA query.

[Example 4-10](#) shows how to use this hint with the `@QueryHint` annotation.

#### Example 4-9 Using `cache-usage.indirection-policy` in a JPA Query

```
query.setHint(QueryHints.INDIRECTION_POLICY, CacheUsageIndirectionPolicy.Trigger);
```

#### Example 4-10 Using `cache-usage.indirection-policy` in a `@QueryHint` Annotation

```
@QueryHint(name=QueryHints.INDIRECTION_POLICY,  
value=CacheUsageIndirectionPolicy.Trigger)
```

### See Also

For more information, see:

- "EclipseLink" JPA Query Hints [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Querying/Query\\_Hints](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Querying/Query_Hints)
- "Oracle TopLink Caches" in *Understanding Oracle TopLink*
- "Querying" in *Solutions Guide for Oracle TopLink*
- "[cache-usage](#)"

## cursor

Use `eclipselink.cursor` to configure the query to return a `CursoredStream`.

### Values

[Table 4-5](#) describes this persistence property's values.

**Table 4-5 Valid Values for cursor**

Value	Description
true	
false	(Default)

### Usage

A *Cursor* is a stream of the JDBC `ResultSet`. Cursors are useful for large results sets, or when you only need the few results of a query.

A cursor implements `Enumeration`, when the each `next()` will fetch the next from the JDBC `ResultSet`, and builds the resulting `Object` or value. A `Cursor` requires, and will keep, a live JDBC connection. You must use `close()` to free the `Cursor`'s resources.

You can access a `Cursor` from a JPA Query through `getSingleResult()`, or from `JpaQuery` using `getResultCursor()`.



#### Tip:

You can use `MAX_ROWS` and `FIRST_RESULT` instead of a `Cursor` to obtain a page of results.

### Examples

[Example 4-11](#) shows how to use this hint in a JPA query.

[Example 4-12](#) shows how to use this hint with the `@QueryHint` annotation.

#### Example 4-11 Using cursor in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.cursor", "TRUE");
```

#### Example 4-12 Using cursor in a @QueryHint Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.CURSOR, value="TRUE");
```

### See Also

For more information, see:

- "cursor.initial-size"
- "cursor.page-size"

## composite-unit.member

The `eclipselink.composite-unit.member` query hint specifies the name of the composite member persistence unit on which you want to execute the query. You must use it on a native query executed on a composite persistence unit.

### Values

[Table 4-6](#) describes this persistence property's values.

**Table 4-6 Valid Values for composite-unit.member**

Value	Description
value	The name of the composite persistence unit.

### Examples

[Example 4-13](#) shows how to use this hint in a JPA query.

[Example 4-14](#) shows how to use this hint with the `@QueryHint` annotation.

#### Example 4-13 Using composite-unit.member in a JPA query

```
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.composite-unit.member", "mypersistentunit");
```

#### Example 4-14 Using composite-unit.member in an @QueryHint annotation

```
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.COMPOSITE_UNIT_MEMBER,
value="mypersistentunit");
```

## cursor.initial-size

Use `eclipselink.cursor.initial-size` to configure the query to return a `CursoredStream` with the specified initial size.

### Values

[Table 4-7](#) describes this query hint's values.

**Table 4-7 Valid Values for cursor.initial-size**

Value	Description
Integer or Strings that can be parsed to int values	The initial number of objects that are prebuilt for the stream before a <code>next()</code> is called

### Examples

[Example 4-15](#) shows how to use this hint in a JPA query.

[Example 4-16](#) shows how to use this hint with the `@QueryHint` annotation.

#### Example 4-15 Using cursor.initial-size in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.cursor_initial_size", "10");
```

#### Example 4-16 Using cursor.initial-size in a @QueryHint Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.CURSOR_INITIAL_SIZE, value="10");
```

#### See Also

For more information, see:

- ["cursor"](#)

## cursor.page-size

Use `eclipselink.cursor.page-size` to configure the query to return a `CursoredStream` with the specified page size.

#### Values

[Table 4-8](#) describes this query hint's values.

**Table 4-8 Valid Values for cursor.page-size**

Value	Description
Integer or Strings that can be parsed to int values	The number of objects that are fetched from the stream on a <code>next()</code> call, if the buffer of objects is empty

#### Examples

[Example 4-17](#) shows how to use this hint in a JPA query.

[Example 4-18](#) shows how to use this hint with the `@QueryHint` annotation.

#### Example 4-17 Using cursor.page-size in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.CURSOR_PAGE_SIZE", "10");
```

#### Example 4-18 Using cursor.page-size in a @QueryHint Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.CURSOR_PAGE_SIZE, value="10");
```

#### See Also

For more information, see:

- ["cursor"](#)

## exclusive-connection

Use `eclipselink.exclusive-connection` to specify if the query should use the exclusive (transactional/write) connection.

### Values

[Table 4-9](#) describes this query hint's values.

**Table 4-9 Valid Values for exclusive-connection**

Value	Description
true	The query is executed through the exclusive connection.
false	

### Usage

This is valid only when an `EXCLUSIVE_CONNECTION_MODE` property has been set for the persistence unit (such as VPD). If a `jdbc.exclusive-connection.mode` has been configured, use this query hint to ensure that the query is executed through the exclusive connection.

This may be required in certain cases, such as when database security prevents a query joining to a secure table from returning the correct results, when executed through the shared connection.

### Examples

[Example 4-19](#) shows how to use this hint in a JPA query.

[Example 4-20](#) shows how to use this hint with the `@QueryHint` annotation.

#### Example 4-19 Using exclusive-connection in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.EXCLUSIVE_CONNECTION", "TRUE");
```

#### Example 4-20 Using exclusive-connection in a @QueryHint Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.EXCLUSIVE_CONNECTION, value="TRUE");
```

### See Also

For more information, see:

- ["jdbc.exclusive-connection.mode"](#)

## flush

Use `eclipselink.flush` to specify if the query should flush the persistence context before executing.



## Values

Table 4-10 describes this query hint's values.

**Table 4-10 Valid Values for flush**

Value	Description
true	The query triggers a flush of the persistence context before execution
false	(Default)

## Usage

If the query may access objects that have been changed in the persistence context, you must trigger a flush in order for the query to see the changes. If the query does not require seeing the changes, you should avoid the flush in order to improve performance.

You can also configure the flush-mode as a persistence unit property. See "[flush-clear.cache](#)" for more information.

You can also use conforming to query changes without requiring a flush. See "[cache-usage](#)" for more information.

## Examples

[Example 4-21](#) shows how to use this hint in a JPA query.

[Example 4-22](#) shows how to use this hint with the `@QueryHint` annotation.

### Example 4-21 Using flush in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.FLUSH", "TRUE");
```

### Example 4-22 Using flush in a @QueryHint Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.FLUSH, value="TRUE");
```

## See Also

For more information, see:

- "[persistence-context.flush-mode](#)"
- "[flush-clear.cache](#)"
- "EclipseLink" JPA Query Hints [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Querying/Query\\_Hints](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Querying/Query_Hints)
- "Oracle TopLink Caches" in *Understanding Oracle TopLink*
- "Querying" in *Solutions Guide for Oracle TopLink*
- "[cache-usage.indirection-policy](#)"
- "[cache-usage](#)"

## history.as-of

Configures the query to query the state of the object as-of a point in time.

### Values

[Table 4-11](#) describes this query hint's values.

**Table 4-11 Valid Values for history.as-of**

Value	Description
Timestamp	Timestamp, in the form: YYYY/MM/DD HH:MM:SS.n

### Usage

Both the query execution and result will conform to the database as it existed based on the database SCN.

#### Note:

This query hint requires a class with historical support or when using Oracle Flashback.

### Examples

[Example 4-23](#) shows how to use this hint in a JPA query.

[Example 4-24](#) shows how to use this hint with the `@QueryHint` annotation.

#### **Example 4-23 Using history.as-of in a JPA Query**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.AS_OF", "2012/10/15 11:21:18.2");
```

#### **Example 4-24 Using history.as-of in @QueryHint Annotation**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.AS_OF, value="2012/10/15 11:21:18.2");
```

### See Also

For more information, see:

- ["history.as-of.scn"](#)
- "Using Oracle Flashback Technology" in *Oracle Database Advanced Application Developer's Guide*

## history.as-of.scn

Use `eclipselink.history.as-of.scn` to configure the query to query the state of the object as-of a database SCN (System Change Number).

### Values

[Table 4-12](#) describes this query hint's values.

**Table 4-12 Valid Values for history.as-of.scn**

Value	Description
value	Integer SCN value

### Usage



#### Note:

This query hint requires Oracle Flashback support.

### Examples

[Example 4-25](#) shows how to use this hint in a JPA query.

[Example 4-26](#) shows how to use this hint with the `@QueryHint` annotation.

#### Example 4-25 Using history.as-of.scn in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.AS_OF_SCN", "3");
```

#### Example 4-26 Using history.as-of.scn in @QueryHint Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.AS_OF_SCN, value="3");
```

### See Also

For more information, see:

- ["history.as-of"](#)
- ["Using Oracle Flashback Technology"](#) in *Oracle Database Advanced Application Developer's Guide*

## inheritance.outer-join

Use `eclipselink.inheritance.outer-join` to configure the query to use an outer-join for all subclasses.

## Values

Table 4-13 describes this query hint's values.

**Table 4-13 Valid Values for inheritance.outer-join**

Value	Description
true	Use outer-join.
false	(Default) Do not use outer-join; execute a separate query for each subclass.

## Usage

This query hint can be used queries to root or branch inherited classes.

You can also configure this behavior by using a `DescriptorCustomizer` (see "[descriptor.customizer](#)").

### Note:

This is required for correct ordering, `firstResult`, `maxResult`, and cursors.

## Examples

[Example 4-27](#) shows how to use this hint in a JPA query.

[Example 4-28](#) shows how to use this hint with the `@QueryHint` annotation.

### Example 4-27 Using inheritance.outer-join in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.INHERITANCE_OUTER_JOIN", "TRUE");
```

### Example 4-28 Using inheritance.outer-join in a @QueryHint Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.INHERITANCE_OUTER_JOIN, value="TRUE");
```

## See Also

For more information, see:

- "Inheritance" in *Understanding Oracle TopLink*
- "Enhancing Performance" in *Solutions Guide for Oracle TopLink*

## jdbc.bind-parameters

Use `eclipselink.jdbc.bind-parameters` to specify if the query uses parameter binding (parameterized SQL).

## Values

[Table 4-14](#) describes this query hint's valid values.

**Table 4-14 Valid Values for org.eclipse.persistence.config.HintValues**

Value	Description
TRUE	Bind all parameters.
FALSE	Do not bind all parameters.
PERSISTENCE_UNIT_DEFAULT	(Default) Use the parameter binding setting made in your EclipseLink session's database login, which is true by default.

## Usage

By default, Oracle TopLink enables parameter binding and statement caching. This causes Oracle TopLink to use a prepared statement, binding all SQL parameters and caching the prepared statement. When you re-execute this query, you avoid the SQL preparation, which improves performance.

You can also configure parameter binding for the persistence unit in the `persistence.xml` file (when used in a Java SE environment).

## Examples

[Example 4-29](#) shows how to use this hint in a JPA query.

[Example 4-30](#) shows how to use this hint with the `@QueryHint` annotation.

[Example 4-31](#) shows how to configure parameter binding in the persistence unit `persistence.xml` file.

### Example 4-29 Using bind-parameters in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.BIND_PARAMETERS, HintValues.TRUE);
```

### Example 4-30 Using bind-parameters in a @QueryHint Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.TargetDatabase;
@QueryHint(name=QueryHints.BIND_PARAMETERS, value=HintValues.TRUE);
```

### Example 4-31 Specifying Parameter Binding Persistence Unit Property

```
<property name="eclipselink.jdbc.bind-parameters" value="false"/>
```

Or by importing a property map:

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.NATIVE_SQL, "true");
```

## See Also

For more information, see:

- ["jdbc.cache-statements"](#)

- "jdbc.batch-writing.size"
- "Parameterized SQL and Statement Caching" in *Solutions Guide for Oracle TopLink*

## jdbc.cache-statement

Specify if the query caches its JDBC statement.

### Values

[Table 4-15](#) describes this query hint's values.

**Table 4-15 Valid Values for jdbc.cache-statement**

Value	Description
true	The query will cache its JDBC statement.
false	(Default)

### Usage

This allows queries to use parameterized SQL with statement caching. It also allows a specific query to not cache its statement, if statement caching is enable for the persistence unit.

#### Tip:

Normally, you should set statement caching for the entire persistence unit (see "[jdbc.cache-statements](#)") instead of each query.

When using a `DataSource`, you must set statement caching in the `DataSource` configuration.

### Examples

[Example 4-32](#) shows how to use this hint in a JPA query.

[Example 4-33](#) shows how to use this hint in the `@QueryHint` annotation.

#### Example 4-32 Using jdbc.cache-statement in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.CACHE_STATEMENT", "TRUE");
```

#### Example 4-33 Using jdbc.cache-statement in a @QueryHint Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.CACHE_STATEMENT, value="TRUE");
```

### See Also

For more information, see:

- "jdbc.cache-statements"
- "Enhancing Performance" in *Solutions Guide for Oracle TopLink*

## jdbc.fetch-size

Use `eclipselink.jdbc.fetch-size` to specify the number of rows to be fetched from the database when additional rows are needed.



### Note:

This property requires JDBC driver support.

### Values

[Table 4-16](#) describes this query hint's valid values.

**Table 4-16 Valid Values for `eclipselink.jdbc.fetch-size`**

Value	Description
from 0 to <code>Integer.MAX_VALUE</code>	(Default = 0) As a <code>String</code> , depending on your JDBC driver. If 0, the JDBC driver default will be used.

### Usage

For queries that return a large number of objects, you can configure the row fetch size used in the query to improve performance by reducing the number database hits required to satisfy the selection criteria.

By default, most JDBC drivers use a fetch size of 10. , so if you are reading 1000 objects, increasing the fetch size to 256 can significantly reduce the time required to fetch the query's results. The optimal fetch size is not always obvious. Usually, a fetch size of one half or one quarter of the total expected result size is optimal.

If you are unsure of the result set size, incorrectly setting a fetch size too large or too small can decrease performance.

### Examples

[Example 4-34](#) shows how to use this hint in a JPA query.

[Example 4-35](#) shows how to use this hint with the `@QueryHint` annotation.

#### Example 4-34 Using `jdbc.fetch-size` in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.JDBC_FETCH_SIZE", "100");
```

**Example 4-35 Using jdbc.fetch-size in a @QueryHint Annotation**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.JDBC_FETCH_SIZE, value="100");
```

**See Also**

For more information, see:

- "EclipseLink" JPA Query Hints [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Querying/Query\\_Hints](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Querying/Query_Hints)
- "Querying" and "Enhancing Performance" in *Solutions Guide for Oracle TopLink*
- "Oracle TopLink Caches" in *Understanding Oracle TopLink*

## jdbc.first-result

Use `eclipselink.jdbc.first-result` to specify if the query should skip the specified number of rows in the result.

**Values**

[Table 4-17](#) describes this query hint's values.

**Table 4-17 Valid Values for jdbc.first-result**

Value	Description
Integer	Integer or String value that can be parsed to an int value. The position of the first result to retrieve.

**Usage**

This query hint is similar to JPA Query `setFirstResults()`, but can be set in metadata for `NamedQuery`s.

**Examples**

[Example 4-36](#) shows how to use this hint in a JPA query.

**Example 4-36 Using jdbc.first-result in a JPA Query**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.JDBC_FIRST_RESULT", "10");
```

**See Also**

For more information, see:

- "Query Concepts" in *Understanding Oracle TopLink*



## jdbc.max-rows

Use `eclipselink.jdbc.max-rows` to specify the maximum number of rows to be returned. If the query returns more rows than specified, the trailing rows will not be returned.

### Values

[Table 4-18](#) describes this query hint's valid values.

**Table 4-18 Valid Values for `eclipselink.jdbc.max-rows`**

Value	Description
Int or String (that can be parsed to Int values)	Configures the JDBC maximum number of rows.

### Usage

This hint is similar to JPQL `setMaxResults()`, but can be specified within the metadata for `NamedQueries`.

### Examples

[Example 4-37](#) shows how to use this hint in a JPA query.

[Example 4-38](#) shows how to use this hint with the `@QueryHint` annotation.

#### Example 4-37 Using `jdbc.max-rows` in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.JDBC_MAX_ROWS", "100");
```

#### Example 4-38 Using `jdbc.max-rows` in a `@QueryHint` Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.JDBC_MAX_ROWS, value="100");
```

### See Also

For more information, see:

- EclipseLink Pagination Example <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Pagination>
- "Query Concepts" in *Understanding Oracle TopLink*

## jdbc.native-connection

Use `eclipselink.jdbc.native-connection` to specify if the query requires a native JDBC connection.

## Values

[Table 4-19](#) describes this persistence property's values.

**Table 4-19 Valid Values for jdbc.native-connection**

Value	Description
true	Require native connection.
false	(Default) Do not require native connection.

## Usage

This may be required for some queries on some server platforms that have `DataSource` implementations that wrap the JDBC connection in their own proxy. If the query requires custom JDBC access, it may require a native connection.

A `ServerPlatform` is required to be set as a persistence property to be able to use a native connection. For features that TopLink already knows require a native connection, `eclipselink.jdbc.native-connection` will default to `true`.

## Examples

[Example 4-39](#) shows how to use the hint in a JPA Query.

### Example 4-39 Using jdbc.native-connection in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.NATIVE_CONNECTION", "TRUE");
```

## See Also

For more information, see:

- ["target-server"](#)

# jdbc.parameter-delimiter

Use `eclipselink.jdbc.parameter-delimiter` to specify a custom parameter binding character (instead of the default hash # character).

## Values

[Table 4-20](#) describes this query hint's values.

**Table 4-20 Valid Values for jdbc.parameter-delimiter**

Value	Description
Character	Any valid, single character. Do not use "".

## Examples

[Example 4-40](#) shows how to use this hint in a JPA query.

[Example 4-41](#) shows how to use this hint with the `@QueryHint` annotation.

#### Example 4-40 Using `jdbc.parameter-delimiter` in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.PARAMETER_DELIMITER", ",");
```

#### Example 4-41 Using `jdbc.parameter-delimiter` in a `@QueryHint` Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.PARAMETER_DELIMITER, value=",");
```

#### See Also

For more information, see:

- ["jdbc.bind-parameters"](#)

## jdbc.timeout

Use `eclipselink.jdbc.timeout` to specify number of seconds Oracle TopLink will wait (time out) for a query result, before throwing a `DatabaseException`.



#### Note:

This property requires JDBC driver support.

#### Values

[Table 4-21](#) describes this query hint's valid values.

**Table 4-21 Valid Values for `eclipselink.jdbc.timeout`**

Value	Description
from 0 to <code>Integer.MAX_VALUE</code>	(Default = 0) As a <code>String</code> , depending on your JDBC driver. If 0, Oracle TopLink will never time out waiting for a query.

#### Usage

Some database platforms may not support lock timeouts, so you may consider setting a `JDBC_TIMEOUT` hint for these platforms.

#### Examples

[Example 4-42](#) shows how to use this hint in a JPA query.

[Example 4-43](#) shows how to use this hint with the `@QueryHint` annotation.

**Example 4-42 Using jdbc.timeout in a JPA Query**

```
import org.eclipse.persistence.config.CacheUsage;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.JDBC_TIMEOUT, "100");
```

**Example 4-43 Using jdbc.timeout in a @QueryHint Annotation**

```
import org.eclipse.persistence.config.CacheUsage;
import org.eclipse.persistence.config.TargetDatabase;
@QueryHint(name=QueryHints.JDBC_TIMEOUT, value="100");
```

**See Also**

For more information, see:

- ["query-type"](#)
- "About JPA Query Hints" in *Understanding Oracle TopLink*
- "Enhancing Performance" in *Solutions Guide for Oracle TopLink*

## join-fetch

Use `eclipselink.join-fetch` hint to join attributes in a query.

**Note:**

Use *dot notation* to access nested attributes. For example, to batch-read an employee's manager's address, use `e.manager.address`.

**Values**

[Table 4-22](#) describes this query hint's valid values.

**Table 4-22 Valid Values for `eclipselink.join-fetch` hint**

Value	Description
A relationship path expression	NA

**Usage**

This hint is similar to `eclipselink.batch`. Subsequent queries of related objects can be optimized in batches instead of being retrieved in one large joined read

The `eclipselink.join-fetch` hint differs from JPQL joining in that it allows multilevel fetch joins.

**Examples**

[Example 4-44](#) shows how to use this hint in a JPA query.

[Example 4-45](#) shows how to use this hint with the `@QueryHint` annotation.

**Example 4-44 Using join-fetch in a JPA Query**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.join-fetch", "e.address");
```

**Example 4-45 Using join-fetch in a @QueryHint Annotation**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.FETCH, value="e.address");
```

**See Also**

For more information, see:

- "EclipseLink" JPA Query Hints [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Querying/Query\\_Hints](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Querying/Query_Hints)
- EclipseLink Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/QueryOptimization>
- "Optimizing Queries" in *Understanding Oracle TopLink*.
- "Fetch Joins" in the JPA Specification (<http://jcp.org/en/jsr/detail?id=317>)
- "batch"
- "left-join-fetch"
- "Enhancing Performance" in *Solutions Guide for Oracle TopLink*

## left-join-fetch

Use `eclipselink.left-join-fetch` to optimize the query: related objects will be joined into the query instead of being queries separately.

**Values**

[Table 4-23](#) describes this query hint's values.

**Table 4-23 Valid Values for left-join-fetch**

Value	Description
String	JPQL-style navigations to a relationship

**Usage**

You can use this query hint to create nested join fetches, which is not supported by JPQL. You can also use `eclipselink.left-join-fetch` to create join fetches with native queries.

**Note:**

This uses an OUTER join to allow null or empty values.

## Examples

[Example 4-46](#) shows how to use this hint in a JPA query.

[Example 4-47](#) shows how to use this hint with the `@QueryHint` annotation.

### Example 4-46 Using left-join-fetch in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.LEFT_FETCH", "STRING");
```

### Example 4-47 Using left-join-fetch in a @QueryHint Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.LEFT_FETCH, value="STRING");
```

## See Also

- EclipseLink Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/QueryOptimization>
- "Fetch Joins" in the JPA Specification (<http://jcp.org/en/jsr/detail?id=317>)
- "batch"
- "join-fetch"
- "Enhancing Performance" in *Solutions Guide for Oracle TopLink*

# load-group

Use `eclipselink.load-group` to configures a query to use the load group object.

## Values

[Table 4-24](#) describes this persistence property's values.

**Table 4-24 Valid Values for load-group**

Value	Description
load-group classname	An instance of <code>LoadGroup</code> .

## Usage

With load groups, TopLink ensures that all relational attributes for a group are loaded. LoadGroups are only supported for queries returning objects (only a single alias can be the select clause).

## Examples

[Example 4-48](#) shows how to use this hint in a JPA query.

[Example 4-49](#) shows how to use this hint with the `@QueryHint` annotation.

**Example 4-48 Using load-group in a JPA Query**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.LOAD_GROUP", MyLoadGroup);
```

**Example 4-49 Using load-group in a @QueryHint Annotation**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.LOAD_GROUP, value="lg");
```

**See Also**

For more information, see:

- ["load-group.attribute"](#)
- "AttributeGroup Types and Operations" in *Understanding Oracle TopLink*
- EclipseLink Attribute Group example:<http://wiki.eclipse.org/EclipseLink/Examples/JPA/AttributeGroup>
- ["@FetchGroup"](#)

## load-group.attribute

Use `eclipselink.load-group.attribute` to specify if the query uses a **load-group** that includes a list of attributes.

**Usage**

You must define each attribute using a separate hint. The query loads all relational attributes defined in the load group.

LoadGroups are only supported for queries returning objects (only a single alias can be the select clause). Both local and nested attributes are supported.

**See Also**

For more information, see:

- ["load-group"](#)

## maintain-cache

Use `eclipselink.maintain-cache` to controls whether or not query results are cached in the session cache

**Values**

[Table 4-25](#) describes this query hint's valid values.

**Table 4-25 Valid Values for org.eclipselink.maintain-cache**

Value	Description
TRUE	Maintain cache.
FALSE	(Default) Do not maintain cache.

### Usage

The `eclipselink.maintain-cache` hint provides a way to query the current database contents *without affecting the current persistence context*. It configures the query to return un-managed instances so any updates to entities queried using this hint would have to be merged into the persistence context.

### Examples

[Example 4-50](#) shows how to use this hint in a JPA query.

[Example 4-51](#) shows how to use this hint with the `@QueryHint` annotation.

#### Example 4-50 Using maintain-cache in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.MAINTAIN_CACHE, HintValues.FALSE);
```

