# Jakarta Persistence API (JPA) Extensions Reference for EclipseLink

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Preface

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 EclipseLink with Java Persistence Architecture (JPA). This document does not include details about related common tasks, but focuses on EclipseLink functionality.

Developers should be familiar with the concepts and programming practices of

- Java SE and Jakarta EE.
- Eclipse IDE ([http://www.eclipse.org](http://www.eclipse.org))


Access to Oracle Support


Related Documents

For more information, see the following documents:

- *Understanding EclipseLink*
- *Solutions Guide for EclipseLink*
- *Oracle Fusion Middleware Java API Reference for EclipseLink*

Conventions

The following text conventions are used in this document:
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<th><strong>Convention</strong></th>
<th><strong>Meaning</strong></th>
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<tbody>
<tr>
<td><strong>boldface</strong></td>
<td>Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.</td>
</tr>
<tr>
<td><strong>italic</strong></td>
<td>Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.</td>
</tr>
<tr>
<td><strong>monospace</strong></td>
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Chapter 1. Introduction

This chapter introduces EclipseLink. EclipseLink 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 EclipseLink
- About This Documentation
- Other Resources

1.1. About EclipseLink

EclipseLink is suitable for use with a wide range of Java Enterprise Edition (Jakarta EE) and Java application architectures. Use EclipseLink 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 (Jakarta 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 EclipseLink 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 Jakarta EE Connector architecture (JCA) adapter and any supported EIS record type, including indexed, mapped, or XML.

EclipseLink includes support for EJB 3.0 and the Jakarta Persistence API (JPA) in Jakarta 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 Jakarta EE (OC4J)
• Various other web containers, such as Apache Tomcat, Eclipse Gemini, IBM WebSphere CE, and SpringSource tcServer

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

The EclipseLink 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 EclipseLink-specific extensions to those standards.

1.2. About This Documentation

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 EclipseLink 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:

• Java Persistence specification for complete information about JPA `http://jcp.org/en/jsr/detail?id=317`

• 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 `http://java.sun.com/xml/ns/persistence/persistence_2_0.xsd`
  ◦ The schema for the persistence object/relational mapping file `http://java.sun.com/xml/ns/persistence/orm_2_0.xsd`
  ◦ The schema for the native EclipseLink mapping file `http://www.eclipse.org/eclipselink/xsds/eclipselink ORM_2_0.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 EclipseLink-specific information, it does contain useful information to help you implement JPA 2.0 applications. http://download.oracle.com/javaee/5/tutorial/doc/bnbpy.html

• Java Persistence, a wiki-based "open book" about JPA 2.0 `http://en.wikibooks.org/wiki/Java_Persistence`
Chapter 2. Annotation Extensions Reference

This chapter includes information on the EclipseLink extensions to the Jakarta Persistence API (JPA) annotations. EclipseLink supports the Jakarta 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

2.1. 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

EclipseLink includes the following annotation extensions for mappings:

- @PrivateOwned
- @JoinFetch
- @Mutable
- @Property
- @Transformation
- @ReadTransformer
- @WriteTransformer
- @WriteTransformers
**Entity Annotations**

EclipseLink includes the following annotation extensions for entities:

- `@AdditionalCriteria`
- `@ExcludeDefaultMappings`
- `@Multitenant`
- `@OptimisticLocking`
- `@ReadOnly`
- `@SerializedConverter`
- `@SerializedConverters`
- `@SerializedObject`
- `@TenantDiscriminatorColumns`
- `@TenantDiscriminatorColumn`
- `@TenantTableDiscriminator`
- `@Struct`

**Converter Annotations**

EclipseLink includes the following annotation extensions for converting data:

- `@Convert`
- `@Converter`
- `@Converters`
- `@TypeConverter`
- `@TypeConverters`
- `@ObjectTypeConverter`
- `@ObjectTypeConverters`
- `@StructConverter`
- `@StructConverters`

**Caching Annotations**

EclipseLink includes the following annotation extensions for caching:

- `@Cache`
Customization and Optimization Annotations
EclipseLink includes the following annotation extensions for customization and optimization.

- @Customizer
- @ChangeTracking

Copy Policy Annotations
EclipseLink includes the following annotation extensions for copy policies:

- @CloneCopyPolicy
- @CopyPolicy
- @InstantiationCopyPolicy

Returning Policy Annotations
EclipseLink includes the following annotation extensions for returning policies:

- @ReturnInsert
- @ReturnUpdate

Stored Procedure and Function Annotations
EclipseLink includes the following annotation extensions for stored procedures and stored functions:

- @NamedPLSQLStoredFunctionQueries
- @NamedPLSQLStoredFunctionQuery
- @NamedPLSQLStoredProcedureQueries
- @NamedPLSQLStoredProcedureQuery
Partitioning Annotations

EclipseLink includes the following annotation extensions for using partitions:

- @HashPartitioning
- @Partitioned
- @Partitioning
- @PinnedPartitioning
- @RangePartition
- @RangePartitioning
- @ReplicationPartitioning
- @RoundRobinPartitioning
- @UnionPartitioning
- @ValuePartitioning

Non-relational (NoSQL) Annotations

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

- @Field
- @JoinField
2.2. 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
- @Property
- @QueryRedirectors
- @RangePartition
- @RangePartitioning
- @ReadOnly
- @ReadTransformer
- @ReplicationPartitioning
- @ReturnInsert
- @ReturnUpdate
- @RoundRobinPartitioning
- @SerializedConverter
- @SerializedConverters
- @SerializedObject
- @StoredProcedureParameter
- @Struct
- @StructConverter
- @StructConverters
- @Structure
- @TenantDiscriminatorColumns
- @TenantDiscriminatorColumn
- @TenantTableDiscriminator
- @TimeOfDay
- @Transformation
- @TypeConverter
- @TypeConverters
- @UuidGenerator
- @UuidGenerators
- @UnionPartitioning
- @ValuePartition
- @ValuePartitioning
- @VariableOneToOne
- @VirtualAccessMethods
- @WriteTransformer
- @WriteTransformers
2.3. @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

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>(Required) The JPQL fragment to use as the additional criteria</td>
<td></td>
</tr>
</tbody>
</table>

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.

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 2-1 Using @AdditionalCriteria Annotation

Define additional criteria on Employee, as follows:

```java
package model;

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

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

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

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

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

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

Uses for Additional Criteria

Uses for additional criteria include:

- Multitenancy
- Soft Delete
- Data History
- Temporal Filtering
- Shared Table

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.

In most cases, you use the @Multitenant annotation in multitenancy environments instead, as shown.
**Example 2-3 Multitenancy Example 1**

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

```java
@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:

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

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,

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

Or

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

### Soft Delete

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

```java
@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.

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

EclipseLink also provides specific history support, via `HistoryPolicy`. See Tracking Changes Using History Policy at [http://wiki.eclipse.org/EclipseLink/Examples/]
Temporal Filtering

The following example filters on a specific date:

```java
@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"

### 2.4. `@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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>databaseType</code></td>
<td>(Required) The name of the database array structure type</td>
<td></td>
</tr>
<tr>
<td><code>targetClass</code></td>
<td>(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</td>
<td>Parameterized type of the collection</td>
</tr>
</tbody>
</table>
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 2-5 Using @Array with Oracle VARRAY**

```java
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 shows how to use this annotation with an PostgreSQL Struct type.

**Example 2-6 Using @Array with PostgreSQL Struct**

```java
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:
2.5. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>size</td>
<td>Default size of the batch fetch, used only when BatchFetchType = IN to define the number of keys in each IN clause</td>
<td>256 or the query’s pageSize (for cursor queries)</td>
</tr>
<tr>
<td>BatchFetchType</td>
<td>(Optional) The type of batch fetch to use:</td>
<td>\textbf{JOIN}</td>
</tr>
<tr>
<td></td>
<td>• JOIN – The original query’s selection criteria is joined with the batch query</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• EXISTS – Uses an SQL EXISTS clause and a sub-select in the batch query instead of a JOIN</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• IN – Uses an SQL IN clause in the batch query, passing in the source object IDs.</td>
<td></td>
</tr>
</tbody>
</table>

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**

```java
@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**

```java
@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**

```java
@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 EclipseLink*
- *Solutions Guide for EclipseLink*

---

### 2.6. @Cache

Use [@Cache](https://docs.oracle.com/en/java/javase/11/docs/api/java.xml.bind/JAXB_2.2.1/jaxb-api.html@Cache) (in place of the JPA [@Cachable](https://docs.oracle.com/en/java/javase/11/docs/api/java.xml.bind/JAXB_2.2.1/jaxb-api.html@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

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
</table>

[For more information, see "@JoinFetch"](https://docs.oracle.com/en/java/javase/11/docs/api/java.xml.bind/JAXB_2.2.1/jaxb-api.html@JoinFetch)

[For more information, see *Understanding EclipseLink*](https://docs.oracle.com/en/java/javase/11/docs/api/java.xml.bind/JAXB_2.2.1/jaxb-api.htmlUnderstanding_EclipseLink)

[For more information, see *Solutions Guide for EclipseLink*](https://docs.oracle.com/en/java/javase/11/docs/api/java.xml.bind/JAXB_2.2.1/jaxb-api.htmlSolutions_Guide_for_EclipseLink)
<table>
<thead>
<tr>
<th><strong>type</strong></th>
<th>(Optional) Set this attribute to the type (org.eclipse.persistence.annotations.CacheType enumerated type) of the cache that you will be using:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• <strong>FULL</strong></td>
<td></td>
</tr>
<tr>
<td>• <strong>WEAK</strong></td>
<td></td>
</tr>
<tr>
<td>• <strong>SOFT</strong></td>
<td></td>
</tr>
<tr>
<td>• <strong>SOFT_WEAK</strong></td>
<td></td>
</tr>
<tr>
<td>• <strong>HARD_WEAK</strong></td>
<td></td>
</tr>
<tr>
<td>• <strong>CACHE</strong> (not recommended)</td>
<td></td>
</tr>
<tr>
<td>• <strong>NONE</strong> (not recommended, use <code>isolation=ISOLATED</code> instead)</td>
<td></td>
</tr>
<tr>
<td>You can override this attribute with these persistence unit properties:</td>
<td></td>
</tr>
<tr>
<td>• <code>eclipselink.cache.type.&lt;ENTITY&gt;</code></td>
<td></td>
</tr>
<tr>
<td>• <code>eclipselink.cache.type.default</code></td>
<td></td>
</tr>
</tbody>
</table>

<p>| <strong>size</strong> | (Optional) Set this attribute to an int value to define the size of cache to use (number of objects). | 100 |</p>
<table>
<thead>
<tr>
<th><strong>isolation</strong></th>
<th>(Optional) The caching level of the Entity:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• <strong>shared</strong> – Entity instances will be cached within the EntityManagerFactory/ServerSession level</td>
</tr>
<tr>
<td></td>
<td>• <strong>isolated</strong> – The Entity and its data is not stored in the shared cache, but is isolated to the Persistence Context/UnitOfWork or IsolatedClientSession</td>
</tr>
<tr>
<td></td>
<td>• <strong>protected</strong> – Entity state information will be cached in the shared cache, but Entity instances will not be shared</td>
</tr>
<tr>
<td><strong>expiry</strong></td>
<td>(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.</td>
</tr>
<tr>
<td><strong>expiryTimeOfDay</strong></td>
<td>(Optional) Specific time of day (org.eclipse.persistence.annotations.TimeOfDay) when the cached instance will expire. Queries executed against the cache after this will be forced back to the database for a refreshed copy.</td>
</tr>
<tr>
<td><strong>alwaysRefresh</strong></td>
<td>(Optional) Set to a boolean value of true to force all queries that go to the database to always refresh the cache</td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>refreshOnlyIfNewer</td>
<td>(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)</td>
</tr>
<tr>
<td>Note</td>
<td>• This option only applies if one of the other refreshing options, such as <code>alwaysRefresh</code>, is already enabled.</td>
</tr>
<tr>
<td></td>
<td>• A version field is necessary to apply this feature.</td>
</tr>
<tr>
<td>disableHits</td>
<td>(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.</td>
</tr>
</tbody>
</table>
**coordinationType**  
(Optional) Set this attribute to the cache coordination mode (org.eclipse.persistence.annotations.CacheCoordinationType enumerated type).

- **SEND_OBJECT_CHANGES** – Sends a list of changed objects, including data about the changes. This data is merged into the receiving cache.
- **INVALIDATE_CHANGED_OBJECTS** – 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).
- **SEND_NEW_OBJECTS_WITH_CHANGES** – Same as **SEND_OBJECT_CHANGES** excepts it also includes any newly-created objects from the transaction
- **NONE** – Does not cache coordination

You must also configure cache coordination in your persistence unit properties. See "Caching".

**databaseChangeNotificationType**  
(Optional) The database change notification mode:

- **INVALIDATE** – Invalidates the EclipseLink cache when a database change event is received for an object.
- **NONE** – No database change events will be processed. The database event listener must also be configured for the persistence unit/session.

**Usage**
Use the `@Cache` annotation instead of the JPA `@Cachable` 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 EclipseLink 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:


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 2-10 Using @Cache Annotation*

```java
...
@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 shows how to use this annotation in the eclipselink-orm.xml file.

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

```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>
```

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

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

```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>
```
For more information, see:

- "@ExistenceChecking"
- "@TimeOfDay"
- "@CacheInterceptor"
- "Understanding Caching" in the *Understanding EclipseLink*
- "Object Caching" in *Solutions Guide for EclipseLink*

## 2.7. @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

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

### 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 2-13 Using `@CacheIndex` Annotation**

```java
@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 shows an example of using the `<cache-index>` XML element in the `eclipselink-orm.xml` file.

**Example 2-14 Using `<cache-index>` XML**

```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>
        <attributes>
            <id name="id"/>
            <basic name="ssn">
                <cache-index/>
            </basic>
        </attributes>
    </entity>
</entity-mappings>
```
Example 2-15 shows an example query using a cache index.

**Example 2-15 Caching an Index Query**

```java
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 EclipseLink*

### 2.8. @CacheIndexes

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

**Annotation Elements**

*Table 2-6* describes this annotation's elements.

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>CacheIndex[]</code></td>
<td>An array of cache indexes</td>
<td></td>
</tr>
</tbody>
</table>

**Examples**
See "@CacheIndex" for examples of using the @CacheIndexes annotation.

See Also

For more information, see:

- "@CacheIndex"
- "About Cache Indexes" in Understanding EclipseLink

### 2.9. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>The class to be used to intercept EclipseLink's cache access</td>
<td>+</td>
</tr>
</tbody>
</table>

**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 2-16 Using @CacheInterceptor Annotation**

In this example, the Employee class intercepts all EclipseLink 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 shows an example of using the `<cache-interceptor>` XML element in the `eclipselink-orm.xml` file.

**Example 2-17 Using `<cache-interceptor>` XML**

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

See Also

For more information, see:

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

### 2.10. `@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

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

@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 CascadeType.

Examples

Example 2-18 shows the cascading deletion of the Employee secondary table and all of its owned relationships.

Example 2-18 Using @CascadeOnDelete Annotation

```java
@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;
    ...
}
```

In the eclipselink-orm.xml descriptor file, specify cascade on delete as shown in Example 2-19

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

```xml
...
<cascade-on-delete>true</cascade-on-delete>
```
See Also

For more information, see:

- EclipseLink example: http://wiki.eclipse.org/EclipseLink/Examples/JPA/DeleteCascade
- "Enhancing Performance" in Solutions Guide for EclipseLink

2.11. @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

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>ChangeTrackingType</td>
<td>(Optional) The change tracking policy to use:</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>AUTO</td>
<td><strong>ATTRIBUTE</strong> – The object’s set method is weaved to raise change events to collect changes as they are made. Requires usage of weaving, and LAZY collection relationships, or eager weaving.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>OBJECT</strong> – The object’s set method is weaved to mark the object as <em>dirty</em>. Any dirty objects are compared against a copy of their original state for changes on commit or flush operations. Requires usage of weaving, and LAZY collection relationships, or eager weaving.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>DEFERRED</strong> – All managed objects are compared against a copy of their original state for changes on commit or flush. Does not require weaving.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>AUTO</strong> – Does not set any change tracking policy; change tracking will be determined at runtime.</td>
<td></td>
</tr>
</tbody>
</table>

**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.

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 2-20 Using @ChangeTracking Annotation

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

Example 2-21 shows how to use the <change-tracking> element in the eclipselink-orm.xml file.

Example 2-21 Using <change-tracking> XML

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

Example 2-22 shows how to configure change tracking in the persistence unit persistence.xml file or by importing a property map.

Example 2-22 Specifying Change Tracking in persistence.xml

Using persistence.xml file:

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

Using property map:

```java
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 EclipseLink
2.12. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>java.lang.Class</td>
<td>(Required) The name of the class extractor to apply to the entity's descriptor</td>
<td>+</td>
</tr>
</tbody>
</table>

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 2-23 Using @ClassExtractor Annotation

```java
@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;
```
Example 2-24 shows how to use the `<class-extractor>` element in the `eclipselink-orm.xml` file.

**Example 2-24 Using `<class-extractor>` XML**

```xml
<entity class="AirMilesAccount">
    <table name="MILES_ACCOUNT"/>
    <inheritance strategy="SINGLE_TABLE"/>
    <class-extractor class="AirMilesClassExtractor"/>
</entity>
```
2.13. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>method</code></td>
<td>(Optional) The method that will be used to create a clone for comparison with EclipseLink’s <code>DeferredChangeDetectionPolicy</code></td>
<td>+</td>
</tr>
<tr>
<td><code>workingCopyMethod</code></td>
<td>(Optional) The <code>workingCopyMethod</code> that will be used to create a clone that will be used when registering an object in an EclipseLink <code>UnitOfWork</code></td>
<td>+</td>
</tr>
</tbody>
</table>

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

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

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

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

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

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

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

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

**See Also**

For more information, see:

- *Understanding EclipseLink*
- "@CopyPolicy"
- "@InstantiationCopyPolicy"
2.14. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>The name of a target composite member persistence unit to which element table belongs (if differs from source composite member persistence unit)</td>
<td>+</td>
</tr>
</tbody>
</table>

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

```java
@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

```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>
```
2.15. @ConversionValue

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

Annotation Elements

Table 2-13 describes this annotation's elements.

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>dataValue</td>
<td>(Required) The database value</td>
<td>+</td>
</tr>
<tr>
<td>objectValue</td>
<td>(Required) The object value</td>
<td>+</td>
</tr>
</tbody>
</table>

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 2-29 Using @ConversionValue Annotation
Example 2-30 illustrates the same function using XML.

**Example 2-30 Using `<conversion-value>` XML**

```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 EclipseLink*

### 2.16. `@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

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>(Optional) The String name for your converter</td>
<td>none</td>
</tr>
</tbody>
</table>

#### 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

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

#### See Also

For more information, see:
2.17. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>The String name for your converter, must be unique across the persistence unit</td>
<td>none</td>
</tr>
<tr>
<td>converterClass</td>
<td>The class of your converter. This class must implement the org.eclipse.persistence.mappings.converters.Converter interface.</td>
<td>none</td>
</tr>
</tbody>
</table>

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 2-32 Using the @Converter Annotation

```java
@Entity
public class Employee implements Serializable{
    ...
    @Basic
    @Converter (name="genderConverter",
                converterClass=org.myorg.converters.GenderConverter.class)
    @Convert("genderConverter")
    public String getGender() {
```
Example 2-33 shows how to use the `<converter>` element in the `eclipselink-orm.xml` file.

**Example 2-33 Using `<converter>` XML**

```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 EclipseLink*

## 2.18. `@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*
2.19. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>java.lang.Class</code></td>
<td>(Required) The class of the copy policy. The class must implement <code>org.eclipse.persistence.descriptors.copying.CopyPolicy</code>.</td>
<td></td>
</tr>
</tbody>
</table>

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 2-35 Using `<copy-policy>` XML

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

See Also

For more information, see:

- "@CloneCopyPolicy"
- "@InstantiationCopyPolicy"
- Understanding EclipseLink

2.20. @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

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
</table>
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 EclipseLink native API. With @Customizer, you can access additional EclipseLink functionality and configurations.

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

A @Customizer is not inherited from its parent classes.

Examples

Example 2-36 show how to use the @Customizer annotation with the following DescriptorCustomer:

```java
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 2-36 Using @Customizer Annotation

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

Example 2-37 show how to use the <customizer> element in the eclipselink-orm.xml file.

Example 2-37 Using <customizer> XML

```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 EclipseLink

## 2.21. @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 Using @DeleteAll Annotation

```java
@Entity
public class Department {
    ...
    @OneToMany(mappedBy = "department")
    @PrivateOwned
    @DeleteAll
```
Example 2-38 shows how to use the `<delete-all>` element in the `eclipselink-orm.xml` file.

**Example 2-39 Using `<delete-all>` XML**

```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"

### 2.22. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>discriminator</td>
<td>(Required) The discriminator to be stored in the database</td>
<td></td>
</tr>
</tbody>
</table>
### @DiscriminatorClass

(Required) The class to be instantiated with the discriminator.

**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 EclipseLink

---

### 2.23. @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*

```java
@ExcludeDefaultMappings
@Entity
public class Dealer {
    @Id
    private long id;
```
See Also

For more information, see:

- "Building Blocks for a EclipseLink Project" in *Understanding EclipseLink*

---

### 2.24. @ExistenceChecking

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

On `merge()` operations, use `@ExistenceChecking` to specify if EclipseLink 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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ExistenceType</code></td>
<td>(Optional) Set the existence checking type:</td>
<td><code>CHECK_CACHE</code></td>
</tr>
<tr>
<td></td>
<td>• <code>ASSUME_EXISTENCE</code></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <code>ASSUME_NON_EXISTENCE</code></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <code>CHECK_CACHE</code></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <code>CHECK_DATABASE</code></td>
<td></td>
</tr>
</tbody>
</table>

**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_CACHE** – 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**

```java
@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 EclipseLink*

---

### 2.25. @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**

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>(Required) Name of the fetch attribute</td>
<td>+</td>
</tr>
</tbody>
</table>

**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**

```java
@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**

```xml
<fetch-group name="basic-fetch-group">
    <attribute name="id"/>
    <attribute name="name"/>
```
2.26. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>FetchAttribute[] attributes</td>
<td>(Required) The list of attributes to fetch</td>
<td>none</td>
</tr>
<tr>
<td>java.lang.String name</td>
<td>(Required) The fetch group name</td>
<td>none</td>
</tr>
<tr>
<td>boolean load</td>
<td>(Optional) Indicates whether all relationship attributes specified in the fetch group should be loaded.</td>
<td>false</td>
</tr>
</tbody>
</table>

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

See Also

For more information, see:

- Understanding EclipseLink
- "@FetchGroup"
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 2-44 Using @FetchGroup Annotation**

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

*Example 2-45* shows how to use this feature in the `eclipselink-orm.xml` file.

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

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

You can also use a named fetch group with a query, as shown in *Example 2-46*.

**Example 2-46 Using a Named Fetch Group on a Query**
2.27. @FetchGroups

Use @FetchGroups to define a group of @FetchGroup.

Annotation Elements

Table 2-23 describes this annotation's elements.

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>FetchGroup</td>
<td>(Required) An array of fetch groups (@FetchGroup)</td>
<td>+</td>
</tr>
</tbody>
</table>

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:

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

Using `property` map:

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

See Also

For more information, see:

- "@FetchGroup"
- "@FetchAttribute"
- "weaving"

## 2.28. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>name</code></td>
<td>(Optional) The data type’s name of the field</td>
<td>+</td>
</tr>
</tbody>
</table>

### 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
2.29. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>(Required) The name of the partition policy. The name must be unique within the persistence unit.</td>
<td></td>
</tr>
<tr>
<td>partitionColumn</td>
<td>(Required) The database column or query parameter by which to partition queries</td>
<td></td>
</tr>
<tr>
<td>connectionPools</td>
<td>(Optional) List of connection pool names across which to partition</td>
<td>All defined pools in the ServerSession</td>
</tr>
<tr>
<td>unionUnpartitionableQueries</td>
<td>(Optional) Specify if queries that do not contain the partition hash should be sent to every database and union the result.</td>
<td>False</td>
</tr>
</tbody>
</table>

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:

- "@Partitioned"

---

### 2.30. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
</table>
**Usage**

Use the `@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`.

**Example 2-48 Using `@Index` Annotation**

```java
@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;
    ...
}
```

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 2-49 Using `<index>` XML**

```xml
<index name="EMP_NAME_INDEX" columns=""F_NAME","L_NAME"/>
```
2.31. @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

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index[]</td>
<td>An array of database indexes</td>
<td>+</td>
</tr>
</tbody>
</table>

Examples

See "@Index" for an example of using the @Index annotation.

See Also

For more information see:

- "@CopyPolicy"
- "@CloneCopyPolicy"
- "@Index"

2.32. @InstantiationCopyPolicy

Use @InstantiationCopyPolicy to set

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 EclipseLink 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 2-50 Using @InstantiationCopyPolicy Annotation

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

Example 2-51 shows how to use this extension in the eclipselink-orm.xml file.

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

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

For more information, see:

- "@CopyPolicy"
- "@CloneCopyPolicy"
- "weaving.internal"

### 2.33. @JoinFetch

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

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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
</table>
(Optional) Set this attribute to the `org.eclipse.persistence.annotations.JoinFetchType` enumerated type of the fetch that you will be using.

The following are the valid values for the `JoinFetchType`:

- **INNER**—This option provides the inner join fetching of the related object.

  Note: Inner joining does not allow for null or empty values.

- **OUTER**—This option provides the outer join fetching of the related object.

  Note: Outer joining allows for null or empty values.

### 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 2-52 Using `@JoinFetch` Annotation**

```java
@Entity
public class Employee implements Serializable {
    ...
    @OneToMany(cascade=ALL, mappedBy="owner")
    @JoinFetchType.INNER
}
Example 2-53 shows how to use this extension in the eclipselink-orm.xml file.