#### Example 4-51 Using maintain-cache in a @QueryHint Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.MAINTAIN_CACHE, value=HintValues.FALSE);
```

### See Also

For more information, see:

- "Scaling Oracle TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*
- "Enhancing Performance" in *Solutions Guide for Oracle TopLink*
- "Oracle TopLink Caches" in *Understanding Oracle TopLink*

## pessimistic-lock

Use `eclipselink.pessimistic-lock` to specify if Oracle TopLink uses pessimistic locking.

### Values

[Table 4-26](#) describes this query hint's valid values.

**Table 4-26 Valid Values for org.eclipse.persistence.config.PessimisticLock**

Value	Description
NoLock	(Default) Do not use pessimistic locking.



**Table 4-26 (Cont.) Valid Values for org.eclipse.persistence.config.PessimisticLock**

Value	Description
Lock	Oracle TopLink issues SELECT . . . . FOR UPDATE statements.
LockNoWait	Oracle TopLink issues SELECT . . . . FOR UPDATE NO WAIT statements.

### Usage

The primary advantage of using pessimistic locking is that you are assured, once the lock is obtained, of a successful edit. This is desirable in highly concurrent applications in which optimistic locking may cause too many optimistic locking errors.

One drawback of pessimistic locking is that it requires additional database resources, requiring the database transaction and connection to be maintained for the duration of the edit. Pessimistic locking may also cause deadlocks and lead to concurrency issues.

### Examples

[Example 4-52](#) shows how to use this hint in a JPA query.

[Example 4-53](#) shows how to use this hint with the `@QueryHint` annotation.

#### Example 4-52 Using pessimistic-lock in a JPA Query

```
import org.eclipse.persistence.config.PessimisticLock;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.PESSIMISTIC_LOCK, PessimisticLock.LockNoWait);
```

#### Example 4-53 Using pessimistic-lock in a @QueryHint Annotation

```
import org.eclipse.persistence.config.PessimisticLock;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.PESSIMISTIC_LOCK, value=PessimisticLock.LockNoWait);
```

### See Also

For more information, see:

- EclipseLink Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/PessimisticLocking>
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*
- "Understanding Queries" in *Understanding Oracle TopLink*
- "Building Blocks of a TopLink Project" in *Understanding Oracle TopLink*

## prepare

Use `eclipselink.prepare` to specify if a query prepares (that is, generates) its SQL for each execution.

### Values

[Table 4-27](#) describes this query hint's values.

**Table 4-27 Valid Values for prepare**

Value	Description
true	Generate the SQL <i>each time</i> TopLink executes the query.
false	(Default) Generate the SQL only the <i>first time</i> TopLink executes the query.

**Usage**

By default, TopLink does not re-generate the SQL for each execution. This may improve performance.

For queries that require dynamic SQL (for example, to handle null parameters) set `eclipselink.prepare` to **false**.

**Examples**

[Example 4-54](#) shows how to use this hint in a JPA query.

[Example 4-55](#) shows how to use this hint with the `@QueryHint` annotation.

**Example 4-54 Using prepare in a JPA Query**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.PREPARE", "TRUE");
```

**Example 4-55 Using prepare in a @QueryHint Annotation**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.PREPARE, value="TRUE");
```

**See Also**

For more information, see:

- "Understanding Queries" in *Understanding Oracle TopLink*

## query-results-cache

Use `eclipselink.query-results-cache` to specify that the query should use a results cache.

**Values**

[Table 4-28](#) describes this persistence property's values.

**Table 4-28 Valid Values for query-results-cache**

Value	Description
Persistence_Unit_Default	(Default)
True	Query results are cache.
False	Query results are not cached.

## Usage

By default, the query will cache 100 query results (see [query-results-cache.size](#)); if the same named query with the same arguments is re-executed TopLink will skip the database and return the cached results.



### Note:

The *query* cache is different and independent from the *object* cache.

## Examples

[Example 4-56](#) shows how to use this hint in a JPA query.

[Example 4-57](#) shows how to use this hint with the `@QueryHint` annotation.

[Example 4-58](#) shows how to use this hint in an `orm.xml` file.

### Example 4-56 Using query-results-cache in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.QUERY_RESULTS_CACHE", "TRUE");
```

### Example 4-57 Using query-results-cache in a @QueryHint Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.QUERY_RESULTS_CACHE, value="TRUE");
```

### Example 4-58 Using query-results-cache in orm.xml File

```
<?xml version="1.0"?>
<entity-mappings
  xmlns="http://www.eclipse.org/eclipselink/xsds/persistence/orm"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.eclipse.org/eclipselink/xsds/persistence/orm
http://www.eclipse.org/eclipselink/xsds/eclipselink_orm_2_4.xsd"
  version="2.4">
  <entity name="Employee" class="org.acme.Employee" access="FIELD">
    <named-query name="findAllEmployeesInCity" query="Select e from Employee e
where e.address.city = :city">
      <hint name="eclipselink.query-results-cache" value="true"/>
      <hint name="eclipselink.query-results-cache.size" value="500"/>
    </named-query>
    ...
  </entity>
</entity-mappings>
```

## See Also

For more information, see:

- "About Query Results Cache" in *Understanding Oracle TopLink*

## query-results-cache.expiry

Use `eclipselink.query-results-cache.expiry` to set the time-to-live (that is, expiration time) of the query's results cache.

### Values

[Table 4-29](#) describes this query hint's values.

**Table 4-29** Valid Values for `query-results-cache.expiry`

Value	Description
Value	Number of milliseconds, as Integer or Strings that can be parsed to int values.

### Usage

By default the query results cache will not expiry results.

### Examples

[Example 4-59](#) shows how to use this hint in a JPA query.

[Example 4-60](#) shows how to use this hint with the `@QueryHint` annotation.

#### Example 4-59 Using `query-results-cache.expiry` in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.QUERY_RESULTS_CACHE_EXPIRY", "100");
```

#### Example 4-60 Using `query-results-cache.expiry` in a `@QueryHint` Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.QUERY_RESULTS_CACHE_EXPIRY, value="100");
```

### See Also

For more information, see:

- ["query-results-cache"](#)

## query-results-cache.expiry-time-of-day

Use `eclipselink.query-results-cache.expiry-time-of-day` to set the time of day of the query's results cache expiration.

### Values

[Table 4-30](#) describes this persistence property's values.

**Table 4-30 Valid Values for query-results-cache.expiry-time-of-day**

Value	Description
Value	Time, in HH:MM:SS format, as a String

**Usage**

By default the query results cache will not expiry results.

**Examples**

[Example 4-61](#) shows how to use this hint in a JPA query.

[Example 4-62](#) shows how to use this hint with the `@QueryHint` annotation.

**Example 4-61 Using query-results-cache.expiry-time-of-day in a JPA Query**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.QUERY_RESULTS_CACHE_EXPIRY_TIME_OF_DAY", "11:15:34");
```

**Example 4-62 Using query-results-cache.expiry-time-of-day in a @QueryHint Annotation**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.QUERY_RESULTS_CACHE_EXPIRY_TIME_OF_DAY,
value="11:15:34");
```

**See Also**

For more information, see:

- ["query-results-cache"](#)

## query-results-cache.ignore-null

Use `eclipselink.query-results-cache.ignore-null` to specify if TopLink caches `null` query results

**Values**

[Table 4-31](#) describes this query hint's values.

**Table 4-31 Valid Values for query-results-cache.ignore-null**

Value	Description
true	Ignore null results (that is, <i>do not</i> cache results)
false	(Default) Do not ignore null results (that is, <i>do</i> cache results)

**Usage**

You can use this query hint to use query cache as a secondary key index, and allow inserts of new objects.

## Examples

[Example 4-63](#) shows how to use this hint in a JPA query.

[Example 4-64](#) shows how to use this hint with the `@QueryHint` annotation.

### Example 4-63 Using query-results-cache.ignore-null in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.QUERY_RESULTS_CACHE_IGNORE_NULL", "TRUE");
```

### Example 4-64 Using query-results-cache.ignore-null in a @QueryHint Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.QUERY_RESULTS_CACHE_IGNORE_NULL, value="TRUE");
```

## See Also

For more information, see:

- ["query-results-cache"](#)

# query-results-cache.randomize-expiry

Use `eclipselink.query-results-cache.randomize-expiry` to specify the expiry time ([query-results-cache.expiry](#)) should be randomized by 10% of its set value.

## Values

[Table 4-32](#) describes this query hint's values.

**Table 4-32 Valid Values for query-results-cache.randomize-expiry**

Value	Description
true	Randomize the expiration time by 10%.
false	(Default) Do not randomize the expiration time.

## Usage

Use this query hint to avoid bottlenecks from multiple cached values expiring at a fixed time.

## Examples

[Example 4-65](#) shows how to use this hint in a JPA query.

[Example 4-66](#) shows how to use this hint with the `@QueryHint` annotation.

### Example 4-65 Using query-results-cache.randomize-expiry in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.QUERY_RESULTS_CACHE_RANDOMIZE_EXPIRY", "TRUE");
```

**Example 4-66 Using query-results-cache.randomize-expiry in a @QueryHint Annotation**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.QUERY_RESULTS_CACHE_RANDOMIZE_EXPIRY, value="TRUE");
```

**See Also**

For more information, see:

- ["query-results-cache"](#)
- ["query-results-cache.expiry"](#)

## query-results-cache.size

Use `eclipselink.query-results-cache.size` to set the fixed size of the query's results cache.

**Values**

[Table 4-33](#) describes this query hint's values.

**Table 4-33 Valid Values for query-results-cache.size**

Value	Description
Size	Integer or Strings that can be parsed to int values (Default: <b>100</b> )

**Usage**

When using [query-results-cache](#), if the same named query with the same arguments is re-executed TopLink will skip the database and return the cached results.

**Note:**

If a query has no arguments, use a size of **1** (as there is only a single result).

**Examples**

[Example 4-67](#) shows how to use this hint in a JPA query.

[Example 4-68](#) shows how to use this hint with the `@QueryHint` annotation.

**Example 4-67 Using query-results-cache.size in a JPA Query**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.QUERY_RESULTS_CACHE_SIZE", "150");
```

**Example 4-68 Using query-results-cache.size in a @QueryHint Annotation**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.QUERY_RESULTS_CACHE_SIZE, value="150");
```

**See Also**

For more information, see:

- ["query-results-cache"](#)

## query-results-cache.type

Use `eclipselink.query-results-cache.type` to set the cache type used for the query's results cache.

**Values**

[Table 4-34](#) describes this query hint's values.

**Table 4-34 Valid Values for query-results-cache.type**

Value	Description
Cache	(Default) Fixed size LRU cache ( <code>CacheIdentityMap</code> )
Full	Provides full caching and guaranteed identity.
Hard_Weak	Similar to <code>SOFT_WEAK</code> , except that it uses <i>hard</i> references in the sub-cache.
None	No caching.
Soft	Similar to <code>FULL</code> , except the map holds the objects using <i>soft</i> references.
Soft_Weak	Similar to <code>WEAK</code> , except it maintains a most-frequently-used sub-cache.
Weak	Similar to <code>FULL</code> , except the map holds the objects using <i>weak</i> references.

**Usage**
 **Caution:**

Using `NONE` does not preserve object identity and does not cache objects.

**Examples**

[Example 4-69](#) shows how to use this hint in a JPA query.

[Example 4-70](#) shows how to use this hint with the `@QueryHint` annotation.

**Example 4-69 Using query-results-cache.type in a JPA Query**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.QUERY_RESULTS_CACHE_TYPE", "FULL");
```



**Example 4-70 Using query-results-cache.type in a @QueryHint Annotation**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.QUERY_RESULTS_CACHE_TYPE, value="FULL");
```

**See Also**

For more information, see:

- "[@Cache](#)"
- "Caching Overview"[http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic JPA Development/Caching/Caching Overview](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic%20JPA%20Development/Caching/Caching%20Overview)
- "Oracle TopLink Caches" in the *Understanding Oracle TopLink*
- "Scaling Oracle TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## query-type

Use `eclipselink.query-type` to specify which Oracle TopLink query type to use for the query.

**Values**

[Table 4-35](#) describes this query hint's valid values.

**Table 4-35 Valid Values for `org.eclipse.persistence.config.QueryType`**

Value	Description
Auto	(Default = 0) Oracle TopLink chooses the type of query.
ReadAll	Use a <code>ReadAllQuery</code> .
ReadObject	Use a <code>ReadObjectQuery</code> .
Report	Use a <code>ReportQuery</code> .

**Usage**

By default, Oracle TopLink uses `org.eclipse.persistence.queries.ReportQuery` or `org.eclipse.persistence.queries.ReadAllQuery` for most JPQL queries. Use the `eclipselink.query-type` hint lets to specify another query type, such as `org.eclipse.persistence.queries.ReadObjectQuery` for queries that will return a single object.

**Examples**

[Example 4-71](#) shows how to use this hint in a JPA query.

[Example 4-72](#) shows how to use this hint with the `@QueryHint` annotation.

**Example 4-71 Using query-type in a JPA Query**

```
import org.eclipse.persistence.config.QueryType;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.QUERY_TYPE, QueryType.ReadObject);
```

**Example 4-72 Using query-type in a @QueryHint Annotation**

```
import org.eclipse.persistence.config.QueryType;
import org.eclipse.persistence.config.TargetDatabase;
@QueryHint(name=QueryHints.QUERY_TYPE, value=QueryType.ReadObject);
```

**See Also**

For more information, see:

- "Queries" in *Understanding Oracle TopLink*

## read-only

Use `eclipselink.read-only` to retrieve read-only results back from a query.

**Values**

Table 4-36 describes this query hint's valid values.

**Table 4-36 Valid Values for read-only**

Value	Description
TRUE	Retrieve read-only results from the query.
FALSE	(Default) Do not retrieve read-only results from the query.

**Usage**

For non-transactional read operations, if the requested entity types are stored in the shared cache you can request that the shared instance be returned instead of a detached copy.

 **Note:**

You should never modify objects returned from the shared cache.

**Examples**

[Example 4-73](#) shows how to use this hint in a JPA query.

[Example 4-74](#) shows how to use this hint with the `@QueryHint` annotation.

**Example 4-73 Using read-only in a JPA Query**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.READ_ONLY, HintValues.TRUE);
```

**Example 4-74 Using read-only in a @QueryHint Annotation**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.READ_ONLY, value=HintValues.TRUE);
```

**See Also**

For more information, see:

- "Oracle Oracle TopLink JPA Performance Tuning" in *Tuning Performance*

## refresh

Use `eclipselink.refresh` to specify whether or not to update the Oracle TopLink session cache with objects returned by the query.

**Values**

[Table 4-37](#) describes this query hint's valid values.

**Table 4-37 Valid Values for `eclipselink.refresh`**

Value	Description
TRUE	Refreshes the cache.
FALSE	(Default) Does not refresh the cache. You can use " " instead of FALSE.

**Usage**

The `eclipselink.refresh` query hint configures the query to refresh the resulting objects in the cache and persistence context with the current state of the database. It also refreshes the objects in the shared cache, unless a flush has occurred. Any *unflushed* changes made to the objects are lost, unless this query triggers a flush before it executes). The refresh will cascade relationships based on the `REFRESH_CASCADE` hint value.

**Examples**

[Example 4-75](#) shows how to use this hint in a JPA query.

[Example 4-76](#) shows how to use this hint with the `@QueryHint` annotation.

**Example 4-75 Using refresh in a JPA Query**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.REFRESH, HintValues.TRUE);
```

**Example 4-76 Using refresh in a `@QueryHint` Annotation**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.REFRESH, value=HintValues.TRUE);
```

**See Also**

For more information, see:

- "[refresh.cascade](#)"

## refresh.cascade

Use `eclipselink.refresh.cascade` to specify if a refresh query should cascade the refresh to relationships.

### Values

[Table 4-38](#) describes this query hint's valid values.

**Table 4-38** Valid Values for `eclipselink.refresh.cascade`

Value	Description
<code>CascadeAllParts</code>	Cascade to all associations.
<code>CascadeByMapping</code>	Cascade by mapping metadata.
<code>CascadePrivateParts</code>	Cascade to privately-owned relationships.
<code>NoCascade</code>	Do not cascade.

### Usage

You should also use a [refresh](#) hint in order to cause the refresh.

### Examples

[Example 4-77](#) shows how to use this hint in a JPA query.

[Example 4-78](#) shows how to use this hint with the `@QueryHint` annotation.

#### Example 4-77 Using `refresh.cascade` in a JPA Query

```
import org.eclipse.persistence.config.HintValues
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.REFRESH_CASCADE, CascadePolicy.CascadeAllParts);
```

#### Example 4-78 Using `refresh.cascade` in a `@QueryHint` Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.REFRESH_CASCADE, value=CascadePolicy.CascadeAllParts);
```

### See Also

For more information, see:

- ["refresh"](#)

## result-collection-type

Use `eclipselink.result-collection-type` to configure the collection class implementation for the query's results.

### Values

[Table 4-39](#) describes this query hint's values.

**Table 4-39 Valid Values for result-collection-type**

Value	Description
true	Fully qualified class name, without <code>.class</code> , representing a collection type.
false	(Default) Do not ignore null results (that is, <i>do</i> cache results)

**Usage**

If you use a `Collection` type that is *not* a `List`, you must use `getResultCollection()` or `getSingleResult()` instead of `getResultList()`.

**Examples**

[Example 4-79](#) show how to use this hint in a JPA query.

[Example 4-80](#) shows how to use this hint with the `@QueryHint` annotation.

**Example 4-79 Using result-collection-type in a JPA Query**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.RESULT_COLLECTION_TYPE", "<CLASS_NAME>");
```

**Example 4-80 Using result-collection-type in a @QueryHint Annotation**

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.RESULT_COLLECTION_TYPE, value="<CLASS_NAME>");
```

**See Also**

For more information, see:

- "Collection Mappings" in the *Understanding Oracle TopLink*

## sql.hint

Use `eclipselink.sql.hint` to include an SQL hint in the SQL for a query.

**Values**

[Table 4-40](#) describes this query hint's values.

**Table 4-40 Valid Values for sql.hint**

Value	Description
value	The full hint string, including the comment <code>\</code> delimiters

**Usage**

A SQL hint can be used on certain database platforms to define how the query uses indexes and other such low level usages. The SQL hint will be included in the SQL, after the `SELECT/INSERT/UPDATE/DELETE` command.

## Examples

[Example 4-81](#) shows how to use this hint in a JPA query.

[Example 4-82](#) shows how to use this hint with the `@QueryHint` annotation.

### Example 4-81 Using `sql.hint` in a JPA Query

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.HINT", "/*+ index(scott.emp ix_emp) * /");
```

### Example 4-82 Using `sql.hint` in a `@QueryHint` Annotation

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.HINT, value="/*+ index(scott.emp ix_emp) * /");
```

## See Also

For more information, see:

- "Query Hints" in *Understanding Oracle TopLink*
- "Query" in *Solutions Guide for Oracle TopLink*
- Section 10.3.1 "NamedQuery Annotation" in the JPA Specification (<http://jcp.org/en/jsr/detail?id=317>)

# 5

## Persistence Property Extensions Reference

This chapter describes the persistence property extensions. You configure persistence units in the JPA persistence descriptor file: `persistence.xml`. Oracle TopLink includes many persistence property enhancements and extensions that can be configured in the `persistence.xml` file.

This chapter includes the following sections:

- [Functional Listing of Persistence Property Extensions](#)
- [Alphabetical Listing of Persistence Property Extensions](#)

### Functional Listing of Persistence Property Extensions

The following lists the Oracle TopLink persistence property (`persistence.xml` file) extensions, categorized by function:

- [Weaving](#)
- [Customizers](#)
- [Validation and Optimization](#)
- [Caching](#)
- [Mapping](#)
- [Schema generation](#)
- [JDBC configuration](#)

#### Weaving

TopLink includes the following persistence property extensions for weaving:

- [weaving](#)
- [weaving.changetracking](#)
- [weaving.eager](#)
- [weaving.fetchgroups](#)
- [weaving.internal](#)
- [weaving.lazy](#)

#### Customizers

TopLink includes the following persistence property extensions for customizing descriptors and sessions:

- [deploy-on-startup](#)

- [descriptor.customizer](#)
- [session.customizer](#)
- [session.include.descriptor.queries](#)
- [session-event-listener](#)
- [session-name](#)
- [sessions-xml](#)
- [target-database](#)
- [target-server](#)
- [metadata-source](#)
- [metadata-source.properties.file](#)
- [metadata-source.send-refresh-command](#)
- [metadata-source.xml.url](#)

## Validation and Optimization

TopLink includes the following persistence property extensions for validation.

- [exception-handler](#)
- [partitioning](#)
- [partitioning.callback](#)
- [profiler](#)

## Logging

TopLink includes the following persistence property extensions for logging.

- [logging.connection](#)
- [logging.exceptions](#)
- [logging.file](#)
- [logging.level](#)
- [logging.session](#)
- [logging.thread](#)
- [logging.timestamp](#)

## Caching

TopLink includes the following persistence property extensions for caching:

- [cache.coordination.channel](#)
- [cache.coordination.jms.factory](#)
- [cache.coordination.jms.host](#)
- [cache.coordination.jms.reuse-topic-publisher](#)



- `cache.coordination.jms.topic`
- `cache.coordination.jndi.initial-context-factory`
- `cache.coordination.jndi.password`
- `cache.coordination.jndi.user`
- `cache.coordination.naming-service`
- `cache.coordination.propagate-asynchronously`
- `cache.coordination.protocol`
- `cache.coordination.remove-connection-on-error`
- `cache.coordination.rmi.announcement-delay`
- `cache.coordination.rmi.multicast-group`
- `cache.coordination.rmi.multicast-group`
- `cache.coordination.rmi.packet-time-to-live`
- `cache.coordination.rmi.url`
- `cache.coordination.thread.pool.size`
- `cache.database-event-listener`
- `cache.shared`
- `cache.size`
- `cache.type`
- `flush-clear.cache`

## Mapping

TopLink includes the following persistence property extensions for mappings:

- `composite-unit`
- `composite-unit.member`
- `composite-unit.properties`

## Schema generation

TopLink includes the following persistence property extensions for mappings:

- `create-ddl-jdbc-file-name`
- `ddl.table-creation-suffix`
- `ddl-generation`
- `ddl-generation.output-mode`
- `drop-ddl-jdbc-file-name`

## JDBC configuration

TopLink includes the following persistence property extensions for configuring JDBC connections and connection pooling:

- [connection-pool](#)
- [connection-pool.read](#)
- [connection-pool.sequence](#)
- [jdbc.allow-native-sql-queries](#)
- [jdbc.batch-writing](#)
- [jdbc.batch-writing.size](#)
- [jdbc.cache-statements](#)
- [jdbc.cache-statements.size](#)
- [jdbc.connector](#)
- [jdbc.exclusive-connection.is-lazy](#)
- [jdbc.exclusive-connection.mode](#)
- [jdbc.native-sql](#)
- [jdbc.property](#)
- [jdbc.sql-cast](#)
- [jdbc.uppercase-columns](#)

## Alphabetical Listing of Persistence Property Extensions

The following lists the Oracle TopLink persistence property (`persistence.xml` file) extensions, in alphabetical order:

- [application-location](#)
- [cache.coordination.channel](#)
- [cache.coordination.jms.factory](#)
- [cache.coordination.jms.host](#)
- [cache.coordination.jms.reuse-topic-publisher](#)
- [cache.coordination.jms.topic](#)
- [cache.coordination.jndi.initial-context-factory](#)
- [cache.coordination.jndi.password](#)
- [cache.coordination.jndi.user](#)
- [cache.coordination.naming-service](#)
- [cache.coordination.propagate-asynchronously](#)
- [cache.coordination.protocol](#)
- [cache.coordination.remove-connection-on-error](#)

- `cache.coordination.rmi.announcement-delay`
- `cache.coordination.rmi.multicast-group`
- `cache.coordination.rmi.multicast-group`
- `cache.coordination.rmi.packet-time-to-live`
- `cache.coordination.rmi.url`
- `cache.coordination.thread.pool.size`
- `cache.database-event-listener`
- `cache.shared`
- `cache.size`
- `cache.type`
- `classloader`
- `composite-unit`
- `composite-unit.member`
- `composite-unit.properties`
- `connection-pool`
- `connection-pool.read`
- `connection-pool.sequence`
- `create-ddl-jdbc-file-name`
- `ddl.table-creation-suffix`
- `ddl-generation`
- `ddl-generation.output-mode`
- `ddl.table-creation-suffix`
- `deploy-on-startup`
- `descriptor.customizer`
- `drop-ddl-jdbc-file-name`
- `exception-handler`
- `exclude-eclipselink-orm`
- `flush-clear.cache`
- `id-validation`
- `jdbc.allow-native-sql-queries`
- `jdbc.batch-writing`
- `jdbc.batch-writing.size`
- `jdbc.cache-statements`
- `jdbc.cache-statements.size`
- `jdbc.connector`
- `jdbc.exclusive-connection.is-lazy`

- `jdbc.exclusive-connection.mode`
- `jdbc.native-sql`
- `jdbc.property`
- `jdbc.sql-cast`
- `jdbc.uppercase-columns`
- `jpa.uppercase-column-names`
- `jpql.parser`
- `jpql.validation`
- `logging.connection`
- `logging.exceptions`
- `logging.file`
- `logging.level`
- `logging.session`
- `logging.thread`
- `logging.timestamp`
- `metadata-source`
- `metadata-source.properties.file`
- `metadata-source.send-refresh-command`
- `metadata-source.xml.url`
- `nosql.connection-factory`
- `nosql.connection-spec`
- `nosql.property`
- `oracle.proxy-type`
- `orm.throw.exceptions`
- `orm.validate.schema`
- `partitioning`
- `partitioning.callback`
- `persistence-context.close-on-commit`
- `persistence-context.commit-without-persist-rules`
- `persistence-context.flush-mode`
- `persistence-context.persist-on-commit`
- `persistence-context.reference-mode`
- `persistenceunits`
- `persistencexml`
- `persisencexml.default`
- `profiler`

- [session.customizer](#)
- [session.include.descriptor.queries](#)
- [session-event-listener](#)
- [session-name](#)
- [sessions-xml](#)
- [target-database](#)
- [target-server](#)
- [temporal.mutable](#)
- [tenant-id](#)
- [transaction.join-existing](#)
- [tuning](#)
- [validate-existence](#)
- [validation-only](#)
- [weaving](#)
- [weaving.changetracking](#)
- [weaving.eager](#)
- [weaving.fetchgroups](#)
- [weaving.internal](#)
- [weaving.lazy](#)

## application-location

Use the `eclipselink.application-location` property to specify the file system directory in which TopLink writes (outputs) DDL files.