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

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

See Also

For more information, see:

- *Understanding EclipseLink*
- "Enhancing Performance" in *Solutions Guide for EclipseLink*
- "@BatchFetch"

2.34. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>(Optional) The name of the foreign key/ID reference field in the source record</td>
<td>+</td>
</tr>
</tbody>
</table>
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**

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

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

```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:

• "@JoinFields"
2.35. @JoinFields

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

Annotation Elements

Table 2-30 describes this annotation’s elements.

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>JoinField[]</code></td>
<td>An array of join fields</td>
<td>+</td>
</tr>
</tbody>
</table>

Examples

See "@JoinField" for an example of using the `@Index` annotation.

See Also

For more information, see:

- "@JoinField"

2.36. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
</table>
### 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 the actual object.
- **class-instance**: Will use a `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 2-56 Using `@MapKeyConvert` Annotation**

```java
@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 shows how to use the `<map-key-convert>` element in the `eclipselink-orm.xml` file.

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

```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"

## 2.37. `@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`

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

**Usage**

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

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

Three types of multitenancy are available:

- **Single-Table Multitenancy**
- **Table-Per-Tenant 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`.

**Example 2-58 Minimal @Multitenant Annotation**

```java
@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:

```java
Map<String, Object> emProperties = new HashMap<String, Object>();
```
Review "Single-Table Multitenancy", "Table-Per-Tenant Multitenancy", and "VPD Multitenancy" for more detailed examples.

### 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 subentities unless they specify their own multitenant metadata.

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**

```java
@Entity
@Table(name="EMP")
@Multitenant(SINGLE_TABLE)
@TenantDiscriminatorColumn(name = "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>`**

```xml
<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**

```java
@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>**

```xml
<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 EclipseLink 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 EclipseLink multitenant
Example 2-63 Example Using @Multitenant(VPD)

The following example shows

```java
@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>

```xml
<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 EclipseLink
- Multitenant Examples at http://wiki.eclipse.org/EclipseLink/Examples/JPA/Multitenant

2.38. @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

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>boolean value</td>
<td>(Optional) Specifies if the mapping is mutable.</td>
<td>true</td>
</tr>
</tbody>
</table>

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 2-65 Using `@Mutable` Annotation

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

    ...

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

    ...
}
```

Example 2-66 shows how to configure mutable mappings in the persistence unit `persistence.xml` file or by importing a `property` map.
Example 2-66 Specifying Mutable Mappings in persistence.xml

Using persistence.xml file:

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

Using property map:

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

See Also

For more information, see:

- "Mapping Annotations"

2.39. @NamedPLSQLStoredFunctionQueries

Use the @NamedPLSQLStoredFunctionQueries annotation to define multiple NamedPLSQLStoredFunctionQuery items.

Annotation Elements

Table 2-34 describes this annotation's elements.

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>NamedStoredFunctionQuery[]</td>
<td>(Required) An array of named stored procedure query</td>
<td></td>
</tr>
</tbody>
</table>

See Also

For more information, see:

- "@NamedPLSQLStoredFunctionQueries"
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 2-36 @NamedPLSQLStoredFunctionQuery Annotation Elements

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>functionName</td>
<td>(Required) The name of the stored function</td>
<td></td>
</tr>
<tr>
<td>name</td>
<td>(Required) The unique name that references this stored function query</td>
<td></td>
</tr>
<tr>
<td>returnParameter</td>
<td>(Required) The return value of the stored function</td>
<td></td>
</tr>
<tr>
<td>hints</td>
<td>(Optional) Query hints</td>
<td></td>
</tr>
<tr>
<td>parameters</td>
<td>(Optional) The parameters for the stored function</td>
<td></td>
</tr>
<tr>
<td>resultSetMapping</td>
<td>(Optional) The name of the SQLResultMapping</td>
<td></td>
</tr>
</tbody>
</table>

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

```sql
@NamedPLSQLStoredFunctionQuery(
    name="getEmployee",
    functionName="EMP_PKG.GET_EMP",
    returnParameter=@PLSQLParameter(
        name="RESULT",
        databaseType="EMP_PKG.EMP_TABLE"
    ))
```
public class Employee { ...}

See Also

For more information, see:

• Oracle PL/SQL

2.41. @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

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>(Required) An array of named stored procedure query</td>
<td></td>
</tr>
</tbody>
</table>

Examples
Example 2-68 shows how to use this annotation.

Example 2-68 Using @NamedPLSQLStoredProcedureQueries Annotation

```java
@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 EclipseLink

2.42. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>procedureName</td>
<td>(Required) The name of the stored procedure</td>
<td></td>
</tr>
<tr>
<td>name</td>
<td>(Required) The unique name that references this stored procedure query</td>
<td></td>
</tr>
<tr>
<td>resultClass</td>
<td>(Optional) The class of the result</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------</td>
<td></td>
</tr>
<tr>
<td>hints</td>
<td>(Optional) Query hints</td>
<td></td>
</tr>
<tr>
<td>parameters</td>
<td>(Optional) The parameters for the stored procedure</td>
<td></td>
</tr>
<tr>
<td>resultSetMapping</td>
<td>(Optional) The name of the SQLResultMapping</td>
<td></td>
</tr>
</tbody>
</table>

**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**

```java
@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 EclipseLink

2.43. @NamedStoredFunctionQueries

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

Annotation Elements

Table 2-38 describes this annotation's elements.

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>NamedStoredFunctionQuery[]</td>
<td>(Required) An array of named stored procedure query</td>
<td>+</td>
</tr>
</tbody>
</table>

Examples

Example 2-70 shows how to use this annotation.

Example 2-70 Using `@NamedStoredFunctionQueries` Annotation

```java
@NamedStoredFunctionQueries{
    @NamedStoredFunctionQuery(
        name="StoredFunction_In",
        functionName="StoredFunction_In",
        parameters={
            @StoredProcedureParameter(direction=IN, name="P_IN",
            queryParameter="P_IN", type=Long.class)
        },
```
To define multiple named stored procedures in the `eclipselink-orm.xml` file, create a list of multiple `<named-stored-function_query>` elements.

- **See Also**

For more information, see:

- "@NamedStoredFunctionQuery"

### 2.44. @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

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>functionName</td>
<td>(Required) The name of the stored function</td>
<td></td>
</tr>
<tr>
<td>name</td>
<td>(Required) The unique name that references this stored function query</td>
<td></td>
</tr>
<tr>
<td>returnParameter</td>
<td>(Required) The return value of the stored function</td>
<td></td>
</tr>
</tbody>
</table>
callByIndex  (Optional) Specifies if the stored function should be called by **index** or by **name**.

- If by index, the parameters must be defined in the same order as the procedure on the database.
- If by name, you must use the database platform support naming procedure parameters.

false

hints  (Optional) Query hints

parameters  (Optional) The parameters for the stored function

resultSetMapping  (Optional) The name of the SQLResultMapping

Usage

You can specify [@NamedStoredFunctionQuery](https://example.com) on an Entity or MappedSuperclass.

Examples

Example 2-71 shows how to use this annotation.

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

```java
@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 shows how to use the `<named-stored-function-query>` element in the eclipselink-
Example 2-72 Using <named-stored-function-query> XML

```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"

2.45. @NamedStoredProcedureQueries

Use the @NamedStoredProcedureQueries annotation to define multiple NamedStoredProcedureQuery items.

Annotation Elements

Table 2-40 describes this annotation’s elements.

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>(Required) An array of named stored procedure query</td>
<td>+</td>
</tr>
</tbody>
</table>

Examples

Example 2-73 shows how to use this annotation.

Example 2-73 Using @NamedStoredProcedureQueries Annotation

```java
@Entity
@Table(name="EMPLOYEE")
@NamedStoredProcedureQueries({
  @NamedStoredProcedureQuery(
```
To define multiple named stored procedure queries in the `eclipselink-orm.xml` file, simply create a list of multiple `<named-stored-procedure_query>` elements.

* See Also*

For more information, see:

* "@NamedStoredProcedureQuery"
* "Stored Procedures" in *Understanding EclipseLink*

### 2.46. @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*
<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>(Required) Unique name that references this stored procedure query</td>
<td></td>
</tr>
<tr>
<td>procedureName</td>
<td>(Required) Name of the stored procedure</td>
<td></td>
</tr>
<tr>
<td>callByIndex</td>
<td>(Optional) Specifies if the stored procedure should be called by name.</td>
<td>false</td>
</tr>
<tr>
<td></td>
<td>• If <strong>true</strong>, the StoredProcedureParameters must be defined in the same</td>
<td></td>
</tr>
<tr>
<td></td>
<td>order as the procedure on the database.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• If <strong>false</strong>, the database platform must support naming procedure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>parameters</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Optional) An array of query hints</td>
<td></td>
</tr>
<tr>
<td>hints</td>
<td>(Optional) An array of parameters for the stored procedure</td>
<td></td>
</tr>
<tr>
<td>multipleResultSets</td>
<td>(Optional) Specifies if the stored procedure returns multiple result sets.</td>
<td>false</td>
</tr>
<tr>
<td></td>
<td>This applies only for databases that support multiple result sets from</td>
<td></td>
</tr>
<tr>
<td></td>
<td>stored procedures.</td>
<td></td>
</tr>
<tr>
<td>resultClass</td>
<td>(Optional) The class of the result</td>
<td>void.class</td>
</tr>
<tr>
<td>resultSetMapping</td>
<td>(Optional) Name of the SQLResultMapping</td>
<td></td>
</tr>
<tr>
<td>returnsResultSet</td>
<td>(Optional) Specifies if the stored procedure retainer a result set.</td>
<td>false</td>
</tr>
<tr>
<td></td>
<td>This applies only for databases that support result sets from</td>
<td></td>
</tr>
<tr>
<td></td>
<td>stored procedures.</td>
<td></td>
</tr>
</tbody>
</table>

**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 2-74 Using @NamedStoredProcedureQuery Annotation

```java
@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 shows how to use the <named-stored-procedure-query> element in the eclipselink-orm.xml file.

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

```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 EclipseLink

2.47. @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 2-76 Using @Noncacheable Annotation**

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

Example 2-77 shows using the <noncacheable> XML element in the eclipselink-orm.xml file.

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

```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"
    version="2.4">
```
See Also

For more information, see:

- "EclipseLink Caches" in Understanding EclipseLink
- "Scaling EclipseLink Applications in Clusters" in Solutions Guide for EclipseLink

2.48. @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

<p>| Annotation Element | Description | Default |</p>
<table>
<thead>
<tr>
<th>dataType</th>
<th>The name of the entities structure. The purpose of the dataType depends on the NoSQL platform used:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• For MongoDB, it is the collection name that the JSON documents are stored to.</td>
</tr>
<tr>
<td></td>
<td>• For Oracle NoSQL, it is the first part of the major key value.</td>
</tr>
<tr>
<td></td>
<td>• For XML files, it is the file name. and XML messaging, use XML.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>dataFormat</th>
<th>(Optional) The type structure (data format) in which the data is stored within the database:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• INDEXED – Maps a class to an array of values.</td>
</tr>
<tr>
<td></td>
<td>• MAPPED – Maps a class to a set of nested key/value pairs, a value can be an embedded map or list.</td>
</tr>
<tr>
<td></td>
<td>Use to map to key/value stores, JSON databases, and other structured data systems.</td>
</tr>
<tr>
<td></td>
<td>• XML – Maps a class to an XML document.</td>
</tr>
<tr>
<td></td>
<td>Use with XML data-stores, XML files, XML messaging systems, and other XML systems.</td>
</tr>
</tbody>
</table>

**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 2-78 Using @NoSql Annotation with XML

```java
d@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;
}
```
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 shows using @NoSql with a JSON data source.

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

```java
@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;
  @Embeddable
  @Field(name="deliveryAddress")
  private Address deliveryAddress
  @ElementCollection
  @Field(name="orderLines")
  private List<OrderLine> orderLines;
  @ManyToOne
  @JoinColumn(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;
}
This would produce the following JSON document:

```json
{
    "_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:

- Oracle Coherence Integration Guide for EclipseLink with Coherence Grid
- "Using Non-SQL Databases" in *Understanding EclipseLink*
- "Using NoSQL Databases" in *Understanding EclipseLink*
- "Using EclipseLink with Nonrelational Databases" in *Solutions Guide for EclipseLink*
- "nosql.property"
2.49. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>Set this attribute to the String name for your converter. Ensure that this name is unique across the persistence unit.</td>
<td>none</td>
</tr>
<tr>
<td>dataType</td>
<td>(Optional) Set this attribute to the type stored in the database.</td>
<td>void.class[^1]</td>
</tr>
<tr>
<td>objectType</td>
<td>(Optional) Set the value of this attribute to the type stored on the entity.</td>
<td>void.class[^1]</td>
</tr>
<tr>
<td>conversionValues</td>
<td>Set the value of this attribute to the array of conversion values (instances of ConversionValue: String objectValue and String dataValue).</td>
<td>none</td>
</tr>
<tr>
<td>defaultObjectValue</td>
<td>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.</td>
<td>Empty String</td>
</tr>
</tbody>
</table>

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"

2.50. @ObjectTypeConverters

Use @ObjectTypeConverters to define multiple ObjectTypeConverter items.

Annotation Elements
Table 2-44 describes this annotation’s elements.

**Table 2-44 @ObjectTypeConverters Annotation Elements**

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>@ObjectTypeConverter</td>
<td>(Required) An array of @ObjectTypeConverter</td>
<td></td>
</tr>
</tbody>
</table>

**Examples**

**Example 2-82** shows how to use this annotation.

**Example 2-82 Using @ObjectTypeConverters Annotation**

```java
@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.Gender.class,
        conversionValues={
            @ConversionValue(dataValue="F", objectValue="Female"),
            @ConversionValue(dataValue="M", objectValue="Male")
        }
    )
})
```

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

**See Also**

For more information, see:

- "@ObjectTypeConverter"

---

**2.51. @OptimisticLocking**

Use `@OptimisticLocking` to specify the type of optimistic locking EclipseLink should use when
Table 2-45 describes this annotation’s elements.

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>cascade</strong></td>
<td>(Optional) Specify where the optimistic locking policy should cascade lock. When changing <strong>private owned</strong> and <strong>delete orphan</strong> object, EclipseLink will update the version. This element is currently only supported with VERSION_COLUMN locking.</td>
<td>false</td>
</tr>
<tr>
<td><strong>selectedColumns</strong></td>
<td>(Optional) Specify a list of columns that will be optimistically locked. This element is required when <strong>type=SELECTED_COLUMNS</strong>.</td>
<td></td>
</tr>
</tbody>
</table>
type (Optional) The type of optimistic locking policy to use:

- **ALL_COLUMNS** – EclipseLink compares every field in the table with the `WHERE` clause, when performing and update or delete operation.
- **CHANGED_COLUMNS** – EclipseLink compares only the changed fields in the `WHERE` clause when performing an update.
- **SELECTED_COLUMNS** – EclipseLink compares the selected field in the `WHERE` clause when performing and update or delete operation on the `SelectedColumns`.
- **VERSION_COLUMN** – EclipseLink compares a single version number in the `WHERE` clause when performing an update.

**Usage**

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

**Examples**

**Example 2-83** shows how to use the `@OptimisticLocking` annotation for all columns

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

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

**Example 2-83** shows how to use the `<optimistic-locking>` element in the `eclipselink-orm.xml` file for a single column.
Example 2-84 Using `<optimistic-locking>` XML

```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 EclipseLink Applications in Clusters" in Solutions Guide for EclipseLink

2.52. `@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>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>(Required) The name of the <code>VARRAY</code> in the database</td>
<td>+</td>
</tr>
<tr>
<td>nestedType</td>
<td>(Required) The name of the database type that the <code>VARRAY</code> holds</td>
<td>VARCHAR_TYPE</td>
</tr>
<tr>
<td>javaType</td>
<td>(Optional) The Java Collection class to which the <code>VARRAY</code> is mapped</td>
<td>ArrayList</td>
</tr>
</tbody>
</table>

Examples

Example 2-85 shows how to use the `@OracleArray` annotation to define a `VARRAY` type.
Example 2-85 Using the @OracleArray Annotation

```java
@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"

2.53. @OracleArrays

Use the @OracleArrays annotation to define multiple VARRAY types.

Annotation Elements

Table 2-47 describes the annotation's elements.
<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>(Required) An array of Oracle VARRAY types</td>
<td></td>
</tr>
</tbody>
</table>

**Examples**

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

- See Also*

For more information, see:

- "[@OracleArray]"

---

### 2.54. @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*

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>(Required) The name of the <code>OBJECT</code> type in the database</td>
<td></td>
</tr>
<tr>
<td>javaType</td>
<td>(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</td>
<td>void</td>
</tr>
<tr>
<td>fields</td>
<td>(Required) Defines the parameter fields in the record type</td>
<td></td>
</tr>
</tbody>
</table>

**Examples**

*Example 2-86* shows how to use the `@OracleObject` annotation to define an Oracle `OBJECT` type.
Example 2-86 Using the `@OracleObject` Annotation

```java
@NamedPLSQLQuery(
    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:

- "@NamedPLSQLQuery"
- "@OracleObjects"

2.55. `@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

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>(Required) An array of Oracle OBJECT types</td>
<td></td>
</tr>
</tbody>
</table>

- + Examples*

See "@OracleObject" for an example of how to use this annotation.

See Also

For more information, see:

- "@OracleObject"

---

### 2.56. @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 \( \{0, 1, \ldots, n-1\} \).

**Annotation Elements**

Table 2-50 describes this annotation's elements.

### Table 2-50 @OrderCorrection Annotation Elements

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>(Optional) Specify a strategy to use if the order list read from the database is invalid:</td>
<td>READ_WRITE</td>
</tr>
<tr>
<td></td>
<td>• EXCEPTION</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• READ</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• READ_WRITE</td>
<td></td>
</tr>
</tbody>
</table>

**Usage**

When using @OrderCorrection, you can specify how EclipseLink should handle invalid list orders:

- EXCEPTION – When OrderCorrectionType=EXCEPTION, EclipseLink will not correct the list. Instead,
EclipseLink 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, EclipseLink will throw an exception.

- **READ** – When `OrderCorrectionType=READ`, EclipseLink 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, objectC, objectD}`

- **READ_WRITE** – When `OrderCorrectionType=READ_WRITE`, EclipseLink 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 database 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 EclipseLink 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 2-87 Using @OrderCorrection Annotation

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

Example 2-88 shows how to use this extension in the `eclipselink-orm.xml` file.

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

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

See Also

For more information see:

- “Entity Annotations”

2.57. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>(Required) Name of the partitioning policy</td>
<td></td>
</tr>
</tbody>
</table>

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 it is more efficient to partition the data access to specific nodes, to reduce cross node communication.

EclipseLink 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 to 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 EclipseLink 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**

```java
@Entity
@IdClass(EmployeePK.class)
@UnionPartitioning(
    name="UnionPartitioningAllNodes",
    replicateWrites=true)
@ValuePartitioning(
...
```
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;
    ...
}
2.58. @Partitioning

Use @Partitioning to configure a custom PartitioningPolicy.

Annotation Elements

Table 2-52 describes this annotation's elements.

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

Usage

Data partitioning allows for an application to scale its data across more than a single database machine. EclipseLink 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**

```java
@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"
2.59. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>connectionPool</td>
<td>Connection pool name to which to pin queries</td>
<td></td>
</tr>
<tr>
<td>name</td>
<td>Name of the partition policy. Names must be unique for the persistence unit.</td>
<td></td>
</tr>
</tbody>
</table>

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 "Using Partitioning" for an example of partitioning with EclipseLink.

See Also

For more information, see:

2.60. @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**

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>(Required) The query parameter name</td>
<td></td>
</tr>
</tbody>
</table>
| direction          | (Optional) The direction of the stored procedure parameter:  
  * IN – Input parameter  
  * IN_OUT – Input and output parameters  
  * OUT – Output parameter  
  * OUT_CURSOR – Output cursor | 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 |         |
### 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 "`@NamedPLSQL.StoredProcedureQuery`" for an example using the `@PLSQLParameter` annotation.

### See Also

For more information:

- "`@NamedPLSQL.StoredProcedureQuery`"
- "`@PLSQLRecord`"

### 2.61. `@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`

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>(Required) The name of the table in the database</td>
<td></td>
</tr>
<tr>
<td>compatibleType</td>
<td>(Required) Name of the database <code>OBJECTYPE</code> that mirror's the record's structure</td>
<td></td>
</tr>
<tr>
<td>fields</td>
<td>(Required) The fields in the record type</td>
<td></td>
</tr>
</tbody>
</table>
**Usage**

Oracle PLSQL RECORD types are structured database types. Although JDBC does not provide a mechanism for returning these types, EclipseLink 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**

```java
@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 EclipseLink*
- "@NamedPLSQL StoredProcedureQuery"
- "@PLSQLRecords"
2.62. @PLSQLRecords

Use @PLSQLRecords to define multiple PLSQLRecord.

Annotation Elements

Table 2-56 describes this annotation’s elements.

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>(Required) An array of named PLSQL records</td>
<td></td>
</tr>
</tbody>
</table>

Examples

See "@PLSQLRecord" for an example of how to use this annotation.

See Also

For more information, see:

- "Stored Procedures" in Understanding EclipseLink
- "@NamedPLSQLStoredProcedureQuery"
- "@PLSQLRecord"

2.63. @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

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>(Required) The name of the table type in the database</td>
<td></td>
</tr>
<tr>
<td>compatibilityType</td>
<td>(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.</td>
<td></td>
</tr>
<tr>
<td>nestedType</td>
<td>(Required) The type of table, e.g. TABLE of EMP_REC</td>
<td>VARCHAR_TYPE</td>
</tr>
<tr>
<td>javaType</td>
<td>(Optional) The Java Collection class to which the VARRAY is mapped. This class can be any valid Collection implementation.</td>
<td>ArrayList</td>
</tr>
<tr>
<td>isNestedTable</td>
<td>(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.</td>
<td>false</td>
</tr>
</tbody>
</table>

### Examples

**Example 2-93 Using the @PLSQLTable Annotation**

```java
@Named PLSQLStoredProcedureQuery(
    name="getEmployee",
    functionName="EMP_PKG.GET_EMP",
    parameters={
        @PLSQLParameter(
            name="EMP_OUT",
            direction=Direction.OUT,
            databaseType="EMP_TABLE"
        )
    }
)

@Embeddable
@Struct(name="EMP_TYPE", fields={"F_NAME", "L_NAME", "SALARY"})
@PLSQLTable(
```
public class Employee{

See Also

For more information, see:

- "@NamedPLSQLProceduredQuery"

2.64. @PLSQLTables

Use the @PLSQLTables annotation to define multiple PLSQL tables.

Annotation Elements

Table 2-58 describes this annotation’s elements.

Table 2-58 @PLSQLTables Annotation Elements

<table>
<thead>
<tr>
<th>Annotation</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>(Required) An array of named PLSQL tables</td>
<td>+</td>
</tr>
</tbody>
</table>

Examples

See "@PLSQLTable" for examples of how to use this annotation.

See Also

For more information, see:

- "@PLSQLTable"

2.65. @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**

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>cacheKeyType</td>
<td>(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 CachedId type. This element can take the following values:</td>
<td>AUTO</td>
</tr>
<tr>
<td></td>
<td>• <strong>ID_VALUE</strong> – This value can only be used for simple singleton IDs, such as long/int/String. This is the default for simple singleton IDs.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <strong>CACHE_ID</strong> – Optimized cache key type that allows composite and complex values. This is the default for composite or complex IDs.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <strong>AUTO</strong> – The cache key type is automatically configured depending on what is optimal for the class.</td>
<td></td>
</tr>
<tr>
<td>columns</td>
<td>(Optional) Directly specifies the primary key columns. This can be used instead of @Id if the primary key includes a non basic field, such as a foreign key, or a inheritance discriminator, embedded, or transformation mapped field.</td>
<td></td>
</tr>
</tbody>
</table>

Validation

(Optional) Configures what ID validation is done:

- **NULL** – EclipseLink interprets zero values as zero. This permits primary keys to use a value of zero.
- **ZERO** (default) – EclipseLink interprets zero as null.
- **NEGATIVE** – EclipseLink interprets negative values as null.
- **NONE** – EclipseLink does not validate the ID value.

By default 0 is not a valid ID value, this can be used to allow 0 ID values.

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 EclipseLink 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 2-94 Using @PrimaryKey Annotation**

```java
@PrimaryKey(validation=IdValidation.ZERO)
public class Employee implements Serializable, Cloneable {
   ...
}
```

Example 2-95 shows how to use the `<primary-key>` element in your `eclipselink-orm.xml` file.

**Example 2-95 Using @<primary-key> XML**
See Also

For more information, see:

- "id-validation"
- "Entity Annotations"

2.66. @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 EclipseLink will delete the target. This is equivalent of setting @CascadeonDelete.
- If you remove the reference to a target from a source, then EclipseLink 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.
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

```java
@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"

2.67. @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 EclipseLink, you can specify mapping properties if an application or extension needs to extend EclipseLink metadata.

Annotation Elements

Table 2-60 describes this annotation’s elements.
Table 2-60 @Properties Annotation Elements

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property</td>
<td>Array of Property elements</td>
<td>+</td>
</tr>
</tbody>
</table>

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, EclipseLink 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”

2.68. @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

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>(Required) Name of the property</td>
<td></td>
</tr>
</tbody>
</table>
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, EclipseLink 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"

---

2.69. `@QueryRedirectors`

Use `@QueryRedirectors` to intercept EclipseLink 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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>allQueries</td>
<td>This <strong>AllQueries</strong> Query Redirector will be applied to any executing object query that does not have a more precise redirector (like the <strong>ReadObjectQuery</strong> Redirector) or a redirector set directly on the query.</td>
<td>void.class</td>
</tr>
<tr>
<td>delete</td>
<td>A Default <strong>Delete</strong> Object Query Redirector will be applied to any executing <strong>DeleteObjectQuery</strong> or <strong>DeleteAllQuery</strong> that does not have a redirector set directly on the query.</td>
<td>void.class</td>
</tr>
<tr>
<td>insert</td>
<td>A Default <strong>Insert</strong> Query Redirector will be applied to any executing <strong>InsertObjectQuery</strong> that does not have a redirector set directly on the query.</td>
<td>void.class</td>
</tr>
<tr>
<td>readAll</td>
<td>A Default <strong>ReadAll</strong> Query Redirector will be applied to any executing <strong>ReadAllQuery</strong> that does not have a redirector set directly on the query. For users executing a JPA Query through the <strong>getResultList()</strong> API this is the redirector that will be invoked</td>
<td>void.class</td>
</tr>
<tr>
<td>readObject</td>
<td>A Default <strong>ReadObject</strong> Query Redirector will be applied to any executing <strong>ReadObjectQuery</strong> that does not have a redirector set directly on the query. For users executing a JPA Query through the <strong>getSingleResult()</strong> API or <strong>EntityManager.find()</strong>, this is the redirector that will be invoked</td>
<td>void.class</td>
</tr>
</tbody>
</table>
### Usage

Use `@QueryRedirectors` to extend the standard EclipseLink 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 EclipseLink Grid to redirect queries to the Coherence grid.

### Examples

Example 2-97 shows how to use this annotation.

#### Example 2-97 Using `@QueryRedirectors` Annotation

```java
@QueryRedirectors(
    allQueries=org.queryredirectors.AllQueriesForEntity.class)
@Entity
public class 
...
```

### See Also

For more information, see:
2.70. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>connectionPool</td>
<td>The connection pool to which to route queries for the specified range</td>
<td></td>
</tr>
<tr>
<td>startValue</td>
<td>The String representation of the range start value</td>
<td></td>
</tr>
<tr>
<td>endValue</td>
<td>The String representation of the range end value</td>
<td></td>
</tr>
</tbody>
</table>

Examples

See "Using @RangePartitioning" for an example of partitioning with EclipseLink.

See Also

For more information, see:

- "@Partitioned"

2.71. @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).
EclipseLink 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**

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>(Required) The name of the partition policy; must be unique for the persistence unit.</td>
<td></td>
</tr>
<tr>
<td>partitionColumn</td>
<td>(Required) The database column or query parameter to partition queries by. This is the <em>table column name</em>, 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.</td>
<td></td>
</tr>
<tr>
<td>partitions</td>
<td>(Required) List of connection pool names to partition across</td>
<td></td>
</tr>
<tr>
<td>partitionValueType</td>
<td>The type of the start and end values</td>
<td>String</td>
</tr>
<tr>
<td>unionunpartitionableQueries</td>
<td>Defines if queries that do not contain the partition field should be sent to every database and have the result unioned.</td>
<td>false</td>
</tr>
</tbody>
</table>

**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
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*

Example 2-98 shows how to use the `@RangePartitioning` annotation.

**Example 2-98 Using @RangePartitioning Annotation**

```java
@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 2-98 shows how to use the `<range-partitioning>` element in the `eclipselink-orm.xml` file.

**Example 2-99 Using <range-partitioning> XML**

```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"/>
        <partition connection-pool="node3" start-value="2000"/>
    </range-partitioning>
    <partitioned>RangePartitioningByPROJ_ID</partitioned>
</entity>
```

See Also
2.72. **@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 EclipseLink’s persistence context to save heap space (such as if you need to load a large dataset).

> You should not modify read-only entities. Doing so can corrupt the EclipseLink cache. To modify a read-only entity, it must cloned or serialized.

**Examples**

*Example 2-100* shows how to use this annotation.

*Example 2-100 Using `@ReadOnly` Annotation*

```java
@ReadOnly
@Entity
@Table(name = "TMP_READONLY")
public class ReadOnlyEntity {
    ...
}
```

*Example 2-101* shows how to use the `<read-only>` element in the `eclipselink-orm.xml` file.

*Example 2-101 Using `<read-only>` XML*
See Also

For more information, see:

- "Entity Annotations"

2.73. @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

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>method</td>
<td>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).</td>
<td></td>
</tr>
<tr>
<td>transformerClass</td>
<td>User-defined class that implements the org.eclipse.persistence.mappings.transformers.AttributeTransformer interface. The class will be instantiated, its buildAttributeValue will be used to create the value to be assigned to the attribute.</td>
<td>void.class</td>
</tr>
</tbody>
</table>

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 "Using @Transformation Annotation" for an example of how to use the `@WriteTransformer` annotation with a Transformation mapping.

**See Also**

For more information, see:

- "@Transformation".
- "@WriteTransformer"

---

### 2.74. @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

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>The name of the partition policy; must be unique for the persistence unit</td>
<td></td>
</tr>
<tr>
<td>connectionPools</td>
<td>List of connection pool names to replicate across</td>
<td>All defined pools in the <code>ServerSession</code></td>
</tr>
</tbody>
</table>

**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 "Using Partitioning" for an example of partitioning with EclipseLink.

**See Also**

For more information, see:

- "@Partitioned"

---

**2.75. @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.

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 @ReturnInsert Annotation Elements_

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>returnOnly</td>
<td>(Optional) If specified (true), the mapping field will be excluded from the INSERT clause during SQL generation.</td>
<td>false</td>
</tr>
</tbody>
</table>

**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, EclipseLink accepts the default value, false.

Example 2-102 Using @ReturnInsert Annotation

@ReturnInsert(returnOnly=true)
public String getFirstName() {
    return firstName;
}

Example 2-103 shows how to use the <return-insert> element in the eclipselink-orm.xml file.

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 EclipseLink

2.76. @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.

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**

```java
@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**

```xml
<basic name="firstName">
    <column name="F_NAME"/>
    <return-update/>
</basic>
```

See Also

For more information, see:

- `"@ReturnInsert"`
- Understanding EclipseLink

---

### 2.77. `@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

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>(Required) Name of the partition policy. Names must be unique for the persistence unit.</td>
<td></td>
</tr>
<tr>
<td>connectionPools</td>
<td>(Optional) List of connection pool names to load balance across</td>
<td>All defined pools in the ServerSession</td>
</tr>
<tr>
<td>replicateWrite</td>
<td>(Optional) This allows for a set of database to be written to and kept in sync, and have reads load-balanced across the databases.</td>
<td>false</td>
</tr>
</tbody>
</table>

### 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 EclipseLink.

### See Also

For more information, see:

- "@Partitioned"
2.78. @SerializedConverter

A @SerializedConverter is used to serialize an object’s value into a database binary, character, or XML field. Annotation allows a named converter that can be used in mappings.

A converter must be uniquely identified by name and can be defined at the class level and can be specified within an Entity, @MappedSuperclass and @Embeddable class.

The usage of a @SerializedConverter is always specified via the @Converter annotation and is supported on a Basic, or ElementCollection mapping.

Annotation Elements

Table 2-69 describes this annotation’s elements.

Table 2-69 @SerializedConverter Attribute Elements

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>(Required) Name this converter. The name should be unique across the whole persistence unit.</td>
<td></td>
</tr>
<tr>
<td>serializerClass</td>
<td>(Required) The serializer class to be used. This class must implement the org.eclipse.persistence.sessions.serializers.Serializer interface.</td>
<td>JavaSerializer.class</td>
</tr>
<tr>
<td>serializerPackage</td>
<td>(Optional) Allows a package name to be passed to the serializer. This is used by some serializers such as XML, JSON to initialize the JAXB context from the classes in the package or a jaxb.index file.</td>
<td></td>
</tr>
</tbody>
</table>

Usage

The usage of a @SerializedConverter is always specified via the @Converter annotation and is supported on a Basic, or ElementCollection mapping.

Examples

Example 2-106.1 demonstrates how to use the @SerializedConverter and apply it with @Converter annotation to the Entity field.
Example 2-106.1 Specifying a Serialized Object Policy

```java
@Entity
@SerializedConverter(name="json2", serializerClass=JSONSerializer.class,
  serializerPackage="org.eclipse.persistence.testing.models.jpa.lob")
public class Image implements Serializable {
...
  @org.eclipse.persistence.annotations.Convert("json2")
  public SerializableNonEntity getJson2() {
    return json2;
  }
...
}
```

See Also

For more information:

• @Converter

2.79. @SerializedConverters

A TypeConverters annotation allows the definition of multiple SerializedConverter.

Annotation Elements

Table 2-69.1 describes this annotation's elements.

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>SerializedConverters value</td>
<td>(Optional) One or more SerializedConverters annotations</td>
<td>none</td>
</tr>
</tbody>
</table>

Examples

Example 2-106.2 demonstrates how to use the @SerializedConverters annotation with field.

Example 2-106.2 Using @SerializedConverters annotation with field.

```java
@SerializedConverters({
  @SerializedConverter(name="xml2", serializerClass=XMLSerializer.class,
    serializerPackage="org.eclipse.persistence.testing.models.jpa.lob")
})
public SerializableNonEntity getXml2() {
  return xml2;
}
```
2.80. @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 2-69.1 describes this annotation’s elements.

Table 2-69.1 @SerializedObject Attribute Elements

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>column</td>
<td>(Optional) The column that holds the serialized object</td>
<td>BLOB column named SOP in the entity's main table.</td>
</tr>
<tr>
<td>value</td>
<td>(Required) The Class that implements the <code>SerializedObjectPolicy</code> interface</td>
<td></td>
</tr>
</tbody>
</table>

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).

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.

**Example 2-106 Specifying a Serialized Object Policy**

```java
@Entity
@SerializedObject(MySerializedPolicy.class);
public class Employee {...

@Entity
@SerializedObject(value = MySerializedObjectPolicy.class, column = @Column(name = "SERIALIZED"));
public class Address {...
```

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 2-107 Preventing the Use of a Serialized Object Policy in a Query**

```java
Query query = em.createQuery("SELECT e FROM Employee e")
  .setHint(QueryHints.SERIALIZED_OBJECT, "false");
```

**Example 2-108** demonstrates how to use a serialized object policy property to prevent searching for a serialized object..

**Example 2-108 Preventing Search Using a Serialized Object Policy Property**

```java
Map hints = new HashMap();
hints.put("eclipselink.serialized-object", "false");
Address address = em.find(Address.class, id, hints);
```

**See Also**

For more information:

- SerializedObjectPolicy
2.81. @StoredProcedureParameter

Use @StoredProcedureParameter within a NamedStoredProcedureQuery annotation.

Annotation Elements

Table 2-70 describes this annotation’s elements.

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>queryParameter</td>
<td>(Required) The query parameter name</td>
<td></td>
</tr>
<tr>
<td>direction</td>
<td>(Optional) The direction of the stored procedure parameter:</td>
<td>IN</td>
</tr>
<tr>
<td></td>
<td>• IN – Input parameter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• IN_OUT – Input and output parameters</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• OUT – Output parameter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• OUT_CURSOR – Output cursor</td>
<td></td>
</tr>
<tr>
<td>jdbcType</td>
<td>(Optional) JDBC type code. This depends on the type returned from the procedure.</td>
<td>-1</td>
</tr>
<tr>
<td>jdbcTypeName</td>
<td>(Optional) JDBC type name. This may be required for ARRAY or STRUCT types.</td>
<td></td>
</tr>
<tr>
<td>name</td>
<td>(Optional) Stored procedure parameter name</td>
<td></td>
</tr>
<tr>
<td>optional</td>
<td>(Optional) Specify if the parameter is required, or optional and defaulted by the procedure.</td>
<td>false</td>
</tr>
<tr>
<td>type</td>
<td>(Optional) Type of Java class desired back from the procedure. This depends on the type returned from the procedure.</td>
<td>void.class</td>
</tr>
</tbody>
</table>

Examples

See "@NamedStoredProcedureQuery" for an example using the @StoredProcedureParameter annotation.
2.82. @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 an object table.

Annotation Elements

Table 2-71 describes this annotation's elements.

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>(Required) The database name of the database structure type</td>
<td></td>
</tr>
<tr>
<td>fields</td>
<td>(Optional) Defines the order of the fields contained in the database structure type.</td>
<td></td>
</tr>
</tbody>
</table>

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 2-110 Using `<struct>` XML**

```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"

### 2.83. @StructConverter

Use `@StructConverter` to enable custom processing of `java.sql.Struct` types to process complex
database types, such as spatial datatypes.

EclipseLink includes the JGeometryConverter class to convert the Oracle JGeometry spatial datatype.

Unlike other converters, @StructConverter has its own interface.

**Annotation Elements**

Table 2-72 describes this annotation’s elements.

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>The String name for your converter. Ensure that this name is unique across the persistence unit.</td>
<td>none</td>
</tr>
<tr>
<td>converter</td>
<td>The converter class as a String. This class must implement the org.eclipse.persistence.platform.database.converters.StructConverter interface.</td>
<td>none</td>
</tr>
</tbody>
</table>

**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.

EclipseLink also includes additional converters, such as @ObjectTypeConverter and @TypeConverter.

**Examples**

Example 2-111 shows how to define the @StructConverter annotation.

**Example 2-111 Using @StructConverter Annotation**

```java
@StructConverter(
    name="JGeometryConverter",
    converter=JGeometryConverter.class.getName())
```

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.

See Also

For more information, see:

- "@StructConverters"

# 2.84. @StructConverters

Use @StructConverters to define multiple @StructConverter annotations.

Annotation Elements

Table 2-73 describes this annotation’s elements.

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>StructConverter[]</td>
<td>(Required) An array of struct converter</td>
<td></td>
</tr>
</tbody>
</table>

Examples

Example 2-112 shows how to use the @StructConverters annotation to define multiple @StructConverter elements.

**Example 2-112 Using @StructConverters Annotation**

```java
@StructConverters{
    @StructConverter(name="StructConverter1", converter="foo.StructConverter1"),
    @StructConverter(name="StructConverter2", converter="foo.StructConverter2")
}
```

Example 2-113 shows how to use the <struct-converters> element in the eclipselink-orm.xml file.
Example 2-113 Using `<struct-converters>` XML

```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"

2.85. `@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.

Example 2-114 Using `@Structure` Annotation

```java
@Structure
protected Address address;
```

You can also define structure mappings in the `eclipselink-orm.xml` file by using the `<structure>` element.

Example 2-115 Using `<structure>` XML
See Also

For more information, see:

- "@Struct"

2.86. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>java.lang.String columnDefinition</td>
<td>(Optional) The SQL fragment that is used when generating the DDL for the discriminator column</td>
<td>The provider-generated SQL to create a column of the specified discriminator type.</td>
</tr>
<tr>
<td>java.lang.String contextProperty</td>
<td>(Optional) The name of the context property to apply to the tenant discriminator column</td>
<td>eclipselink.tenant-id</td>
</tr>
<tr>
<td>DiscriminatorType</td>
<td>(Optional) The type of object/column to use as a class discriminator</td>
<td>jakarta.persistence.DiscriminatorType.STRING</td>
</tr>
<tr>
<td>int length</td>
<td>(Optional) The column length for String-based discriminator types</td>
<td>The column length for String-based discriminator types. Ignored for other discriminator types.</td>
</tr>
<tr>
<td>java.lang.String name</td>
<td>(Optional) The name of column to be used for the tenant discriminator</td>
<td>TENANT_ID</td>
</tr>
<tr>
<td>boolean primaryKey</td>
<td>Specifies that the tenant discriminator column is part of the primary key of the tables.</td>
<td>false</td>
</tr>
<tr>
<td>java.lang.String table</td>
<td>(Optional) The name of the table that contains the column</td>
<td>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.</td>
</tr>
</tbody>
</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.

- 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 `@jakarta.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*

Table 2-74 shows a number of uses of tenant discriminator columns.

**Example 2-116 Using @TenantDiscriminatorColumn Annotation**

```java
/** 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 shows the same mappings, using the `<tenant-discriminator-column>` XML element in the `eclipselink-orm.xml` file.

### Example 2-117 Using `<tenant-discriminator-column>` XML

```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>
```
See Also

- "@Multitenant"
- "@TenantDiscriminatorColumns"
- "@TenantTableDiscriminator"
- "Using Multitenancy" in Solutions Guide for EclipseLink
- Multitenant Examples at http://wiki.eclipse.org/EclipseLink/Examples/JPA/Multitenant

2.87. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>TenantDiscriminatorColumn value</td>
<td>(Optional) One or more TenantDiscriminatorColumn annotations</td>
<td>none</td>
</tr>
</tbody>
</table>

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
Examples

```java
@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"

## 2.88. `@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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>java.lang.String</td>
<td>(Optional) Name of the context property to apply to as tenant table discriminator</td>
<td>eclipselink.tenant-id</td>
</tr>
</tbody>
</table>
**TenantTableDiscriminator type** *(Optional) Type of tenant table discriminator to use with the tables of the persistence unit:*

- **SCHEMA**
- **SUFFIX**
- **PREFIX**

**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**

```java
@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**

```xml
<entity class="Employee">
    <multitenant type="TABLE_PER_TENANT">
        <tenant-table-discriminator type="SCHEMA" context-property="eclipselink.tenant-id"/>
    </multitenant>
</entity>
```
See Also

- "@Multitenant"
- "@TenantDiscriminatorColumn"
- "@TenantDiscriminatorColumns"
- "Using Multitenancy" in *Solutions Guide for EclispeLink*

## 2.89. @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

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>hour</td>
<td>(Optional) Hour of the day</td>
<td>0</td>
</tr>
<tr>
<td>millisecond</td>
<td>(Optional) Millisecond of the day</td>
<td>0</td>
</tr>
<tr>
<td>minute</td>
<td>(Optional) Minute of the day</td>
<td>0</td>
</tr>
<tr>
<td>second</td>
<td>(Optional) Second of the day</td>
<td>0</td>
</tr>
<tr>
<td>specified</td>
<td>For internal use – do not modify</td>
<td>true</td>
</tr>
</tbody>
</table>

### Examples

See "@Cache" for examples of using `@TimeOfDay`.

### See Also

For more information, see:
2.90. @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

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>fetch</td>
<td>(Optional) Defines whether the value of the field or property should be lazily loaded or must be eagerly fetched.</td>
<td>EAGER</td>
</tr>
<tr>
<td></td>
<td>- The <strong>EAGER</strong> strategy is a requirement on the persistence provider runtime that the value must be eagerly fetched.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- The <strong>LAZY</strong> strategy is a hint to the persistence provider runtime.</td>
<td></td>
</tr>
<tr>
<td>optional</td>
<td>(Optional) A hint as to whether the value of the field or property may be <code>null</code>. It is disregarded for primitive types, which are considered non-optional.</td>
<td>true</td>
</tr>
</tbody>
</table>

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 2-120 Using @Transformation Annotation**

```java
@Transformation(fetch=FetchType.LAZY, optional="true")
@ReadTransformer(class=package.MyNormalHoursTransformer.class)
@WriteTransformers({
    @WriteTransformer(column=@Column(name="START_TIME"),
        method="getStartDate"),
    @WriteTransformer(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 shows the same mapping, using the `<transformation>` XML element in the eclipselink-orm.xml file.

**Example 2-121 Using <transformation> XML**

```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:
2.91. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>(Required) The String name for your converter. This name must be unique across the persistence unit.</td>
<td>none</td>
</tr>
<tr>
<td>dataType</td>
<td>(Optional) The type stored in the database</td>
<td>void.class</td>
</tr>
<tr>
<td>objectType</td>
<td>(Optional) The type stored on the entity</td>
<td>void.class</td>
</tr>
</tbody>
</table>

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.

EclipseLink 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"

2.92. @TypeConverters

Use @TypeConverters to define multiple TypeConverter elements.

Annotation Elements

Table 2-80 describes this annotation’s elements.

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>TypeConverter[]</td>
<td>(Required) An array of type converter</td>
<td>+</td>
</tr>
</tbody>
</table>

Examples
Example 2-123 shows how to use this annotation.

**Example 2-123 Using @TypeConverters Annotation**

```java
@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 2-123 shows how to use the `<type-converters>` element in the `eclipselink-orm.xml` file.

**Example 2-124 Using `<type-converters>` XML**

```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>
```

See Also

For more information, see:

- `"@TypeConverter"
- `"@Convert"

---

**2.93. @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

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>name</strong></td>
<td>Name of the partition policy. Names must be unique for the persistence unit.</td>
<td></td>
</tr>
<tr>
<td><strong>connectionPools</strong></td>
<td>List of connection pool names to load balance across</td>
<td>Defaults to all defined pools in the ServerSession</td>
</tr>
<tr>
<td><strong>replicateWrite</strong></td>
<td>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.</td>
<td>false</td>
</tr>
</tbody>
</table>

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 "Using Partitioning" for an example of partitioning with EclipseLink.

See Also

For more information, see:

- "@Partitioned"
2.94. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>Name of the UUID generator, which must be unique for the persistence unit</td>
<td></td>
</tr>
</tbody>
</table>

Examples

Example 2-125 shows how to use this annotation.

Example 2-125 Using @UuidGenerator Annotation

```java
@Entity
@UuidGenerator(name="EMP_ID_GEN")
public class Employee {
    @Id
    @GeneratedValue(generator="EMP_ID_GEN")
    private String id;
}
```

You can also specify the SessionCustomizer and configure the named sequence in your eclipselink-orm.xml file, as shown in Example 2-126.

Example 2-126 Using <generated-value> XML

```xml
<id name="id">
```
You can also specify the named sequence at the persistence unit level (in the `persistence.xml` file) as shown in Example 2-127.