### Values

[Table 5-1](#) describes this persistence property's values.

**Table 5-1 Valid Values for application-location**

Value	Description
value	Directory location. The path must be fully qualified. For Windows, use a backslash. For UNIX use a slash.

### Usage

You may set this option only if the value of `eclipselink.ddl-generation.output-mode` is `sql-script` or `both`.

### Examples

[Example 5-1](#) shows how to use this property in the `persistence.xml` file.

[Example 5-2](#) shows how to use this property in a property map.

**Example 5-1 Using application-location in persistence.xml**

```
<property name="eclipselink.application-location" value="c:/YOURDIRECTORY/" />
```

**Example 5-2 Using application-location in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.APPLICATION_LOCATION,
" c:/YOURDIRECTORY/");
```

**See Also**

For more information, see:

- ["ddl-generation.output-mode"](#)

## cache.coordination.channel

Use the `eclipselink.cache.coordination.channel` property to configure cache coordination for a clustered environment.

**Values**

[Table 5-2](#) describes this persistence property's values.

**Table 5-2 Valid Values for cache.coordination.channel**

Value	Description
channel name	The channel used for cache coordination. All persistence units using the same channel will be coordinated. Default: <code>EclipseLinkCommandChannel</code>

**Usage**

If multiple EclipseLink deployments reside on the same network, they should be in different channels.

**Examples**

[Example 5-3](#) shows how to use this property in the `persistence.xml` file.

[Example 5-4](#) shows how to use this property in a property map.

**Example 5-3 Using application-location in persistence.xml**

```
<property name="eclipselink.cache.coordination.channel" value="EmployeeChannel" />
```

**Example 5-4 Using cache.coordination.channel in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.CACHE_COORDINATION_CHANNEL,
"myChannel");
```

**See Also**

For more information, see:

- ["@Cache"](#)

- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## cache.coordination.jms.factory

Use the `eclipselink.cache.coordination.jms.factory` property to configure the JMS topic connection factory name, when using JMS coordination for a clustered environment.

### Values

[Table 5-3](#) describes this persistence property's values.

**Table 5-3 Valid Values for `cache.coordination.jms.factory`**

Value	Description
name	The JMS topic connection factory name. Default: <code>jms/EclipseLinkTopicConnectionFactory</code>

### Usage

Use this property for JMS coordination (when `eclipselink.cache.coordination.protocol = jms`).

### Examples

See [Example 5-13](#) for information on how to use this property.

### See Also

For more information, see:

- "[cache.coordination.protocol](#)"
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## cache.coordination.jms.host

Use the `eclipselink.cache.coordination.jms.host` property to configure the URL of the JMS server that hosts the topic, when using JMS coordination for a clustered environment.

### Values

[Table 5-4](#) describes this persistence property's values.

**Table 5-4 Valid Values for `cache.coordination.jms.host`**

Value	Description
url	The fully-qualified URL for the JMS server. This is not required if the topic is distributed across the cluster (that is, it can be looked up in local JNDI).

**Usage**

Use this property for JMS coordination (when `eclipselink.cache.coordination.protocol = jms`). You must use a fully qualified URL.

**Examples**

See [Example 5-13](#) for information on how to use this property.

**See Also**

For more information, see:

- "[cache.coordination.protocol](#)"
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## cache.coordination.jms.reuse-topic-publisher

Use the `eclipselink.cache.coordination.jms.reuse-topic-publisher` property to specify if the JSM transport manager should cache a `TopicPublisher` and reuse it for all cache coordination publishing.

**Values**

[Table 5-5](#) describes this persistence property's values.

**Table 5-5 Valid Values for `cache.coordination.jms.reuse-topic-publisher`**

Value	Description
true	Caches the topic publisher.
false	(Default) Does not cache the topic publisher.

**Usage**

Use this property for JMS coordination (when `eclipselink.cache.coordination.protocol = jms`).

**Examples**

See [Example 5-13](#) for information on how to use this property.



**See Also**

For more information, see:

- ["cache.coordination.protocol"](#)
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## cache.coordination.jms.topic

Use the `eclipselink.cache.coordination.jms.topic` property to set the JMS topic name, when using JMS coordination for a clustered environment.

**Values**

[Table 5-6](#) describes this persistence property's values.

**Table 5-6 Valid Values for `cache.coordination.jms.topic`**

Value	Description
name	Set the JMS topic name. Default: <code>jms/EclipseLinkTopic</code>

**Usage**

Use this property for JMS coordination (when `eclipselink.cache.coordination.protocol = jms`).

**Examples**

See [Example 5-13](#) for information on how to use this property.

**See Also**

For more information, see:

- ["cache.coordination.protocol"](#)
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## cache.coordination.jndi.initial-context-factory

Use the `eclipselink.cache.coordination.jndi.initial-context-factory` property to set the JNDI `InitialContext` factory, when using cache coordination for a clustered environment.

**Values**

[Table 5-7](#) describes this persistence property's values.

**Table 5-7 Valid Values for `cache.coordination.jndi.initial-context-factory`**

Value	Description
name	Name of the JNDI <code>InitialContext</code> factory.

**Usage**

Normally, you will not need this property when connecting to the local server.

**Examples**

[Example 5-5](#) shows how to use this property in the `persistence.xml` file.

[Example 5-6](#) shows how to use this property in a property map.

**Example 5-5 Using `cache.coordination.jndi.initial-context-factory` in `persistence.xml`.**

```
<property name="eclipselink.cache.coordination.jndi.initial-context-factory"
value="weblogic.jndi.WLInitialContextFactory"/>
```

**Example 5-6 Using `cache.coordination.jndi.initial-context-factory` in a property map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put
(PersistenceUnitProperties.CACHEH_COORDINATION_JNDI_INITIAL_CONTEXT_FACTORY,
"weblogic.jndi.WLInitialContextFactory");
```

**See Also**

For more information, see:

- ["cache.coordination.protocol"](#)
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## cache.coordination.jndi.password

Use the `eclipselink.cache.coordination.jndi.password` property to set the password for the [cache.coordination.jndi.user](#), when using cache coordination for a clustered environment.

**Values**

[Table 5-8](#) describes this persistence property's values.

**Table 5-8 Valid Values for `cache.coordination.jndi.password`**

Value	Description
value	Password for the <a href="#">cache.coordination.jndi.user</a> .

### Usage

Normally, you will not need this property when connecting to the local server.

### Examples

[Example 5-7](#) shows how to use this property in the `persistence.xml` file.

[Example 5-8](#) shows how to use this property in a property map.

#### Example 5-7 Using `cache.coordination.jndi.password` in `persistence.xml`

```
<property name="eclipselink.cache.coordination.jndi.user" value="USERNAME" />
<property name="eclipselink.cache.coordination.jndi.password" value="PASSWORD" />
```

#### Example 5-8 Using `cache.coordination.jndi.password` in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put(PersistenceUnitProperties.CACHE_COORDINATION_JNDI_USER,
"USERNAME");
propertyMap.put(PersistenceUnitProperties.CACHE_COORDINATION_JNDI_PASSWORD,
"PASSWORD");
```

### See Also

For more information, see:

- ["cache.coordination.jndi.user"](#)
- ["cache.coordination.protocol"](#)
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## cache.coordination.jndi.user

Use the `eclipselink.cache.coordination.jndi.user` property to set JNDI naming service user, when using cache coordination for a clustered environment.

### Values

[Table 5-9](#) describes this persistence property's values.

**Table 5-9 Valid Values for `cache.coordination.jndi.user`**

Value	Description
value	The JNDI user.

### Usage

Normally, you will not need this property when connecting to the local server.

### Examples

See [Example 5-13](#) for information on how to use this property.

**See Also**

For more information, see:

- ["cache.coordination.jndi.password"](#)
- ["cache.coordination.protocol"](#)
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## cache.coordination.naming-service

Use the `eclipselink.cache.coordination.naming-service` property to specify the naming service to use, when using cache coordination for a clustered environment.

**Values**

[Table 5-10](#) describes this persistence property's values.

**Table 5-10 Valid Values for `cache.coordination.naming-service`**

Value	Description
jndi	Uses JNDI.
rmi	Configures RMI.

**Usage**

Cache coordination must be enabled.

**Examples**

[Example 5-9](#) shows how to use this property in the `persistence.xml` file.

[Example 5-10](#) shows how to use this property in a property map.

**Example 5-9 Using `cache.coordination.naming-service` in `persistence.xml`**

```
<property name="eclipselink.cache.coordination" value="true"/>
<property name="eclipselink.cache.coordination.naming-service" value="jndi"/>
```

**Example 5-10 Using `cache.coordination.naming-service` in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put(PersistenceUnitProperties.CACHE_COORDINATION_NAMING_SERVICE,
"jndi");
```

**See Also**

For more information, see:

- ["cache.coordination.protocol"](#)
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## cache.coordination.propagate-asynchronously

Use the `eclipselink.cache.coordination.propagate-asynchronously` property to specify if the coordination broadcast should occur asynchronously with the committing thread.

The property configures cache coordination for a clustered environment. Set if the coordination broadcast should occur asynchronously with the committing thread. This means the coordination will be complete before the thread returns from the commit of the transaction.

### Values

[Table 5-11](#) describes this persistence property's values.

**Table 5-11 Valid Values for `cache.coordination.propagate-asynchronously`**

Value	Description
true	(Default) TopLink will broadcast asynchronously. The coordination will be complete before the thread returns from the committing the transaction.
false	TopLink will broadcast synchronously.

### Usage

JMS cache coordination is always asynchronous, regardless of this setting.

By default, RMI cache coordination is asynchronous. Use synchronous (`eclipselink.cache.coordination.propagate-asynchronously = false`) to ensure that all servers are updated before the request returns.

### Examples

[Example 5-11](#) shows how to use this property in the `persistence.xml` file.

[Example 5-12](#) shows how to use this property in a property map.

#### **Example 5-11 Using `cache.coordination.propagate-asynchronously` in `persistence.xml`**

```
<property name="eclipselink.cache.coordination.propagate-asynchronously"
value="false" />
```

#### **Example 5-12 Using `cache.coordination.propagate-asynchronously` in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put
(PersistenceUnitProperties.CACHE_COORDINATION_PROPAGATE_ASYNCHRONOUSLY,
"false");
```

### See Also

For more information, see:

- "[cache.coordination.protocol](#)"
- "Cache Coordination" in *Understanding Oracle TopLink*

- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## cache.coordination.protocol

Use the `eclipselink.cache.coordination.protocol` property to specify the cache coordination protocol to use. Depending on the cache configuration for each descriptor, this will broadcast cache updates or inserts to the cluster to update or invalidate each session's cache.

### Values

[Table 5-12](#) describes this persistence property's values.

**Table 5-12 Valid Values for `cache.coordination.protocol`**

Value	Description
<code>jms</code>	Use Java Message Service (JMS) to broadcast changes.
<code>jms-publishing</code>	Use an EJB MessageDrivenBean to be used to broadcast changes. You must configure the MessageDrivenBean separately.
<code>rmi</code>	Use Java Remote Method Invocation (RMI) to broadcast changes.
<code>rmi-iiop</code>	Use RMI over the Internet Inter-Orb Protocol (IIOP) to broadcast changes.
<code>ClassName</code>	The name of a subclass implementation of the <code>TransportManager</code> abstract class

### Usage

You must specify the `cache.coordination.protocol` for every persistence unit and session in the cluster.

### Examples

[Example 5-13](#) shows how configure JMS cache coordination in the `persistence.xml` file.

[Example 5-14](#) shows how to configure RMI cache coordination in the `persistence.xml` file.

#### Example 5-13 Configuring JMS Cache Coordination in `persistence.xml`

```
<property name="eclipselink.cache.coordination.protocol" value="jms" />
<property name="eclipselink.cache.coordination.jms.topic"
value="jms/EmployeeTopic" />
<property name="eclipselink.cache.coordination.jms.factory"
value="jms/EmployeeTopicConnectionFactory" />
```

If your application *is not* running in a cluster, you must provide the URL:

```
<property name="eclipselink.cache.coordination.jms.host"
value="t3://myserver:7001/" />
```

You can also include a username and password, if required, to access the server (for example, if on a separate domain):

```
<property name="eclipselink.cache.coordination.jndi.user" value="weblogic" />
<property name="eclipselink.cache.coordination.jndi.password" value="password" />
```

**Example 5-14 Configuring RMI Cache Coordination in persistence.xml**

```
<property name="eclipselink.cache.coordination.protocol" value="rmi" />
```

If your application *is not* running in a cluster, you must provide the URL:

```
<property name="eclipselink.cache.coordination.rmi.url"
value="t3://myserver:7001/" />
```

You can also include a username and password, if required, to access the server (for example, if on a separate domain):

```
<property name="eclipselink.cache.coordination.jndi.user" value="weblogic" />
<property name="eclipselink.cache.coordination.jndi.password" value="password" />
```

By default, RMI cache coordination broadcasts are asynchronous. You can override this, if needed:

```
<property name="eclipselink.cache.coordination.propagate-asynchronously"
value="false" />
```

If you have multiple applications on the same server or network, you can specify a separate cache coordination channel for each application:

```
<property name="eclipselink.cache.coordination.channel" value="EmployeeChannel" />
```

RMI cache coordination uses a multicast socket to allow servers to find each other. You can configure the multicast settings, if needed:

```
<property name="eclipselink.cache.coordination.rmi.announcement-delay"
value="1000" />
<property name="eclipselink.cache.coordination.rmi.multicast-group"
value="239.192.0.0" />
<property name="eclipselink.cache.coordination.rmi.multicast-group.port"
value="3121" />
<property name="eclipselink.cache.coordination.packet-time-to-live" value="2" />
```

**See Also**

For more information, see:

- ["cache.coordination.channel"](#)
- ["cache.coordination.jms.factory"](#)
- ["cache.coordination.jms.host"](#)
- ["cache.coordination.jms.reuse-topic-publisher"](#)
- ["cache.coordination.jms.topic"](#)
- ["cache.coordination.jndi.initial-context-factory"](#)
- ["cache.coordination.jndi.password"](#)
- ["cache.coordination.jndi.user"](#)
- ["cache.coordination.naming-service"](#)
- ["cache.coordination.propagate-asynchronously"](#)
- ["cache.coordination.remove-connection-on-error"](#)
- ["cache.coordination.rmi.announcement-delay"](#)

- "cache.coordination.rmi.multicast-group"
- "cache.coordination.rmi.multicast-group"
- "cache.coordination.rmi.packet-time-to-live"
- "cache.coordination.rmi.url"
- "cache.coordination.thread.pool.size"
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*
- Cache Coordination Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/CacheCoordination>
- "Clustering and Cache Coordination" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Caching/Coordination](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Caching/Coordination)

## cache.coordination.remove-connection-on-error

Use the `eclipselink.cache.coordination.remove-connection-on-error` property to specify if the connection should be removed if TopLink encounters a communication error when coordinating the cache.

### Values

Table 5-13 describes this persistence property's values.

**Table 5-13 Valid Values for `cache.coordination.remove-connection-on-error`**

Value	Description
true	Removes the connection if a communication error occurs. TopLink will reconnect when the server becomes available.
false	(Default) Does not remove the connection if a communication error occurs.

### Usage

Normally, this is used for RMI connections in the event that a server goes down.

### Examples

[Example 5-15](#) shows how to use this property in the `persistence.xml` file.

[Example 5-16](#) shows how to use this property in a property map.

#### **Example 5-15 Using `cache.coordination.remove-connection-on-error` in `persistence.xml`**

```
<property name="eclipselink.cache.coordination.remove-connection-on-error"
value="true"/>
```

#### **Example 5-16 Using `cache.coordination.remove-connection-on-error` in a property map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put
(PersistenceUnitProperties.CACHE_COORDINATION_REMOVE_CONNECTION_ON_ERROR, "true");
```



**See Also**

For more information, see:

- ["cache.coordination.protocol"](#)
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## cache.coordination.rmi.announcement-delay

Use the `eclipselink.cache.coordination.rmi.announcement-delay` property to set the time (in milliseconds) to wait for announcements from other cluster members on startup.

**Values**

[Table 5-14](#) describes this persistence property's values.

**Table 5-14 Valid Values for `cache.coordination.rmi.announcement-delay`**

Value	Description
Numeric	Time (in milliseconds) to wait for announcements, on startup. Default: <b>1000</b>

**Usage**

Use this property for RMI coordination (when `eclipselink.cache.coordination.protocol = rmi`).

**Examples**

See [Example 5-14](#) for information on how to use this property.

**See Also**

For more information, see:

- ["cache.coordination.protocol"](#)
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## cache.coordination.rmi.multicast-group

Use the `eclipselink.cache.coordination.rmi.multicast-group` property to set the multicast socket group address (used to find other members of the cluster), when using cache coordination for a clustered environment.

**Values**

[Table 5-15](#) describes this persistence property's values.

**Table 5-15 Valid Values for `cache.coordination.rmi.multicast-group`**

Value	Description
Numeric	Set the multicast socket group address Default: 239.192.0.0

**Usage**

Use this property for RMI coordination (when `eclipselink.cache.coordination.protocol = rmi`).

**Examples**

See [Example 5-14](#) for information on how to use this property.

**See Also**

For more information, see:

- "[cache.coordination.protocol](#)"
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## `cache.coordination.rmi.multicast-group.port`

Use the `eclipselink.cache.coordination.rmi.multicast-group.port` property to set the multicast socket group port (used to find other members of the cluster), when using cache coordination for a clustered environment.

**Values**

[Table 5-16](#) describes this persistence property's values.

**Table 5-16 Valid Values for `cache.coordination.rmi.multicast-group.port`**

Value	Description
Numeric	Set the multicast socket group port. Default: 3121

**Usage**

Use this property for RMI coordination (when `eclipselink.cache.coordination.protocol = rmi`).

**Examples**

See [Example 5-14](#) for information on how to use this property.

**See Also**

For more information, see:

- ["cache.coordination.protocol"](#)
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## cache.coordination.rmi.packet-time-to-live

Use the `eclipselink.cache.coordination.rmi.packet-time-to-live` property to set the number of hops the session announcement data packets will take before expiring. The multicast group is used to find other members of the cluster.

### Values

[Table 5-17](#) describes this persistence property's values.

**Table 5-17 Valid Values for `cache.coordination.rmi.packet-time-to-live`**

Value	Description
Numeric	Number of hops the session announcement data packets will take before expiring. Default: 2

### Usage

If sessions are hosted on different LANs that are part of WAN, the announcement sent by one session may not reach other sessions. In this case, consult your network administrator for the correct time-to-live value or test your network by increasing the value until each session receives announcement sent by others.

Use this property for RMI coordination (when `eclipselink.cache.coordination.protocol = rmi`).

### Examples

See [Example 5-14](#) for information on how to use this property.

### See Also

For more information, see:

- ["cache.coordination.protocol"](#)
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## cache.coordination.rmi.url

Use the `eclipselink.cache.coordination.rmi.url` property to set the URL of the host server. This is the URL that other cluster member use to connect to this host.

### Values

[Table 5-18](#) describes this persistence property's values.

**Table 5-18 Valid Values for `cache.coordination.rmi.url`**

Value	Description
url	URL of the host server Default: local

**Usage**

Use this property for RMI coordination (when `eclipselink.cache.coordination.protocol = rmi`).

This may not be required in a clustered environment where JNDI is replicated. You can also set the location as a System property or using a `SessionCustomizer` to avoid requiring a separate `persistence.xml` file per server.

**Examples**

See [Example 5-14](#) for information on how to use this property.

**See Also**

For more information, see:

- "`cache.coordination.protocol`"
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## `cache.coordination.thread.pool.size`

Use the `eclipselink.cache.coordination.thread.pool.size` property to configure the size of the thread pool, for cache coordination threads.

**Values**

[Table 5-19](#) describes this persistence property's values.

**Table 5-19 Valid Values for `cache.coordination.thread.pool.size`**

Value	Description
Numeric	Size of the thread pool. If 0, TopLink does not use a thread pool; instead threads are spawned when required. Default: 32

**Usage**

For RMI cache coordination, TopLink spawns one thread per node to send change notifications and one thread to listen for new node notifications.

For JMS cache coordination, TopLink spawns one thread to *receive* JMS change notification messages (unless MDB is used) and one thread to *process* the change notification (unless MDB is used).

### Examples

[Example 5-17](#) shows how to use this property in the `persistence.xml` file.

[Example 5-18](#) shows how to use this property in a property map.

#### Example 5-17 Using `cache.coordination.thread.pool.size` in `persistence.xml`

```
<property name="eclipselink.cache.coordination.thread.pool.size"
value="48"/>
```

#### Example 5-18 Using `cache.coordination.thread.pool.size` in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put(PersistenceUnitProperties.CACHE_COORDINATION_THREAD_POOL_SIZE,
"48");
```

### See Also

For more information, see:

- ["cache.coordination.protocol"](#)
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*

## cache.database-event-listener

Use the `eclipselink.cache.database-event-listener` property to integrate TopLink with a database event notification service, such as Oracle QCN/DCN (Query Change Notification/Database Change Notification).

### Values

[Table 5-20](#) describes this persistence property's values.

**Table 5-20 Valid Values for `cache.database-event-listener`**

Value	Description
Class	The name of a class that implements <code>DatabaseEventListener</code> , such as the <code>OracleChangeNotificationListener</code> ( <code>org.eclipse.persistence.platform.database.oracle.dcn.OracleChangeNotificationListener</code> ). You can also use <b>DCN</b> and <b>QCN</b> for Oracle.

### Usage

You can use this property to allow the TopLink cache to be invalidated by database change events, triggers, or other services.

### Examples

[Example 5-19](#) shows how to use this property with Oracle DCN.

**Example 5-19 Using cache.database-event-listener in persistence.xml**

```
<?xml version="1.0" encoding="UTF-8"?>
<persistence xmlns="http://java.sun.com/xml/ns/persistence"
             xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
             xsi:schemaLocation="http://java.sun.com/xml/ns/persistence
persistence_2_0.xsd"
             version="2.0">
  <persistence-unit name="acme" transaction-type="RESOURCE_LOCAL">
    <provider>org.eclipse.persistence.jpa.PersistenceProvider</provider>
    <exclude-unlisted-classes>false</exclude-unlisted-classes>
    <properties>
      <property name="eclipselink.cache.database-event-listener" value=
"org.eclipse.persistence.platform.database.oracle.dcn.OracleChangeNotificationList
ener"/>
    </properties>
  </persistence-unit>
</persistence>
```

**See Also**

For more information, see:

- "[@Cache](#)"
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*
- "Database Change Notification" in *Administering JDBC Data Sources for Oracle WebLogic Server*
- "Clustering and Cache Coordination" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Caching/Coordination](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Caching/Coordination)
- Cache Coordination Example <http://wiki.eclipse.org/EclipseLink/Examples/JPA/CacheCoordination>

## cache.shared

Use the `eclipselink.cache.shared` property prefix to indicate whether an entity's cache is shared (non-isolated).

**Values**

[Table 5-21](#) describes this persistence property prefix's values.

**Table 5-21 Valid Values for cache.shared**

Value	Description
true	(Default) Shares an entity's cache. The value is case insensitive.
false	Prevents sharing of an entity's cache. The value is case insensitive.

**Usage**

Form a property name by appending either a valid entity name or class name to `class.shared`, indicating that the property values apply only to a particular entity. As

an alternative, you can append the `default` suffix to the `cache.shared` property prefix to form a property name that sets the default for all entities.

**Examples**

See [Example 2-12](#) for information on how to use this property.