```
<property name="eclipselink.session.customizer" value="eclipselink.example.UUIDSequence"/>
```

### See Also

For more information, see:

- "Entity Annotations"

## 2.95. `@UuidGenerators`

Use `@UuidGenerators` to define multiple `@UuidGenerator`. It's container annotation for `@UuidGenerator`.

### Annotation Elements

Table 2-82.1 describes this annotation's elements.

**Table 2-82.1 `@UuidGenerators` Annotation Elements**

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>UuidGenerator</code> value</td>
<td>(Optional) One or more <code>UuidGenerator</code> annotations</td>
<td>none</td>
</tr>
</tbody>
</table>

### Examples

**Example 2-125.1** shows how to use this annotation.

**Example 2-125.1 Using `@UuidGenerator` Annotation**

```java
@Entity
@UuidGenerator({
    @UuidGenerator(name="EMP_ID_GEN")
})
```
2.96. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>connectionPool</td>
<td>The connection pool to which to route queries to for the value</td>
<td></td>
</tr>
<tr>
<td>value</td>
<td>The String representation of the value</td>
<td></td>
</tr>
</tbody>
</table>

Examples

Example 2-128 shows how to use the @ValuePartition and @ValuePartitioning annotations.

Example 2-128 Using @ValuePartition Annotation

```java
@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")
    })
```
Example 2-129 shows how to use the `<partition>` element in the `eclipselink-orm.xml` file.

**Example 2-129 Using `<partition>` XML**

```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"

### 2.97. `@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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>(Required) Name of the partition policy. Names must be unique for the persistence unit.</td>
<td></td>
</tr>
<tr>
<td>partitionColumn</td>
<td>(Required) The database column or query parameter to partition queries by</td>
<td></td>
</tr>
<tr>
<td></td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If a query does not contain the field the query will not be partitioned.</td>
<td></td>
</tr>
<tr>
<td>partitions</td>
<td>(Required) Store the value partitions. Each partition maps a value to a connectionPool.</td>
<td></td>
</tr>
<tr>
<td>defaultConnectionPool</td>
<td>(Optional) The default connection pool is used for any unmapped values</td>
<td></td>
</tr>
<tr>
<td>partitionValueType</td>
<td>(Optional) The type of the start and end values</td>
<td>String</td>
</tr>
<tr>
<td>unionUnpartitionableQueries</td>
<td>(Optional) Defines if queries that do not contain the partition field should be sent to every database and have the result unioned.</td>
<td>false</td>
</tr>
</tbody>
</table>

**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 "Using Partitioning" for an example of partitioning with EclipseLink.

See Also

For more information, see:

- "@Partitioned"

2.98. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>CascadeType</td>
<td>(Optional) Array of operations that must be cascaded to the target of the association</td>
<td></td>
</tr>
<tr>
<td><strong>DiscriminatorClasses</strong></td>
<td>(Optional) Array of discriminator types that can be used with this mapping</td>
<td>If none are specified, EclipseLink adds entities within the persistence unit that implement the target interface. If <code>DiscriminatorColumn</code> is <code>STRING</code>, EclipseLink uses <code>Entity.name()</code>. If <code>DiscriminatorColumn</code> is <code>CHAR</code>, EclipseLink uses the first letter of the entity class. If <code>DiscriminatorColumn</code> is <code>INTEGER</code>, EclipseLink uses the next integer after the highest integer explicitly stated.</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>DiscriminatorColumn</strong></td>
<td>(Optional) The discriminator column that contains the type identifiers</td>
<td><strong>DTYPE</strong></td>
</tr>
<tr>
<td><strong>FetchType</strong></td>
<td>(Optional) Specify how the value of the field or property should be loaded:</td>
<td><strong>Eager</strong></td>
</tr>
<tr>
<td></td>
<td>• <strong>Eager</strong>: Requires that the persistence provider runtime must eagerly fetch the value</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <strong>Lazy</strong>: Hints that the persistence provider should lazily load the value</td>
<td></td>
</tr>
<tr>
<td><strong>Optional</strong></td>
<td>(Optional) Specify if the association is optional.</td>
<td></td>
</tr>
<tr>
<td><strong>OrphanRemoval</strong></td>
<td>(Optional) Specify if interface class that is the target of this mapping.</td>
<td></td>
</tr>
<tr>
<td><strong>TargetInterface</strong></td>
<td>(Optional) The interface class that is the target of this mapping</td>
<td>If none is specified, EclipseLink will infer the interface class based on the type of object being referenced.</td>
</tr>
</tbody>
</table>

**Usage**

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

**Examples**

Example 2-130 shows how to use the `@VariableOneToOne` annotation.
Example 2-130 Using `@VariableOneToOne` Annotation

```java
@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 shows the same mapping using the `<variable-one-to-one>` XML element in the `eclipselink-orm.xml` file.

Example 2-131 Using `<variable-one-to-one>` XML

```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" referenced-column-name="C_ID"/>
    <private-owned/>
    <join-fetch>INNER</join-fetch>
</variable-one-to-one>
```

See Also

For more information, see:

- `"@DiscriminatorClass"
- `"@PrivateOwned"`
2.99. **@VirtualAccessMethods**

Use `@VirtualAccessMethods` to specify that a specific class contains virtual methods.

**Annotation Elements**

Table 2-87 describes this annotation's elements.

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>get</code></td>
<td>(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>.</td>
<td><code>get</code></td>
</tr>
<tr>
<td><code>set</code></td>
<td>(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>.</td>
<td><code>set</code></td>
</tr>
</tbody>
</table>

**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.

**Example 2-132 Using `@VirtualAccessMethods` Annotation**

```java
@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);
}

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 2-133 Using <access> and <access-methods> XML

```
<access>VIRTUAL</access><access-methods get-method="get" set-method="set"/>@Entity
```

See Also

For more information, see:

- "Making JPA Entities and JAXB Beans Extensible" in Solutions Guide for EclipseLink

### 2.100. @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>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>column</th>
<th>(Optional) The column into which the value should be written</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If a single <code>WriteTransformer</code> annotates an attribute, the attribute's name will be used as the column name.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>method</th>
<th>(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.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Note:</strong> 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></td>
</tr>
<tr>
<td></td>
<td>The method may require <code>@Transient</code> to avoid being mapped as a <code>Basic</code> by default.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>transformerClass</th>
<th>(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.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Note:</strong> To support DDL generation and returning policy, the method <code>buildFieldval</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></td>
</tr>
</tbody>
</table>

You must specify either `transformerClass` or `method`, but not both.
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 "Using @Transformation Annotation" for an example of how to use the `@WriteTransformer` annotation with a Transformation mapping.

**See Also**

For more information, see:

- "@WriteTransformers"
- "@Transformation".

### 2.101. @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.
### Annotation Element

<table>
<thead>
<tr>
<th>Annotation Element</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>WriteTransformer</td>
<td>An array of <code>WriteTransformer</code></td>
<td></td>
</tr>
</tbody>
</table>

### Usage

You cannot use `@WriteTransformer` for a read-only mapping.

### Examples

See "Using @Transformation Annotation" for an example of how to use the `@WriteTransformer` annotation with a Transformation mapping.

### See Also

For more information, see:

- "@WriteTransformer".
- "@Transformation".

[1] The default is inferred from the type of the persistence field or property.
Chapter 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 EclipseLink specific features.

This chapter includes the following sections:

- Special Operators
- EclipseLink Query Language

For more information on JQPL, see:


3.1. Special Operators

EclipseLink defines the following operators to perform database operations that would not be possible in standard JPQL:

- COLUMN
- FUNCTION
- OPERATOR
- SQL

3.2. EclipseLink Query Language

- CAST
- EXCEPT
- EXTRACT
- INTERSECT
- ON
3.3. 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))
```

3.4. 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**.

**Example 3-2 Using COLUMN EQL**
In Example 3-3, uses COLUMN EQL access a primitive column (ROWID).

Example 3-3 Using COLUMN with a Primitive Column

```sql
SELECT e FROM Employee e WHERE COLUMN('ROWID', e) = :id
```

See Also

For more information, see:

- "@AdditionalCriteria"

3.5. 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

```sql
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"
3.6. 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)
```

---

3.7. 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.

FUNCTION is database specific – it does not translate the function call in any way to support different databases as other JPQL functions do.

**Examples**

**Example 3-6** shows how to use this JPQL extension.

**Example 3-6 Using FUNCTION EQL**

```
SELECT p FROM Phone p WHERE FUNCTION('TO_NUMBER', e.areaCode) > 613
```
Example 3-7 shows how to use FUNCTION with Oracle Spatial queries.

**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"

### 3.8. 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”

3.9. ON

Use the **ON** clause to append additional conditions to a **JOIN** condition, such as for outer joins.

**Usage**

EclipseLink 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**

```sql
SELECT e FROM Employee e LEFT JOIN e.address ON a.city = :city
```

```sql
SELECT e FROM Employee e LEFT JOIN MailingAddress a ON e.address = a.address
```

**See Also**

For more information, see:


3.10. OPERATOR

Use **OPERATION** to call any EclipseLink operator.

**Usage**

EclipseLink supports many database functions using standard operator names that are translated to different databases. EclipseLink 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 EclipseLink 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
Examples

Example 3-10 shows how to use this JPQL extension.

Example 3-10 Using OPERATOR EQL

```sql
SELECT e FROM Employee e WHERE OPERATOR('ExtractXml', e.resume, '@years-experience') > 10
```

See Also

For more information, see:

- "FUNCTION"
3.11. 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 'îDr\.*'

See Also

For more information, see:


3.12. 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**

```sql
SELECT p FROM Phone p WHERE SQL('CAST(? AS CHAR(3))', e.areaCode) = '613'
```

```sql
SELECT SQL('EXTRACT(YEAR FROM ?)', e.startDate) AS year, COUNT(e) FROM Employee e GROUP BY year
```

```sql
SELECT e FROM Employee e ORDER BY SQL('? NULLS FIRST', e.startDate)
```

```sql
SELECT e FROM Employee e WHERE e.startDate = SQL('(SELECT SYSDATE FROM DUAL)')
```

**See Also**

For more information, see:


---

### 3.13. 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**

```sql
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:

3.14. 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**

```sql
SELECT e FROM Employee JOIN TREAT(e.projects AS LargeProject) p WHERE p.budget > 1000000
```

3.15. 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**

```sql
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"  
Chapter 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:

- `batch`
- `batch.size`
- `batch.type`
- `cache-usage`
- `cache-usage.indirection-policy`
- `cursor`
- `composite-unit.member`
- `cursor.initial-size`
- `cursor.page-size`
- `cursor.size.sql`
- `cursor.scrollable`
- `cursor.scrollable.result-set-type`
- `cursor.scrollable.result-set-concurrency`
- `exclusive-connection`
- `fetch-group`
- `fetch-group.attribute`
- `fetch-group.default`
- `fetch-group.load`
- `fetch-group.name`
- `flush`
- `history.as-of`
- `history.as-of.scn`
- `inheritance.outer-join`
- `inner-join-in-where-clause`
- `jdbc.batch-writing`
• jdbc.bind-parameters
• jdbc.allow-native-sql-query
• jdbc.allow-partial-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
• partitioning
• pessimistic-lock
• pessimistic.lock.timeout.unit
• prepare
• query.redirector
• query-results-cache
• query-results-cache.expiry
• query-results-cache.expiry-time-of-day
• query-results-cache.ignore-null
• query-results-cache.invalidate-on-change
• query-results-cache.randomize-expiry
• query-results-cache.size
• query-results-cache.type
• query-results-cache.validation
• query-return-name-value-pairs
• query-type
• read-only
• refresh
• refresh.cascade
• result-collection-type
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).

---

### 4.1. batch

Use `eclipselink.batch` to supply EclipseLink 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 EclipseLink 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.

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 4-1 Using batch in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.batch", "e.address");
```

**Example 4-2** shows how to use this hint with the `@QueryHint` annotation.

**Example 4-2 Using batch in a @QueryHint Annotation**

```java
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:

- "join-fetch"
- "batch.size"
- "batch.type"
- "Querying" in *Solutions Guide for EclipseLink*

## 4.2. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
</table>

*Table 4-1 Valid Values for batch.size*
The number of keys in each `IN` clause
Default: 256 or the query’s `pageSize` (for cursor queries)

**Examples**

**Example 4-3** shows how to use this hint in a JPA query.

**Example 4-3 Using batch.size in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.BATCH_SIZE", "3");
```

**Example 4-4** shows how to use this hint with the `@QueryHint` annotation.

**Example 4-4 Using batch.size in a @QueryHint Annotation**

```java
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"

---

### 4.3. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOIN</td>
<td>(Default) The original query's selection criteria is joined with the batch query.</td>
</tr>
<tr>
<td>EXISTS</td>
<td>Uses an SQL EXISTS and a sub-select in the batch query instead of a join.</td>
</tr>
<tr>
<td>IN</td>
<td>Uses an SQL IN clause in the batch query passing in the source object IDs.</td>
</tr>
</tbody>
</table>

**Examples**

*Example 4-5* shows how to use this hint in a JPA query.

### Example 4-5 Using batch.type in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.BATCH_TYPE", "EXISTS");
```

*Example 4-6* shows how to use this hint with the @QueryHint annotation.

### Example 4-6 Using batch.type in a @QueryHint Annotation

```java
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"

---

**4.4. cache-usage**

Use `eclipselink.cache-usage` to specify how the query should interact with the EclipseLink cache.

**Values**
Table 4-3 describes this query hint’s valid values.

**Table 4-3 Valid Values for org.eclipse.persistence.config.CacheUsage**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DoNotCheckCache</td>
<td>Always go to the database.</td>
</tr>
<tr>
<td>CheckCacheByExactPrimaryKey</td>
<td>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</td>
</tr>
<tr>
<td>CheckCacheByPrimaryKey</td>
<td>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.</td>
</tr>
<tr>
<td>CheckCacheThenDatabase</td>
<td>You can configure any read-object query to check the cache completely before you resort to accessing the database.</td>
</tr>
<tr>
<td>CheckCacheOnly</td>
<td>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.</td>
</tr>
<tr>
<td>ConformResultsInUnitOfWork</td>
<td>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.</td>
</tr>
<tr>
<td>UseEntityDefault</td>
<td>(Default) Use the cache configuration as specified by the EclipseLink descriptor API for this entity.</td>
</tr>
</tbody>
</table>

**Note:** 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.

**Usage**

EclipseLink JPA uses a shared cache assessed across the entire persistence unit. After completing an
operation in a particular persistence context, EclipseLink 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 Jakarta 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 4-7 Using cache-usage in a JPA Query**

```java
import org.eclipse.persistence.config.CacheUsage;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.CACHE_USAGE, CacheUsage.CheckCacheOnly);
```

Example 4-8 shows how to use this hint with the `@QueryHint` annotation.

**Example 4-8 Using cache-usage in a @QueryHint Annotation**

```java
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:

- "EclipseLink Caches" in *Understanding EclipseLink*
- "Querying" in *Solutions Guide for EclipseLink*
- "Enhancing Performance" in *Solutions Guide for EclipseLink*
- "cache-usage.indirection-policy"

4.5. 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conform</td>
<td>If conforming encounters an uninstantiated indirection/lazy object, it is assumed to conform.</td>
</tr>
<tr>
<td>Exception</td>
<td>(Default) If conforming encounters an uninstantiated indirection/lazy object an exception is thrown.</td>
</tr>
<tr>
<td>NotConform</td>
<td>If conforming encounters an uninstantiated indirection/lazy object it is assumed to not conform.</td>
</tr>
<tr>
<td>Trigger</td>
<td>If conforming encounters an uninstantiated indirection/lazy object it is triggered.</td>
</tr>
</tbody>
</table>

**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.

```java
query.setHint(QueryHints.INDIRECTION_POLICY, CacheUsageIndirectionPolicy.Trigger);
```

**Example 4-10** shows how to use this hint with the `@QueryHint` annotation.

```java
@QueryHint(name=QueryHints.INDIRECTION_POLICY,
value=CacheUsageIndirectionPolicy.Trigger)
```

**See Also**

For more information, see:

4.6. cursor

Use `eclipselink.cursor` to configure the query to return a `CursoredStream`.

Values

Table 4-5 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>+</td>
</tr>
<tr>
<td>false</td>
<td>(Default)</td>
</tr>
</tbody>
</table>

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()`.

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 4-11 Using cursor in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
```
Example 4-12 shows how to use this hint with the `@QueryHint` annotation.

**Example 4-12 Using cursor in a `@QueryHint` Annotation**

```java
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"

### 4.7. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>The name of the composite persistence unit.</td>
</tr>
</tbody>
</table>

**Examples**

Example 4-13 shows how to use this hint in a JPA query.

**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 shows how to use this hint with the @QueryHint annotation.

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");

4.8. 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integer or Strings that can be parsed to int values</td>
<td>The initial number of objects that are prebuilt for the stream before a next() is called</td>
</tr>
</tbody>
</table>

Examples

Example 4-15 shows how to use this hint in a JPA query.

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 shows how to use this hint with the @QueryHint annotation.
Example 4-16 Using cursor.initial-size in a @QueryHint Annotation

```java
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"

4.9. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integer or Strings that can be parsed to int values</td>
<td>The number of objects that are fetched from the stream on a <code>next()</code> call, if the buffer of objects is empty</td>
</tr>
</tbody>
</table>

Examples

*Example 4-17* shows how to use this hint in a JPA query.

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.CURSOR_PAGE_SIZE", "10");
```

*Example 4-18* shows how to use this hint with the @QueryHint annotation.
**Example 4-18 Using cursor.page-size in a @QueryHint Annotation**

```java
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"

---

### 4.10. cursor.size-sql

Configures the SQL string for the size query of a Cursor query. This is only required for cursor queries that use native SQL or procedures. The size query is only used if the size() is called on the Cursor. The SQL should perform a COUNT of the rows returned by the original query.

**Values**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>String</td>
<td>SQL which counts size of the cursor.</td>
</tr>
</tbody>
</table>

**Examples**

**Example 4-17 Using cursor.size-sql in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.CURSOR_SIZE", "select count(*) from EMPLOYEE");
```

**Example 4-18 Using cursor.size-sql in a @QueryHint Annotation**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
```
@QueryHint(name=QueryHints.CURSOR_SIZE, value="select count(*) from EMPLOYEE");

See Also

For more information, see:

- cursor

## 4.11. cursor.scrollable

Configures the query to return a ScrollableCursor. A cursor is a stream of the JDBC ResultSet. ScrollableCursor implements ListIterator, when the each next() will fetch the next from the JDBC ResultSet, and build the resulting Object or value. ScrollableCursor can scroll forwards and backwards and position into the ResultSet. A Cursor requires and will keep a live JDBC connection, close() must be called to free the Cursor’s resources. A Cursor can be accessed from a JPA Query through getSingleResult(), or from JpaQuery using getResultCursor(). Cursors are useful for large results sets, and if only some of the results are desired. MAX_ROWS and FIRST_RESULT can also be used instead of cursors to obtain a page of results.

### Values

Table 4-8 describes this query hint’s values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Return a ScrollableCursor.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Do not return a ScrollableCursor.</td>
</tr>
</tbody>
</table>

### Examples

Example 4-17 shows how to use this hint in a JPA query.

**Example 4-17 Using cursor.scrollable in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.SCROLLABLE_CURSOR, true);
```

Example 4-18 shows how to use this hint with the `@QueryHint` annotation.

**Example 4-18 Using cursor.scrollable in a @QueryHint Annotation**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
```
See Also

For more information, see:

- cursor

4.12. cursor.scrollable.result-set-type

This can be used on ScrollableCursor queries to set the JDBC ResultSet `org.eclipse.persistence.config.ResultSetType` scroll type.

Values

Table 4-8 describes this query hint’s values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Forward&quot;</td>
<td>The rows in a result set will be processed in a forward direction; first-to-last.</td>
</tr>
<tr>
<td>&quot;ForwardOnly&quot;</td>
<td>The type for a ResultSet object whose cursor may move only forward.</td>
</tr>
<tr>
<td>&quot;Unknown&quot;</td>
<td>The order in which rows in a result set will be processed is unknown.</td>
</tr>
<tr>
<td>&quot;Reverse&quot;</td>
<td>The rows in a result set will be processed in a reverse direction; last-to-first.</td>
</tr>
<tr>
<td>&quot;ScrollInsensitive&quot;</td>
<td>The type for a ResultSet object that is scrollable but generally not sensitive to changes made by others.</td>
</tr>
<tr>
<td>&quot;ScrollSensitive&quot;</td>
<td>(Default) The type for a ResultSet object that is scrollable and generally sensitive to changes made by others.</td>
</tr>
</tbody>
</table>

Examples

Example 4-17 shows how to use this hint in a JPA query.

Example 4-17 Using cursor.scrollable.result-set-type in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.RESULT_SET_TYPE, ResultSetType.Reverse);
```
Example 4-18 shows how to use this hint with the @QueryHint annotation.

**Example 4-18 Using cursor.scrollable.result-set-type in a @QueryHint Annotation**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.RESULT_SET_TYPE, value=ResultSetType.Reverse);
```

**See Also**

For more information, see:

- cursor
- cursor.scrollable

### 4.13. cursor.scrollable.result-set-concurrency

This can be used on ScrollableCursor queries to set the JDBC ResultSet concurrency org.eclipse.persistence.config.ResultSetConcurrency.

**Values**

Table 4-8 describes this query hint's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Updatable&quot;</td>
<td>(Default) The concurrency mode for a ResultSet object that may be updated.</td>
</tr>
<tr>
<td>&quot;ReadOnly&quot;</td>
<td>The concurrency mode for a ResultSet object that may NOT be updated.</td>
</tr>
</tbody>
</table>

**Examples**

Example 4-17 shows how to use this hint in a JPA query.

**Example 4-17 Using cursor.scrollable.result-set-concurrency in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.RESULT_SET_CONCURRENCY, ResultSetConcurrency.ReadOnly);
```

Example 4-18 shows how to use this hint with the @QueryHint annotation.

**Example 4-18 Using cursor.scrollable.result-set-concurrency in a @QueryHint Annotation**
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.RESULT_SET_CONCURRENCY,
value=ResultSetConcurrency.ReadOnly);

See Also

For more information, see:

- cursor
- cursor.scrollable
- cursor.scrollable.result-set-type

### 4.14. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>The query is executed through the exclusive connection.</td>
</tr>
<tr>
<td>false</td>
<td></td>
</tr>
</tbody>
</table>

#### 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 4-19 Using exclusive-connection in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.EXCLUSIVE_CONNECTION", "TRUE");
```

Example 4-20 shows how to use this hint with the `@QueryHint` annotation.

Example 4-20 Using exclusive-connection in a `@QueryHint` Annotation

```java
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"

4.15. fetch-group

Configures the query to use the fetch group object. This is an instance of `org.eclipse.persistence.queries.FetchGroup`. The query will only fetch the attributes defined in the fetch group, if any other attribute is accessed it will cause the object to be refreshed. To load all FetchGroup's relationship attributes set the FetchGroup's boolean flag "shouldLoad" to true. FetchGroups are only supported for queries returning objects (only a single alias can be the select clause). Weaving is required to allow usage of fetch groups.

Values

Table 4-8 describes this query hint's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object</td>
<td>Instance of <code>org.eclipse.persistence.queries.FetchGroup</code></td>
</tr>
</tbody>
</table>

Examples

Example 4-17 shows how to use this hint in a JPA query.
**Example 4-17 Using fetch-group in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
import org.eclipse.persistence.queries.FetchGroup;

FetchGroup fetchGroup = new FetchGroup();
fetchGroup.addAttribute("id");
query.setHint(QueryHints.FETCH_GROUP, fetchGroup);
```

**See Also**

For more information, see:

- `load-group`

## 4.16. fetch-group.attribute

Configures the query to use a dynamic fetch group that includes a list of attributes. Each attribute must be defined using a separate hint. The primary key and version are always included. The query will only fetch the attributes defined in the fetch group, if any other attribute is accessed it will cause the object to be refreshed. To load all FetchGroup's relationship attributes set FETCH_GROUP_LOAD to "true". FetchGroups are only supported for queries returning objects (only a single alias can be the select clause). Weaving is required to allow usage of fetch groups. Both local and nested attributes are supported.

**Values**

Table 4-8 describes this query hint's values.

### Table 4-8 Valid Values for fetch-group.attribute

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>String</td>
<td>Name of the fetch group, as defined on the ClassDescriptor.</td>
</tr>
</tbody>
</table>

**Examples**

**Example 4-17** shows how to use this hint in a JPA query.

**Example 4-17 Using fetch-group.attribute in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
import org.eclipse.persistence.queries.FetchGroup;
...
Query query = em.createQuery("SELECT e FROM Employee e WHERE e.id = :ID");
```
query.setParameter("ID", minimumEmployeeId(em));
query.setHint(QueryHints.FETCH_GROUP_ATTRIBUTE, "firstName");
query.setHint(QueryHints.FETCH_GROUP_ATTRIBUTE, "lastName");
...

See Also

For more information, see:

- load-group
- fetch-group
- fetch-group.load
- fetch-group.name

4.17. fetch-group.default

Configures the query not to use the default fetch group. The default fetch group is defined by all non-lazy Basic mappings. If set to FALSE all attributes will be fetched, including lazy Basics, this still excludes lazy relationships, they will fetch their foreign keys, but not their values. FetchGroups are only supported for queries returning objects (only a single alias can be the select clause). Weaving is required to allow usage of fetch groups.

Values

Table 4-8 describes this query hint's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;true&quot; (String)</td>
<td>(default) Use/fetch attributes defined in the fetch group.</td>
</tr>
<tr>
<td>&quot;false&quot; (String)</td>
<td>All attributes will be fetched, including lazy Basics.</td>
</tr>
</tbody>
</table>

Examples

Example 4-17 shows how to use this hint in a JPA query.

Example 4-17 Using fetch-group.default in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
...
FetchGroup employeeGroup = new FetchGroup();
employeeGroup.addAttribute("firstName");
```
employeeGroup.addAttribute("lastName");

TypedQuery<Employee> query = em.createQuery("SELECT e FROM Employee e WHERE e.gender = :GENDER", Employee.class);
query.setParameter("GENDER", Gender.Female);
query.setHint(QueryHints.FETCH_GROUP, employeeGroup);
query.setHint(QueryHints.FETCH_GROUP_DEFAULT, "false");
List<Employee> emps = query.getResultList();
...

See Also

For more information, see:

• load-group
• fetch-group
• fetch-group.attribute
• fetch-group.load
• fetch-group.name

4.18. fetch-group.load

Configures a dynamic fetch group to load (default) or not to load its attributes. Could be used with FETCH_ATTRIBUTES hint. To load all FetchGroup's relationship attributes set this hint to "true". Weaving is required to allow usage of fetch groups.

Values

Table 4-8 describes this query hint's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;true&quot; (String)</td>
<td>(default) Should load fetch group.</td>
</tr>
<tr>
<td>&quot;false&quot; (String)</td>
<td>Do not load fetch group.</td>
</tr>
</tbody>
</table>

Examples

Example 4-17 shows how to use this hint in a JPA query.

Example 4-17 Using fetch-group.load in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
...
```
FetchGroup employeeGroup = new FetchGroup();
employeeGroup.addAttribute("firstName");
employeeGroup.addAttribute("lastName");

TypedQuery<Employee> query = em.createQuery("SELECT e FROM Employee e WHERE e.gender = :GENDER", Employee.class);
query.setParameter("GENDER", Gender.Female);
query.setHint(QueryHints.FETCH_GROUP, employeeGroup);
query.setHint(QueryHints.FETCH_GROUP_LOAD, "true");
query.setHint(QueryHints.BATCH, "e.projects");
List<Employee> employees = query.getResultList();
...

See Also

For more information, see:

- load-group
- fetch-group
- fetch-group.attribute
- fetch-group.name

### 4.19. fetch-group.name

Configures the query to use a named fetch group defined for the result class. This is the name of the fetch group, as defined on the ClassDescriptor. Currently FetchGroups can only be defined on the ClassDescriptor using a DescriptorCustomizer. The query will only fetch the attributes defined in the fetch group, if any other attribute is accessed it will cause the object to be refreshed. To load all FetchGroup’s relationship attributes set the FetchGroup’s boolean flag "load" to true. FetchGroups are only supported for queries returning objects (only a single alias can be the select clause). Weaving is required to allow usage of fetch groups.

Values

*Table 4-8* describes this query hint’s values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>String</td>
<td>Name of the fetch group, as defined on the ClassDescriptor.</td>
</tr>
</tbody>
</table>

Examples

*Example 4-17* shows how to use this hint in a JPA query.
Example 4-17 Using fetch-group.name in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
import org.eclipse.persistence.queries.FetchGroup;
...
ClassDescriptor descriptor = getDescriptor("Employee");
FetchGroup fetchGroup = new FetchGroup("names");
fetchGroup.addAttribute("firstName");
fetchGroup.addAttribute("lastName");
descriptor.getFetchGroupManager().addFetchGroup(fetchGroup);
Query query = em.createQuery("SELECT e FROM Employee e WHERE e.id = :ID");
query.setParameter("ID", minimumEmployeeId(em));
query.setHint(QueryHints.FETCH_GROUP_NAME, "names");
...
```

See Also

For more information, see:

- load-group
- fetch-group

4.20. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>The query triggers a flush of the persistence context before execution</td>
</tr>
<tr>
<td>false</td>
<td>(Default)</td>
</tr>
</tbody>
</table>

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 4-21 Using flush in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.FLUSH", "TRUE");
```

Example 4-22 shows how to use this hint with the @QueryHint annotation.

Example 4-22 Using flush in a @QueryHint Annotation

```java
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 Caches” in Understanding EclipseLink
- “Querying” in Solutions Guide for EclipseLink
- “cache-usage.indirection-policy”
- “cache-usage”
4.21. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timestamp</td>
<td>Timestamp, in the form: YYYY/MM/DD HH:MM:SS.n</td>
</tr>
</tbody>
</table>

Usage

Both the query execution and result will conform to the database as it existed based on the database SCN.

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 4-23 Using history.as-of in a JPA Query

```java
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 shows how to use this hint with the @QueryHint annotation.

Example 4-24 Using history.as-of in @QueryHint Annotation

```java
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:
4.22. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>Integer SCN value</td>
</tr>
</tbody>
</table>

**Usage**

This query hint requires Oracle Flashback support.

**Examples**

Example 4-25 shows how to use this hint in a JPA query.

**Example 4-25 Using history.as-of.scn in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.AS_OF_SCN", "3");
```

Example 4-26 shows how to use this hint with the `@QueryHint` annotation.

**Example 4-26 Using history.as-of.scn in @QueryHint Annotation**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
```
4.23. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Use outer-join.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Do not use outer-join; execute a separate query for each subclass.</td>
</tr>
</tbody>
</table>

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").

<table>
<thead>
<tr>
<th>Information</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>This is required for correct ordering, <code>firstResult</code>, <code>maxResult</code>, and cursors.</td>
<td></td>
</tr>
</tbody>
</table>

Examples

Example 4-27 shows how to use this hint in a JPA query.

Example 4-27 Using `inheritance.outer-join` in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
```
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.INHERITANCE_OUTER_JOIN", "TRUE");

Example 4-28 shows how to use this hint with the @QueryHint annotation.

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 EclipseLink
• "Enhancing Performance" in Solutions Guide for EclipseLink

4.24. inner-join-in-where-clause

Changes the way that inner joins are printed in generated SQL for the database. With a value of true, inner joins are printed in the WHERE clause, if false, inner joins are printed in the FROM clause. This query hint should override global/session switch org.eclipse.persistence.internal.databaseaccess.DatabasePlatform#setPrintInnerJoinInWhereClause(boolean) Indicates whether the query printer/normalizer changes the way that inner joins are printed in generated SQL for the database. With a value of true, inner joins are printed in the WHERE clause, if false, inner joins are printed in the FROM clause. If value is set it overrides printInnerJoinInWhereClause persistence unit property. Default value null - value from printInnerJoinInWhereClause persistence unit property is used*/

Values

Table 4-14 describes this query hint’s valid values.

Table 4-14 Valid Values for org.eclipse.persistence.config.HintValues

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>null</td>
<td>(Default false)Take value from Persistence Property.</td>
</tr>
<tr>
<td>HintValues.FALSE or False (String)</td>
<td>Inner joins are printed in the FROM clause.</td>
</tr>
<tr>
<td>HintValues.TRUE or True (boolean)</td>
<td>Inner joins are not printed in the FROM clause.</td>
</tr>
</tbody>
</table>

Examples
Example 4-29 shows how to use this hint in a JPA query.

**Example 4-29 Using inner-join-in-where-clause in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
...
query.setHint(QueryHints.INNER_JOIN_IN_WHERE_CLAUSE, "false");
```

Example 4-30 shows how to use this hint with the `@QueryHint` annotation.

**Example 4-30 Using inner-join-in-where-clause in a @QueryHint Annotation**

```java
import org.eclipse.persistence.config.HintValues;
...
@NamedQuery(
    name="QueryOrder.findAllOrdersWithEmptyOrderLinesHintTrue",
    query="SELECT o FROM QueryOrder o WHERE o.queryOrderLines IS EMPTY"
    ,
    hints={
        @QueryHint(name=QueryHints.INNER_JOIN_IN_WHERE_CLAUSE, value="true")
    }
)
...
```

### 4.25. jdbc.batch-writing

Configures if this modify query can be batched through batch writing. Some types of queries cannot be batched, such as DDL on some databases. Disabling batch writing will also allow the row count to be returned.

#### Values

- **Table 4-14** describes this query hint’s valid values.

**Table 4-14 Valid Values for org.eclipse.persistence.config.HintValues**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>HintValues.PERSISTENCE_UNIT_DEFAULT</code> or</td>
<td>Don't use query batch writing.</td>
</tr>
<tr>
<td><code>HintValues.FALSE</code> or <code>false</code> (boolean)</td>
<td></td>
</tr>
<tr>
<td><code>HintValues.TRUE</code> or <code>true</code> (boolean)</td>
<td>(Default) Use query batch writing.</td>
</tr>
</tbody>
</table>

#### Examples

- **Example 4-29** shows how to use this hint in a JPA query.
Example 4-29 Using jdbc.batch-writing in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
...
query.setHint(QueryHints.BATCH_WRITING, false);
```

See Also

For more information, see:

- “jdbc-batch-writing” Persistence property

---

4.26. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRUE</td>
<td>Bind all parameters.</td>
</tr>
<tr>
<td>FALSE</td>
<td>Do not bind all parameters.</td>
</tr>
<tr>
<td>PERSISTENCE_UNIT_DEFAULT</td>
<td>(Default) Use the parameter binding setting made in your EclipseLink session’s database login, which is true by default.</td>
</tr>
</tbody>
</table>

Usage

By default, EclipseLink enables parameter binding and statement caching. This causes EclipseLink 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 4-29 Using bind-parameters in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.BIND_PARAMETERS, HintValues.TRUE);
```

Example 4-30 shows how to use this hint with the `@QueryHint` annotation.

### Example 4-30 Using bind-parameters in a @QueryHint Annotation

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.TargetDatabase;
@QueryHint(name=QueryHints.BIND_PARAMETERS, value=HintValues.TRUE);
```

Example 4-31 shows how to configure parameter binding in the persistence unit `persistence.xml` file.

### Example 4-31 Specifying Parameter Binding Persistence Unit Property

```xml
<property name="eclipselink.jdbc.bind-parameters" value="false"/>
```

Or by importing a `property` map:

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.JDBC_BIND_PARAMETERS, "true");
```

### See Also

For more information, see:

- "jdbc.cache-statements"
- "jdbc.batch-writing.size"
- "Parameterized SQL and Statement Caching" in Solutions Guide for EclipseLink
4.27. jdbc.allow-native-sql-query

The `eclipselink.jdbc.allow-native-sql-query` property specifies whether a single native SQL query should override a persistence unit level setting (`eclipselink.jdbc.allow-native-sql-queries`). The PU level flag is of particular importance within a multitenant to minimize the potential impact of revealing multitenant. However in some cases the application may need to allow certain native SQL queries through.

Values

Table 4-83 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Allow native SQL (and override the persistence unit flag).</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Do not allow native SQL (and respect the persistence unit flag if set).</td>
</tr>
</tbody>
</table>

Examples

Example 4-83 shows how to configure parameter binding in the persistence unit `persistence.xml` file.

**Example 4-83 Specifying Allow Native SQL Query Persistence Unit Property**

```xml
<property name="eclipselink.jdbc.allow-native-sql-queries" value="true"/>
```

Or by importing a `property` map:

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.ALLOW_NATIVE_SQL_QUERIES, "true");
```

Example 4-17 shows how to use this hint in a JPA query.

**Example 4-17 Using jdbc.allow-native-sql-query in a JPA Query**

```java
Query deleteQuery = em.createNamedQuery("DeleteAllMafiaFamilies");
deleteQuery.setHint(QueryHints.ALLOW_NATIVE_SQL_QUERY, true);
```

See Also

For more information, see:

- `jdbc.allow-native-sql-queries` Persistence property
4.28. jdbc.allow-partial-bind-parameters

Use `eclipselink.jdbc.allow-partial-bind-parameters` to specify if parameter binding decisions apply to individual expressions or the whole query.

Values

Table 4-83 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRUE</td>
<td>EclipseLink binds parameters per SQL function/expression.</td>
</tr>
<tr>
<td>FALSE</td>
<td>(Default) EclipseLink either binds all parameters or no parameters; depending on database support.</td>
</tr>
</tbody>
</table>

Usage

EclipseLink determines binding behavior based on the database's support for binding. If the database does not support binding, for a specific expression, EclipseLink will disable parameter binding for the whole query. Setting this property to 'true' will allow EclipseLink to bind per expression, instead of per query.

Examples

Example 4-83 shows how to configure parameter binding in the persistence unit `persistence.xml` file.

**Example 4-83 Specifying Allow Partial Parameter Binding Persistence Unit Property**

```
<property name="eclipselink.jdbc.allow-partial-bind-parameters" value="true"/>
```

Or by importing a `property` map:

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.JDBC_ALLOW_PARTIAL_PARAMETERS, "true");
```

See Also
For more information, see:

- "jdbc.bind-parameters"
- "jdbc.batch-writing.size"
- "Parameterized SQL and Statement Caching" in Solutions Guide for EclipseLink

4.29. jdbc.cache-statement

Specify if the query caches its JDBC statement.

Values

Table 4-15 describes this query hint’s values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>The query will cache its JDBC statement.</td>
</tr>
<tr>
<td>false</td>
<td>(Default)</td>
</tr>
</tbody>
</table>

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 enabled for the persistence unit.

 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 4-32 Using jdbc.cache-statement in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.CACHE_STATEMENT", "TRUE");
```
Example 4-33 shows how to use this hint in the @QueryHint annotation.

Example 4-33 Using jdbc.cache-statement in a @QueryHint Annotation

```java
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 EclipseLink

4.30. 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.

This property requires JDBC driver support.

Values

Table 4-16 describes this query hint’s valid values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>from 0 to Integer.MAX_VALUE</td>
<td>(Default = 0) As a String, depending on your JDBC driver. If 0, the JDBC driver default will be used.</td>
</tr>
</tbody>
</table>

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 4-34 Using `jdbc.fetch-size` in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.JDBC_FETCH_SIZE", "100");
```

**Example 4-35** shows how to use this hint with the `@QueryHint` annotation.

**Example 4-35 Using `jdbc.fetch-size` in a `@QueryHint` Annotation**

```java
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:

- “Querying” and “Enhancing Performance” in *Solutions Guide for EclipseLink*
- “EclipseLink Caches” in *Understanding EclipseLink*

---

**4.31. `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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integer</td>
<td>Integer or String value that can be parsed to an int value.</td>
</tr>
<tr>
<td></td>
<td>The position of the first result to retrieve.</td>
</tr>
</tbody>
</table>

Usage

This query hint is similar to JPA Query `setFirstResults()`, but can be set in metadata for NamedQueries.

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

```java
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 EclipseLink

---

4.32. 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`

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int or String (that can be parsed to Int values)</td>
<td>Configures the JDBC maximum number of rows.</td>
</tr>
</tbody>
</table>

#### 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 4-37 Using `jdbc.max-rows` in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.JDBC_MAX_ROWS", "100");
```

Example 4-38 shows how to use this hint with the `@QueryHint` annotation.

**Example 4-38 Using `jdbc.max-rows` in a `@QueryHint` Annotation**

```java
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:

- "Query Concepts" in *Understanding EclipseLink*

---

### 4.33. `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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Require native connection.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Do not require native connection.</td>
</tr>
</tbody>
</table>

#### 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 EclipseLink 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**

```java
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"

---

### 4.34. 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Character</td>
<td>Any valid, single character. Do not use &quot;&quot;.</td>
</tr>
</tbody>
</table>

Examples

Example 4-40 shows how to use this hint in a JPA query.

Example 4-40 Using jdbc.parameter-delimiter in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.PARAMETER_DELIMITER", ",");
```

Example 4-41 shows how to use this hint with the `@QueryHint` annotation.

Example 4-41 Using jdbc.parameter-delimiter in a @QueryHint Annotation

```java
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”

4.35. jdbc.timeout

Use `eclipselink.jdbc.timeout` to specify number of seconds EclipseLink will wait (time out) for a query result, before throwing a `DatabaseException`.

This property requires JDBC driver support.
Values

Table 4-21 describes this query hint’s valid values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>from 0 to <code>Integer.MAX_VALUE</code></td>
<td>(Default = 0) As a <code>String</code>, depending on your JDBC driver. If 0, EclipseLink will never time out waiting for a query.</td>
</tr>
</tbody>
</table>

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 4-42 Using `jdbc.timeout` in a JPA Query**

```java
import org.eclipse.persistence.config.CacheUsage;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.JDBC_TIMEOUT, "100");
```

Example 4-43 shows how to use this hint with the `@QueryHint` annotation.

**Example 4-43 Using `jdbc.timeout` in a `@QueryHint` Annotation**

```java
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 EclipseLink*
4.36. join-fetch

Use `eclipselink.join-fetch` hint to join attributes in a query.

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>
<thead>
<tr>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A relationship path expression</td>
</tr>
</tbody>
</table>

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.

```
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.join-fetch", "e.address");
```

Example 4-45 shows how to use this hint with the `@QueryHint` annotation.

```
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 Examples http://wiki.eclipse.org/EclipseLink/Examples/JPA/QueryOptimization
• "Optimizing Queries" in Understanding EclipseLink.
• "batch"
• "left-join-fetch"
• "Enhancing Performance" in Solutions Guide for EclipseLink

4.37. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>String</td>
<td>JPQL-style navigations to a relationship</td>
</tr>
</tbody>
</table>

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.

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 4-46 Using left-join-fetch in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.LEFT_FETCH", "STRING");
```

Example 4-47 shows how to use this hint with the `@QueryHint` annotation.

**Example 4-47 Using left-join-fetch in a @QueryHint Annotation**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.LEFT_FETCH, value="STRING");
```

See Also

- "batch"
- "join-fetch"
- "Enhancing Performance" in *Solutions Guide for EclipseLink*

4.38. **load-group**

Use `eclipselink.load-group` to configure 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**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>load-group</td>
<td>An instance of LoadGroup.</td>
</tr>
</tbody>
</table>
Usage

With load groups, EclipseLink 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 4-48 Using load-group in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.LOAD_GROUP", MyLoadGroup);
```

Example 4-49 shows how to use this hint with the @QueryHint annotation.

Example 4-49 Using load-group in a @QueryHint Annotation

```java
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 EclipseLink
- EclipseLink example: http://wiki.eclipse.org/EclipseLink/Examples/JPA/AttributeGroup
- "@FetchGroup"

4.39. 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"

4.40. maintain-cache

Use `eclipselink.maintain-cache` to control whether or not query results are cached in the session cache.

Values

Table 4-25 describes this query hint’s valid values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRUE</td>
<td>Maintain cache.</td>
</tr>
<tr>
<td>FALSE</td>
<td>(Default) Do not maintain cache.</td>
</tr>
</tbody>
</table>

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 4-50 Using maintain-cache in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
```
Example 4-51 shows how to use this hint with the `@QueryHint` annotation.

**Example 4-51 Using maintain-cache in a @QueryHint Annotation**

```java
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 EclipseLink Applications in Clusters" in *Solutions Guide for EclipseLink*
- "Enhancing Performance" in *Solutions Guide for EclipseLink*
- "EclipseLink Caches" in *Understanding EclipseLink*

## 4.41. partitioning

Used to provide a `PartitioningPolicy` instance or name to the query. This allows the query to execute on a specific, or on multiple connection pools.

**Values**

Table 4-32 describes this query hint's values.

### Table 4-32 Valid Values for partitioning

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>String</td>
<td><code>org.eclipse.persistence.descriptors.partitioning.PartitioningPolicy</code> instance or partitioning policy name.</td>
</tr>
</tbody>
</table>

**Examples**

**Example 4-65** shows how to use this hint in a JPA query.

**Example 4-65 Using partitioning in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.PARTITIONING,
```
Example 4-66 shows how to use this hint with the `@QueryHint` annotation.

**Example 4-66 Using partitioning in a @QueryHint Annotation**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.PARTITIONING,
value="org.acme.persistence.OrderPartitioningPolicy");
```

**Example Implementation of org.eclipse.persistence.descriptors.partitioning.PartitioningPolicy**

```java
... 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;
    }
}
```

### 4.42. pessimistic-lock

Use `eclipselink.pessimistic-lock` to specify if EclipseLink 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**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NoLock</td>
<td>(Default) Do not use pessimistic locking.</td>
</tr>
</tbody>
</table>
Lock

EclipseLink issues `SELECT … FOR UPDATE` statements.

LockNoWait

EclipseLink 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.

```java
import org.eclipse.persistence.config.PessimisticLock;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.PESSIMISTIC_LOCK, PessimisticLock.LockNoWait);
```

Example 4-53 shows how to use this hint with the `@QueryHint` annotation.

```java
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:

- "Scaling EclipseLink Applications in Clusters" in Solutions Guide for EclipseLink
- "Understanding Queries" in Understanding EclipseLink
- "Building Blocks of a EclipseLink Project" in Understanding EclipseLink
4.43. `pessimistic.lock.timeout.unit`

Configures the pessimistic lock timeout unit value. Allows users more refinement.

**Values**

Table 4-26 describes this query hint's valid values.

**Table 4-26 Valid Values for pessimistic.lock.timeout.unit**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MILLISECONDS</td>
<td>(Default) milliseconds.</td>
</tr>
<tr>
<td>SECONDS</td>
<td>seconds</td>
</tr>
<tr>
<td>MINUTES</td>
<td>minutes</td>
</tr>
</tbody>
</table>

Values must match with enum at `java.util.concurrent.TimeUnit`.

**Examples**

**Example 4-52** shows how to use this hint in a JPA query.

```java
import org.eclipse.persistence.config.PessimisticLock;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.PESSIMISTIC_LOCK_TIMEOUT_UNIT, "SECONDS");
```

**Example 4-53** shows how to use this hint with the `@QueryHint` annotation.

```java
import org.eclipse.persistence.config.PessimisticLock;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.PESSIMISTIC_LOCK_TIMEOUT_UNIT, "SECONDS");
```

**See Also**

For more information, see:

- "Scaling EclipseLink Applications in Clusters" in *Solutions Guide for EclipseLink*
- "Understanding Queries" in *Understanding EclipseLink*
- "Building Blocks of a EclipseLink Project" in *Understanding EclipseLink*
4.44. 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**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Generate the SQL <em>each time</em> EclipseLink executes the query.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Generate the SQL only the <em>first time</em> EclipseLink executes the query.</td>
</tr>
</tbody>
</table>

Usage

By default, EclipseLink 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 4-54 Using prepare in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.PREPARE", "TRUE");
```

Example 4-55 shows how to use this hint with the `@QueryHint` annotation.

**Example 4-55 Using prepare in a @QueryHint Annotation**

```java
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 EclipseLink*

## 4.45. `query.redirector`

Used to provide a QueryRedirector to the executing query. The redirector must implement the QueryRedirector interface. This can be used to perform advanced query operations in code, or dynamically customize the query in code before execution. The value should be the name of the QueryRedirector class, i.e. `org.acme.persistence.MyQueryRedirector`. The value could also be a Class, or an instance that implements the QueryRedirector interface. See `org.eclipse.persistence.queries.QueryRedirector`.

### Values

**Table 4-32** describes this query hint's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>String</td>
<td>Qualified class name which implements</td>
</tr>
<tr>
<td></td>
<td><code>org.eclipse.persistence.queries.QueryRedirector</code></td>
</tr>
</tbody>
</table>

### Examples

**Example 4-65** shows how to use this hint in a JPA query.

**Example 4-65 Using `query.redirector` in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.query.redirector",
"org.acme.persistence.MyQueryRedirector");
```

**Example 4-66** shows how to use this hint with the `@QueryHint` annotation.

**Example 4-66 Using `query.redirector` in a @QueryHint Annotation**

```java
import org.eclipse.persistence.config.HintValues;
```
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.QUERY_REDIRECTOR,
value="org.acme.persistence.MyQueryRedirector");

Example Implementation of org.eclipse.persistence.queries.QueryRedirector

... 
public class MyQueryRedirector implements QueryRedirector {
    @Override
    public Object invokeQuery(DatabaseQuery query, DataRecord dataRecord, Session session) {
        List<?> result = (List<?>)session.executeQuery(query);
        return result.toArray(new Object[result.size()]);
    }
}

4.46. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistence_Unit_Default</td>
<td>(Default)</td>
</tr>
<tr>
<td>True</td>
<td>Query results are cache.</td>
</tr>
<tr>
<td>False</td>
<td>Query results are not cached.</td>
</tr>
</tbody>
</table>

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 EclipseLink will skip the database and return the cached results.

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 4-56 Using query-results-cache in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.QUERY_RESULTS_CACHE", "TRUE");
```

Example 4-57 shows how to use this hint with the `@QueryHint` annotation.