## cache.size

Use the `eclipselink.cache.size` property prefix to specify the cache size for a specific entity type.

**Values**

[Table 5-22](#) describes this persistence property prefix's values.

**Table 5-22 Valid Values for cache.size**

Value	Description
integer	The size of the cache. Default: 100 Bytes.

**Usage**

Form a property name by appending either a valid entity name or class name to `cache.size`, indicating that the property values apply only to a particular entity. As an alternative, you can append the `default` suffix to the `cache.size` property prefix, indicating that the property value applies to all entities.

For most cache types, the size is only the initial size, not a fixed or maximum size. For `CacheType.SoftCache` and `CacheType.HardCache` types, the size is the sub-cache size. The default cache size is 100 Bytes.

**Examples**

See [Example 2-12](#) for information on how to use this property.

## cache.type

Use the `eclipselink.cache.type` property prefix to set the type of cache.

**Values**

[Table 5-23](#) describes this persistence property prefix's values

**Table 5-23 Valid values for cache.type**

Value	Description
Weak	Holds all objects in use by the application, and allows any unreferenced objects to be free for garbage collection. This cache type guarantees object identity and allows optimal garbage collection, but provides little caching benefit.
Soft	Holds all objects read by the application, and allows any unreferenced objects to be free for garbage collection only when the JVM decides that memory is low. This cache type guarantees object identity, allows for garbage collection when memory is low, and provides optimal caching benefit.

**Table 5-23 (Cont.) Valid values for `cache.type`**

Value	Description
<code>SoftWeak</code>	(Default) Holds all objects read by the application, and a fixed-size subcache of MRU objects using <code>Soft</code> references. The <code>SoftWeak</code> cache allows any unreferenced objects not in the sub-cache to be free for garbage collection. The objects in the sub-cache are free to garbage collect only when the JVM decides that memory is low. This cache type guarantees object identity, allows configurable garbage collection, and provides configurable caching benefit.
<code>HardWeak</code>	Holds all objects in use by the application, and a fixed-size subcache of MRU objects using normal <code>Hard</code> references. This type allows any unreferenced objects not in the subcache to be free for garbage collection, but not objects in the subcache. This cache type guarantees object identity, allows configurable garbage collection, and provides configurable caching benefit.
<code>Full</code>	Holds all objects read by the application. This cache type does not allow garbage collection. This guarantees object identity, allows no garbage collection, and provides complete caching benefit.  WARNING: Use this cache type only for a fixed number of objects; otherwise, memory leakage will occur eventually.
<code>NONE</code>	Does not cache any objects, and frees any unreferenced objects for garbage collection. This provides no object identity, allows complete garbage collection, and provides no caching benefit.  WARNING: This cache type should normally not be used. Instead, disable the shared cache through <code>PersistenceUnitProperties.CACHE_SHARED</code> . Lack of object identity can lead to infinite loops for objects that have circular references and no indirection.

### Usage

Form a property name by appending a valid entity name or class name to `cache.type`, indicating that the property values apply only to a particular entity. As an alternative, you can append the `default` suffix to the `cache.type` prefix to form a property name that sets the default for all entities.

Valid values for `cache.type` properties are declared in the `CacheType` class. The default is `SoftWeak`.

If you do not want to cache entities, set the `cache.shared` property.

### Examples

See [Example 2-12](#) for information about how to use this property.

### See Also

For more information, see:

- [cache.shared](#)

## classloader

Use the `eclipselink.classloader` property to create an `EntityManagerFactory` in the property map to be passed to `Persistence.createEntityManagerFactory`.



## Values

[Table 5-24](#) describes this persistence property's values.

**Table 5-24 Valid Values for classloader**

Value	Description
value	Classloader to use.

## Usage

This is a dynamic property that must be set at runtime, in the property map. You cannot configure this property in the `persistence.xml` file.

## Examples

[Example 5-20](#) shows how to use this property in a property map.

### Example 5-20 Using classloader in a Property Map

```
properties.put("eclipselink.classloader", this.getClass().getClassLoader());
```

## composite-unit

Use the `eclipselink.composite-unit` property to specify if the persistence unit is a composite persistence unit.

## Values

[Table 5-25](#) describes this persistence property's values.

**Table 5-25 Valid Values for composite-unit**

Value	Description
true	Persistence unit <i>is</i> a composite persistence unit.
false	(Default) Persistence unit <i>is not</i> a composite persistence unit.

## Usage

The property must be specified in `persistence.xml` of a composite persistence unit. The composite persistence unit must contain all persistence units found in JAR files specified by the `persistence.xml` file.

### Note:

If this property is passed to the `createEntityManagerFactory` method or if it is set in system properties, it is ignored.)

## Examples

[Example 5-21](#) shows how to use this property in the `persistence.xml` file.

### Example 5-21 Using composite-unit in persistence.xml

```

<persistence xmlns="http://java.sun.com/xml/ns/persistence" xmlns:xsi="http://
www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://java.sun.com/xml/ns/
persistence persistence_1_0.xsd" version="1.0">
  <persistence-unit name="compositePu" transaction-type="JTA">
    <provider>
      org.eclipse.persistence.jpa.PersistenceProvider
    </provider>

    <jar-file>member1.jar</jar-file>
    <jar-file>member2.jar</jar-file>

    <properties>
      <property name="eclipselink.composite-unit" value="true"/>
      <property name="eclipselink.target-server" value="WebLogic_10"/>
    </properties>
  </persistence-unit>
</persistence>

```

## See Also

For more information, see:

- ["composite-unit.member"](#)
- ["composite-unit.properties"](#)
- "Using Multiple Databases with a Composite Persistence Unit" in *Solutions Guide for Oracle TopLink*
- "Composite Persistence Units" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/Composite\\_Persistence\\_Units](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/Composite_Persistence_Units)

## composite-unit.member

Use the `eclipselink.composite-unit.member` property to specify if the persistence unit is a *member* composite persistence unit.

### Values

[Table 5-26](#) describes this persistence property's values.

**Table 5-26 Valid Values for composite-unit.member**

Value	Description
true	The persistence unit must be a member of a composite persistence unit and cannot be used as an independent persistence unit.
false	(Default) The persistence unit does not have to be a member of a composite persistence unit.

## Usage

Setting this property to `true` indicates that the persistence unit has dependencies on other persistence units.

### Note:

If this property is passed to the `createEntityManagerFactory` method or if it is set in system properties, it is ignored.)

If this property is `true`, you may still create `EntityManagerFactory`, but it cannot be connected. Any attempt to create an entity manager will cause an exception.

## Query Hint

When executing a native query on a composite persistence unit, use `composite-unit.member` to specify the name of the composite member persistence unit on which to execute the query.

## Examples

[Example 5-22](#) shows how to use this property in the `persistence.xml` file.

### Example 5-22 Using `composite-unit.member` in `persistence.xml`

Composite member persistence unit **memberPu2** is defined in the **member2.jar** file. It has dependency on a class defined in **member1.jar** and cannot be used independently.

```

<persistence xmlns="http://java.sun.com/xml/ns/persistence"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://java.sun.com/xml/ns/persistence persistence_1_0.xsd"
version="1.0">
  <persistence-unit name="memberPu2">
    <provider>
      org.eclipse.persistence.jpa.PersistenceProvider
    </provider>
    <mapping-file>META-INF/advanced-entity-mappings2.xml</mapping-file>
    <jta-data-source>jdbc/MySQLJtaDS</jta-data-source>
    <exclude-unlisted-classes>>false</exclude-unlisted-classes>
    <properties>
      <property name="eclipselink.composite-unit.member" value="true"/>
      <property name="eclipselink.target-database"
value="org.eclipse.persistence.platform.database.MySQLPlatform"/>
    </properties>
  </persistence-unit>
</persistence>

```

## See Also

For more information, see:

- ["@CompositeMember"](#)
- ["composite-unit"](#)

- ["composite-unit.member"](#)

## composite-unit.properties

Use the `eclipselink.composite-unit.properties` property to configure the properties for persistence unit members.

### Values

[Table 5-27](#) describes this persistence property's values.

**Table 5-27 Valid Values for composite-unit.properties**

Value	Description
Map of properties	Properties to be passed to the persistence unit. Use the persistence unit's name as the key.

### Usage

Pass this property to `createEntityManager` method of a composite persistence unit to pass properties to its member persistence units.

### Examples

[Example 5-23](#) shows how to use this property in a property map

#### Example 5-23 Using composite-unit.properties in a Property Map

```
Map props1 = new HashMap();

props1.put("javax.persistence.jdbc.user", "user1");
props1.put("javax.persistence.jdbc.password", "password1");
props1.put("javax.persistence.jdbc.driver", "oracle.jdbc.OracleDriver");
props1.put("javax.persistence.jdbc.url", "jdbc:oracle:thin:@oracle_db_url:1521:db");

Map props2 = new HashMap();

props2.put("javax.persistence.jdbc.user", "user2");
props2.put("javax.persistence.jdbc.password", "password2");
props2.put("javax.persistence.jdbc.driver", "com.mysql.jdbc.Driver");
props2.put("javax.persistence.jdbc.url", "jdbc:mysql://my_sql_db_url:3306/user2");

Map memberProps = new HashMap();
memberProps.put("memberPu1", props1);
memberProps.put("memberPu2", props2);

Map props = new HashMap();
props.put("eclipselink.logging.level", "FINEST");
props.put("eclipselink.composite-unit.properties", memberProps);

EntityManagerFactory emf = Persistence.createEntityManagerFactory("compositePu", props);
```

### See Also

For more information, see:

- "composite-unit"

## connection-pool

Use the `eclipselink.connection-pool` property to configure the various connection pool properties.

### Values

Table 5-28 describes this persistence property's values.

**Table 5-28 Valid Values for connection-pool**

Value	Description
<code>initial</code>	Starting (initial) number of connections.
<code>min</code>	Minimum number of connections.
<code>max</code>	Maximum number of connections.
<code>wait</code>	Amount of time (in milliseconds) to wait for a connection from the pool.
<code>url</code>	URL of the JDBC for the connection.
<code>shared</code>	For read connection pools, indicates that read connections are shared across threads.
<code>jtaDataSource</code>	JTA DataSource name to use for the connection, if different than the default.
<code>nonJtaDataSource</code>	Non-JTA DataSource name to use for the connection, if different than the default.
<code>user</code>	Username to use for this connection (if different than the default).
<code>password</code>	Password of the <code>user</code> for this connection (if different than the default).

### Usage

Append the name of the connection pool and property to be configured. If connection pool is specified, TopLink configures the default (write) pool.

### Examples

Example 5-24 shows how to use this property in the `persistence.xml` file.

#### Example 5-24 Using connection-pool in persistence.xml

```
<property name="eclipselink.connection-pool.default.initial" value="1" />
<property name="eclipselink.connection-pool.node2.min" value="16"/>
<property name="eclipselink.connection-pool.node2.max" value="16"/>
<property name="eclipselink.connection-pool.node2.url"
value="jdbc:oracle:thin:@node2:1521:orcl"/>
```

### See Also

For more information, see:

- Partitioning Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Partitioning>
- "Connection Pools" in *Understanding Oracle TopLink*
- "Connection Pooling" in *Solutions Guide for Oracle TopLink*

- ["jdbc.cache-statements"](#)
- ["connection-pool.read"](#)
- ["connection-pool.sequence"](#)

## connection-pool.read

Use the `eclipselink.connection-pool.read` property to configure a read connection pool for non-transaction read queries.

### Values

[Table 5-29](#) describes this persistence property's values.

**Table 5-29 Valid Values for connection-pool.read**

Value	Description
<code>initial</code>	Starting (initial) number of connection.
<code>min</code>	Minimum number of connections.
<code>max</code>	Maximum number of connections.
<code>wait</code>	Amount of time it takes to get connections from the pool.
<code>url</code>	URL of the JDBC connection.
<code>shared</code>	For read connection pools, indicates that read connections are shared across threads.
<code>jtaDataSource</code>	JTA DataSource name to use for the connection, if different than the default.
<code>nonJtaDataSource</code>	Non-JTA DataSource name to use for the connection, if different than the default.
<code>user</code>	Username to use for this connection (if different than the default).
<code>password</code>	Password of the <code>user</code> for this connection (if different then the default).

### Usage

By default, TopLink *does not* use a separate read connection pool; the default pool is used for read queries.

### Examples

[Example 5-25](#) shows how to use this property in the `persistence.xml` file.

#### Example 5-25 Using connection-pool.read in persistence.xml

```
<property name="eclipselink.connection-pool.read.min" value="16"/>
<property name="eclipselink.connection-pool.read.max" value="16"/>
```

### See Also

For more information, see:

- "Connection Pools" in *Understanding Oracle TopLink*
- "Connection Pooling" in *Solutions Guide for Oracle TopLink*
- ["connection-pool"](#)

## connection-pool.sequence

Use the `eclipselink.connection-pool.sequence` property to have the connection pool allocate generated IDs.

### Values

[Table 5-30](#) describes this persistence property's values.

**Table 5-30 Valid Values for connection-pool.sequence**

Value	Description
true	Uses the internal connection pool to pool connections from a datasource.
false	(Default) Does not use the internal connection pool to pool connections from a datasource.

### Usage

This is only required for `TABLE` sequencing. By default, TopLink *does not* use a separate sequence connection pool; the default pool is used for sequencing.

### Examples

[Example 5-26](#) shows how to use this property in the `persistence.xml` file.

#### Example 5-26 Using connection-pool.sequence in persistence.xml

```
<property name="eclipselink.connection-pool.sequence" value="true"/>
```

### See Also

For more information, see:

- "Connection Pools" in *Understanding Oracle TopLink*
- "Connection Pooling" in *Solutions Guide for Oracle TopLink*
- "[connection-pool](#)"

## create-ddl-jdbc-file-name

Use the `eclipselink.create-ddl-jdbc-file-name` property to specify the name of the DDL file generated by TopLink that contains the SQL statements to create tables for JPA entities.

### Values

[Table 5-31](#) describes this persistence property's values.

**Table 5-31 Valid Values for create-ddl-jdbc-file-name**

Value	Description
File name	A file name valid for your operating system. You can prefix the file name with a file path if a concatenation of <code>eclipselink.application-location</code> + <code>eclipselink.create-ddl-jdbc-file-name</code> is valid for your operating system.

**Usage**

If `eclipselink.ddl-generation` is set to `create-tables` or `drop-and-create-tables`, TopLink writes this file to the location specified by `eclipselink.application-location`.

**Examples**

See [Example 5-27](#) for information on how to use this property.

**See Also**

For more information, see:

- `"application-location"`
- `"ddl-generation"`

## ddl-generation

Use the `eclipselink.ddl-generation` property to specify how TopLink generates DDL (Data Definition Language) for the database schema (tables and constraints) on deployment

**Values**

[Table 5-32](#) describes this persistence property's values.

**Table 5-32 Valid Values for ddl-generation**

Value	Description
<code>create-tables</code>	TopLink will attempt to execute a <code>CREATE TABLE SQL</code> for each table. If the table already exists, TopLink will follow the default behavior of your specific database and JDBC driver combination (when a <code>CREATE TABLE SQL</code> is issued for an already existing table). In most cases an exception is thrown and the table is not created; the existing table will be used. EclipseLink will then continue with the next statement.
<code>create-or-extend-tables</code>	TopLink will attempt to create tables. If the table exists, TopLink will add any missing columns.



**Table 5-32 (Cont.) Valid Values for ddl-generation**

Value	Description
drop-and-create-tables	<p>TopLink will attempt to DROP all tables, then CREATE all tables. If any issues are encountered, TopLink will follow the default behavior of your specific database and JDBC driver combination, then continue with the next statement.</p> <p>This is useful in development if the schema frequently changes or during testing when the existing data needs to be cleared.</p> <p><b>Note:</b> Using drop-and-create will remove all of the data in the tables when they are dropped. You should never use option on a production schema that has valuable data in the database. If the schema changed dramatically, there could be old constraints in the database that prevent the dropping of the old tables. This may require the old schema to be dropped through another mechanism.</p>
none	(Default) No DDL generated; no schema generated.

### Usage

You can use `create-or-extend-tables` only when `eclipselink.ddl-generation.output-mode = database`.

If you are using persistence in a Java SE environment and would like to create the DDL files without creating tables, additionally define a Java system property `INTERACT_WITH_DB` and set its value to `false`.

`DDL_GENERATION` must be set in order for this property to take effect.

### Examples

[Example 5-27](#) shows how to use this property in the `persistence.xml` file.

[Example 5-28](#) shows how to use this property in a property map.

#### Example 5-27 Using ddl-generation in persistence.xml

```
<property name="eclipselink.ddl-generation" value="drop-and-create-tables"/>
<property name="eclipselink.create-ddl-jdbc-file-name"
value="createDDL_ddlGeneration.jdbc"/>
<property name="eclipselink.drop-ddl-jdbc-file-name"
value="dropDDL_ddlGeneration.jdbc"/>
<property name="eclipselink.ddl-generation.output-mode" value="both"/>
```

#### Example 5-28 Using ddl-generation in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.DDL_GENERATION,
PersistenceUnitProperties.DROP_AND_CREATE);
propertiesMap.put(PersistenceUnitProperties.DDL_GENERATION_MODE,
PersistenceUnitProperties.BOTH);
propertiesMap.put(PersistenceUnitProperties.CREATE_JDBC_DDL_FILE, "create.sql");
```

### See Also

For more information, see:

- ["create-ddl-jdbc-file-name"](#)
- ["drop-ddl-jdbc-file-name"](#)

- "ddl-generation.output-mode"
- Example <http://wiki.eclipse.org/EclipseLink/Examples/JPA/DDL>

## ddl-generation.output-mode

Use the `eclipselink.ddl-generation.output-mode` property to specify where TopLink generates and writes the DDL.

### Values

Table 5-33 describes this persistence property's values.

**Table 5-33 Valid Values for `ddl-generation.output-mode`**

Value	Description
both	DDL will be generated and written to both the database and a file. <ul style="list-style-type: none"> <li>• If <code>eclipselink.ddl-generation</code> is set to <code>create-tables</code>, then <code>eclipselink.create-ddl-jdbc-file-name</code> is written to <code>eclipselink.application-location</code> and executed on the database.</li> <li>• If <code>eclipselink.ddl-generation</code> is set to <code>drop-and-create-tables</code>, then both <code>eclipselink.create-ddl-jdbc-file-name</code> and <code>eclipselink.drop-ddl-jdbc-file-name</code> are written to <code>eclipselink.application-location</code>, and both SQL files are executed on the database.</li> </ul>
database	(Default) DDL will be generated and written to the database only.
sql-script	DDL will be generated and written to a file only. <ul style="list-style-type: none"> <li>• If <code>eclipselink.ddl-generation</code> is set to <code>create-tables</code>, then <code>eclipselink.create-ddl-jdbc-file-name</code> is written to <code>eclipselink.application-location</code>. It is <i>not</i> executed on the database.</li> <li>• If <code>eclipselink.ddl-generation</code> is set to <code>drop-and-create-tables</code>, then both <code>eclipselink.create-ddl-jdbc-file-name</code> and <code>eclipselink.drop-ddl-jdbc-file-name</code> are written to <code>eclipselink.application-location</code>. Neither are executed on the database.</li> </ul>

### Usage

You can only use `ddl-generation.output-mode` if you use `ddl-generation`. Then, you can optimally set other properties.

### Examples

See [Example 5-27](#) for information on how to use this property.

### See Also

For more information, see:

- "application-location"
- "ddl-generation"
- "create-ddl-jdbc-file-name"

## ddl.table-creation-suffix

Use the `eclipselink.ddl.table-creation-suffix` property to append a string to generated `CREATE Table` statements.

### Values

[Table 5-34](#) describes this property's values.

**Table 5-34 Valid Values for `ddl-generation.table-creation-suffix`**

Value	Description
value	The name of the suffix.

### Usage

The `ddl.generation` property must be set.

### Examples

[Example 5-29](#) shows how to use this property in the `persistence.xml` file.

#### Example 5-29 Using `ddl.table-creation-suffix` in `persistence.xml`

```
<property name="eclipselink.ddl.table-creation-suffix" value="engine=InnoDB"/>
```

### See Also

For more information, see:

- ["ddl-generation"](#)

## deploy-on-startup

Use the `eclipselink.deploy-on-startup` property to configure deployment on startup (at the creation of the `EntityManagerFactory`) instead of occurring the first time an `EntityManager` is created.

### Values

[Table 5-35](#) describes this persistence property's values.

**Table 5-35 Valid Values for `delay-on-startup`**

Value	Description
true	Causes a persistence unit to be created when the <code>EntityManager</code> is created, usually during deployment to a Java EE container or servlet container.
false	(Default) The persistence unit is not initialized until the first <code>EntityManager</code> is created, or until metadata is required from the <code>EntityManagerFactory</code> .

### Usage

Using `true` may increase startup time of a JavaEE server, but will avoid the first request from hanging as the persistence unit is deployed.

### Examples

[Example 5-30](#) shows how to use this property in the `persistence.xml` file.

#### Example 5-30 Using `deploy-on-startup` in `persistence.xml`

```
<property name="eclipselink.deploy-on-startup" value="true" />
```

## descriptor.customizer

Use the `eclipselink.descriptor.customizer` property as a prefix for a property to configure a `DescriptorCustomizer`. Use this class's `customize` method, which takes an `org.eclipse.persistence.descriptors.ClassDescriptor`, to programmatically access advanced EclipseLink descriptor and mapping API for the descriptor associated with the JPA entity.

### Values

[Table 5-36](#) describes this persistence property's values.

**Table 5-36 Valid Values for `descriptor.customizer`**

Value	Description
name	Full name for a class that implements <code>DescriptorCustomizer</code> .

### Usage

You cannot use multiple descriptor customizers.

### Examples

[Example 5-31](#) shows how to use this property in the `persistence.xml` file.

[Example 5-32](#) shows how to use this property with a property map.

#### Example 5-31 Using `descriptor.customizer` in `persistence.xml`

```
<property name="eclipselink.descriptor.customizer.Order"
value="acme.sessions.MyDescriptorCustomizer" />
```

#### Example 5-32 Using `descriptor.customizer` in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.DEScriptor_CUSTOMIZER+".Order",
"acme.sessions.MyDescriptorCustomizer");
```

### See Also

For more information, see:

- [Understanding Oracle TopLink](#)

- Section 8.1, "Entity" in the JPA Specification <http://jcp.org/en/jsr/detail?id=220>

## drop-ddl-jdbc-file-name

Use the `eclipselink.drop-ddl-jdbc-file-name` property to specify the name of the DDL file generated by TopLink that contains the SQL statements to drop tables for JPA entities.

### Values

[Table 5-37](#) describes this persistence property's values.

**Table 5-37 Valid Values for drop-ddl-jdbc-file-name**

Value	Description
File name	A file name valid for your operating system. You can prefix the file name with a file path if a concatenation of <code>eclipselink.application-location</code> + <code>eclipselink.create-ddl-jdbc-file-name</code> is valid for your operating system.

### Usage

If `eclipselink.ddl-generation` is set to `create-tables`, TopLink writes this file to the location specified by `eclipselink.application-location`.

### Examples

See [Example 5-27](#) for information on how to use this property.

### See Also

For more information, see:

- ["ddl-generation"](#)

## exception-handler

Use the `eclipselink.exception-handler` property to specify the TopLink exception handler class: an exception handler class that implements the `org.eclipse.persistence.exceptions.ExceptionHandler` interface. The class must provide a default, no-argument constructor.

### Values

[Table 5-38](#) describes this persistence property's values.

**Table 5-38 Valid Values for exception-handler**

Value	Description
ExceptionHandler class	Use the <code>handleException</code> method of the class, which takes a <code>java.lang.RuntimeException</code> , to: <ul style="list-style-type: none"> <li>• Re-throw the exception</li> <li>• Throw a different exception</li> <li>• Retry the query or database operation</li> </ul>

### Usage

The `ExceptionHandler` class name must be fully qualified by its package name.

### Examples

[Example 5-33](#) shows how to use this property in the `persistence.xml` file.

[Example 5-34](#) shows how to use this extension in a property map.

#### Example 5-33 Using exception-handler in persistence.xml

```
<property name="eclipselink.exception-handler"
value="my.package.MyExceptionHandler">
```

#### Example 5-34 Using exception-handler in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.EXCEPTION_HANDLER_CLASS,
"my.package.MyExceptionHandler");
```

### See Also

For more information, see:

- ["orm.throw.exceptions"](#)
- ["Sessions" in \*Understanding Oracle TopLink\*](#)
- ["Managing and Diagnosing Problems" in \*Solutions Guide for Oracle TopLink\*](#)

## exclude-eclipselink-orm

Use the `eclipselink.exclude-eclipselink-orm` property to exclude an EclipseLink ORM mapping file for a specific persistence unit.

### Values

[Table 5-39](#) describes this persistence property's values.

**Table 5-39 Valid Values for exclude-eclipselink-orm**

Value	Description
true	Does not use the <code>eclipselink-orm.xml</code> file.
false	(Default) TopLink uses the <code>eclipselink-orm.xml</code> file.

### Usage

By default the first file found at the resource name: `META-INF/eclipselink-orm.xml` is processed and overrides configurations specified in annotations and standard mapping files.

### Examples

[Example 5-35](#) shows how to use this property in the `persistence.xml` file.

#### Example 5-35 Using `exclude-eclipselink-orm` in `persistence.xml`

```
<property name="eclipselink.exclude-eclipselink-orm" value="true"/>
```

### See Also

For more information, see:

- "Building Blocks of a TopLink Project" in *Understanding Oracle TopLink*
- "Using an External Metadata Source" in *Solutions Guide for Oracle TopLink*

## flush-clear.cache

Use the `eclipselink.flush-clear.cache` property to specify the TopLink `EntityManager` cache behavior when a `clear` method follows the `flush` method.

### Values

[Table 5-40](#) describes this persistence property's values.

**Table 5-40 Valid Values for `flush-clear.cache`**

Value	Description
Drop	TopLink drops the entire <code>EntityManager</code> cache. Although this is the fastest mode and uses the least memory, the shared cache may potentially contain stale data after performing the commit.
DropInvalidate	(Default) TopLink drops the entire <code>EntityManager</code> cache. Classes that have at least one updated or deleted object become invalid in the shared cache after performing the commit. This mode is slower than <code>Drop</code> , but as efficient (in terms of memory usage) and prevents stale data.
Merge	TopLink drops objects the <code>EntityManager</code> cache that have not been flushed. Although this mode leaves the shared cache in a perfect state after performing the commit, it is the least memory-efficient. In a very large transaction you may run out of memory.

### Usage

You can specify this property when creating an `EntityManagerFactory` (in the map passed to the `createEntityManagerFactory` method or in the `persistence.xml` file), or an `EntityManager` (in the map passed to the `createEntityManager` method).

Note that the latter overrides the former.

## Examples

[Example 5-36](#) shows how to use this property in the `persistence.xml` file.

[Example 5-37](#) shows how to use this extension in a property map.

### Example 5-36 Using `flush-clear.cache` in `persistence.xml`

```
<property name="eclipselink.flush-clear.cache" value="Drop"/>
```

### Example 5-37 Using `flush-clear.cache` in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.FLUSH_CLEAR_CACHE,
FlushClearCache.Drop);
```

## See Also

For more information, see:

- "[@Cache](#)"
- "Cache Coordination" in *Understanding Oracle TopLink*
- "Scaling TopLink Applications in Clusters" in *Solutions Guide for Oracle TopLink*
- Cache Coordination Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/CacheCoordination>
- "Clustering and Cache Coordination" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Caching/Coordination](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Caching/Coordination)

## id-validation

Use the `eclipselink.id-validation` property to define which primary key components values are considered invalid.

### Values

[Table 5-41](#) describes this persistence property's values.

**Table 5-41 Valid Values for `id-validation`**

Value	Description
Negative	Null, 0 and negative values are invalid for IDs extending <code>Number</code> and primitive <code>int</code> and <code>long</code> IDs.
None	TopLink performs no ID validation.
Null	Null is invalid All other values are valid.
Zero	Null, 0 and negative values are invalid for primitive <code>int</code> and <code>long</code> IDs.

### Usage

Identity and sequencing (with `shouldAlwaysOverrideExistingValue` configured as `true`) will override any existing ID value.



## Examples

[Example 5-38](#) shows how to use this property in the `persistence.xml` file.

### Example 5-38 Using `id-validation` in `persistence.xml`

```
<property name="eclipselink.id-validation" value="NULL"/>
```

## See Also

For more information, see:

- "Persisting Objects" in *Understanding Oracle TopLink*
- "[@PrimaryKey](#)"

## `jdbc.allow-native-sql-queries`

Use the `eclipselink.jdbc.allow-native-sql-queries` property to specify if user-defined (that is, native) SQL is allowed within a persistence unit.

## Values

[Table 5-42](#) describes this persistence property's values.

**Table 5-42 Valid Values for `jdbc.allow-native-sql-queries`**

Value	Description
true	(Default) TopLink allows native SQL.
false	TopLink does not allow native SQL.

## Usage

Within a multitenant, use this option to minimize the potential impact of revealing multitenant information. By default, any persistence unit with a multitenant entity causes TopLink to set `eclipselink.jdbc.allow-native-sql-queries` as false.

## Examples

[Example 5-39](#) shows how to use this property in the `persistence.xml` file.

### Example 5-39 Using `jdbc.allow-native-sql-queries` in `persistence.xml`

```
<property name="eclipselink.jdbc.allow-native-sql-queries" value="false" />
```

## See Also

For more information, see:

- "Querying" in *Understanding Oracle TopLink*

## jdbc.batch-writing

Use the `eclipselink.jdbc.batch-writing` property to configure batch writing to optimize transactions with multiple write functions.

### Values

Table 5-43 describes this persistence property's values.

**Table 5-43** Valid Values for `jdbc.batch-writing`

Value	Description
<code>jdbc</code>	Use JDBC batch writing.
<code>buffered</code>	Do not use JDBC batch writing or the platform's native batch writing.
<code>oracle-jdbc</code>	Use the Oracle platform's native batch writing. In a property map, use <code>OracleJDBC</code> . <b>Note:</b> This requires an Oracle JDBC driver.
<code>custom-class</code>	A custom class that extends the <code>BatchWritingMechanism</code> class.
<code>none</code>	(Default) Do not use batch writing (that is, turn it off).

### Usage

Batch writing allows multiple heterogeneous dynamic SQL statements to be sent to the database as a single execution, or multiple homogeneous parameterized SQL statements to be executed as a single batch execution.



#### Note:

Not all JDBC drivers or databases support batch writing.

Use `eclipselink.jdbc.batch-writing.size` to specify the batch size.

### Examples

[Example 5-40](#) shows how to use this property in the `persistence.xml` file.

[Example 5-41](#) shows how to use this property in a property map.

#### Example 5-40 Using `jdbc.batch-writing` in `persistence.xml`

```
<property name="eclipselink.jdbc.batch-writing" value="Oracle-JDBC"/>
```

#### Example 5-41 Using `jdbc.batch-writing` in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.BATCH_WRITING,
BatchWriting.OracleJDBC);
```

### See Also

For more information, see:

- ["jdbc.batch-writing.size"](#)
- "Batch Writing" in *Solutions Guide for Oracle TopLink*

## jdbc.batch-writing.size

Use the `eclipselink.jdbc.batch-writing.size` property to configure the batch size used for batch writing.

### Values

[Table 5-44](#) describes this persistence property's values.

**Table 5-44 Valid Values for jdbc.batch-writing.size**

Value	Description
batch size	For <b>parameterized</b> batch writing, this value is the number of statements to batch (default: 100). For <b>dynamic</b> batch writing, this value is the size of the batched SQL buffer (default: 32k).

### Examples

[Example 5-42](#) shows how to use this property in the `persistence.xml` file.

#### Example 5-42 Using jdbc.batch-writing.size in persistence.xml

```
<property name="eclipselink.jdbc.batch-writing.size" value="1000"/>
```

### See Also

For more information, see:

- ["jdbc.batch-writing"](#)
- "Batch Writing" in *Solutions Guide for Oracle TopLink*

## jdbc.cache-statements

Use the `eclipselink.jdbc.cache-statements` property to specify if JDBC statements should be cached.

### Values

[Table 5-45](#) describes this persistence property's values.

**Table 5-45 Valid Values for jdbc.cache-statements**

Value	Description
true	Enable internal statement caching.
false	(Default) Disable internal statement caching.

## Usage

You should use this property when using TopLink's internal connection pooling. See ["connection-pool"](#) for more information.

## Examples

[Example 5-43](#) shows how to use this property in the `persistence.xml` file.

[Example 5-44](#) shows how to use this property in a property map.

### Example 5-43 Using `jdbc.cache-statements` in `persistence.xml`

```
<property name="eclipselink.jdbc.cache-statements" value="false"/>
```

### Example 5-44 Using `jdbc.cache-statements` in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.CACHE_STATEMENTS, "false");
```

## See Also

For more information, see:

- ["jdbc.cache-statements.size"](#)
- ["connection-pool"](#)
- "Batch Writing" in *Solutions Guide for Oracle TopLink*

## `jdbc.cache-statements.size`

Use the `eclipselink.jdbc.cache-statements.size` property to specify the number of statements held when using internal statement caching.

## Values

[Table 5-46](#) describes this persistence property's values.

**Table 5-46 Valid Values for `jdbc.cache-statements.size`**

Value	Description
size	A string value containing a positive integer or zero (Default: 50). The maximum value may vary, depending on your JDBC driver.

## Examples

[Example 5-45](#) shows how to use this property in the `persistence.xml` file.

[Example 5-46](#) shows how to use this property in a property map.

### Example 5-45 Using `jdbc.cache-statements.size` in `persistence.xml`

```
<property name="eclipselink.jdbc.cache-statements.size" value="100"/>
```

**Example 5-46 Using jdbc.cache-statements.size in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.CACHE_STATEMENTS_SIZE, "100");
```

**See Also**

For more information, see:

- ["jdbc.cache-statements"](#)
- "Batch Writing" in *Solutions Guide for Oracle TopLink*

## jdbc.connector

Use the `eclipselink.jdbc.connector` property to define a custom connector to connect to the database.

**Values**

[Table 5-47](#) describes this persistence property's values.

**Table 5-47 Valid Values for jdbc.connector**

Value	Description
Fully qualified class name	A class that implements the <code>Connector</code> interface.

**Usage**

You can use this property to connect to a non-standard connection pool, or provide customized details on how to obtain a connection.

This property is not required when using a `DataSource` or `JDBC DriverManager`.

**Examples**

[Example 5-47](#) shows how to use this property in the `persistence.xml` file.

**Example 5-47 Using jdbc.connector in persistence.xml**

```
<property name="eclipselink.jdbc.connector" value="package.MyConnector"/>
```

## jdbc.exclusive-connection.is-lazy

Use the `eclipselink.jdbc.exclusive-connection.is-lazy` property to specify if `TopLink` acquires write connections lazily.

**Values**

[Table 5-48](#) describes this persistence property's values.

**Table 5-48 Valid Values for jdbc.exclusive-connection.is-lazy**

Value	Description
true	(Default) Acquire write connections lazily.
false	Do not acquire write connections lazily.

**Examples**

[Example 5-48](#) shows how to use this property in the `persistence.xml` file.

[Example 5-49](#) shows how to use this property in a property map.

**Example 5-48 Using jdbc.exclusive-connection.is-lazy in persistence.xml**

```
<property name="eclipselink.jdbc.exclusive-connection.is-lazy" value="false"/>
```

**Example 5-49 Using jdbc.exclusive-connection.is-lazy in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.EXCLUSIVE_CONNECTION_IS_LAZY,
"false");
```

**See Also**

For more information, see:

- Auditing <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Auditing>

## jdbc.exclusive-connection.mode

Use the `eclipselink.jdbc.exclusive-connection.mode` property to specify when TopLink performs reads through the write connection.

**Values**

[Table 5-49](#) describes this persistence property's values.

**Table 5-49 Valid Values for jdbc.exclusive-connection.mode**

Value	Description
Transactional	(Default) Create an isolated client session if some or all entities require isolated cache, otherwise create a client session. <b>Notes:</b> <ul style="list-style-type: none"> <li>• TopLink keeps the connection exclusive for the duration of the transaction.</li> <li>• <i>Inside</i> the transaction, TopLink performs all writes and reads through the exclusive connection.</li> <li>• <i>Outside</i> the TopLink transaction, a new connection is acquired from the connection pool for each read and released back immediately after the query is executed.</li> </ul>

**Table 5-49 (Cont.) Valid Values for `jdbc.exclusive-connection.mode`**

Value	Description
Isolated	<p>Create an exclusive isolated client session if reading an isolated entity, otherwise raise an error.</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• TopLink keeps the connection exclusive for the lifetime of the owning <code>EntityManager</code>.</li> <li>• <i>Inside</i> the transaction, TopLink performs all writes and reads through the exclusive connection.</li> <li>• <i>Outside</i> the TopLink transaction, only isolated entities are read through the exclusive connection. For non-isolated entities, TopLink acquires a new connection from the connection pool for each read and immediately releases the connection after executing the query.</li> </ul>
Always	<p>Create an exclusive isolated client session if reading an isolated entity, otherwise create an exclusive client session.</p> <p><b>Note:</b> TopLink keeps the connection exclusive for the lifetime of the owning <code>EntityManager</code> and performs all writes and reads through the exclusive connection.</p>

### Usage

You can set this property while creating either an `EntityManagerFactory` (either in the map passed to the `createEntityManagerFactory` method, or in the `persistence.xml` file), or an `EntityManager` (in the map passed to the `createEntityManager` method). Note that the latter overrides the former.

### Examples

[Example 5-50](#) shows how to use this property in the `persistence.xml` file.

[Example 5-51](#) shows how to use this property in a property map.

#### Example 5-50 Using `jdbc.exclusive-connection.mode` in `persistence.xml`

```
property name="eclipselink.jdbc.exclusive-connection.mode" value="Always"/>
```

#### Example 5-51 Using `jdbc.exclusive-connection.mode` in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.EXCLUSIVE_CONNECTION_MODE, "Always");
```

### See Also

For more information, see:

- ["jdbc.exclusive-connection.is-lazy"](#)
- "Isolated Client Sessions" in *Understanding Oracle TopLink*
- "Connections" in *Understanding Oracle TopLink*

## jdbc.native-sql

Use the `eclipselink.jdbc.native-sql` property to specify if TopLink uses generic SQL or includes platform-specific (that is, "native") SQL statements.

## Values

[Table 5-50](#) describes this persistence property's values.

**Table 5-50 Valid Values for jdbc.native-sql**

Value	Description
true	(Default) Use platform-specific ("native" ) SQL.
false	Use generic SQL.

## Usage

When using platform-specific SQL (`eclipselink.jdbc.native-sql = true`), TopLink uses platform-specific SQL to customize join syntax, date operators, using sequencing, and so on.

## Examples

[Example 5-52](#) shows how to use this property in the `persistence.xml` file.

[Example 5-53](#) shows how to use this property in a property map.

### Example 5-52 Using jdbc.native-sql in persistence.xml

```
<property name="eclipselink.jdbc.native-sql" value="false"/>
```

### Example 5-53 Using jdbc.native-sql in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.NATIVE_SQL, "false");
```

## See Also

For more information, see:

- "Querying" in *Understanding Oracle TopLink*
- "Query Languages" in *Understanding Oracle TopLink*

## jdbc.property

Use the `eclipselink.jdbc.property` prefix to pass JDBC driver-specific connection properties to TopLink.

## Usage

Append the JDBC driver-specific property name to this property prefix.

## Examples

[Example 5-54](#) shows how to use this property prefix in the `persistence.xml` file.

### Example 5-54 Using jdbc.property in persistence.xml

```
<property name="eclipselink.jdbc.property.defaultRowPrefetch" value="25"/>
```



**See Also**

For more information, see:

- "Using TopLink with the Oracle Database" in *Solutions Guide for Oracle TopLink*
- "Introduction to Data Access" in *Understanding Oracle TopLink*

## jdbc.sql-cast

Use the `eclipselink.jdbc.sql-cast` property to specify if TopLink uses platform-specific (that is, "native") `CAST` SQL operations.

**Note:**

Normally, casting is not required. Using it may cause issues.

**Values**

[Table 5-51](#) describes this persistence property's values.

**Table 5-51 Valid Values for jdbc.sql-cast**

Value	Description
true	Use platform-specific <code>CAST</code> operations.
false	(Default) Do not use platform-specific <code>CAST</code> operations.

**Examples**

[Example 5-55](#) shows how to use this property in the `persistence.xml` file.

**Example 5-55 Using jdbc.sql-cast in persistence.xml**

```
<property name="eclipselink.jdbc.sql-cast" value="true"/>
```

## jdbc.uppercase-columns

Use the `eclipselink.jdbc.uppercase-columns` property to force column names from the metadata to be uppercase.

**Note:**

This parameter has been replaced by `jpql.parser`, which ensures that both sides use uppercase for comparisons.

**Values**

[Table 5-52](#) describes this persistence property's values.

**Table 5-52 Valid Values for jdbc.uppercase-columns**

Value	Description
true	Forces all column names from the metadata to uppercase.
false	(Default) Does not force column names from the metadata to uppercase.

**Usage**

When using native SQL queries, the JDBC metadata may return column names in lower case on some platforms. If the column names are uppercase in the mappings (default), they will not match. You should use this parameter to force all column names from the metadata to uppercase.

**Examples**

[Example 5-56](#) shows how to use this parameter in the `persistence.xml` file.

**Example 5-56 Using jdbc.uppercase-column-names in persistence.xml**

```
<property name="eclipselink.jpa.uppercase-columns" value="true"/>
```

**See Also**

For more information, see:

- ["jpql.parser"](#)
- "Using TopLink with the Oracle Database" in *Solutions Guide for Oracle TopLink*
- "Introduction to Data Access" in *Understanding Oracle TopLink*

## jpql.parser

Use the `eclipselink.jpql.parser` property to configure the JPQL parser parameters.

**Values**

[Table 5-53](#) describes this persistence property's values.

**Table 5-53 Valid Values for jpql.parser**

Value	Description
<code>org.eclipse.persistence.inter nal.jpa.jpql.HermesParser</code>	(Default) Current parser, starting with EclipseLink 2.4, that provides extended JPQL support.
<code>org.eclipse.persistence.queri es.ANTLRQueryBuilder</code>	Old parser, used for backward compatibility (prior to EclipseLink 2.4).

**See Also**

For more information, see:

- ["jpql.validation"](#)

## jpa.uppercase-column-names

Use the `eclipselink.jpa.uppercase-column-names` property to specify JPA processing to uppercase all column name definitions (simulating case insensitivity).

### Values

[Table 5-54](#) describes this persistence property's values.

**Table 5-54 Valid Values for `jpa.uppercase-column-names`**

Value	Description
true	JDBC metadata returned from the database is returned in uppercase, ensuring fields are the same case. Sets <a href="#">jdbc.uppercase-columns</a> to true.
false	(Default) Does not return JDBC metadata in uppercase.

### Usage

Use this property to correct situations in which user-defined fields do not match the case returned by the database for native queries.

### Examples

[Example 5-57](#) shows how to use this property in the `persistence.xml` file.

#### Example 5-57 Using `jpa.uppercase-column-names` in `persistence.xml`

```
<property name="eclipselink.jpa.uppercase-column-names" value="true"/>
```

### See Also

For more information, see:

- ["jdbc.uppercase-columns"](#)
- "Using TopLink with the Oracle Database" in *Solutions Guide for Oracle TopLink*
- "Introduction to Data Access" in *Understanding Oracle TopLink*

## jpql.validation

Use the `eclipselink.jpql.parser` property to configure the JPQL parser validation level.

### Values

[Table 5-55](#) describes this persistence property's values.

**Table 5-55 Valid Values for `jpql.validation`**

Value	Description
EclipseLink	(Default) Allows EclipseLink JPAL extensions.
JPA 1.0	Allows valid JPA 1.0 JPQL only.

**Table 5-55 (Cont.) Valid Values for `jpql.validation`**

Value	Description
JPA 2.0	Allows valid JPA 2.0 JPQL only.
JPA 2.1	Allows valid JPA 2.1 JPQL only.
None	No JPQL validation.

**Usage**

This parameter applies only when `eclipselink.jpql.parser` is `HermesParser`.

**Examples**

[Example 5-58](#) shows how to use this property in the `persistence.xml` file.

**Example 5-58 Using `jpql.validation` in `persistence.xml`**

```
<property name="eclipselink.jpql.validation" value="JPA 1.0"/>
```

**See Also**

For more information, see:

- ["jpql.parser"](#)
- ["Java Persistence Query Language Extensions "](#)

## logging.connection

Use the `eclipselink.logging.connection` property to specify if connections are logged.

**Values**

[Table 5-56](#) describes this persistence property's values.

**Table 5-56 Valid Values for `logging.connection`**

Value	Description
true	(Default) Logs the connection name.
false	Does not log the connection name.

**Usage**

Using this parameter means that all connections are logged and not masked by the application code.

**Examples**

[Example 5-59](#) shows how to use this parameter in the `persistence.xml` file.

**Example 5-59 Using logging.connection in persistence.xml**

```
<property name="eclipselink.logging.connection" value="false"/>
```

**See Also**

For more information, see:

- Logging Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Logging>
- "Configuring WebLogic Server to Expose TopLink Logging" in *Solutions Guide for Oracle TopLink*
- "logging.level"

## logging.exceptions

Use the `eclipselink.logging.exceptions` property to specify if exceptions are logged when they are thrown, before returning the exception to the calling application.

**Values**

[Table 5-57](#) describes this persistence property's values.

**Table 5-57 Valid Values for logging.exceptions**

Value	Description
true	(Default) Logs exceptions when they are thrown.
false	Does not log exceptions when they are thrown.

**Usage**

Using this property ensures that all exceptions are logged and not masked by the application code.

**Examples**

[Example 5-60](#) shows how to use this property in the `persistence.xml` file.

[Example 5-61](#) shows how to use this property in a property map.

**Example 5-60 Using logging.exceptions in persistence.xml file**

```
<property name="eclipselink.logging.exceptions" value="false" />
```

**Example 5-61 Using logging.exceptions in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.LOGGING_EXCEPTIONS, "false");
```

**See Also**

For more information, see:

- Logging Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Logging>

- "Configuring WebLogic Server to Expose TopLink Logging" in *Solutions Guide for Oracle TopLink*
- "logging.level"

## logging.file

Use the `eclipselink.logging.file` property to specify a file location in which to output the log instead of the standard out.

### Values

Table 5-58 describes this persistence property's values.

**Table 5-58 Valid Values for logging.file**

Value	Description
directory name	A string location to a directory in which you have write access. The location may be relative to your current working directory or an absolute location.

### Usage

This property applies when used in a Java SE environment.

### Examples

Example 5-62 shows how to use this property in the `persistence.xml` file.

Example 5-63 shows how to use this property in a property map.

#### Example 5-62 Using logging.file in persistence.xml file

```
<property name="eclipselink.logging.file" value="C:\myout\" />
```

#### Example 5-63 Using logging.file in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.LOGGING_FILE, "C:\myout\");
```

### See Also

For more information, see:

- Logging Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Logging>
- "Configuring WebLogic Server to Expose TopLink Logging" in *Solutions Guide for Oracle TopLink*

## logging.level

Use the `eclipselink.logging.level` property to specify a specific logging level and control the amount and detail that is emitted.

## Values

Table 5-59 describes this persistence property's values.

**Table 5-59 Valid Values for logging.level**

Value	Description
OFF	Disables logging. You may want to use OFF during production in order to avoid the overhead of logging.
SEVERE	Logs exceptions indicating that TopLink cannot continue, as well as any exceptions generated during login. This includes a stack trace.
WARNING	Logs exceptions that <i>do not</i> force TopLink to stop, including all exceptions not logged with SEVERE level. This does not include a stack trace.
INFO	(Default) Logs the login/logout per sever session, including the user name. After acquiring the session, detailed information is logged.
CONFIG	Logs only login, JDBC connection, and database information. You may want to use this log level at deployment time.
FINE	Logs all SQL. You may want to use this log level during debugging and testing, but not at production time.
FINER	Similar to WARNING, but includes stack trace. You may want to use this log level during debugging and testing, but not at production time.
FINEST	Similar to FINER, but includes additional low level information. You may want to use this log level during debugging and testing, but not at production time.
ALL	Logs at the same level as FINEST.

## Examples

Example 5-64 shows how to use this property in the `persistence.xml` file.

Example 5-65 shows how to use this property in a property map.

### Example 5-64 Using logging.level in persistence.xml file

```
<property name="eclipselink.logging.level" value="OFF" />
```

### Example 5-65 Using logging.level in a Property Map

```
import java.util.logging.Level;
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.LOGGING_LEVEL, Level.OFF);
```

## See Also

For more information, see:

- "Configuring WebLogic Server to Expose TopLink Logging" in *Solutions Guide for Oracle TopLink*
- Logging Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Logging>

## logging.logger

Use the `eclipselink.logging.logger` property to define the type of logger to use.

### Values

Table 5-60 describes this persistence property's values.

**Table 5-60 Valid Values for logging.logger**

Value	Description
Custom logger	Fully qualified class name of a custom logger which implements <code>org.eclipse.persistence.logging.SessionLog</code> .
JavaLogger	Uses <code>java.util.logging</code> .
ServerLogger	Integrates with the application server's logging.
DefaultLogger	(Default) Uses TopLink's native logger, <code>DefaultSessionLog</code> .

### Examples

Example 5-66 shows how to use this parameter in the `persistence.xml` file.

Example 5-67 shows how to use this parameter in a property map.