**Example 4-57 Using query-results-cache in a @QueryHint Annotation**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.QUERY_RESULTS_CACHE, value="TRUE");
```

Example 4-58 shows how to use this hint in an `orm.xml` file.

**Example 4-58 Using query-results-cache in orm.xml File**

```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">
        <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 EclipseLink*
4.47. query-results-cache.expire

Use `eclipselink.query-results-cache.expire` 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Number of milliseconds, as <code>Integer</code> or <code>Strings</code> that can be parsed to <code>int</code> values.</td>
</tr>
</tbody>
</table>

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 4-59 Using query-results-cache.expire in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.QUERY_RESULTS_CACHE_EXPIRY", "100");
```

Example 4-60 shows how to use this hint with the `@QueryHint` annotation.

**Example 4-60 Using query-results-cache.expire in a @QueryHint Annotation**

```java
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"

### 4.48. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time, in HH:MM:SS format, as a <code>String</code></td>
<td></td>
</tr>
</tbody>
</table>

**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**

```java
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**

```java
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"

4.49. query-results-cache.ignore-null

Use eclipselink.query-results-cache.ignore-null to specify if EclipseLink caches null query results.

Values

Table 4-31 describes this query hint’s values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Ignore null results (that is, do not cache results)</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Do not ignore null results (that is, do cache results)</td>
</tr>
</tbody>
</table>

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 4-63 Using query-results-cache.ignore-null in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.QUERY_RESULTS_CACHE_IGNORE_NULL", "TRUE");
```

Example 4-64 shows how to use this hint with the @QueryHint annotation.

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"

4.50. query-results-cache.invalidate-on-change

Configures if the query cache results should be invalidated if any object of any class used in the query if modified.

Values

Table 4-32 describes this query hint’s values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Invalidate on change.</td>
</tr>
<tr>
<td>false</td>
<td>Do not invalidate on change.</td>
</tr>
</tbody>
</table>

Examples

Example 4-65 shows how to use this hint in a JPA query.

Example 4-65 Using query-results-cache.randomize-expiry in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.QUERY_RESULTS_CACHE_INVALIDATE", "TRUE");
```

Example 4-66 shows how to use this hint with the @QueryHint annotation.

Example 4-66 Using query-results-cache.randomize-expiry in a @QueryHint Annotation

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.QUERY_RESULTS_CACHE_INVALIDATE, value="TRUE");
```
4.51. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Randomize the expiration time by 10%.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Do not randomize the expiration time.</td>
</tr>
</tbody>
</table>

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.

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.QUERY_RESULTS_CACHE_RANDOMIZE_EXPIRY", "TRUE");
```

**Example 4-66** shows how to use this hint with the `@QueryHint` annotation.

```java
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"

4.52. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>Integer or Strings that can be parsed to int values (Default: 100)</td>
</tr>
</tbody>
</table>

Usage

When using `query-results-cache`, if the same named query with the same arguments is re-executed EclipseLink will skip the database and return the cached results.

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 4-67 Using `query-results-cache.size` in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.QUERY_RESULTS_CACHE_SIZE", "150");
```
Example 4-68 shows how to use this hint with the \texttt{@QueryHint} annotation.

\textbf{Example 4-68 Using \texttt{query-results-cache.size} in a \texttt{@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:

- "\texttt{query-results-cache}"

\section*{4.53. \texttt{query-results-cache.type}}

Use \texttt{eclipselink.query-results-cache.type} to set the cache type used for the query's results cache.

\section*{Values}

Table 4-34 describes this query hint's values.

\begin{table}[h]
\centering
\begin{tabular}{|l|l|}
\hline
Value & Description \\
\hline
Cache & (Default) Fixed size LRU cache (\texttt{CacheIdentityMap}) \\
Full & Provides full caching and guaranteed identity. \\
Hard\_Weak & Similar to \texttt{SOFT\_WEAK}, except that it uses \texttt{hard} references in the sub-cache. \\
None & No caching. \\
Soft & Similar to \texttt{FULL}, except the map holds the objects using \texttt{soft} references. \\
Soft\_Weak & Similar to \texttt{WEAK}, except it maintains a most-frequently-used sub-cache. \\
Weak & Similar to \texttt{FULL}, except the map holds the objects using \texttt{weak} references. \\
\hline
\end{tabular}
\end{table}

\section*{Usage}
Examples

Example 4-69 shows how to use this hint in a JPA query.

Example 4-69 Using query-results-cache.type in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.QUERY_RESULTS_CACHE_TYPE", "FULL");
```

Example 4-70 shows how to use this hint with the `@QueryHint` annotation.

Example 4-70 Using query-results-cache.type in a @QueryHint Annotation

```java
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"
- "EclipseLink Caches" in the Understanding EclipseLink
- "Scaling EclipseLink Applications in Clusters" in Solutions Guide for EclipseLink

4.54. query-results-cache.validation

This property control (enable/disable) query result cache validation. This can be used to help debugging an object identity problem. An object identity problem is when an managed/active entity in the cache references an entity not in managed state. This method will validate that objects in query results are in a correct state. As a result there are new log messages in the log. It's related with "read" queries like `<code>em.find(...);</code>` or JPQL queries like `<code>SELECT e FROM Entity e</code>`. It should be controlled at persistence unit level too by persistence unit property "query-results-cache.validation".

Values

Table 4-32 describes this query hint’s values.
Table 4-32 Valid Values for query-results-cache.validation

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Validate query result object tree and if content is not valid print diagnostic messages. In this case there should be negative impact to the performance.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Don’t validate and print any diagnostic messages.</td>
</tr>
</tbody>
</table>

Examples

Example 4-65 shows how to use this hint in a JPA query.

Example 4-65 Using query-results-cache.validation in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.query-results-cache.validation", true);
```

Example 4-66 shows how to use this hint with the @QueryHint annotation.

Example 4-66 Using query-results-cache.validation in a @QueryHint Annotation

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
@QueryHint(name=QueryHints.QUERY_RESULTS_CACHE_VALIDATION, value="TRUE");
```

See Also

For more information, see:

- "query-results-cache"

4.55. query-return-name-value-pairs

Configures a ResultSetMappingQuery to return populated DatabaseRecord(s) instead of raw data. This is particularly useful when the structure of the returned data is not known.

Values

Table 4-40 describes this query hint's values.
<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HintValues.TRUE</td>
<td>&quot;True&quot; (String) Return DatabaseRecord(s).</td>
</tr>
<tr>
<td>HintValues.FALSE</td>
<td>&quot;False&quot; (String) (Default) Don't return DatabaseRecord(s).</td>
</tr>
</tbody>
</table>

Examples

Example 4-81 shows how to use this hint in a JPA query.

Example 4-81 Using query-return-name-value-pairs in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
...
query.setHint(QueryHints.RETURN_NAME_VALUE_PAIRS, "True");
...
```

4.56. query-type

Use `eclipselink.query-type` to specify which EclipseLink query type to use for the query.

Values

Table 4-35 describes this query hint's valid values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto</td>
<td>(Default = 0) EclipseLink chooses the type of query.</td>
</tr>
<tr>
<td>ReadAll</td>
<td>Use a ReadAllQuery.</td>
</tr>
<tr>
<td>ReadObject</td>
<td>Use a ReadObjectQuery.</td>
</tr>
<tr>
<td>Report</td>
<td>Use a ReportQuery.</td>
</tr>
</tbody>
</table>

Usage

By default, EclipseLink 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.ReadAllQuery` for queries that will return a single object.

Examples
Example 4-71 shows how to use this hint in a JPA query.

Example 4-71 Using query-type in a JPA Query

```java
import org.eclipse.persistence.config.QueryType;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.QUERY_TYPE, QueryType.ReadObject);
```

Example 4-72 shows how to use this hint with the `@QueryHint` annotation.

Example 4-72 Using query-type in a `@QueryHint` Annotation

```java
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 EclipseLink*

4.57. **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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRUE</td>
<td>Retrieve read-only results from the query.</td>
</tr>
<tr>
<td>FALSE</td>
<td>(Default) Do not retrieve read-only results from the query.</td>
</tr>
</tbody>
</table>

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.

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 4-73 Using read-only in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.READ_ONLY, HintValues.TRUE);
```

Example 4-74 shows how to use this hint with the `@QueryHint` annotation.

**Example 4-74 Using read-only in a @QueryHint Annotation**

```java
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 EclipseLink JPA Performance Tuning” in Oracle Fusion Middleware Performance and Tuning Guide

---

### 4.58. refresh

Use `eclipselink.refresh` to specify whether or not to update the EclipseLink 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRUE</td>
<td>Refreshes the cache.</td>
</tr>
<tr>
<td>FALSE</td>
<td>(Default) Does not refresh the cache. You can use &quot;&quot; instead of FALSE.</td>
</tr>
</tbody>
</table>

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.

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.REFRESH, HintValues.TRUE);
```

**Example 4-76** shows how to use this hint with the `@QueryHint` annotation.

```java
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"
4.59. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CascadeAllParts</td>
<td>Cascade to all associations.</td>
</tr>
<tr>
<td>CascadeByMapping</td>
<td>Cascade by mapping metadata.</td>
</tr>
<tr>
<td>CascadePrivateParts</td>
<td>Cascade to privately-owned relationships.</td>
</tr>
<tr>
<td>NoCascade</td>
<td>Do not cascade.</td>
</tr>
</tbody>
</table>

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 4-77 Using refresh.cascade in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint(QueryHints.REFRESH_CASCADE, CascadePolicy.CascadeAllParts);
```

Example 4-78 shows how to use this hint with the `@QueryHint` annotation.

**Example 4-78 Using refresh.cascade in a @QueryHint Annotation**

```java
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"

## 4.60. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Fully qualified class name, without <code>.class</code>, representing a collection type.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Do not ignore null results (that is, do cache results)</td>
</tr>
</tbody>
</table>

### 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 4-79 Using result-collection-type in a JPA Query**

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
query.setHint("eclipselink.RESULT_COLLECTION_TYPE", "<CLASS_NAME>");
```

**Example 4-80** shows how to use this hint with the `@QueryHint` annotation.

**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 EclipseLink

4.61. result-type

By default in JPA for non-single select queries an Array of values is returned. If getSingleResult() is called the first array is returned, for getResultList() a List of arrays is returned. i.e. Select e.firstName, e.lastName from Employee e returns List<Object[]> or the native query, SELECT * FROM EMPLOYEE returns List<Object[]> The ResultType can be used to instead return a Map of values (DatabaseRecord, ReportQueryResult). It can also be used to return a single column, or single value.

Values

Table 4-40 describes this query hint’s values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>org.eclipse.persistence.config.ResultType.Array (String)</td>
<td>(Default) An Object array of values is returned (List&lt;Object[]&gt; or Object[]).</td>
</tr>
<tr>
<td>org.eclipse.persistence.config.ResultType.Attribute (String)</td>
<td>A List of the first selected value is returned.</td>
</tr>
<tr>
<td>org.eclipse.persistence.config.ResultType.Map (String)</td>
<td>A Map of key value pairs is returned.</td>
</tr>
<tr>
<td>org.eclipse.persistence.config.ResultType.Value (String)</td>
<td>The first value of the first rows is returned.</td>
</tr>
</tbody>
</table>

Examples

Example 4-81 shows how to use this hint in a JPA query.

Example 4-81 Using result-type in a JPA Query

```java
import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;

... query = em.createQuery("Select employee.id from Employee employee where employee.id = :id and employee.firstName = :firstName");
```
query.setHint(QueryHints.RESULT_TYPE, ResultType.Array);
query.setParameter("id", employee.getId());
query.setParameter("firstName", employee.getFirstName());
Object[] arrayResult = (Object[])query.getSingleResult();

// or Map
query = em.createQuery("Select employee.id from Employee employee where employee.id = :id and employee.firstName = :firstName");
query.setHint(QueryHints.RESULT_TYPE, ResultType.Map);
query.setParameter("id", employee.getId());
query.setParameter("firstName", employee.getFirstName());
Map mapResult = (Map)query.getSingleResult();

// or Value
query = em.createQuery("Select employee.id, employee.firstName from Employee employee where employee.id = :id and employee.firstName = :firstName");
query.setHint(QueryHints.RESULT_TYPE, ResultType.Value);
query.setParameter("id", employee.getId());
query.setParameter("firstName", employee.getFirstName());
Object valueResult = query.getSingleResult();
...

### 4.62. result-set-access

Configures if this read object(s) query should keep result set until all result object(s) are built. That allows to avoid getting potentially huge objects (LOBs) from ResultSet in case they would not be used because the object is found in the cache. Allow queries to build while accessing the database result-set. Skips accessing result set non-pk fields in case the cached object is found. If ResultSet optimization is used (isResultSetOptimizedQuery is set to true) then ResultSet Access optimization is ignored.

**Values**

Table 4-40 describes this query hint’s values.

**Table 4-40 Valid Values for result-set-access**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>HintValues.TRUE</code> &quot;True&quot; (String)</td>
<td>Build query directly from the result set.</td>
</tr>
<tr>
<td><code>HintValues.FALSE</code> &quot;False&quot; (String)</td>
<td>(Default) Don’t build query directly from the result set.</td>
</tr>
<tr>
<td><code>HintValues.PERSISTENCE_UNIT_DEFAULT</code> or &quot;PersistenceUnitDefault&quot; (String)</td>
<td>Take value from persistence unit properties.</td>
</tr>
</tbody>
</table>

**Examples**

Example 4-81 shows how to use this hint in a JPA query.
4.63. serialized-object

Configures if this read object(s) query use SerializedObjectPolicy if it's set on the descriptor. If SerializedObjectPolicy is specified Eclipselink writes out the whole entity object with its privately owned (and nested privately owned) entities and element collections into an additional (likely BLOB) field in the database.

Values

Table 4-40 describes this query hint's values.

Table 4-40 Valid Values for serialized-object

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HintValues.TRUE</td>
<td>&quot;True&quot; (String) Use SerializedObjectPolicy.</td>
</tr>
<tr>
<td>HintValues.FALSE</td>
<td>&quot;False&quot; (String) (Default) Don't use SerializedObjectPolicy.</td>
</tr>
</tbody>
</table>

Examples

Example 4-81 shows how to use this hint in a JPA query.

Example 4-81 Using result-type in a JPA Query

import org.eclipse.persistence.config.HintValues;
import org.eclipse.persistence.config.QueryHints;
...
quarry.setHint(QueryHints.RESULT_SET_ACCESS, "True");
...

4.64. 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**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>The full hint string, including the comment \</td>
</tr>
<tr>
<td></td>
<td>delimiters</td>
</tr>
</tbody>
</table>

**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 Using sql.hint in a JPA Query**

```java
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**

```java
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 EclipseLink*
- "Query" in *Solutions Guide for EclipseLink*
Chapter 5. Persistence Property Extensions

This chapter describes the persistence property extensions. You configure persistence units in the JPA persistence descriptor file: persistence.xml. EclipseLink 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

5.1. Functional Listing of Persistence Property Extensions

The following lists the EclipseLink persistence property (persistence.xml file) extensions, categorized by function:

- Weaving
- Customizers
- Validation and Optimization
- Caching
- Mapping
- Schema generation
- JDBC configuration
- Concurrency manager
- Canonical model

Weaving

EclipseLink includes the following persistence property extensions for weaving:

- weaving
- weaving.changetracking
- weaving.eager
- weaving.fetchgroups
- weaving.internal
EclipseLink 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-database-properties
- target-server
- metadata-source
- metadata-source.properties.file
- metadata-source.send-refresh-command
- metadata-source.xml.url

Validation and Optimization

EclipseLink includes the following persistence property extensions for validation.

- beanvalidation.no-optimisation
- exception-handler
- partitioning
- partitioning.callback
- profiler
- query-results-cache.validation

Logging

EclipseLink includes the following persistence property extensions for logging.
Caching
EclipseLink 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.port
- cache.coordination.rmi.packet-time-to-live
- cache.coordination.rmi.url
- cache.coordination.thread.pool.size
- cache.database-event-listener
- cache.extended.logging
- cache.shared
• cache.size
• cache.type
• flush-clear.cache

Mapping
EclipseLink includes the following persistence property extensions for mappings:

• composite-unit
• composite-unit.member
• composite-unit.properties

Schema generation
EclipseLink includes the following persistence property extensions for mappings:

• create-ddl-jdbc-file-name
• ddl.table-creation-suffix
• ddl-generation
• ddl-generation.output-mode
• ddlgen-terminate-statements
• drop-ddl-jdbc-file-name

JDBC configuration
EclipseLink 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.allow-partial-bind-parameters
• jdbc.batch-writing
• jdbc.batch-writing.size
• jdbc.cache-statements
• jdbc.cache-statements.size
Concurrency manager

EclipseLink includes the following persistence property extensions for concurrency management:

- concurrency.manager.allow.concurrencyexception
- concurrency.manager.allow.interruptedexception
- concurrency.manager.allow.readlockstacktrace
- concurrency.manager.build.object.complete.waittime
- concurrency.semaphore.log.timeout
- concurrency.manager.maxfrequencytodumpmassivemessage
- concurrency.manager.maxfrequencytodumptinymessage
- concurrency.manager.maxsleeptime
- concurrency.manager.object.building.semaphore
- concurrency.manager.write.lock.manager.no.threads
- concurrency.manager.write.lock.manager.semaphore
- concurrency.manager.waittime
- concurrency.semaphore.max.time.permit

Canonical model

EclipseLink includes the following persistence property extensions for canonical model:

- canonicalmodel.generate_comments
- canonicalmodel.generate_timestamp
- canonicalmodel.load_xml
- canonicalmodel.prefix
- canonicalmodel.suffix
- canonicalmodelsubpackage
5.2. Alphabetical Listing of Persistence Property Extensions

The following lists the EclipseLink persistence property (persitence.xml file) extensions, in alphabetical order:

- application-location
- beanvalidation.no-optimisation
- 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.port
- cache.coordination.rmi.packet-time-to-live
- cache.coordination.rmi.url
- cache.coordination.thread.pool.size
- cache.database-event-listener
- cache.extended.logging
- cache.shared
- cache.size
- cache.type
- canonicalmodel.generate_comments
• canonicalmodel.generate_timestamp
• canonicalmodel.load_xml
• canonicalmodel.prefix
• canonicalmodel.suffix
• canonicalmodel.subpackage
• canonicalmodel.use_generated
• canonicalmodel.use_static_factory
• classloader
• composite-unit
• composite-unit.member
• composite-unit.properties
• concurrency.manager.allow.concurrencyexception
• concurrency.manager.allow.interruptedexception
• concurrency.manager.allow.readlockstacktrace
• concurrency.manager.build.object.complete.waittime
• concurrency.semaphore.log.timeout
• concurrency.manager.maxfrequencytodumpmassivemessage
• concurrency.manager.maxfrequencytodumptinymessage
• concurrency.manager.maxsleeptime
• concurrency.manager.object.building.semaphore
• concurrency.manager.write.lock.manager.no.threads
• concurrency.manager.write.lock.manager.semaphore
• concurrency.manager.waittime
• concurrency.semaphore.max.time.permit
• connection-pool
• connection-pool.read
• connection-pool.sequence
• create-ddl-jdbc-file-name
• ddl.table-creation-suffix
• ddl-generation
• ddl-generation.output-mode
• ddlgen-terminate-statements
• 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.allow-partial-bind-parameters
• 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.force-bind-parameters
• jdbc.native-sql
• jdbc.property
• jdbc.sql-cast
• jdbc.uppercase-columns
• jpa.naming_into_indexed
• jpa.sql-call-deferral
• jpa.uppercase-column-names
• jql.parser
• jql.validation
• jta.controller
• logging.connection
• logging.exceptions
• logging.file
• logging.level
• logging.session
• logging.thread
• logging.timestamp
• locking.timestamp.local
• 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
• persistencexml.default
• pessimistic.lock.timeout.unit
• profiler
• query-results-cache.validation
• query.timeout.unit
• se-puinfo
• sequencing.start-sequence-at-nextval
• session.customizer
• session.include.descriptor.queries
• session-event-listener
• session-name
• sessions-xml
• target-database
• target-database-properties
• target-server
• temporal.mutable
• tenant-id
• tenant-schema-id
• thread.extended.logging
5.3. application-location

Use the `eclipselink.application-location` property to specify the file system directory in which EclipseLink writes (outputs) DDL files.

**Values**

Table 5-1 describes this persistence property's values.

*Table 5-1 Valid Values for application-location*

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>Directory location. The path must be fully qualified. For Windows, use a backslash. For UNIX use a slash.</td>
</tr>
</tbody>
</table>

**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 5-1 Using application-location in persistence.xml

<property name="eclipselink.application-location" value="c:/YOURDIRECTORY/">

Example 5-2 shows how to use this property in a property map.

Example 5-2 Using application-location in a Property Map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.APPLICATION_LOCATION, "c:/YOURDIRECTORY/");
```

See Also

For more information, see:

- "ddl-generation.output-mode"

5.4. beanvalidation.no-optimisation

Property for disabling Bean Validation optimisations. Bean Validation features optimisations, which are used to skip BV processes on non-constrained objects. This is to make maintenance easier and to allow for debugging in case that some object is not validated, but should be.

Values

Table 5-2 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) To enable optimisations.</td>
</tr>
<tr>
<td>false</td>
<td>To disable optimisations.</td>
</tr>
</tbody>
</table>

Examples

Example 5-3 shows how to use this property in the persistence.xml file.

Example 5-3 Using beanvalidation.no-optimisation in persistence.xml

```xml
<property name="eclipselink.beanvalidation.no-optimisation" value="false" />
```
Example 5-4 shows how to use this property in a property map.

**Example 5-4 Using cache.beanvalidation.no-optimisation in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.BEAN_VALIDATION_NO_OPTIMISATION, "true");
```

### 5.5. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>channel name</td>
<td>The channel used for cache coordination. All persistence units using the same channel will be coordinated.</td>
</tr>
<tr>
<td></td>
<td>Default: <code>EclipseLinkCommandChannel</code></td>
</tr>
</tbody>
</table>

**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 5-3 Using application-location in persistence.xml**

```xml
<property name="eclipselink.cache.coordination.channel" value="EmployeeChannel" />
```

Example 5-4 shows how to use this property in a property map.
Example 5-4 Using `cache.coordination.channel` in a Property Map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.CACHE_COORDINATION_CHANNEL, "myChannel");
```

See Also

For more information, see:

- "@Cache"
- "Cache Coordination" in *Understanding EclipseLink*
- "Scaling EclipseLink Applications in Clusters" in *Solutions Guide for EclipseLink*

5.6. `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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>The JMS topic connection factory name.</td>
</tr>
<tr>
<td></td>
<td>Default: <code>jms/EclipseLinkTopicConnectionFactory</code></td>
</tr>
</tbody>
</table>

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""

5.7. **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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>url</td>
<td>The fully-qualified URL for the JMS server.</td>
</tr>
<tr>
<td></td>
<td>This is not required if the topic is distributed across the cluster (that is, it can be looked up in local JNDI).</td>
</tr>
</tbody>
</table>

**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 EclipseLink*
- "Scaling EclipseLink Applications in Clusters" in *Solutions Guide for EclipseLink*
5.8. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Caches the topic publisher.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Does not cache the topic publisher.</td>
</tr>
</tbody>
</table>

**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 EclipseLink*
- "Scaling EclipseLink Applications in Clusters" in *Solutions Guide for EclipseLink*

5.9. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
</table>

Table 5-6 Valid Values for cache.coordination.jms.topic
<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>Set the JMS topic name. Default: jms/EclipseLinkTopic</td>
</tr>
</tbody>
</table>

**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 EclipseLink*
- "Scaling EclipseLink Applications in Clusters" in *Solutions Guide for EclipseLink*

---

### 5.10. 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**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>Name of the JNDI <code>InitialContext</code> factory.</td>
</tr>
</tbody>
</table>

**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 5-5 Using cache.coordination.jndi.initial-context-factory in persistence.xml.

```xml
<property name="eclipselink.cache.coordination.jndi.initial-context-factory" value="weblogic.jndi.WLInitialContextFactory/>
```

Example 5-6 shows how to use this property in a property map.