#### Example 5-66 Using logging.logger in persistence.xml

```
<property name="eclipselink.logging.logger" value="JavaLogger"/>
```

#### Example 5-67 Using logging.logger in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.LOGGING_LOGGER,
"acme.loggers.MyCustomLogger");
```

### See Also

For more information, see:

- Logging examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Logging>
- Custom logger <http://wiki.eclipse.org/EclipseLink/Examples/JPA/CustomLogger>

## logging.parameters

Use the `eclipselink.logging.parameters` property to define if SQL bind parameters are included in exceptions and logs.

### Note:

This parameter applies to bind parameters only. Parameters are always displayed when not using binding.



## Values

[Table 5-61](#) describes this persistence property's values.

**Table 5-61 Valid Values for logging.parameters**

Value	Description
true	(Default) Display the parameters.
false	Do not display the parameters.

## Usage

By default, when using [logging.level](#) of `FINE` (or greater), SQL bind parameters are displayed. Use this parameter to override the default behavior.

## Examples

[Example 5-58](#) shows how to use this parameter in the `persistence.xml` file.

### Example 5-68 Using logging.parameters in persistence.xml

```
<paramter name="eclipselink.logging.parameters" value="false"/>
```

## See Also

For more information, see:

- "[logging.level](#)"
- "Configuring WebLogic Server to Expose TopLink Logging" in *Solutions Guide for Oracle TopLink*
- Logging Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Logging>

## logging.session

Use the `eclipselink.logging.session` property to specify if TopLink should include a session identifier in each log message.

## Values

[Table 5-62](#) describes this persistence property's values.

**Table 5-62 Valid Values for logging.session**

Value	Description
true	(Default) Log a session identifier.
false	Do not log a session identifier.

## Usage

This setting is applicable to messages that require a database connection such as SQL and the transaction information to determine on which underlying session (if any) the message was sent.

## Examples

[Example 5-69](#) shows how to use this property in the `persistence.xml` file.

[Example 5-70](#) shows how to use this property in a property map.

### Example 5-69 Using `logging.session` in `persistence.xml` file

```
<property name="eclipselink.logging.session" value="false" />
```

### Example 5-70 Using `logging.session` in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.LOGGING_SESSION, "false");
```

## See Also

For more information, see:

- "Configuring WebLogic Server to Expose TopLink Logging" in *Solutions Guide for Oracle TopLink*
- Logging Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Logging>
- "[logging.level](#)"

## logging.thread

Use the `eclipselink.logging.thread` property to specify if TopLink should include a thread identifier in each log message.

## Values

[Table 5-63](#) describes this persistence property's values.

**Table 5-63 Valid Values for `logging.thread`**

Value	Description
true	(Default) Log a thread identifier.
false	Do not log a thread identifier.

## Usage

You should use this property when running multi-threaded applications. TopLink will include a hashcode of the thread.

## Examples

[Example 5-71](#) shows how to use this property in the `persistence.xml` file.

[Example 5-72](#) shows how to use this property in a property map.

**Example 5-71 Using logging.thread in persistence.xml file**

```
<property name="eclipselink.logging.thread" value="false" />
```

**Example 5-72 Using logging.thread in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.LOGGING_THREAD, "false");
```

**See Also**

For more information, see:

- ["logging.level"](#)
- Logging Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Logging>
- "Configuring WebLogic Server to Expose TopLink Logging" in *Solutions Guide for Oracle TopLink*

## logging.timestamp

Use the `eclipselink.logging.timestamp` property to specify if TopLink should include a timestamp in each log message.

**Values**

[Table 5-64](#) describes this persistence property's values.

**Table 5-64 Valid Values for logging.timestamp**

Value	Description
true	(Default) Log a timestamp.
false	Do not log a timestamp.

**Examples**

[Example 5-73](#) shows how to use this property in the `persistence.xml` file.

[Example 5-74](#) shows how to use this property in a property map.

**Example 5-73 Using logging.timestamp in persistence.xml file**

```
<property name="eclipselink.logging.timestamp" value="false" />
```

**Example 5-74 Using logging.timestamp in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.LOGGING_TIMESTAMP, "false");
```

**See Also**

For more information, see:

- "Configuring WebLogic Server to Expose TopLink Logging" in *Solutions Guide for Oracle TopLink*
- Logging Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Logging>
- "logging.level"

## metadata-source

Use the `eclipselink.metadata-source` property to specify the `MetadataSource` implementation TopLink uses to read metadata.

### Values

Table 5-65 describes this persistence property's values.

**Table 5-65 Valid Values for metadata-source**

Value	Description
XML	Use <code>XMLMetadataSource</code> .
Custom metadata source	A custom class name which implements <code>MetadataSource</code> .

### Usage

Use this property with `eclipselink.metadata-source.xml.file` to access an external mapping file at a fixed URL for a persistence unit.

### Examples

Example 5-75 shows how to use this property in the `persistence.xml` file.

#### Example 5-75 Using metadata-source in persistence.xml

```
<property name="eclipselink.metadata-source" value="xml"/>
<property name="eclipselink.metadata-source.xml.file" value="c:/myfile.xml"/>
```

### See Also

For more information, see:

- "metadata-source.send-refresh-command"
- "metadata-source.xml.file"
- "metadata-source.xml.url"
- Metadata Source Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/MetadataSource>
- "Extensible Entities" [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/Extensible\\_Entities](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/Extensible_Entities)
- "Using an External Metadata Source" in *Solutions Guide for Oracle TopLink*

## metadata-source.properties.file

Use the `eclipselink.metadata-source.properties.file` property to specify the name of the metadata repository properties file to read from, using the classloader to find the resource.

### Values

[Table 5-66](#) describes this persistence property's values.

**Table 5-66 Valid Values for metadata-repository.properties.file**

Value	Description
Filename	Name of the metadata source XML file.

### Usage

Use this property with `eclipselink.metadata-source` when using an XML repository.

### Examples

[Example 5-76](#) shows how to use this property in the `persistence.xml` file.

#### Example 5-76 Using metadata-source.properties.file in persistence.xml

```
<property name="eclipselink.metadata-source.properties.file"
value="c:\myproperties.xml" />
```

### See Also

For more information, see:

- "metadata-source"
- Metadata Source Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/MetadataSource>
- "Using an External Metadata Source" in *Solutions Guide for Oracle TopLink*

## metadata-source.send-refresh-command

Use the `eclipselink.metadata-source.send-refresh-command` property with cache coordination for a clustered environment to control how TopLink sends RCM refresh metadata commands to the cluster.

### Values

[Table 5-67](#) describes this persistence property's values.

**Table 5-67 Valid Values for metadata-source.send-refresh-command**

Value	Description
true	(Default) To propagate refresh commands to the cluster, you must configure RCM and use the <code>eclipselink.deploy-on-startup</code> property.

**Table 5-67 (Cont.) Valid Values for metadata-source.send-refresh-command**

Value	Description
false	Does not propagate refresh commands to the cluster.

**Usage**

If cache coordination is configured and the session is deployed on startup, this property controls the sending of RCM refresh metadata commands to the cluster.

These commands will cause the remote instances to refresh their metadata.

**Examples**

[Example 5-77](#) shows how to use this property in the `persistence.xml` file.

[Example 5-78](#) shows how to use this property in a property map.

**Example 5-77 Using metadata-source.send-refresh-command in persistence.xml**

```
<property name="eclipselink.metadata-source-refresh-command" value="false"/>
```

**Example 5-78 Using metadata-source-refresh-command in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.METADATA_SOURCE_RCM_COMMAND, "false");
```

**See Also**

For more information, see:

- ["metadata-source"](#)
- ["deploy-on-startup"](#)
- Metadata Source Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/MetadataSource>
- "Using an External Metadata Source" in *Solutions Guide for Oracle TopLink*

## metadata-source.xml.file

Use the `eclipselink.metadata-repository.xml.file` property to specify the name of the metadata repository XML file to read from, using the classloader to find the resource.

**Values**

[Table 5-68](#) describes this persistence property's values.

**Table 5-68 Valid Values for metadata-source.xml.file**

Value	Description
filename	Metadata repository.xml file.

### Usage

Use this property with the `eclipselink.metadata-source` property when using an XML repository.

### Examples

[Example 5-79](#) shows how to use this property in the `persistence.xml` file.

#### Example 5-79 Using `metadata-source.xml.file` in `persistence.xml`

```
<property name="eclipselink.metadata-source" value="xml"/>
<property name="eclipselink.metadata-source.xml.file" value="c:/myfile.xml"/>
```

### See Also

For more information, see:

- "[metadata-source](#)"
- Metadata Source Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/MetadataSource>
- "Using an External Metadata Source" in *Solutions Guide for Oracle TopLink*

## metadata-source.xml.url

Use the `eclipselink.metadata-source.xml.url` property to specify the location of an external mapping file.

### Values

[Table 5-69](#) describes this persistence property's values.

**Table 5-69 Valid Values for `metadata-source.xml.url`**

Value	Description
url	Specifies the metadata repository of the XML URL.

### Usage

The `metadata-source` property must be set to XML.

### Examples

[Example 5-75](#) shows how to use this property in the `persistence.xml` file.

#### Example 5-80 Using `metadata-source.xml.url` in `persistence.xml`

```
<property name="eclipselink.metadata-source" value="xml"/>
<property name="eclipselink.metadata-source.xml.url" value="http://myfile.xml"/>
```

### See Also

For more information, see:

- "[metadata-source](#)"

- Metadata Source Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/MetadataSource>
- "Using an External Metadata Source" in *Solutions Guide for Oracle TopLink*

## multitenant.tenants-share-cache

Use the `eclipselink.multitenant.tenants-share-cache` property to specify if multitenant entities will share the L2 cache.

### Values

[Table 5-70](#) describes this persistence property's values.

**Table 5-70 Valid Values for multitenant.tenants-share-cache**

Value	Description
true	Multitenant entities will use an protected cache.
false	(Default) Multitenant entities will use an isolated cache.

### Usage

#### WARNING:

When this setting is `false`, queries that use the cache may return data from other tenants when using the `PROTECTED` setting.

### Examples

[Example 5-81](#) shows how to use this property in the `persistence.xml` file.

[Example 5-82](#) shows how to use this property in a property map.

#### **Example 5-81 Using multitenant.tenants-share-cache in persistence.xml**

```
<property name="eclipselink.multitenant.tenants-share-cache" value="true" />
```

#### **Example 5-82 Using multitenant.tenants-share-cache in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.MULTITENANT_TENANTS_SHARE_CACHE,
"true");
```

### See Also

For more information, see:

- "[@Multitenant](#)"
- Multitenant examples: <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Multitenant>
- "Using Multitenancy" in *Solutions Guide for Oracle TopLink*



## multitenant.tenants-share-emf

Use the `eclipselink.multitenant.shared-emf` property to specify if multitenant entities will be used within a shared entity manager factory.

### Values

[Table 5-71](#) describes this persistence property's values.

**Table 5-71 Valid Values for multitenant.tenants-share-emf**

Value	Description
true	(Default) Multitenant entities will be used.
false	Specify a unique session name.

### Usage

When setting it to `false`, you are required to provide a unique session name.

### Examples

[Example 5-83](#) shows how to use this property in the `persistence.xml` file.

#### Example 5-83 Using multitenant.tenants-share-emf in persistence.xml

```
<property name="eclipselink_multitenant_tenants_share_emf" value="true" />
```

### See Also

For more information, see:

- "[@Multitenant](#)"
- Multitenant examples: <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Multitenant>
- "Using Multitenancy" in *Solutions Guide for Oracle TopLink*

## nosql.connection-factory

Use the `eclipselink.nosql.connection-factory` property to specify the JNDI name of a JCA `ConnectionFactory` or a JCA `ConnectionFactory` class name that connects to the NoSQL data-source.

### Values

[Table 5-72](#) describes this persistence property's values.

**Table 5-72 Valid Values for nosql.connection-factory**

Value	Description
connection factory	JNDI name or class name of the JCA Connection Factory.

## Usage

This property allows the JCA `ConnectionFactory` to be used with a NoSql or EIS adapter for a NoSQL datasource (that is, a non-relationship datasource such as a legacy database, NoSQL database, XML database, transactional and messaging systems, or ERP systems).

## Examples

[Example 5-84](#) shows how to use this property in the `persistence.xml` file.

### Example 5-84 Using `nosql.connection-factory` in `persistence.xml`

```
<property name="eclipselink.nosql.connection-factory"
value="MyConnectionFactory" />
```

## See Also

For more information, see:

- "[@NoSql](#)"
- "[nosql.property](#)"
- NoSQL Persistence Units [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/NoSQL/Persistence\\_Units](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/NoSQL/Persistence_Units)
- Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/NoSQL>
- "Using NoSQL Databases" in *Understanding Oracle TopLink*
- "Using TopLink with Nonrelational Databases" in *Solutions Guide for Oracle TopLink*

## nosql.connection-spec

Use the `eclipselink.nosql.connection-spec` property to specify an `EISConnectionSpec` class name that defines how to connect to the NoSQL datasource.

## Values

[Table 5-73](#) describes this persistence property's values.

**Table 5-73 Valid Values for `nosql.connection-spec`**

Value	Description
classname	<code>EISConnectionSpec</code> classname

## Usage

This property allows the JCA `ConnectionFactory` to be used with a NoSql or EIS adapter for a NoSQL datasource (that is, a non-relationship datasource such as a legacy database, NoSQL database, XML database, transactional and messaging systems, or ERP systems).

## Examples

See [Example 5-85](#) for information on how to use this property.

## See Also

For more information, see:

- ["@NoSql"](#)
- ["nosql.property"](#)
- NoSQL Persistence Units [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/NoSQL/Persistence\\_Units](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/NoSQL/Persistence_Units)
- Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/NoSQL>
- "Using NoSQL Databases" in *Understanding Oracle TopLink*
- "Using TopLink with Nonrelational Databases" in *Solutions Guide for Oracle TopLink*

## nosql.property

Use the `eclipselink.nosql.property` property to set NoSQL-specific connection properties.

## Values

[Table 5-74](#) describes this persistence property's values.

**Table 5-74** Valid Values for `nosql.property`

Value	Description
property name	A NoSQL property.

## Usage

Append the NoSQL-specific property name to this property.

## Examples

[Example 5-85](#) shows how to use this property in the `persistence.xml` file.

### Example 5-85 Using `nosql.property` in `persistence.xml`

```
<persistence xmlns="http://java.sun.com/xml/ns/persistence"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://java.sun.com/xml/ns/persistence persistence_2_0.xsd"
version="2.0">
  <persistence-unit name="acme" transaction-type="RESOURCE_LOCAL">
    <provider>org.eclipse.persistence.jpa.PersistenceProvider</provider>
    <exclude-unlisted-classes>false</exclude-unlisted-classes>
    <properties>
      <property name="eclipselink.target-database"
value="org.eclipse.persistence.nosql.adapters.mongo.MongoPlatform"/>
      <property name="eclipselink.nosql.connection-spec"
```

```

value="org.eclipse.persistence.nosql.adapters.mongo.MongoConnectionSpec"/>
  <property name="eclipselink.nosql.property.mongo.port" value="27017,
27017"/>
  <property name="eclipselink.nosql.property.mongo.host" value="host1,
host2"/>
  <property name="eclipselink.nosql.property.mongo.db" value="acme"/>
</properties>
</persistence-unit>
</persistence>

```

### See Also

For more information, see:

- ["@NoSql"](#)
- "Using Non-SQL Databases" in *Understanding Oracle TopLink*
- NoSQL Persistence Units [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced\\_JPA\\_Development/NoSQL/Persistence\\_Units](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Advanced_JPA_Development/NoSQL/Persistence_Units)
- Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/NoSQL>
- ["nosql.connection-factory"](#)
- ["nosql.connection-spec"](#)

## oracle.proxy-type

Use the `eclipselink.oracle.proxy-type` property to specify the proxy type to be passed to the `OracleConnection.openProxySession` method.

### Values

[Table 5-75](#) describes this persistence property's values.

**Table 5-75 Valid Values for oracle.proxy-type**

Value	Description
USER_NAME	This type uses a user name for authentication when creating a proxy connection.
DISTINGUISHED_NAME	This type uses a distinguished name for authentication when creating a proxy connection.
CERTIFICATE	This type uses a digital certificate for authentication when creating a proxy connection.

### Usage

This property requires Oracle JDBC version 10.1.0.2 or later and `eclipselink.target-database` must be configured to use Oracle9 or later.

Typically, you should set this property into `EntityManager`, through a `createEntityManager` method or by using proprietary `setProperties` method on `EntityManagerImpl`. This causes `EntityManager` to use proxy connection for writing and reading inside transaction.

If `proxy-type` and the corresponding `proxy` property set into `EntityManagerFactory`, all connections created by the factory will be proxy connections.

## Examples

[Example 5-86](#) shows how to use the property with `EntityManager`.

### Example 5-86 Using `eclipselink.oracle.proxy-type` with `EntityManager`

```
Map emProperties = new HashMap();
emProperties.put("eclipselink.oracle.proxy-type",
OracleConnection.PROXYTYPE_USER_NAME);
emProperties.put(OracleConnection.PROXY_USER_NAME, "john");
EntityManager em = emf.createEntityManager(emProperties);
```

With injection:

```
entityManager.setProperty("eclipselink.oracle.proxy-type",
OracleConnection.PROXYTYPE_USER_NAME);
entityManager.setProperty(OracleConnection.PROXY_USER_NAME, "john");
```

## See Also

For more information, see:

- ["target-database"](#)
- Oracle Proxy Authentication Example <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Oracle/Proxy>
- Auditing example <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Auditing>

## orm.throw.exceptions

Use the `eclipselink.orm.throw.exceptions` property to specify if TopLink throws an exception or logs a warning when encountering a problem with any of the files in the `<mapping-file>` element of the `persistence.xml` file.

## Values

[Table 5-76](#) describes this persistence property's values.

**Table 5-76 Valid Values for `orm.throw.exceptions`**

Value	Description
true	(Default) Throw an exception.
false	Log a warning only.

## Examples

[Example 5-87](#) shows how to use this property in the `persistence.xml` file.

[Example 5-88](#) shows how to use this property in a property map.

### Example 5-87 Using `orm.throw.exceptions` in `persistence.xml`

```
<property name="oracle.orm.throw.exceptions" value="false"/>
```

**Example 5-88 Using orm.throw.exceptions in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.ECLIPSELINK_ORM_THROW_EXCEPTIONS,
"false");
```

**See Also**

For more information, see:

- ["exception-handler"](#)

## orm.validate.schema

Use the `orm.validate.schema` property to override `orm.xml` schema validation from its default value of `false`.

**Values**

[Table 5-77](#) describes this persistence property's values.

**Table 5-77 Valid Values for orm.validate.schema**

Value	Description
true	Enables schema validation on on <code>orm.xml</code> file.
false	(Default) No schema validation is performed on the <code>orm.xml</code> file.

**Usage**

Use `orm.validate.schema` to enable `orm.xml` schema validation.

**Examples**

[Example 5-89](#) shows how to use this property in the `persistence.xml` file.

[Example 5-90](#) shows how to use this property in a property map.

**Example 5-89 Using orm.validate.schema in persistence.xml**

```
<property name="eclipselink.orm.validate.schema" value="true"/>
```

**Example 5-90 Using orm.validate.schema in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put(PersistenceUnitProperties.ORM_VALIDATE_SCHEMA, "true");
```

## partitioning

Use the `eclipselink.partitioning` property to set the default `PartitioningPolicy` for a persistence unit. The value must be the name of an existing, defined `PartitioningPolicy`.

**Values**

[Table 5-78](#) describes this persistence property's values.

**Table 5-78 Valid Values for partitioning**

Value	Description
name	An existing, defined PartitioningPolicy.

**Usage**

Use this property to partition data for a class across multiple different databases or across a database cluster such as Oracle RAC. Partitioning may provide improved scalability by allowing multiple database machines to service requests.

If multiple partitions are used to process a single transaction, use JTA (Java Transaction API) for proper XA transaction support.

**Examples**

[Example 5-91](#) shows how to use this property in the `persistence.xml` file.

**Example 5-91 Using partitioning in persistence.xml**

```
<property name="eclipselink.partitioning" value="Replicate" />
```

**See Also**

For more information, see:

- Partitioning Examples <http://wiki.eclipse.org/EclipseLink/Examples/JPA/Partitioning>
- "@Partitioning"

## partitioning.callback

Use the `eclipselink.partitioning.callback` property to integrate an external DataSource's affinity support, such as UCP.

**Values**

[Table 5-79](#) describes this persistence property's values.

**Table 5-79 Valid Values for eclipselink.partitioning.callback**

Value	Description
value	A class that implements the <code>DataPartitioningCallBack</code> interface.

**Usage**

The value must be set to the full class name.

**Examples**

[Example 5-92](#) shows how to use this property in the `persistence.xml` file.

[Example 5-93](#) shows how to use this property in a property map.

**Example 5-92 Using partitioning.callback in persistence.xml**

```
<property name="eclipselink.partitioning.callback"
value="mypackage.MyDataPartitioningCallback"/>
```

**Example 5-93 Using partitioning.callback in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.PARTITIONING_CALLBACK,
"mypackage.MyDataPartitioningCallback");
```

## persistence-context.close-on-commit

Use the `eclipselink.persistence-context.close-on-commit` property to specify if the `EntityManager` will be closed or not used after commit (not extended).

**Values**

[Table 5-80](#) describes this persistence property's values.

**Table 5-80 Valid Values for persistence-context.close-on-commit**

Value	Description
true	Closes the <code>EntityManager</code> after a commit.
false	(Default) Does not close the <code>EntityManager</code> after a commit.

**Usage**

For a container-managed `EntityManager` and most managed applications, you normally set this property to `false`. This setting avoids additional performance overhead of resuming the persistence context after a `commit()` transaction.

The property set in `persistence.xml` or passed to `createEntityManagerFactory` affects *all* `EntityManager`s created by the factory. Alternatively, to apply the property to *specific* `EntityManager`s, pass it to `createEntityManager` method.

**Examples**

[Example 5-94](#) shows how to use this property in the `persistence.xml` file.

**Example 5-94 Using persistence-context.close-on-commit in persistence.xml**

```
<property name="eclipselink.persistence-context.close-on-commit" value="true"/>
```

[Example 5-95](#) shows how to use this property in a property map.

**Example 5-95 Using persistence-context.close-on-commit in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.PERSISTENCE_CONTEXT_CLOSE_ON_COMMIT,
"true");
```

## persistence-context.commit-without-persist-rules

Use the `eclipselink.persistence-context.commit-without-persist-rules` property to specify if the `EntityManager` will search all managed objects and persist



any related non-managed new objects that are found, ignoring any absence of `CascadeType.PERSIST` settings.

**Values**

[Table 5-81](#) describes this persistence property's values.

**Table 5-81 Valid Values for `persistence-context.commit-without-persist-rules`**

Value	Description
true	Cascades Entity life-cycle Persist operations to related entities and uses the <code>CascadeType.PERSIST</code> settings.
false	(Default) Does not cascase Entitity life-cycle Persist operations to related entities and does not use the <code>CascadeType.PERSIST</code> settings.

**Usage**

Setting this property to `true` replicates the traditional EclipseLink native functionality.

**Examples**

[Example 5-96](#) shows how to use this property in the `persistence.xml` file.

[Example 5-97](#) shows how to use this property in a property map.

**Example 5-96 Using `persistence-context.commit-without-persist-rules` in `persistence.xml`**

```
<property name="eclipse.persistence-context.commit-without-persist-rules"
value="true"/>
```

**Example 5-97 Using `persistence-context.commit-without-persist-rules` in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put
(PersistenceUnitProperties.PERSISTENCE_CONTEXT_COMMIT_WITHOUT_PERSIST_RULES,
"true");
```

## persistence-context.flush-mode

Use the `eclipselink.persistence-context.flush-mode` property to configure the `EntityManager FlushMode` to be set as a persistence property and specify when flushing occurs.

**Values**

[Table 5-82](#) describes this persistence property's values.

**Table 5-82 Valid Values for `persistence-context.flush-mode`**

Value	Description
auto	(Default) Flushing occurs at query execution.
commit	Flushing occurs at transaction commit.

## Usage

The property set in `persistence.xml` or passed to `createEntityManagerFactory` affects *all* `EntityManager`s created by the factory. To apply the property to *specific* `EntityManager`s pass it to the `createEntityManager` method.

## Examples

[Example 5-98](#) shows how to use this property in the `persistence.xml` file.

[Example 5-99](#) shows how to use this property in a property map.

### Example 5-98 Using `persistence-context.flush-mode` in `persistence.xml`

```
<property name="eclipselink.persistence-context.flush-mode" value="commit" />
```

### Example 5-99 Using `persistence-context.flush-mode` in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.PERSISTENCE_CONTEXT_FLUSH_MODE,
"false");
```

## See Also

For more information, see:

- ["flush"](#)
- "Enhancing Performance" in *Solutions Guide for Oracle TopLink*

## persistence-context.persist-on-commit

Use the `eclipselink.persistence-context.persist-on-commit` property to specify if the `EntityManager` searches all managed objects and persists any related non-managed new objects that are cascade persist. This can be used to avoid the cost of performing this search if persist is always used for new objects.

## Values

[Table 5-83](#) describes this persistence property's values.

**Table 5-83 Valid Values for `persistence-context.persist-on-commit`**

Value	Description
true	(Default) Searches and persists related non-managed new objects that are cascade persist.
false	Does not search and persist related non-managed new objects that are cascade persist.

## Usage

The property set in `persistence.xml` or passed to `createEntityManagerFactory` affects *all* `EntityManager`s created by the factory. To apply the property to *specific* `EntityManager`s pass it to `createEntityManager` method.

## Examples

[Example 5-100](#) shows how to use this property in the `persistence.xml` file.

[Example 5-101](#) show how to use this property in a property map.

### Example 5-100 Using `persistence-context.persist-on-commit` in `persistence.xml`

```
<property name="eclipselink.persistence-context.persist-on-commit" value="false"/>
```

### Example 5-101 Using `persistence-context.persis-on-commit` in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.PERSISTENCE_CONTEXT_PERSIST_ON_COMMIT,
    "false");
```

## persistence-context.reference-mode

Use the `eclipselink.persistence-context.reference-mode` property to specify if hard or soft (that is, weak) references are used within the Persistence Context.

### Values

[Table 5-84](#) describes this persistence property's values.

**Table 5-84 Valid Values for `persistence-context.reference-mode`**

Value	Description
hard	(Default) TopLink references all objects through hard references. These objects will not be available for garbage collection until the referencing artifact (such as the persistence context or unit of work) is released/cleared or closed.
weak	References to objects supporting active attribute change tracking (see " <a href="#">@ChangeTracking</a> ") will be held by weak references. That is, any object no longer referenced directly or indirectly will be available for garbage collection. When a change is made to a change-tracked object, that object is moved to a hard reference and will not be available for garbage collection until flushed.  <b>Note:</b> Any changes that have not been flushed in these entities will be lost. New and removed objects, as well as objects that do not support active attribute change tracking, will also be held by hard references and will not be available for garbage collection.
force_weak	All objects, including non-change-tracked objects, are to be held by weak references. When a change is made to a change-tracked object (see " <a href="#">@ChangeTracking</a> "), that object is moved to a hard reference and will not be available for garbage collection until flushed. However, any objects that do not support active attribute change tracking may be garbage collected before their changes are flushed to a database, which can potentially result in a loss of changes.  New and removed objects will be held by hard references and will not be available for garbage collection.

### Usage

The property set in `persistence.xml` or passed to `createEntityManagerFactory` affects all `EntityManagers` created by the factory. To apply the property to specific `EntityManagers` pass it to `createEntityManager` method.

## Examples

[Example 5-102](#) shows how to use this property in a `persistence.xml` file.

[Example 5-103](#) shows how to use this property in a property map.

### Example 5-102 Using `persistence-context.reference-mode` in `persistence.xml`

```
<property name="eclipselink.persistence-context.reference-mode"
value="FORCE_WEAK"/>
```

### Example 5-103 Using `persistence-context.reference-mode` in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.PERSISTENCE_CONTEXT_REFERENCE_MODE,
ReferenceMode.FORCE_WEAK);
```

## See Also

For more information, see:

- ["@ChangeTracking"](#)

## persistenceunits

Use the `eclipselink.persistenceunits` property to specify the set of persistence unit names that will be processed when generating the canonical model. By default, TopLink uses all persistence units available in all persistence XML files.

## Values

[Table 5-85](#) describes this persistence property's values.

**Table 5-85** Valid Values for `persistenceunits`

Value	Description
names	A comma separated list of persistence units <b>Note:</b> When specifying multiple persistence units, you <i>cannot</i> include a comma ( , ) in the name of a persistence unit.

## Examples

[Example 5-104](#) shows how to use this property in the `persistence.xml` file.

### Example 5-104 Using `persistenceunits` in `persistence.xml`

```
<property name="eclipselink.persistenceunits" value="mypu1, mypu2"/>
```

## persistencexml

Use the `eclipselink.persistencexml` property to specify the full resource name in which to look for the persistence XML files. If omitted, TopLink uses the default location: `META-INF/persistence.xml`.

 **Note:**

Currently, this property is used only for the canonical model generator.

**Values**

[Table 5-86](#) describes this persistence property's values.

**Table 5-86 Valid Values for persistencexml**

Value	Description
resource name	Location of the <code>persistence.xml</code> file.

**Usage**

This property is only used by EclipseLink when it is locating the configuration file. When used within an EJB/Spring container in container-managed mode, the locating and reading of this file is done by the container and will not use this configuration.

If you want to change the default location, use [persistence.xml.default](#).

**Examples**

[Example 5-105](#) shows how to use this property in the `persistence.xml` file.

**Example 5-105 Using persistencexml in persistence.xml**

```
<property name="eclipselink.persistencexml" value="resources/persistence.xml"/>
```

**See Also**

For more information, see: "[persistence.xml.default](#)"

## persistence.xml.default

Use the `eclipselink.persistence.xml.default` property to specify the default resource location where the `persistence.xml` configuration file is located. The default location is `META-INF/persistence.xml`.

**Values**

[Table 5-87](#) describes this persistence property's values.

**Table 5-87 Valid Values for persistence.xml.default**

Value	Description
resource location	Default resource location of the <code>persistence.xml</code> file.

**Examples**

[Example 5-106](#) shows how to use this property in a property map.

**Example 5-106 Using persistence.xml.default in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.ECLIPSELINK_PERSISTENCE_XML_DEFAULT,
"resources/persistence.xml");
```

## profiler

Use the `eclipselink.profiler` property to specify which performance profiler to use in order to capture runtime statistics.

**Values**

[Table 5-88](#) describes this persistence property's values.

**Table 5-88 Valid Values for profiler**

Value	Description
NoProfiler	(Default) Do not use a performance profiler.
PerfomationMonitor	Use EclipseLink performance monitor <code>org.eclipse.persistence.tools.profiler.PerformanceMonitor</code> .
PerformanceProfiler	Use EclipseLink performance profiler ( <code>org.eclipse.persistence.tools.profiler.PerformanceProfiler</code> ).
QueryMonitor	Monitor query executions and cache hits ( <code>org.eclipse.persistence.tools.profiler.QueryMonitor</code> class). This option provides a simple low-overhead means for measuring performance of query executions and cache hits. You may want to use this option for performance analysis in a complex system.
DMSProfiler	Use <code>org.eclipse.persistence.tools.profiler.oracle.DMSPerformanceProfiler</code> . This property is specific to the Oracle Dynamic Monitoring Service (DMS).
Custom profiler	Specify a custom profiler class name which implements <code>SessionProfiler</code> and provides a no-argument constructor.

**Examples**

[Example 5-107](#) shows how to use this property in the `persistence.xml` file.

[Example 5-108](#) shows how to use this property in a property map.

**Example 5-107 Using profiler in persistence.xml**

```
<property name="eclipselink.profiler" value="PerformanceProfiler"/>
```

**Example 5-108 Using profiler in a Property Map**

```
import org.eclipse.persistence.config.ProfilerType;
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.PROFILER,
ProfilerType.PerformanceProfiler);
```

**See Also**

For more information, see:

- "Measuring Performance" in *Solutions Guide for Oracle TopLink*

## session.customizer

Use the `eclipselink.session.customizer` property to specify a session customizer class that implements the `org.eclipse.persistence.config.SessionCustomizer` interface. The class must provide a default, no argument constructor.

### Values

[Table 5-89](#) describes this persistence property's values.

**Table 5-89 Valid Values for session.customizer**

Value	Description
class name	Fully qualified class name of a <code>SessionCustomizer</code> class.

### Usage

You can use the `customize` method of the class (which takes an `org.eclipse.persistence.sessions.Session`) to programmatically access advanced EclipseLink session API. You can use the session customizer class to define multiple session event listeners.

### Examples

[Example 5-109](#) shows how to use this property in the `persistence.xml` file.

[Example 5-110](#) shows how to use this property in a property map.

#### Example 5-109 Using session.customizer in persistence.xml

```
<property name="eclipselink.session.customizer"
value="acme.sessions.MySessionCustomizer"/>
```

#### Example 5-110 Using session.customizer in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.SESSION_CUSTOMIZER,
"acme.sessions.MySessionCustomizer");
```

### See Also

For more information, see:

- ["session-event-listener"](#)

## session.include.descriptor.queries

Use the `eclipselink.session.include.descriptor.queries` property to specify whether all descriptor named queries are copied to the session for use by the entity manager.

### Values

[Table 5-90](#) describes this persistence property's values.

**Table 5-90 Valid Values for session.include.descriptor.queries**

Value	Description
true	Copying is enabled.
false	(Default) Copying is disabled.

**Examples**

[Example 5-111](#) shows how to use this property in the `persistence.xml` file.

[Example 5-112](#) shows how to use this property in a property map.

**Example 5-111 Using session.include.descriptor.queries in persistence.xml**

```
<property name="eclipselink.session.include.descriptor.queries" value="true"/>
```

**Example 5-112 Using session.include.descriptor.queries in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.INCLUDE_DESCRIPTOR_QUERIES, "true");
```

## session-event-listener

Use the `eclipselink.session-event-listener` property to specify a descriptor event listener to be added during bootstrapping.

**Values**

[Table 5-91](#) describes this persistence property's values.

**Table 5-91 Valid Values for session-event-listener**

Value	Description
Class name	A qualified class name for a class that implements the <code>org.eclipse.persistence.sessions.SessionEventListener</code> interface.

**Usage**

To define multiple event listener, you can use a [session.customizer](#) class.

**Examples**

[Example 5-113](#) shows how to use this property in a `persistence.xml` file.

[Example 5-113](#) shows how to use this property in a property map.

**Example 5-113 Using session-event-listener in persistence.xml**

```
<property name="eclipselink.session-event-listener"
value="mypackage.MyClass.class"/>
```



**Example 5-114 Using session-event-listener in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.SESSION_EVENT_LISTENER_CLASS,
"mypackage.MyClass.class");
```

**See Also**

For more information, see:

- ["session.customizer"](#)

## session-name

Use the `eclipselink.session-name` property to configure a unique name to use when storing the singleton server session within the `SessionManager`.

**Values**

[Table 5-92](#) describes this persistence property's values.

**Table 5-92 Valid Values for session.name**

Value	Description
Name	Unique session name to use instead of the default, TopLink-generated session name.

**Usage**

By default, TopLink generates a unique session name. You can provide a custom, unique, session name with this property.

When using a `sessions.xml` file, you must include this session name as the name of the session in the `sessions.xml` file.

**Examples**

[Example 5-115](#) shows how to use this property in the `persistence.xml` file.

[Example 5-116](#) shows how to use this property in a property map.

**Example 5-115 Using session-name in persistence.xml**

```
<property name="eclipselink.session-name" value="MySession"/>
```

**Example 5-116 Using session-name in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.SESSION_NAME, "MySession");
```

**See Also**

For more information, see:

- ["sessions.xml"](#)

## sessions-xml

Use the `eclipselink.sessions-xml` property to use a specified native `sessions.xml` configuration file (which references a `project.xml` file) to load configuration and mapping information instead of JPA annotations or TopLink XML (as shown in [Figure 5-1](#)).

### Values

[Table 5-93](#) describes this persistence property's values.

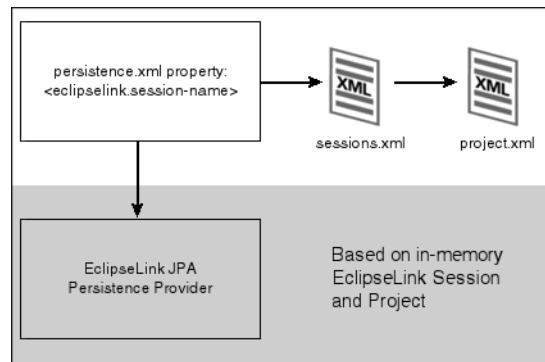
**Table 5-93 Valid Values for sessions-xml**

Value	Description
configuration file	The resource name of the sessions XML file. If you do not specify the value for this property, it will not be used.

### Usage

You can use the `eclipselink.sessions-xml` property as an alternative to using annotations and deployment XML. With this property, EclipseLink builds an in-memory EclipseLink session and project based on this metadata (as shown in [Figure 5-1](#)). You can acquire a persistence manager and use it, having defined all entities and so on using only EclipseLink `sessions.xml`.

**Figure 5-1 Using the eclipselink.sessions-xml Persistence Property**



### Examples

[Example 5-117](#) shows how to use this property in a `persistence.xml` file.

[Example 5-118](#) shows how to use this property in a property map.

#### Example 5-117 Using sessions-xml in the persistence.xml file

```
<property name="eclipselink.sessions-xml" value="mysession.xml" />
```

#### Example 5-118 Using sessions-xml in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.SESIONS_XML, "mysession.xml");
```

**See Also**

For more information, see:

- ["Overriding and Merging"](#)

## target-database

Use the `eclipselink.target-database` property to specify the database to use, controlling custom operations and SQL generation for the specified database.

**Values**

[Table 5-94](#) describes this persistence property's values.

**Table 5-94 Valid Values for target-database**

Value	Description
Defined in the <code>TargetDatabase</code> class or a fully qualified class name that extends <code>DatabasePlatform</code>	Specify your database: <ul style="list-style-type: none"> <li>• <b>Attunity</b></li> <li>• <b>Auto</b> (Default): TopLink attempts to access the database and the JDBC metadata to determine the target database.</li> <li>• <b>Cloudscape</b></li> <li>• <b>Database</b>: Use a generic database, if your target database is not listed and your JDBC driver does not support the metadata required for <b>Auto</b>.</li> <li>• <b>DB2</b></li> <li>• <b>DB2Mainframe</b></li> <li>• <b>DBase</b></li> <li>• <b>Derby</b></li> <li>• <b>HSQL</b></li> <li>• <b>Informix</b></li> <li>• <b>JavaDB</b></li> <li>• <b>MaxDB</b></li> <li>• <b>MySQL</b></li> <li>• <b>MySQL4</b></li> <li>• <b>Oracle</b></li> <li>• <b>Oracle10</b></li> <li>• <b>Oracle11</b></li> <li>• <b>Oracle8</b></li> <li>• <b>Oracle9</b></li> <li>• <b>PointBase</b></li> <li>• <b>PostgreSQL</b></li> <li>• <b>SQLAnywhere</b></li> <li>• <b>SQLServer</b></li> <li>• <b>Sybase</b></li> <li>• <b>Symfoware</b></li> <li>• <b>TimesTen</b></li> </ul>

**Usage**

If `eclipselink.validation-only = true`, you cannot use an `Auto` class name or short name.

## Examples

[Example 5-119](#) shows how to use this property in the `persistence.xml` file.

[Example 5-120](#) shows how to use this property in a property map.

### Example 5-119 Using target-database in persistence.xml

```
<property name="eclipselink.target-database" value="Oracle"/>
```

or

```
<property name="eclipselink.target-database"
value="org.eclipse.persistence.platform.database.HSQLPlatform"/>
```

### Example 5-120 Using target-database in a Property Map

```
import org.eclipse.persistence.config.TargetDatabase;
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.TARGET_DATABASE, TargetDatabase.Oracle);
```

## target-server

Use the `eclipselink.target-server` property to configure the `ServerPlatform` that will be used to enable integration with a host container.

### Values

[Table 5-95](#) describes this persistence property's values.

**Table 5-95 Valid Values for target-server**

Value	Description
Defined in the <code>TargetServer</code> class	Specify your application server: <ul style="list-style-type: none"> <li>• <b>JBoss</b>: JBoss Application Server</li> <li>• <b>OC4J</b>: OC4J persistence provider</li> <li>• <b>SAPNetWeaver_7_1</b>: SAP NetWeaver Application Server 7.1 (and higher)</li> <li>• <b>SunAS9</b>: Sun Application Server 9</li> <li>• <b>WebLogic</b>: Oracle WebLogic Server</li> <li>• <b>WebLogic_10</b>: Oracle WebLogic Server 10</li> <li>• <b>WebLogic_9</b>: Oracle WebLogic Server 9</li> <li>• <b>WebSphere</b>: IBM WebSphere</li> <li>• <b>WebSphere_6_1</b>: IBM WebSphere 6.1</li> <li>• <b>WebSphere_7</b>: IBM WebSphere 7</li> <li>• <b>WebSphere_Liberty</b>: IBM WebSphere Liberty</li> <li>• <b>Default</b> (<code>TargetServer.None</code>)</li> </ul>

### Usage

In addition to the supplied values, you can specify a custom server platform by supply the full class name for the platform.

Specifying a name of the class implementing `ExternalTransactionController` sets `CustomServerPlatform` with this controller.

### Examples

[Example 5-121](#) shows how to use this property in a `persistence.xml` file.

[Example 5-122](#) shows how to use this property in a property map.

#### Example 5-121 Using target-server in persistence.xml

```
<property name="eclipselink.target-server" value="OC4J_10_1_3"/>
```

#### Example 5-122 Using target-server in a Property Map

```
import org.eclipse.persistence.config.TargetServer;
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.TARGET_SERVER,
TargetServer.OC4J_10_1_3);
```

### See Also

For more information, see:

- *Solutions Guide for Oracle TopLink*
- "Integrating TopLink with an Application Server" and "TopLink Database and Application Server Support" in *Understanding Oracle TopLink*

## temporal.mutable

Use the `eclipselink.temporal.mutable` property to configure the default for detecting changes to the temporal field (Date, Calendar).

### Values

[Table 5-96](#) shows this persistence property's values.

**Table 5-96 Valid Values for temporal.mutable**

Value	Description
true	Changes to the object are detected. Disables weaving of attribute change tracking.
false	(Default) Changes to the object itself are not detected.

### Usage

By default, it is assumed that temporal fields are replaced, and the temporal object is not changed directly.

### Examples

[Example 5-123](#) shows how to use this property in the `persistence.xml` file.

[Example 5-124](#) shows how to use this property in a property map.

#### Example 5-123 Using temporal.mutable in persistence.xml

```
<property name="eclipselink.temporal.mutable" value="true"/>
```

**Example 5-124 Using temporal.mutable in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put(PersistenceUnitProperties.TEMPORAL_MUTABLE,
"true");
```

## tenant-id

Use the `eclipselink.tenant-id` property to specify the default context property used to populate multitenant entities.

**Values**

[Table 5-97](#) describes this persistence property's values.

**Table 5-97 Valid Values for tenant-id**

Value	Description
value	Name of the default context property.

**Usage**

This is a default multitenant property that can be used on its own or with other properties defined by you. You are not obligated to use this property. You are free to specify your own.

**Examples**

[Example 5-125](#) shows how to use this property in the `persistence.xml` file.

[Example 5-126](#) shows how to use this property in a property map.

**Example 5-125 Using tenant-id in persistence.xml**

```
<property name="eclipselink.tenant-id" value="Oracle"/>
```

**Example 5-126 Using tenant-id in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put(PersistenceUnitProperties.MULTI_TENANT_PROPERTY_DEFAULT,
"Oracle");
```

## transaction.join-existing

Use the `eclipselink.transaction.join-existing` property to force the persistence context to read through the JTA-managed ("write") connect

ion in case there is an active transaction.

**Values**

[Table 5-98](#) describes this persistence property's values.

**Table 5-98 Valid Values for transaction.join-existing**

Value	Description
true	Forces the persistence context to read through the JTA-managed connection.
false	(Default) Does not force the persistence context to read through the JTA-managed connection.

### Usage

The property set in `persistence.xml` or passed to `createEntityManagerFactory` affects all `EntityManager`s created by the factory. If the property set to `true`, objects read during transaction *will not* be placed into the shared cache unless they have been updated. Alternatively, to apply the property only to some `EntityManager`s, pass it to `createEntityManager` method.

### Examples

[Example 5-127](#) shows how to use this property in the `persistence.xml` file.

[Example 5-128](#) shows how to use this property in a property map.

#### Example 5-127 Using transaction.join-existing in persistence.xml

```
<property name="eclipselink.transaction.join-existing" value="true"/>
```

#### Example 5-128 Using transaction.join-existing in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put(PersistenceUnitProperties.TRANSACTION_JOIN_EXISTING,
"true");
```

### See Also

For more information, see:

- "Automated Tuning" in *Solutions Guide for Oracle TopLink*

## tuning

The `eclipselink.tuning` property selects the type of tuner to use to configure the persistence unit.

### Values

[Table 5-99](#) describes this persistence property's values.

**Table 5-99 Valid Values for tuning**

Value	Description
standard	(Default) Uses the standard tuner and does not change any of the default configuration settings.
safe	Configures the persistence unit for debugging. This disables caching and several performance optimizations. The purpose is to provide a simplified development and debugging configuration.

**Table 5-99 (Cont.) Valid Values for tuning**

Value	Description
custom tuner	Specifies the full class name of an implementation of the <code>org.eclipse.persistence.tools.tuning.SessionTuner</code> interface.

**Usage**

Use automated tuning to set multiple configuration properties as part of a single flag to perform dynamic tuning during different steps of application deployment.

**Examples**

[Example 5-129](#) shows how to use this property in the `persistence.xml` file.

**Example 5-129 Using tuning in persistence.xml**

```
<property name="eclipselink.tuning" value="safe"/>
```

## validate-existence

Use the `eclipselink.validate-existence` property to specify if TopLink should verify an object's existence on `persist()`.

**Values**

[Table 5-100](#) describes this persistence property's values.

**Table 5-100 Valid Values for validate-existence**

Value	Description
true	TopLink verifies the object's existence.
false	(Default) TopLink assumes the object is new, if it is not in the persistence context.

**Usage**

TopLink will throw an error if a validated object is not in the persistence context.

**Examples**

[Example 5-130](#) shows how to use this property in the `persistence.xml` file.

[Example 5-131](#) shows how to use this property in a property map.

**Example 5-130 Using validate-existence in persistence.xml**

```
<property name="eclipselink.validate-existence" value="true"/>
```

**Example 5-131 Using validate-existence in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put(PersistenceUnitProperties.VALIDATE-EXISTENCE,
"true");
```



## validation-only

Use the `eclipselink.validation-only` property to validate deployments by initializing descriptors but not connecting to the data source.

### Values

[Table 5-101](#) describes this persistence property's values.

**Table 5-101 Valid Values for validation-only**

Value	Description
true	TopLink will initialize the descriptors but not log in.
false	(Default) TopLink will initialize the descriptors and log in.

### Usage

When setting `eclipselink.validation-only` to `true`, you must also configure `eclipselink.target-database` with a non-Auto class name or a short name.

### Examples

[Example 5-132](#) show how to use this property in the `persistence.xml` file.

[Example 5-133](#) shows how to use this property in a property map.

#### Example 5-132 Using validation-only in persistence.xml

```
<property name="eclipselink.validation-only" value="true"/>
```

#### Example 5-133 Using validation-only in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;  
propertyMap.put(PersistenceUnitProperties.VALIDATION_ONLY,  
"true");
```

### See Also

For more information, see:

- ["target-database"](#)

## weaving

Use the `eclipselink.weaving` property to specify if TopLink weaves the entity classes. EclipseLink JPA uses weaving to enhance JPA entities for such things as lazy loading, change tracking, fetch groups, and internal optimizations.

### Values

[Table 5-102](#) describes this persistence property's values.

**Table 5-102 Valid values for weaving**

Value	Description
true	Weave the entity classes dynamically.
false	Do not weave the entity classes.
static	Weave the entity classes statically.

**Examples**

[Example 5-134](#) shows how to use this property in the `persistence.xml` file.

[Example 5-135](#) shows how to use this property in a property map.

**Example 5-134 Using weaving in persistence.xml**

```
<property name="eclipse.weaving" value="false"/>
```

**Example 5-135 Using weaving in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put
(PersistenceUnitProperties.WEAVING, "false");
```

**See Also**

For more information, see:

- "Using Weaving" in *Understanding EclipseLink*
- "Enhancing Performance" in *Solutions Guide for EclipseLink*
- ["weaving.changetracking"](#)
- ["weaving.eager"](#)
- ["weaving.fetchgroups"](#)
- ["weaving.internal"](#)
- ["@ChangeTracking"](#)

## weaving.changetracking

Use the `eclipselink.weaving.changetracking` persistence property to:

- Enable `AttributeLevelChangeTracking` through weaving.
- Permit only classes with all mappings to change.
- Permit tracking to enable change tracking. Mutable basic attributes prevent change tracking.

This property is enabled only when weaving is enabled.

**Values**

[Table 5-103](#) describes this persistence property's values.

**Table 5-103 Valid Values for `weaving.changetracking`**

Value	Description
true	(Default) Enables this property.
false	Disables this property.

**Examples**

[Example 5-136](#) shows how to use this property in the `persistence.xml` file.

[Example 5-137](#) shows how to use this property in a property map.