Example 5-6 Using cache.coordination.jndi.initial-context-factory in a property map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put(PersistenceUnitProperties.CACHE_COORDINATION_JNDI_INITIAL_CONTEXT_FACTORY, "weblogic.jndi.WLInitialContextFactory);
```

See Also

For more information, see:

- "cache.coordination.protocol"
- "Cache Coordination" in Understanding EclipseLink
- "Scaling EclipseLink Applications in Clusters" in Solutions Guide for EclipseLink

5.11. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>Password for the <code>cache.coordination.jndi.user</code>.</td>
</tr>
</tbody>
</table>

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 5-7 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 shows how to use this property in a property map.

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 EclipseLink
- "Scaling EclipseLink Applications in Clusters" in Solutions Guide for EclipseLink

5.12. 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
<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>The JNDI user.</td>
</tr>
</tbody>
</table>

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 EclipseLink
- "Scaling EclipseLink Applications in Clusters" in Solutions Guide for EclipseLink

5.13. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>jndi</td>
<td>Uses JNDI.</td>
</tr>
<tr>
<td>rmi</td>
<td>Configures RMI.</td>
</tr>
</tbody>
</table>

Usage

Cache coordination must be enabled.

Examples

Example 5-9 shows how to use this property in the persistence.xml file.
Example 5-9 Using `cache.coordination.naming-service` in `persistence.xml`

```xml
<property name="eclipselink.cache.coordination" value="true"/>
<property name="eclipselink.cache.coordination.naming-service" value="jndi"/>
```

Example 5-10 shows how to use this property in a property map.

Example 5-10 Using `cache.coordination.naming-service` in a Property Map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put(PersistenceUnitProperties.CACHECOORDINATION_NAMINGSERVICE, "jndi");
```

See Also

For more information, see:

- "`cache.coordination.protocol`"
- "Cache Coordination" in *Understanding EclipseLink*
- "Scaling EclipseLink Applications in Clusters" in *Solutions Guide for EclipseLink*

5.14. `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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
</table>

*Table 5-11 Valid Values for `cache.coordination.propagate-asynchronously`*
(Default) EclipseLink will broadcast asynchronously. The coordination will be complete before the thread returns from the committing the transaction.

false

EclipseLink 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 5-11 Using cache.coordination.propagate-asynchronously in persistence.xml

```xml
<property name="eclipselink.cache.coordination.propagate-asynchronously" value="false" />
```

Example 5-12 shows how to use this property in a property map.

Example 5-12 Using cache.coordination.propagate-asynchronously in a Property Map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put
(PersistenceUnitProperties.CACHECOORDINATIONPROPAGATEASYNCHRONOUSLY,
"false");
```

See Also

For more information, see:

- "cache.coordination.protocol"
- "Cache Coordination" in Understanding EclipseLink
- "Scaling EclipseLink Applications in Clusters" in Solutions Guide for EclipseLink
5.15. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>jms</td>
<td>Use Java Message Service (JMS) to broadcast changes.</td>
</tr>
<tr>
<td>jms-publishing</td>
<td>Use an EJB MessageDrivenBean to be used to broadcast changes. You must configure the MessageDrivenBean separately.</td>
</tr>
<tr>
<td>rmi</td>
<td>Use Java Remote Method Invocation (RMI) to broadcast changes.</td>
</tr>
<tr>
<td>rmi-iiop</td>
<td>Use RMI over the Internet Inter-Orb Protocol (IIOP) to broadcast changes.</td>
</tr>
<tr>
<td>ClassName</td>
<td>The name of a subclass implementation of the <code>TransportManager</code> abstract class</td>
</tr>
</tbody>
</table>

**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 5-13 Configuring JMS Cache Coordination in persistence.xml**

```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:
You can also include a username and password, if required, to access the server (for example, if on a separate domain):

Example 5-14 shows how to configure RMI cache coordination in the persistence.xml file.

**Example 5-14 Configuring RMI Cache Coordination in persistence.xml**

If your application is not running in a cluster, you must provide the URL:

By default, RMI cache coordination broadcasts are asynchronous. You can override this, if needed:

If you have multiple applications on the same server or network, you can specify a separate cache coordination channel for each application:

RMI cache coordination uses a multicast socket to allow servers to find each other. You can configure the multicast settings, if needed:
5.16. `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 EclipseLink 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Removes the connection if a communication error occurs. EclipseLink will reconnect when the server becomes available.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Does not remove the connection if a communication error occurs.</td>
</tr>
</tbody>
</table>

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 5-15 Using cache.coordination.remove-connection-on-error in persistence.xml

```xml
<property name="eclipselink.cache.coordination.remove-connection-on-error" value="true"/>
```

Example 5-16 shows how to use this property in a property map.

Example 5-16 Using cache.coordination.remove-connection-on_error in a property map

```java
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 EclipseLink
- "Scaling EclipseLink Applications in Clusters" in Solutions Guide for EclipseLink
5.17. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numeric</td>
<td>Time (in milliseconds) to wait for announcements, on startup.</td>
</tr>
<tr>
<td></td>
<td>Default: 1000</td>
</tr>
</tbody>
</table>

**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 EclipseLink*
- "Scaling EclipseLink Applications in Clusters" in *Solutions Guide for EclipseLink*

---

5.18. 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numeric</td>
<td>Set the multicast socket group address</td>
</tr>
<tr>
<td></td>
<td>Default: 239.192.0.0</td>
</tr>
</tbody>
</table>

#### 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 EclipseLink*
- "Scaling EclipseLink Applications in Clusters" in *Solutions Guide for EclipseLink*

### 5.19. 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numeric</td>
<td>Set the multicast socket group port.</td>
</tr>
<tr>
<td></td>
<td>Default: 3121</td>
</tr>
</tbody>
</table>

#### 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 EclipseLink*
- "Scaling EclipseLink Applications in Clusters" in *Solutions Guide for EclipseLink*

---

### 5.20. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numeric</td>
<td>Number of hops the session announcement data packets will take before expiring. Default: 2</td>
</tr>
</tbody>
</table>

#### 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.
5.21. 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 members use to connect to this host.

### Values

*Table 5-18* describes this persistence property’s values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>url</td>
<td>URL of the host server</td>
</tr>
<tr>
<td></td>
<td>Default: <code>local</code></td>
</tr>
</tbody>
</table>

### 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 EclipseLink*
- "Scaling EclipseLink Applications in Clusters" in *Solutions Guide for EclipseLink*
5.22. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numeric</td>
<td>Size of the thread pool. If 0, EclipseLink does not use a thread pool; instead threads are spawned when required. Default: 32</td>
</tr>
</tbody>
</table>

Usage

For RMI cache coordination, EclipseLink spawns one thread per node to send change notifications and one thread to listen for new node notifications.

For JMS cache coordination, EclipseLink 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 5-17 Using cache.coordination.thread.pool.size in persistence.xml**

```xml
<property name="eclipselink.cache.coordination.thread.pool.size" value="48"/>
```

Example 5-18 shows how to use this property in a property map.

**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 EclipseLink*
• "Scaling EclipseLink Applications in Clusters" in *Solutions Guide for EclipseLink*

### 5.23. cache.database-event-listener

Use the `eclipselink.cache.database-event-listener` property to integrate EclipseLink 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>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 <code>DCN</code> and <code>QCN</code> for Oracle.</td>
</tr>
</tbody>
</table>

**Usage**

You can use this property to allow the EclipseLink 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
<?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
database_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.OracleChangeNotificationListener"/>
        </properties>
    </persistence-unit>
</persistence>
```

See Also

For more information, see:

- "@Cache"
- "Cache Coordination" in *Understanding EclipseLink*
- "Scaling EclipseLink Applications in Clusters" in *Solutions Guide for EclipseLink*
- "Database Change Notification" in *Oracle Fusion Middleware Configuring and Managing JDBC Data Sources for Oracle WebLogic Server*

5.24. cache.extended.logging

The `eclipselink.cache.extended.logging` property controls (enable/disable) usage logging of JPA L2 cache. In case of `true` EclipseLink generates messages into log output about cache hit/miss new object population and object removal or invalidation. This kind of messages will be displayed only if logging level (property `eclipselink.logging.level`) is set to `FINEST`. It displays Entity class, ID and thread info (ID, Name).

Values

*Table 5-2* describes this persistence property’s values.
Table 5-2 Valid Values for cache.extended.logging

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>To enable extended logging.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) To disable extended logging.</td>
</tr>
</tbody>
</table>

Examples

Example 5-3 shows how to use this property in the persistence.xml file.

Example 5-3 Using cache.extended.logging in persistence.xml

```xml
<property name="eclipselink.cache.extended.logging" value="true" />
```

Example 5-4 shows how to use this property in a property map.

Example 5-4 Using cache.beanvalidation.no-optimisation in a Property Map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.CACHE_EXTENDED_LOGGING, "true");
```

5.25. cache.query-force-deferred-locks

This property force all queries and relationships to use deferred lock strategy during object building and L2 cache population.

Values

Table 5-2 describes this persistence property's values.

Table 5-2 Valid Values for cache.query-force-deferred-locks

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Use deferred locking strategy all queries and relationships.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Use mixed object cache locking strategy.</td>
</tr>
</tbody>
</table>

Examples

Example 5-3 shows how to use this property in the persistence.xml file.

Example 5-3 Using cache.query-force-deferred-locks in persistence.xml
Example 5-4 shows how to use this property in a property map.

**Example 5-4 Using cache.beanvalidation.no-optimisation in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.CACHE_QUERY_FORCE_DEFERRED_LOCKS, "true");
```

## 5.26. 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Shares an entity's cache. The value is case insensitive.</td>
</tr>
<tr>
<td>false</td>
<td>Prevents sharing of an entity's cache. The value is case insensitive.</td>
</tr>
</tbody>
</table>

**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.
5.27. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>integer</td>
<td>The size of the cache. Default: 100 Bytes.</td>
</tr>
</tbody>
</table>

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.

5.28. 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

| Value       | Description |
|-------------|-------------|-------------|

Table 5-23 Valid values for cache.type
<table>
<thead>
<tr>
<th>Cache Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weak</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Soft</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>SoftWeak</strong> (Default)</td>
<td>Holds all objects read by the application, and a fixed-size subcache of MRU objects using Soft references. The SoftWeak cache allows any unreferenced objects not in the subcache 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.</td>
</tr>
<tr>
<td><strong>HardWeak</strong></td>
<td>Holds all objects in use by the application, and a fixed-size subcache of MRU objects using normal Hard 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.</td>
</tr>
<tr>
<td><strong>Full</strong></td>
<td>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.</td>
</tr>
</tbody>
</table>

Use this cache type only for a fixed number of objects; otherwise, memory leakage will occur eventually.
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.

This cache type should normally not be used. Instead, disable the shared cache through PersistenceUnitProperties.CACHE_SHARED. 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

5.29. canonicalmodel.generate_comments

This optional property can be used to disable usage of comments in declaration of {code Generated} annotation.

Values

Table 5-2 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
</table>

Table 5-2 Valid Values for canonicalmodel.generate_comments
true  (Default) To enable usage of comments.
false  To disable usage of comments.

Examples

Example 5-3 shows how to use this property in the persistence.xml file.

**Example 5-3 Using canonicalmodel.generate_comments in persistence.xml**

```xml
<property name="eclipselink.canonicalmodel.generate_comments" value="false" />
```

Example 5-4 shows how to use this property in a property map.

**Example 5-4 Using cache.canonicalmodel.generate_comments in a Property Map**

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

### 5.30. canonicalmodel.generate_timestamp

This optional property can be used to disable usage of date in declaration of `@link jakarta.annotation.Generated` annotation.

Values

Table 5-2 describes this persistence property's values.

**Table 5-2 Valid Values for canonicalmodel.generate_comments**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) To enable usage of date.</td>
</tr>
<tr>
<td>false</td>
<td>To disable usage of date.</td>
</tr>
</tbody>
</table>

Examples

Example 5-3 shows how to use this property in the persistence.xml file.

**Example 5-3 Using canonicalmodel.generate_timestamp in persistence.xml**

```xml
<property name="canonicalmodel.generate_timestamp" value="false" />
```

Example 5-4 shows how to use this property in a property map.
**5.31. canonicalmodel.load_xml**

This optional property can be used as a performance enhancement between compile rounds. It is used to avoid reloading XML metadata on each compile which may only contain a single class etc. The default value is true and should be left as such for the initial generation to capture the XML metadata. Afterwards users may choose to set this flag if no changes to XML are expected thereafter.

**Values**

*Table 5-2* describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) To enable performance enhancement.</td>
</tr>
<tr>
<td>false</td>
<td>To disable performance enhancement.</td>
</tr>
</tbody>
</table>

**Examples**

*Example 5-3* shows how to use this property in the `persistence.xml` file.

*Example 5-3 Using canonicalmodel.load_xml in persistence.xml*

```xml
<property name="eclipselink.canonicalmodel.load_xml" value="false" />
```

*Example 5-4* shows how to use this property in a property map.

*Example 5-4 Using canonicalmodel.load_xml in a Property Map*

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.CANONICAL_MODEL_LOAD_XML, "true");
```

**5.32. canonicalmodel.prefix**

This optional property specifies the prefix that will be added to the start of the class name of any
canonical model class generated. By default the prefix is not used. If this property is specified, the value must be a non-empty string that contains valid characters for use in a Java class name.

**Values**

*Table 5-2* describes this persistence property's values.

*Table 5-2 Valid Values for canonicalmodel.prefix*

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>Generated class name prefix (String)</td>
</tr>
</tbody>
</table>

**Examples**

*Example 5-3* shows how to use this property in the *persistence.xml* file.

*Example 5-3 Using canonicalmodel.prefix in persistence.xml*

```xml
<property name="eclipselink.canonicalmodel.prefix" value="GEN" />
```

*Example 5-4* shows how to use this property in a property map.

*Example 5-4 Using canonicalmodel.prefix in a Property Map*

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.CANONICAL_MODEL_PREFIX, "GEN");
```

### 5.33. canonicalmodel.suffix

This optional property specifies the suffix that will be added to the end of the class name of any canonical model class generated. The suffix defaults to "_" unless a prefix is specified. If this property is specified, the value must be a non-empty string that contains valid characters for use in a Java class name.

**Values**

*Table 5-2* describes this persistence property's values.

*Table 5-2 Valid Values for canonicalmodel.suffix*

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>Generated class name suffix (String)</td>
</tr>
</tbody>
</table>

**Examples**

*Example 5-3* shows how to use this property in the *persistence.xml* file.
### Example 5-3 Using `canonicalmodel.suffix` in `persistence.xml`

```xml
<property name="eclipselink.canonicalmodel.suffix" value="_GEN" />
```

### Example 5-4

Example 5-4 shows how to use this property in a property map.

### Example 5-4 Using `canonicalmodel.prefix` in a Property Map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.CANONICAL_MODEL_SUFFIX, "_GEN");
```

### 5.34. `canonicalmodel.subpackage`

This optional property specifies a sub-package name that can be used to have the canonical model generator generate its classes in a sub-package of the package where the corresponding entity class is located. By default the canonical model classes are generated into the same package as the entity classes.

#### Values

Table 5-2 describes this persistence property's values.

### Table 5-2 Valid Values for `canonicalmodel.subpackage`

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>Sub-package name (String)</td>
</tr>
</tbody>
</table>

#### Examples

**Example 5-3** shows how to use this property in the `persistence.xml` file.

**Example 5-3 Using `canonicalmodel.subpackage` in `persistence.xml`**

```xml
<property name="eclipselink.canonicalmodel.subpackage" value="genpackage" />
```

**Example 5-4** shows how to use this property in a property map.

**Example 5-4 Using `canonicalmodel.subpackage` in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.CANONICAL_MODEL_SUB_PACKAGE, "genpackage");
```
5.35. canonicalmodel.use_generated

This optional property can be used to disable generation of `jakarta.annotation.Generated` annotation. The default value is `true`. If the value is `false`, `canonicalmodel.generate_comments` and `canonicalmodel.generate_timestamp` properties are ignored.

Values

Table 5-2 describes this persistence property's values.

**Table 5-2 Valid Values for canonicalmodel.use_generated**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>true</code></td>
<td>(Default) Generate <code>jakarta.annotation.Generated</code> annotation.</td>
</tr>
<tr>
<td><code>false</code></td>
<td>Disable generation of <code>jakarta.annotation.Generated</code> annotation.</td>
</tr>
</tbody>
</table>

Examples

**Example 5-3** shows how to use this property in the `persistence.xml` file.

*Example 5-3 Using canonicalmodel.use_generated in persistence.xml*

```xml
<property name="eclipselink.canonicalmodel.use_generated" value="false" />
```

**Example 5-4** shows how to use this property in a property map.

*Example 5-4 Using canonicalmodel.use_generated in a Property Map*

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

5.36. canonicalmodel.use_static_factory

This optional property can be used a performance enhancement between compile rounds within an IDE. It is used to avoid using a static metadata factory between 'cache' metadata from incremental builds. Turning this off in some use cases (IDE) could result in a loss of functionality. The default value is true and should be left as such for full feature support.

Values

Table 5-2 describes this persistence property's values.
Table 5-2 Valid Values for canonicalmodel.use_static_factory

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Enable performance enhancement.</td>
</tr>
<tr>
<td>false</td>
<td>Disable performance enhancement.</td>
</tr>
</tbody>
</table>

Examples

Example 5-3 shows how to use this property in the persistence.xml file.

Example 5-3 Using canonicalmodel.use_generated in persistence.xml

```xml
<property name="eclipselink.canonicalmodel.use_static_factory" value="false" />
```

Example 5-4 shows how to use this property in a property map.

Example 5-4 Using canonicalmodel.use_static_factory in a Property Map

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

5.37. 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>Classloader to use.</td>
</tr>
</tbody>
</table>

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

```java
properties.put("eclipselink.classloader", this.getClass().getClassLoader());
```

5.38. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Persistence unit is a composite persistence unit.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Persistence unit is not a composite persistence unit.</td>
</tr>
</tbody>
</table>

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.

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

```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 EclipseLink

5.39. 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
<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>The persistence unit must be a member of a composite persistence unit and cannot be used as an independent persistence unit.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) The persistence unit does not have to be a member of a composite persistence unit.</td>
</tr>
</tbody>
</table>

**Usage**

Setting this property to `true` indicates that the persistence unit has dependencies on other persistence units.

- 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 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.

```xml
  <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"

5.40. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map of properties</td>
<td>Properties to be passed to the persistence unit. Use the persistence unit's name as the key.</td>
</tr>
</tbody>
</table>

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

```java
Map props1 = new HashMap();
props1.put("jakarta.persistence.jdbc.user", "user1");
```
props1.put("jakarta.persistence.jdbc.password", "password1");
props1.put("jakarta.persistence.jdbc.driver", "oracle.jdbc.OracleDriver");
props1.put("jakarta.persistence.jdbc.url", "jdbc:oracle:thin:@oracle_db_url:1521:db");

Map props2 = new HashMap();

props2.put("jakarta.persistence.jdbc.user", "user2");
props2.put("jakarta.persistence.jdbc.password", "password2");
props2.put("jakarta.persistence.jdbc.driver", "com.mysql.jdbc.Driver");
props2.put("jakarta.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"

### 5.41. concurrency.manager.waittime

This property in milliseconds can control thread management in org.eclipse.persistence.internal.helper.ConcurrencyManager. It control how much time loop wait before it try acquire lock for current thread again. It value is set above above 0 dead lock detection mechanism and related extended logging will be activated.

**Values**

Table 5-30 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait time</td>
<td>How much time loop wait before it try acquire lock for current thread again. Default value is 0 (unit is ms). Allowed values are: long</td>
</tr>
</tbody>
</table>
Examples

Example 5-24 shows how to use this property in the persistence.xml file.

Example 5-24 Using concurrency.manager.waittime in persistence.xml

```xml
<property name="eclipselink.concurrency.manager.waittime" value="100" />
```

5.42. concurrency.manager.maxsleeptime

This system property in milliseconds can control thread management in org.eclipse.persistence.internal.helper.ConcurrencyManager. It controls how long we are willing to wait before firing up an exception.

Values

Table 5-30 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait time</td>
<td>It controls how long we are willing to wait before firing up an exception. Default value is 40000 (unit is ms). Allowed values are: long</td>
</tr>
</tbody>
</table>

Examples

Example 5-24 shows how to use this property in the persistence.xml file.

Example 5-24 Using concurrency.manager.maxsleeptime in persistence.xml

```xml
<property name="eclipselink.concurrency.manager.maxsleeptime" value="100" />
```

5.43. concurrency.manager.maxfrequencytodumptinymessage

This system property in milliseconds can control thread management in org.eclipse.persistence.internal.helper.ConcurrencyManager and
org.eclipse.persistence.internal.helper.ConcurrencyUtil. It control how frequently the tiny dump log message is created.

Values

Table 5-30 describes this persistence property's values.

Table 5-30 Valid Values for concurrency.manager.maxfrequencytodumptinymessage

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait time</td>
<td>It control how frequently the tiny dump log message is created. Default value is 40000 (unit is ms). Allowed values are: long</td>
</tr>
</tbody>
</table>

Examples

Example 5-24 shows how to use this property in the persistence.xml file.

Example 5-24 Using concurrency.manager.maxfrequencytodumptinymessage in persistence.xml

```
<property name="eclipselink.concurrency.manager.maxfrequencytodumptinymessage" value="100000" />
```

5.44. concurrency.manager.maxfrequencytodumpmassivemessage

This system property in milliseconds can control thread management in org.eclipse.persistence.internal.helper.ConcurrencyManager and org.eclipse.persistence.internal.helper.ConcurrencyUtil. It control how frequently the massive dump log message is created.

Values

Table 5-30 describes this persistence property's values.

Table 5-30 Valid Values for concurrency.manager.maxfrequencytodumpmassivemessage

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait time</td>
<td>It control how frequently the massive dump log message is created. Default value is 60000 (unit is ms). Allowed values are: long</td>
</tr>
</tbody>
</table>
5.45. concurrency.manager.allow.interruptedexception

In the places where use this property normally if a thread is stuck it is because it is doing object building. Blowing the threads ups is not that dangerous. It can be very dangerous for production if the dead lock ends up not being resolved because the productive business transactions will become cancelled if the application has a limited number of retries to for example process an MDB. However, the code spots where we use this constant are not as sensible as when the write lock manager is starving to run commit.

Values

Table 5-30 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) If we want the to fire up an exception to try to get the current thread to release all of its acquired locks and allow other threads to progress.</td>
</tr>
<tr>
<td>false</td>
<td>If aborting frozen thread is not effective it is preferable to not fire the interrupted exception let the system.</td>
</tr>
</tbody>
</table>

Examples

Example 5-24 shows how to use this property in the persistence.xml file.

Example 5-24 Using concurrency.manager.allow.interruptedexception in persistence.xml
5.46. concurrency.manager.allow.concurrencyexception

See valid values table.

Values

Table 5-30 describes this persistence property's values.

Table 5-30 Valid Values for concurrency.manager.allow.concurrencyexception

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) If we want the to fire up an exception to try to get the current thread to release all of its acquired locks and allow other threads to progress.</td>
</tr>
<tr>
<td>false</td>
<td>If aborting frozen thread is not effective it is preferable to not fire the concurrency exception let the system freeze and die and force the administration to kill the server. This is preferable to aborting the transactions multiple times without success in resolving the dead lock and having business critical messages that after 3 JMS retries are discarded out. Failing to resolve a dead lock can have terrible impact in system recovery unless we have infinite retries for the business transactions.</td>
</tr>
</tbody>
</table>

Examples

Example 5-24 shows how to use this property in the persistence.xml file.

Example 5-24 Using concurrency.manager.allow.concurrencyexception in persistence.xml

```xml
<property name="eclipselink.concurrency.manager.allow.concurrencyexception" value="true" />
```
5.47. concurrency.manager.allow.readlockstacktrace

Collect debug/trace information during ReadLock acquisition.

Values

Table 5-30 describes this persistence property's values.

Table 5-30 Valid Values for concurrency.manager.allow.readlockstacktrace

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Collect debug/trace information during ReadLock acquisition.</td>
</tr>
<tr>
<td>false</td>
<td>Don't collect debug/trace information during ReadLock acquisition</td>
</tr>
</tbody>
</table>

Examples

Example 5-24 shows how to use this property in the persistence.xml file.

Example 5-24 Using concurrency.manager.allow.readlockstacktrace in persistence.xml

```xml
<property name="eclipselink.concurrency.manager.allow.readlockstacktrace" value="true"/>
```

5.48. concurrency.manager.build.object.complete.waittime

This property in milliseconds can control thread management in org.eclipse.persistence.internal.helper.ConcurrencyManager. It control how much time ConcurrencyManager will wait before it will identify, that thread which builds new object/entity instance should be identified as a potential dead lock source. It leads into some additional log messages. Default value is 0 (unit is ms). In this case extended logging is not active. Allowed values are: long

Values

Table 5-2 describes this persistence property's values.

Table 5-2 Valid Values for concurrency.manager.build.object.complete.waittime

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
</table>


value | ConcurrencyManager wait time in [ms] (integer).

Examples

Example 5-3 shows how to use this property in the persistence.xml file.

Example 5-3 Using concurrency.manager.build.object.complete.waittime in persistence.xml

```xml
<property name="eclipselink.concurrency.manager.build.object.complete.waittime" value="5"/>
```

Example 5-4 shows how to use this property in a property map.