**Example 5-136 Using `weaving.changetracking` in `persistence.xml`**

```
<property name="eclipse.weaving.changetracking" value="false"/>
```

**Example 5-137 Using `weaving.changetracking` in a Property Map**

```
import org.eclipselink.persistence.config.PersistenceUnitProperties;
propertiesMap.put
(Persistence.Unit.Properties.WEAVING_CHANGETRACKING,
value="false");
```

**See Also**

For more information, see:

- ["weaving"](#)

## `weaving.eager`

Use the `eclipselink.weaving.eager` property to specify if TopLink uses indirection on eager relationships.

**Values**

[Table 5-104](#) describes this persistence property's values.

**Table 5-104 Valid Values for `weaving.eager`**

Value	Description
true	Enables indirection on eager relationships through weaving.
false	(Default) Disables indirection on eager relationships through weaving.

**Usage**

One-to-one and many-to-one mappings, even when configured with `FetchType.EAGER`, will effectively become "lazy."

You can use this extension only if [weaving](#) is configured to `true` or `static`. See ["weaving"](#) for more information.

## Examples

[Example 5-138](#) shows how to use this property in the `persistence.xml` file.

[Example 5-139](#) shows how to use this extension in a property map

### Example 5-138 Using weaving in persistence.xml

```
<property name="eclipselink.weaving.eager" value="true"/>
```

### Example 5-139 Using weaving in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put
(PersistenceUnitProperties.WEAVING_EAGER, "true");
```

## See Also

For more information, see:

- ["weaving"](#)

## weaving.fetchgroups

Use the `eclipselink.weaving.fetchgroups` property to enable `FetchGroups` through weaving. When this is enabled, lazy direct mapping is supported, as well as descriptor and query-level `FetchGroups`.

`FetchGroups` allow partial objects to be read and written. Access to un-fetched attributes refreshes (fully-fetches) the object.

This property is only considered when weaving is enabled.

## Values

[Table 5-105](#) describes this persistence property's values.

**Table 5-105 Valid Values for weaving.fetchgroups**

Value	Description
true	(Default) Enables <code>FetchGroups</code> through weaving.
false	Disables <code>FetchGroups</code> through weaving.

## Examples

[Example 5-140](#) shows how to use this property in the `persistence.xml` file.

[Example 5-141](#) shows how to use this property in a property map.

### Example 5-140 Using weaving.fetchgroups in persistence.xml

```
<property name="eclipselink.weaving.fetchgroups" value="false"/>
```

**Example 5-141 Using `weaving.fetchgroups` in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put
(PersistenceUnitProperties.WEAVING_FETCHGROUPS, "false")
```

**See Also**

For more information, see:

- ["weaving"](#)

## weaving.internal

Use the `eclipselink.weaving.internal` property to specify if TopLink uses internal optimizations through weaving.

**Values**

[Table 5-106](#) describes this persistence property's values.

**Table 5-106 Valid Values for `weaving.internal`**

Value	Description
true	(Default) Enables internal optimizations through weaving.
false	Disables internal optimizations through weaving.

**Usage**

You can use this extension only if [weaving](#) is configured to `true` or `static`. See ["weaving"](#) for more information.

**Examples**

[Example 5-142](#) shows how to use this property in the `persistence.xml` file.

[Example 5-143](#) shows how to use this property in a property map.

**Example 5-142 Using `weaving` in `persistence.xml`**

```
<property name="eclipselink.weaving.internal" value="false"/>
```

**Example 5-143 Using `weaving` in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put
(PersistenceUnitProperties.WEAVING_INTERNAL, "false");
```

**See Also**

For more information, see:

- ["weaving"](#)

## weaving.lazy

Use the `eclipselink.weaving.lazy` property to specify if TopLink uses lazy one-to-one and many-to-one mappings.

### Values

[Table 5-107](#) describes this persistence property's values.

**Table 5-107 Valid Values for `weaving.lazy`**

Value	Description
<code>true</code>	(Default) Enables lazy one-to-one and many-to-one mappings through weaving.
<code>false</code>	Disables lazy one-to-one and many-to-one mappings through weaving.

### Usage

You can use this extension only if [weaving](#) is configured to `true` or `static`. See "[weaving](#)" for more information.

### Examples

[Example 5-144](#) shows how to use this property in the `persistence.xml` file.

[Example 5-145](#) shows how to use this property in a property map.

#### Example 5-144 Using `weaving.lazy` in `persistence.xml`

```
<property name="eclipselink.weaving.lazy" value="false"/>
```

#### Example 5-145 Using `weaving.lazy` in a Property Map

```
import org.eclipse.persistence.config.PersistenceUnitProperties;  
propertiesMap.put  
(PersistenceUnitProperties.WEAVING_LAZY, "false");
```

### See Also

For more information, see:

- "[weaving](#)"

# 6

## eclipselink-orm.xml Schema Reference

This chapter describes how you can use TopLink's native metadata XML file, `eclipselink-orm.xml`, to override mappings defined in the JPA configuration file (`orm.xml`) and to provide extended ORM features.

### Note:

Using the `eclipselink-orm.xml` mapping file enables many TopLink advanced features, but it may prevent the persistence unit from being portable to other JPA implementations.

The `eclipselink-orm.xml` file defines object-relational mapping metadata for TopLink. It has the same basic structure as the `orm.xml` file, which makes it more intuitive, requires minimum configuration, and makes it easy to override.

For more information, see:

- Section 12.2 "XML Overriding Rules" in the JPA Specification
- [http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic\\_JPA\\_Development/Configuration/JPA/orm.xml](http://wiki.eclipse.org/EclipseLink/UserGuide/JPA/Basic_JPA_Development/Configuration/JPA/orm.xml)

The schema for EclipseLink is `eclipselink_orm_X_X.xsd` where `X_X` is the current EclipseLink version number (such as `2_4` for **2.4**). All EclipseLink schemas are available from <http://wiki.eclipse.org/EclipseLink/XSDs>.

This chapter includes the following sections:

- [Overriding and Merging](#)

## Overriding and Merging

To override the `orm.xml` file's mapping, you must define the `META-INF/eclipselink-orm.xml` file in the project. When both `orm.xml` and `eclipselink-orm.xml` are specified, the contents of `eclipselink-orm.xml` will override `orm.xml` and any other JPA mapping file specified in the persistence unit. If there are overlapping specifications in multiple ORM files, the files are merged if they are no conflicting entities.

### Note:

The order of files defined in `persistence.xml` *does not* define the order of their processing. The files are processed, merged, and overridden as determined by the rules.

See the following sections for more information:

- [Rules for Overriding and Merging](#)
- [Examples of Overriding and Merging](#)

## Rules for Overriding and Merging

Oracle TopLink provides specific overriding and merging rules for the following elements defined in the `orm.xml` file:

- [Persistence Unit Metadata](#)
- [Entity Mappings](#)
- [Mapped Superclasses](#)
- [Entity override and merging rules](#)
- [Embeddable](#)

### Persistence Unit Metadata

In `eclipselink-orm.xml`, a `persistence-unit-metadata` element merges or overrides the values of existing `persistence-unit-metadata` specification as defined in [Table 6-1](#).

**Table 6-1** Overriding and Merging Persistence Unit Metadata

<b>entity-mappings/ persistence-unit-metadata</b>	<b>Rule</b>	<b>Description</b>
<code>xml-mapping-metadata-complete</code>	Full override	If specified, the complete set of mapping metadata for the persistence unit is contained in the XML mapping files for the persistence unit.
<code>persistence-unit-defaults/ schema</code>	Full override	If a <code>schema</code> setting exists, then the <code>eclipselink-orm.xml</code> <code>schema</code> setting overrides the existing setting or creates a new <code>schema</code> setting.
<code>persistence-unit-defaults/ catalog</code>	Full override	If a <code>catalog</code> setting exists, then the <code>eclipselink-orm.xml</code> <code>catalog</code> setting overrides the existing setting or creates a new <code>catalog</code> setting.
<code>persistence-unit-defaults/ access</code>	Full override	If an <code>access</code> setting exists, then the <code>eclipselink-orm.xml</code> <code>access</code> setting overrides the existing setting, or creates a new <code>access</code> setting.
<code>entity-mappings/ persistence-unit-metadata/persistence-unit-defaults/cascade-persist</code>	Full override	If a <code>cascade-persist</code> setting exists, then the <code>eclipselink-orm.xml</code> <code>cascade-persist</code> setting overrides the existing setting or creates a new <code>cascade-persist</code> setting.
<code>entity-mappings/ persistence-unit-metadata/persistence-unit-defaults/entity-listeners</code>	Merge	If an <code>entity-listeners</code> exists, then the <code>eclipselink-orm.xml</code> <code>entity-listeners</code> will be merged with the list of all <code>entity-listeners</code> from the persistence unit.



## Entity Mappings

Entities, embeddables and mapped superclasses are defined within the `entity-mappings` section. The `eclipselink-orm.xml` entities, embeddables and mapped superclasses are added to the persistence unit as defined in [Table 6-2](#).

**Table 6-2** Overriding and Merging Entity Mappings

<code>entity-mappings/</code>	Rule	Description
<code>package</code>	None	The <code>package</code> element specifies the package of the classes listed within the subelements and attributes of the same mapping file only. It is only applicable to those entities that are fully defined within the <code>eclipselink-orm.xml</code> file, else its usage remains local and is same as described in the JPA specification.
<code>catalog</code>	None	The <code>catalog</code> element applies only to the subelements and attributes listed within the <code>eclipselink-orm.xml</code> file that are not an extension to another mapping file. Otherwise, the use of the <code>catalog</code> element within the <code>eclipselink-orm.xml</code> file remains local and is same as described in the JPA specification.
<code>schema</code>	None	The <code>schema</code> element applies only to the subelements and attributes listed within the <code>eclipselink-orm.xml</code> file that are not an extension to another mapping file. Otherwise, the use of the <code>schema</code> element within the <code>eclipselink-orm.xml</code> file remains local and is same as described in the JPA specification.
<code>access</code>	None	The <code>access</code> element applies only to the subelements and attributes listed within the <code>eclipselink-orm.xml</code> file that are not an extension to another mapping file. Otherwise, the use of the <code>access</code> element within the <code>eclipselink-orm.xml</code> file remains local and is same as described in the JPA specification.
<code>sequence-generator</code>	Full override	A <code>sequence-generator</code> is unique by name. The <code>sequence-generator</code> defined in the <code>eclipselink-orm.xml</code> will override a <code>sequence-generator</code> of the same name defined in another mapping file. Outside of the overriding case, an exception is thrown if two or more <code>sequence-generators</code> with the same name are defined in one or across multiple mapping files.
<code>table-generator</code>	Full override	A <code>table-generator</code> is unique by name. The <code>table-generator</code> defined in the <code>eclipselink-orm.xml</code> will override a <code>table-generator</code> of the same name defined in another mapping file. Outside of the overriding case, an exception is thrown if two or more <code>table-generators</code> with the same name are defined in one or across multiple mapping files.
<code>named-query</code>	Full override	A <code>named-query</code> is unique by name. The <code>named-query</code> defined in the <code>eclipselink-orm.xml</code> will override a <code>named-query</code> of the same name defined in other mapping files. Outside of the overriding case, an exception is thrown if two or more <code>named-queries</code> with the same name are defined in one or across multiple mapping file.
<code>named-native-query</code>	Full override	A <code>named-native-query</code> is unique by name. The <code>named-native-query</code> defined in the <code>eclipselink-orm.xml</code> will override a <code>named-native-query</code> of the same name defined in other mapping files. Outside of the overriding case, an exception is thrown if two or more <code>named-native-queries</code> with the same name are defined in one or across multiple mapping files.

Table 6-2 (Cont.) Overriding and Merging Entity Mappings

entity-mappings/ sql-result-set- mapping	Rule	Description
	Full override	A <code>sql-result-set-mapping</code> is unique by name. The <code>sql-result-set-mapping</code> defined in the <code>eclipselink-orm.xml</code> will override a <code>sql-result-set-mapping</code> of the same name defined in other mapping files. Outside of the overriding case, an exception is thrown if two or more <code>sql-result-set-mapping</code> entities with the same name are defined in one or across multiple mapping files.

## Mapped Superclasses

A mapped-superclass can be defined completely, or with specific elements to provide extensions to a mapped-superclass from another mapping file. Table 6-3 lists individual override and merging rules:

Table 6-3 Overriding and Merging Mapped Superclasses

entity-mappings/ mapped-superclass	Rule	Description
id-class	Full override	If an <code>id-class</code> exists, then the <code>eclipselink-orm.xml</code> <code>id-class</code> setting overrides the existing setting, or creates a new <code>id-class</code> setting.
exclude-default- listeners	Full override	If an <code>exclude-default-listeners</code> exists, then the <code>eclipselink-orm.xml</code> <code>exclude-default-listeners</code> setting will be applied. If the <code>exclude-default-listeners</code> setting is not specified, it will not override an existing setting, that is essentially turning it off.
exclude-superclass- listeners	Full override	If an <code>exclude-superclass-listeners</code> setting exists, then the <code>eclipselink-orm.xml</code> <code>exclude-superclass-listeners</code> setting will be applied. If <code>exclude-superclass-listeners</code> setting is not specified, it will not override an existing setting, that is essentially turning it off.
entity-listeners	Merge and full override	If an <code>entity-listeners</code> setting exists, then the <code>eclipselink-orm.xml</code> <code>entity-listeners</code> setting will override and merge with an existing setting, or creates a new <code>entity-listeners</code> setting all together.  <b>Note:</b> An entity listener override must be complete. All lifecycle methods of that listener must be specified and no merging of individual lifecycle methods of an entity listener is allowed. The class name of the listener is the key to identify the override.
pre-persist	Full override	If a <code>pre-persist</code> setting exists, then the <code>eclipselink-orm.xml</code> <code>pre-persist</code> setting overrides the existing setting, or creates a new <code>pre-persist</code> setting.
post-persist	Full override	If a <code>post-persist</code> setting exists, then the <code>eclipselink-orm.xml</code> <code>post-persist</code> setting overrides the existing setting, or creates a new <code>post-persist</code> setting.

**Table 6-3 (Cont.) Overriding and Merging Mapped Superclasses**

<b>entity-mappings/ mapped-superclass</b>	<b>Rule</b>	<b>Description</b>
pre-remove	Full override	If a pre-remove setting exists, then the eclipselink-orm.xml's pre-remove setting overrides the existing setting, or creates a new pre-remove setting.
post-remove	Full override	If a post-remove setting exists, then the eclipselink-orm.xml's post-remove setting overrides the existing setting, or creates a new post-remove setting.
pre-update	Full override	If a pre-update setting exists, then the eclipselink-orm.xml's pre-update setting overrides the existing setting, or creates a new pre-update setting.
post-update	Full override	If a post-update setting exists, then the eclipselink-orm.xml's post-update setting overrides the existing setting, or creates a new post-update setting.
post-load	Full override	If a post-load setting exists, then the eclipselink-orm.xml's post-load setting overrides the existing setting, or creates a new post-load setting.
attributes	Merge and mapping level override	If the attribute settings (such as id, embedded-id, basic, version, many-to-one, one-to-many, or one-to-one) exist at the mapping level, then the eclipselink-orm.xml attributes merges or overrides the existing settings, else creates new attributes.
class	None	
access	Full override	If an access setting exists, then the eclipselink-orm.xml's access setting overrides the existing setting, or creates a new access setting. It also overrides the default class setting.
metadata-complete	Full override	If a metadata-complete setting exists, then the eclipselink-orm.xml's metadata-complete setting will be applied. If metadata-complete setting is not specified, it will not override an existing setting, that is essentially turning it off.

## Entity override and merging rules

An entity can be defined completely, or with specific elements to provide extensions to an entity from another mapping file. The following table lists individual override and merging rules:

**Table 6-4 Overriding and Merging Entities**

<b>entity-mappings/entity</b>	<b>Rule</b>	<b>Description</b>
table	Full override	The table definition overrides any other table setting (with the same name) for this entity. There is no merging of individual table values.
secondary-table	Full override	The secondary-table definition overrides another secondary-table setting (with the same name) for this entity. There is no merging of individual secondary-table(s) values.

Table 6-4 (Cont.) Overriding and Merging Entities

entity-mappings/entity	Rule	Description
primary-key-join-column	Full override	The primary-key-join-column(s) definition overrides any other primary-key-join-column(s) setting for this entity. There is no merging of the primary-key-join-column(s). The specification is assumed to be complete and these primary-key-join-columns are the source of truth.
id-class	Full override	If an id-class setting exists, then the eclipselink-orm.xml's id-class setting overrides the existing setting, or creates a new id-class .
inheritance	Full override	If an inheritance setting exists, then the eclipselink-orm.xml's inheritance setting overrides the existing setting, or creates a new inheritance setting.
discriminator-value	Full override	If a discriminator-value setting exists, then the eclipselink-orm.xml's discriminator-value setting overrides the existing setting, or creates a new discriminator-value setting.
discriminator-column	Full override	If a discriminator-column setting exists, then the eclipselink-orm.xml's discriminator-column setting overrides the existing setting, or creates a new discriminator-column setting.
sequence-generator	Full override	A sequence-generator is unique by name. The sequence-generator defined in eclipselink-orm.xml overrides sequence-generator of the same name defined in other mapping files. Outside of the overriding case, an exception is thrown if two or more sequence-generators with the same name are defined in one or across multiple mapping files.
table-generator	Full override	A table-generator is unique by name. The table-generator defined in eclipselink-orm.xml overrides table-generator of the same name defined in other mapping files. Outside of the overriding case, an exception is thrown if two or more table-generators with the same name are defined in one or across multiple mapping files.
named-query	Merge and full override	A named-query is unique by name. The named-query defined in eclipselink-orm.xml overrides any named-query of the same name defined in other mapping files. Outside of the overriding case, an exception is thrown if two or more named-query elements with the same name are defined in one or across multiple mapping files.
named-native-query	Merge and full override	A named-native-query is unique by name. The named-native-query defined in eclipselink-orm.xml overrides named-native-query of the same name defined in other mapping files. Outside of the overriding case, an exception is thrown if two or more named-native-query elements with the same name are defined in one or across multiple mapping files.

Table 6-4 (Cont.) Overriding and Merging Entities

entity-mappings/entity	Rule	Description
sql-result-set-mapping	Merge and full override	A sql-result-set-mapping is unique by name. sql-result-set-mapping defined in eclipselink-orm.xml overrides sql-result-set-mapping of the same name defined in other mapping files. Outside of the overriding case, an exception is thrown if two or more sql-result-set-mapping elements with the same name are defined in one or across multiple mapping files.
exclude-default-listeners	Full override	If an exclude-default-listeners setting exists, then the eclipselink-orm.xml's exclude-default-listeners setting will be applied. If an exclude-default-listeners setting is not specified, it will not override an existing setting, that is essentially turning it off.
exclude-superclass-listeners	Full override	If an exclude-superclass-listeners setting exists, then the eclipselink-orm.xml's exclude-superclass-listeners setting will be applied. If an exclude-superclass-listeners setting is not specified, it will not override an existing setting, that is essentially turning it off.
entity-listeners	Full override	If an entity-listeners setting exists, then the eclipselink-orm.xml's entity-listeners setting will override and merge with an existing setting, or creates a new entity-listeners setting all together. <b>Note:</b> An entity listener override must be complete. All lifecycle methods of that listener must be specified and no merging of individual lifecycle methods of an entity listener is allowed. The class name of the listener is the key to identify the override.
pre-persist	Full override	If a pre-persist setting exists, then the eclipselink-orm.xml's pre-persist setting overrides the existing setting, or creates a new pre-persist setting.
post-persist	Full override	If a post-persist setting exists, then the eclipselink-orm.xml's post-persist setting overrides the existing setting, or creates a new post-persist setting.
pre-remove	Full override	If a pre-remove setting exists, then the eclipselink-orm.xml's pre-remove setting overrides the existing setting, or creates a new pre-remove setting.
post-remove	Full override	If a post-remove setting exists, then the eclipselink-orm.xml's post-remove setting overrides the existing setting, or creates a new post-remove setting.
pre-update	Full override	If a pre-update setting exists, then the eclipselink-orm.xml's pre-update setting overrides the existing setting, or creates a new pre-update setting.
post-update	Full override	If a post-update setting exists, then the eclipselink-orm.xml's post-update setting overrides the existing setting, or creates a new post-update setting.
post-load	Full override	If a post-load setting exists, then the eclipselink-orm.xml's post-load setting overrides the existing setting, or creates a new post-load setting.

**Table 6-4 (Cont.) Overriding and Merging Entities**

entity-mappings/entity	Rule	Description
attributes	Merge and mapping level override	If the attribute settings (id, embedded-id, basic, version, many-to-one, one-to-many, one-to-one) exist at the mapping level, then the eclipselink-orm.xml's attributes merges or overrides the existing settings, else creates new attributes.
association-override	Merge and mapping level override	If an association-override setting exists, then the eclipselink-orm.xml's association-override setting overrides the existing setting, or creates a new association-override setting.
name	Full override	If a name setting exists, then the eclipselink-orm.xml's name setting overrides the existing setting, or creates a new name setting.
class	None	
access	Full override	If an access setting exists, then the eclipselink-orm.xml's access setting overrides the existing setting, or creates a new access setting. It also overrides the default class setting
metadata-complete	Full override	If a metadata-complete setting exists, then the eclipselink-orm.xml's metadata-complete setting will be applied. If a metadata-complete setting is not specified, it will not override an existing setting, that is essentially turning it off.

## Embeddable

An embeddable can be defined wholly or may be defined so as to provide extensions to an embeddable from another mapping file. Therefore, we will allow the merging of that class' metadata. [Table 6-4](#) lists the individual override rules Embeddable classes.

**Table 6-5 Overriding and Merging Embeddable Classes**

entity-mappings/ embeddable	Rule	Description
attributes	Override and merge	If the attribute settings (id, embedded-id, basic, version, many-to-one, one-to-many, one-to-one, many-to-many, embedded, transient) exist at the mapping level, then the eclipselink-orm.xml's attributes merges or overrides the existing settings, or creates new attributes.
class	None	
access	Full override	If an access setting exists, then the eclipselink-orm.xml's access setting overrides the existing setting, or creates a new access setting. It also overrides the default class setting.
metadata-complete	Full override	If a metadata-complete setting exists, then the eclipselink-orm.xml's metadata-complete setting will be applied. If a metadata-complete setting is not specified, it will not override an existing setting, that is essentially turning it off.

## Examples of Overriding and Merging

### Example 6-1 Overriding/Merging Example 1

In this example, your Oracle TopLink project contains:

- META-INF/orm.xml – Defines Entity **A** with the mappings **b** and **c**
- META-INF/eclipselink-orm.xml – Defines Entity **A** with the mappings **c** and **d**

Results in:

- Entity **A** containing:
  - mapping **b** (from orm.xml)
  - mappings **c** and **d** (from eclipselink-orm.xml)

### Example 6-2 Overriding/Merging Example 2

In this example, your Oracle TopLink project contains:

- META-INF/orm.xml – Defines Entity **A** with mappings **b** and **c**
- META-INF/some-other-mapping-file.xml – Defines Entity **B** with mappings **a** and **b**
- META-INF/eclipselink-orm.xml – Defines Entity **A** with the mappings **c** and **d**, and Entity **B** with mapping **b** and **c**

Results in:

- Entity **A** containing:
  - mapping **b** (from orm.xml)
  - mappings **c** and **d** (from eclipselink-orm.xml)
- Entity **B** containing:
  - mapping **a** (from some-other-mapping-file)
  - mappings **b** and **c** (from eclipselink-orm.xml)

### Example 6-3 Overriding/Merging Example 3

In this example, your Oracle TopLink project contains:

- META-INF/orm.xml – Defines Entity **A** with mappings **b** and **c**.
- META-INF/eclipselink-orm.xml – Defines Entity **A** with mappings **c** and **d**.
- META-INF/some-other-mapping-file.xml – Defines Entity **A** with mapping **x**.

Results in:

- Entity **A** containing:
  - mapping **b** (from orm.xml)
  - mappings **c** and **d** (from eclipselink-orm.xml)
  - mapping **x** (from some-other-mapping-file.xml)

#### Example 6-4 Overriding/Merging Example 4

In this example, your Oracle TopLink project contains:

- META-INF/orm.xml – Defines Entity **A** with mappings **b** and **c**.
- META-INF/extensions/eclipselink-orm.xml – Defines defines Entity **A** with mappings **c** and **d**.

Note: The file is added through a `<mapping-file>` tag in the `persistence.xml` file.

Results in an exception, due to conflicting specifications for mapping **c**.

#### Example 6-5 Overriding/Merging Example 5

In this example, your Oracle TopLink project contains:

- META-INF/orm.xml – Defines Entity **A** with mappings **b** and **c**
- META-INF/jpa-mapping-file.xml – Defines Entity **A** with mappings **a** and **d**
- META-INF/extensions/eclipse-mapping-file.xml – Defines defines Entity **A** with mappings **c** and **d**

Results in an exception, due to conflicting specifications for mapping **c** or **d** (which ever is processed first).