Example 5-4 Using concurrency.manager.build.object.complete.waittime in a Property Map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.CONCURRENCY_MANAGER_BUILD_OBJECT_COMPLETE_WAIT_TIME, "5");
```

5.49. concurrency.manager.object.building.semaphore

This property control (enable/disable) semaphore in org.eclipse.persistence.internal.descriptors.ObjectBuilder Object building see org.eclipse.persistence.internal.descriptors.ObjectBuilder could be one of the primary sources pressure on concurrency manager. Most of the cache key acquisition and releasing is taking place during object building. Enable true this property to try reduce the likelihood of having dead locks is to allow less threads to start object building in parallel. In this case there should be negative impact to the performance. Note: Parallel access to the same entity/entity tree from different threads is not recommended technique in EclipseLink.

Values

Table 5-2 describes this persistence property's values.

Table 5-2 Valid Values for concurrency.manager.object.building.semaphore

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>means we want to override vanilla behavior and use a semaphore to not allow too many threads in parallel to do object building</td>
</tr>
<tr>
<td>false</td>
<td>(Default) means just go ahead and try to build the object without any semaphore (false is vanilla behavior).</td>
</tr>
</tbody>
</table>
Examples

Example 5-3 shows how to use this property in the `persistence.xml` file.

Example 5-3 Using `concurrency.manager.object.building.semaphore` in `persistence.xml`

```
<property name="eclipselink.concurrency.manager.object.building.semaphore" value="true" />
```

Example 5-4 shows how to use this property in a property map.

Example 5-4 Using `concurrency.manager.object.building.semaphore` in a Property Map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.CONCURRENCY_MANAGER_USE_SEMAPHORE_TO_SLOW_DOWN_OBJECT_BUILDING, "true");
```

5.50. `concurrency.manager.write.lock.manager.no.threads`

This property control number of threads in semaphore in `org.eclipse.persistence.internal.helper.WriteLockManager#acquireRequiredLocks` if `eclipselink.concurrency.manager.write.lock.manager.semaphore` property is `true` default value is 2.

Allowed values are: int if `eclipselink.concurrency.manager.write.lock.manager.semaphore` property is `false` (DEFAULT) number of threads is unlimited.

Values

Table 5-2 describes this persistence property's values.

Table 5-2 Valid Values for `concurrency.manager.object.building.semaphore`

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>If <code>eclipselink.concurrency.manager.write.lock.manager.semaphore</code> property is <code>true</code> default value is 2. If <code>eclipselink.concurrency.manager.write.lock.manager.semaphore</code> property is <code>false</code> (DEFAULT) number of threads is unlimited.</td>
</tr>
</tbody>
</table>

Examples

Example 5-3 shows how to use this property in the `persistence.xml` file.
Example 5-3 Using `concurrency.manager.write.lock.manager.no.threads` in `persistence.xml`

```xml
<property name="eclipselink.concurrency.manager.write.lock.manager.no.threads" value="10" />
```

Example 5-4 shows how to use this property in a property map.

**Example 5-4 Using concurrency.manager.write.lock.manager.no.threads in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.CONCURRENCY_MANAGER_WRITE_LOCK_MANAGER_ACQUIRE_REQUIRED_LOCKS_NO_THREADS, 10);
```

### 5.51. `concurrency.manager.write.lock.manager.semaphore`

This property controls (enable/disable) semaphore in `org.eclipse.persistence.internal.helper.WriteLockManager#acquireRequiredLocks` This algorithm `org.eclipse.persistence.internal.helper.WriteLockManager#acquireRequiredLocks` is being used when a transaction is committing and it is acquire locks to merge the change set. It should happen if algorithm has trouble when multiple threads report change sets on the same entity (e.g. one-to-many relations of master detail being enriched with more details on this master). Note: Parallel access to the same entity/entity tree from different threads is not recommended technique in EclipseLink.

**Values**

Table 5-2 describes this persistence property's values.

**Table 5-2 Valid Values for `beanvalidation.no-optimisation`**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>means we want to override vanilla behavior and use a semaphore to not allow too many threads. In this case there should be negative impact to the performance.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) means just go ahead and try to build the object without any semaphore (false is vanilla behavior).</td>
</tr>
</tbody>
</table>

**Examples**

Example 5-3 shows how to use this property in the `persistence.xml` file.
Example 5-3 Using `concurrency.manager.object.building.semaphore` in persistence.xml

```xml
<property name="eclipselink.concurrency.manager.object.building.semaphore" value="true" />
```

Example 5-4 shows how to use this property in a property map.

**Example 5-4 Using concurrency.manager.object.building.semaphore in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.CONCURRENCY_MANAGER_USE_SEMAPHORE_TO_SLOW_DOWN_OBJECT_BUILDING, "true");
```

### 5.52. `concurrency.semaphore.log.timeout`

This property controls the timeout between log messages in `org.eclipse.persistence.internal.helper.ConcurrencySemaphore#acquireSemaphoreIfAppropriate(boolean)` when method/thread tries to get permit for the execution. Default value is 10000 (unit is ms). Allowed values are: long

**Values**

Table 5-2 describes this persistence property's values.

**Table 5-2 Valid Values for `concurrency.semaphore.log.timeout`**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>Timeout between log messages. Default value is 10000 (unit is ms). Allowed values are: long</td>
</tr>
</tbody>
</table>

**Examples**

Example 5-3 shows how to use this property in the `persistence.xml` file.

**Example 5-3 Using `concurrency.semaphore.log.timeout` in persistence.xml**

```xml
<property name="eclipselink.concurrency.semaphore.log.timeout" value="50000" />
```

Example 5-4 shows how to use this property in a property map.

**Example 5-4 Using `concurrency.semaphore.log.timeout` in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.CONCURRENCY_SEMAPHORE_LOG_TIMEOUT, 50000);
```
5.53. concurrency.semaphore.max.time.permit

This property controls semaphore the maximum time to wait for a permit in
org.eclipse.persistence.internal.helper.ConcurrencySemaphore#acquireSemaphoreIfAppropriate(boolean) It’s passed to java.util.concurrent.Semaphore#tryAcquire(long, TimeUnit) Default value is 2000 (unit is ms). Allowed values are: long

Values

Table 5-2 describes this persistence property's values.

Table 5-2 Valid Values for concurrency.semaphore.max.time.permit

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>Maximum time to wait for a permit. Default value is 2000 (unit is ms). Allowed values are: long</td>
</tr>
</tbody>
</table>

Examples

Example 5-3 shows how to use this property in the persistence.xml file.

Example 5-3 Using concurrency.semaphore.max.time.permit in persistence.xml

```xml
<property name="eclipselink.concurrency.semaphore.max.time.permit" value="2000" />
```

Example 5-4 shows how to use this property in a property map.

Example 5-4 Using concurrency.semaphore.max.time.permit in a Property Map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.CONCURRENCY_SEMAPHORE_MAX_TIME_PERMIT, 50000);
```

5.54. 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>initial</td>
<td>Starting (initial) number of connections.</td>
</tr>
<tr>
<td>min</td>
<td>Minimum number of connections.</td>
</tr>
<tr>
<td>max</td>
<td>Maximum number of connections.</td>
</tr>
<tr>
<td>wait</td>
<td>Amount of time (in milliseconds) to wait for a connection from the pool.</td>
</tr>
<tr>
<td>url</td>
<td>URL of the JDBC for the connection.</td>
</tr>
<tr>
<td>shared</td>
<td>For read connection pools, indicates that read connections are shared across threads.</td>
</tr>
<tr>
<td>jtaDataSource</td>
<td>JTA DataSource name to use for the connection, if different than the default.</td>
</tr>
<tr>
<td>nonJtaDataSource</td>
<td>Non-JTA DataSource name to use for the connection, if different than the default.</td>
</tr>
<tr>
<td>user</td>
<td>Username to use for this connection (if different than the default).</td>
</tr>
<tr>
<td>password</td>
<td>Password of the user for this connection (if different than the default).</td>
</tr>
</tbody>
</table>

### Usage

Append the name of the connection pool and property to be configured. If connection pool is specified, EclipseLink 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**

```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:
5.55. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>initial</td>
<td>Starting (initial) number of connection.</td>
</tr>
<tr>
<td>min</td>
<td>Minimum number of connections.</td>
</tr>
<tr>
<td>max</td>
<td>Maximum number of connections.</td>
</tr>
<tr>
<td>wait</td>
<td>Amount of time it takes to get connections from the pool.</td>
</tr>
<tr>
<td>url</td>
<td>URL of the JDBC connection.</td>
</tr>
<tr>
<td>shared</td>
<td>For read connection pools, indicates that read connections are shared across threads.</td>
</tr>
<tr>
<td>jtaDataSource</td>
<td>JTA DataSource name to use for the connection, if different than the default.</td>
</tr>
<tr>
<td>nonJtaDataSource</td>
<td>Non-JTA DataSource name to use for the connection, if different than the default.</td>
</tr>
<tr>
<td>user</td>
<td>Username to use for this connection (if different than the default).</td>
</tr>
<tr>
<td>password</td>
<td>Password of the user for this connection (if different than the default).</td>
</tr>
</tbody>
</table>

Usage
By default, EclipseLink 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

```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 EclipseLink
- "Connection Pooling" in Solutions Guide for EclipseLink
- "connection-pool"

### 5.56. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Uses the internal connection pool to pool connections from a datasource.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Does not use the internal connection pool to pool connections from a datasource.</td>
</tr>
</tbody>
</table>

Usage

This is only required for table sequencing. By default, EclipseLink 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

```xml
<property name="eclipselink.connection-pool.sequence" value="true"/>
```

See Also

For more information, see:

- "Connection Pools" in Understanding EclipseLink
- "Connection Pooling" in Solutions Guide for EclipseLink
- "connection-pool"

5.57. create-ddl-jdbc-file-name

Use the eclipselink.create-ddl-jdbc-file-name property to specify the name of the DDL file generated by EclipseLink that contains the SQL statements to create tables for JPA entities.

Values

Table 5-31 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>File name</td>
<td>A file name valid for your operating system. You can prefix the file name</td>
</tr>
<tr>
<td></td>
<td>with a file path if a concatenation of eclipselink.application-location</td>
</tr>
<tr>
<td></td>
<td>eclipselink.create-ddl-jdbc-file-name is valid for your operating system.</td>
</tr>
</tbody>
</table>

Usage

If eclipselink.ddl-generation is set to create-tables or drop-and-create-tables, EclipseLink writes this file to the location specified by eclipselink.application-location.
5.58. *ddl-generation*

Use the `eclipselink.ddl-generation` property to specify how EclipseLink generates DDL (Data Definition Language) for the database schema (tables and constraints) on deployment.

Note: EclipseLink does not support mixing EclipseLink defined and JPA defined DDL generation properties. If the `eclipselink.ddl-generation` property is specified, the `jakarta.persistence.schema-generation.database.action`, `jakarta.persistence.schema-generation.scripts.action`, and `jakarta.persistence.sql-load-script-source` JPA defined properties will be ignored.

**Values**

Table 5-32 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>create-tables</code></td>
<td>EclipseLink will attempt to execute a <code>CREATE TABLE</code> SQL for each table. If the table already exists, EclipseLink will follow the default behavior of your specific database and JDBC driver combination (when a <code>CREATE TABLE</code> SQL 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.</td>
</tr>
<tr>
<td><code>create-or-extend-tables</code></td>
<td>EclipseLink will attempt to create tables. If the table exists, EclipseLink will add any missing columns.</td>
</tr>
</tbody>
</table>
drop-and-create-tables  
EclipseLink will attempt to DROP all tables, then CREATE all tables. If any issues are encountered, EclipseLink will follow the default behavior of your specific database and JDBC driver combination, then continue with the next statement. This is useful in development if the schema frequently changes or during testing when the existing data needs to be cleared.

Note: 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.

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 5-27 Using ddl-generation in persistence.xml

```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 shows how to use this property in a property map.
Example 5-28 Using ddl-generation in a Property Map

```java
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"

### 5.59. **ddl-generation.output-mode**

Use the `eclipselink.ddl-generation.output-mode` property to specify where EclipseLink generates and writes the DDL.

**Values**

Table 5-33 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
</table>

**Table 5-33 Valid Values forddl-generation.output-mode**
<table>
<thead>
<tr>
<th><strong>both</strong></th>
<th>DDL will be generated and written to both the database and a file.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• 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.</td>
</tr>
<tr>
<td></td>
<td>• 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.</td>
</tr>
<tr>
<td><strong>database</strong></td>
<td>(Default) DDL will be generated and written to the database only.</td>
</tr>
<tr>
<td><strong>sql-script</strong></td>
<td>DDL will be generated and written to a file only.</td>
</tr>
<tr>
<td></td>
<td>• 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 not executed on the database.</td>
</tr>
<tr>
<td></td>
<td>• 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.</td>
</tr>
</tbody>
</table>

**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"
5.60. **ddlgen-terminate-statements**

When value of this property is set to true and a DDL script is being generated, the value of `DatabasePlatform#getStoredProcedureTerminationToken()` is appended to the end of each statement.

**Values**

Table 5-2 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Print line terminator characters.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Do not print line terminator characters.</td>
</tr>
</tbody>
</table>

**Examples**

*Example 5-3* shows how to use this property in the `persistence.xml` file.

*Example 5-3 Using ddlgen-terminate-statements in persistence.xml*

```xml
<property name="eclipselink.ddlgen-terminate-statements" value="true" />
```

*Example 5-4* shows how to use this property in a property map.

*Example 5-4 Using ddlgen-terminate-statements in a Property Map*

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.SCHEMA_GENERATION_SCRIPT_TERMINATE_STATEMENTS, "true");
```

5.61. **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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>The name of the suffix.</td>
</tr>
</tbody>
</table>

#### 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**

```xml
<property name="eclipselink.ddl.table-creation-suffix" value="engine=InnoDB"/>
```

#### See Also

For more information, see:

- "ddl-generation"

---

### 5.62. 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Causes a persistence unit to be created when the EntityManager is created, usually during deployment to a Jakarta EE container or servlet container.</td>
</tr>
</tbody>
</table>
false

(Default) The persistence unit is not initialized until the first EntityManager is created, or until metadata is required from the EntityManagerFactory.

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

```xml
<property name="eclipselink.deploy-on-startup" value="true" />
```

5.63. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>Full name for a class that implements DescriptorCustomizer.</td>
</tr>
</tbody>
</table>

Usage

You cannot use multiple descriptor customizers.

Examples
Example 5-31 shows how to use this property in the peristence.xml file.

Example 5-31 Using descriptor.customizer in persistence.xml

<property name="eclipselink.descriptor.customizer.Order"
value="acme.sessions.MyDesriptorCustomizer"/>
Example 5-32 shows how to use this property with a property map.

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 EclipseLink

5.64. drop-ddl-jdbc-file-name
Use the eclipselink.drop-ddl-jdbc-file-name property to specify the name of the DDL file generated
by EclipseLink 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 `eclipselink.application-location` `eclipselink.create-ddl-jdbc-file-name` is valid for your operating system.

Usage

If `eclipselink.ddl-generation` is set to `create-tables`, EclipseLink 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”

---

5.65. exception-handler

Use the `eclipselink.exception-handler` property to specify the EclipseLink 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>ExceptionHandler</code> class</td>
<td>Use the <code>handleException</code> method of the class, which takes a <code>java.lang.RuntimeException</code>, to:</td>
</tr>
<tr>
<td></td>
<td>• Re-throw the exception</td>
</tr>
<tr>
<td></td>
<td>• Throw a different exception</td>
</tr>
<tr>
<td></td>
<td>• Retry the query or database operation</td>
</tr>
</tbody>
</table>
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 5-33 Using exception-handler in persistence.xml

```xml
<property name="eclipselink.exception-handler" value="my.package.MyExceptionHandler"/>
```

Example 5-34 shows how to use this extension in a property map.

Example 5-34 Using exception-handler in a Property Map

```java
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 EclipseLink
- "Managing and Diagnosing Problems" in Solutions Guide for EclipseLink

5.66. 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Does not use the <code>eclipselink-orm.xml</code> file.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) EclipseLink uses the <code>eclipselink-orm.xml</code> file.</td>
</tr>
</tbody>
</table>

### 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 EclipseLink Project" in *Understanding EclipseLink*
- "Using an External Metadata Source" in *Solutions Guide for EclipseLink*

---

### 5.67. flush-clear.cache

Use the `eclipselink.flush-clear.cache` property to specify the EclipseLink `EntityManager` cache behavior when a `clear` method follows the `flush` method.

#### Values

*Table 5-40* describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
</table>
### Drop

EclipseLink drops the entire `EntityManager` 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) EclipseLink drops the entire `EntityManager` 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 **Drop**, but as efficient (in terms of memory usage) and prevents stale data.

### Merge

EclipseLink drops objects the `EntityManager` 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 5-36 Using `flush-clear.cache` in `persistence.xml`**

```xml
<property name="eclipselink.flush-clear.cache" value="Drop"/>
```

**Example 5-37** shows how to use this extension in a property map.

**Example 5-37 Using `flush-clear.cache` in a Property Map**

```java
import org.ecliplse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.FLUSH_CLEAR_CACHE,
```
See Also

For more information, see:

- "@Cache"
- "Cache Coordination" in *Understanding EclipseLink*
- "Scaling EclipseLink Applications in Clusters" in *Solutions Guide for EclipseLink*

5.68. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>Null, 0 and negative values are invalid for IDs extending <em>Number</em> and primitive <em>int</em> and <em>long</em> IDs.</td>
</tr>
<tr>
<td>None</td>
<td>EclipseLink performs no ID validation.</td>
</tr>
<tr>
<td>Null</td>
<td>Null is invalid All other values are valid.</td>
</tr>
<tr>
<td>Zero</td>
<td>Null, 0 and negative values are invalid for primitive <em>int</em> and <em>long</em> IDs.</td>
</tr>
</tbody>
</table>

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 EclipseLink
- "@PrimaryKey"

5.69. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) EclipseLink allows native SQL.</td>
</tr>
<tr>
<td>false</td>
<td>EclipseLink does not allow native SQL.</td>
</tr>
</tbody>
</table>

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 EclipseLink 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
See Also

For more information, see:

• “Querying” in Understanding EclipseLink

5.70. jdbc.allow-partial-bind-parameters

This property configures whether partial parameter binding should be allowed in the creation of JDBC prepared statements. EclipseLink determines binding behavior based on the database platform’s support for binding. If the database platform doesn't support binding for a specific expression, EclipseLink disables all binding for the whole query. Setting this property to 'true' will allow EclipseLink to bind per expression, instead of per query.

Values

Table 5-2 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>EclipseLink binds parameters per SQL function/expression. Requires Platform support if enabled.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) EclipseLink either binds all parameters or no parameters. Depending on database support.</td>
</tr>
</tbody>
</table>

Usage

Usage of parameter binding is generally a performance optimization; allowing for SQL and prepared statement caching, as well as usage of batch writing.

Examples

Example 5-3 shows how to use this property in the persistence.xml file.

Example 5-3 Using jdbc.allow-partial-bind-parameters in persistence.xml

```xml
<property name="eclipselink.jdbc.allow-partial-bind-parameters" value="true" />
```

Example 4 shows how to use this property in a property map.

Example 5-4 Using jdbc.allow-partial-bind-parameters in a Property Map
5.71. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>jdbc</td>
<td>Use JDBC batch writing.</td>
</tr>
<tr>
<td>buffered</td>
<td>Do not use JDBC batch writing or the platform's native batch writing.</td>
</tr>
<tr>
<td>oracle-jdbc</td>
<td>Use the Oracle platform's native batch writing. In a property map, use <code>OracleJDBC</code>. <strong>Note</strong>: This requires an Oracle JDBC driver.</td>
</tr>
<tr>
<td>custom-class</td>
<td>A custom class that extends the <code>BatchWritingMechanism</code> class.</td>
</tr>
<tr>
<td>none</td>
<td>(Default) Do not use batch writing (that is, turn it off).</td>
</tr>
</tbody>
</table>

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.

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 5-40 Using `jdbc.batch-writing` in persistence.xml

```xml
<property name="eclipselink.jdbc.batch-writing" value="Oracle-JDBC"/>
```

Example 5-41 shows how to use this property in a property map.

Example 5-41 Using `jdbc.batch-writing` in a Property Map

```java
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 EclipseLink

5.72. `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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>batch size</td>
<td>For <strong>parameterized</strong> batch writing, this value is the number of statements to batch (default: 100). For <strong>dynamic</strong> batch writing, this value is the size of the batched SQL buffer (default: 32k).</td>
</tr>
</tbody>
</table>

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 EclipseLink

---

### 5.73. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Enable internal statement caching.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Disable internal statement caching.</td>
</tr>
</tbody>
</table>

#### Usage

You should use this property when using EclipseLink'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 5-43 Using jdbc.cache-statements in persistence.xml**
Example 5-44 shows how to use this property in a property map.

**Example 5-44 Using jdbc.cache-statements in a Property Map**

```java
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 EclipseLink

## 5.74. 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**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>size</td>
<td>A string value containing a positive integer or zero (Default: 50). The maximum value may vary, depending on your JDBC driver.</td>
</tr>
</tbody>
</table>

+ Examples*

Example 5-45 shows how to use this property in the `persistence.xml` file.
Example 5-45 Using `jdbc.cache-statements.size` in `persistence.xml`

```
<property name="eclipselink.jdbc.cache-statements.size" value="100"/>
```

Example 5-46 shows how to use this property in a property map.

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 EclipseLink*

---

### 5.75. `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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully qualified class name</td>
<td>A class that implements the <code>Connector</code> interface.</td>
</tr>
</tbody>
</table>

**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"/>
```

5.76. jdbc.exclusive-connection.is-lazy

Use the `eclipselink.jdbc.exclusive-connection.is-lazy` property to specify if EclipseLink 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**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Acquire write connections lazily.</td>
</tr>
<tr>
<td>false</td>
<td>Do not acquire write connections lazily.</td>
</tr>
</tbody>
</table>

**Examples**

Example 5-48 shows how to use this property in the persistence.xml file.

**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 shows how to use this property in a property map.

**Example 5-49 Using jdbc.exclusive-connection.is-lazy in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.EXCLUSIVE_CONNECTION_IS_LAZY,
```
5.77. jdbc.exclusive-connection.mode

Use the `eclipselink.jdbc.exclusive-connection.mode` property to specify when EclipseLink 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction</td>
<td>(Default) Create an isolated client session if some or all entities require isolated cache, otherwise create a client session.</td>
</tr>
</tbody>
</table>

**Notes:**

- EclipseLink keeps the connection exclusive for the duration of the transaction.
- *Inside* the transaction, EclipseLink performs all writes and reads through the exclusive connection.
- *Outside* the EclipseLink transaction, a new connection is acquired from the connection pool for each read and released back immediately after the query is executed.
<table>
<thead>
<tr>
<th>Isolated</th>
<th>Create an exclusive isolated client session if reading an isolated entity, otherwise raise an error.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notes:</td>
<td>• EclipseLink keeps the connection exclusive for the lifetime of the owning EntityManager.</td>
</tr>
<tr>
<td></td>
<td>• Inside the transaction, EclipseLink performs all writes and reads through the exclusive connection.</td>
</tr>
<tr>
<td></td>
<td>• Outside the EclipseLink transaction, only isolated entities are read through the exclusive connection. For non-isolated entities, EclipseLink acquires a new connection from the connection pool for each read and immediately releases the connection after executing the query.</td>
</tr>
<tr>
<td>Always</td>
<td>Create an exclusive isolated client session if reading an isolated entity, otherwise create an exclusive client session.</td>
</tr>
<tr>
<td>Note:</td>
<td>EclipseLink keeps the connection exclusive for the lifetime of the owning EntityManager and performs all writes and reads through the exclusive connection.</td>
</tr>
</tbody>
</table>

**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 5-50 Using jdbc.exclusive-connection.mode in persistence.xml*

```xml
<property name="eclipselink.jdbc.exclusive-connection.mode" value="Always"/>
```

*Example 5-51* shows how to use this property in a property map.

*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 EclipseLink
- "Connections" in Understanding EclipseLink

5.78. jdbc.force-bind-parameters

This property enables parameter binding in the creation of JDBC prepared statements. Some database platforms disable parameter binding on certain functions and relations. This property allows the user to force parameter binding to be enabled regardless.

Values

Table 5-2 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Bindings will use platform default.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) values will default to platform specific logic.</td>
</tr>
</tbody>
</table>

Examples

Example 5-3 shows how to use this property in the persistence.xml file.

**Example 5-3 Using jdbc.force-bind-parameters in persistence.xml**

```xml
<property name="eclipselink.jdbc.force-bind-parameters" value="true" />
```

Example 5-4 shows how to use this property in a property map.

**Example 5-4 Using jdbc.force-bind-parameters in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.JDBC_FORCE_BIND_PARAMETERS, "true");
```
5.79. jpa.naming_into_indexed

Use the `eclipselink.jpa.naming_into_indexed` property defines if stored procedure parameters passed by name should be transformed into positional/index based passing if property value will be `true`.

For stored procedure:

```sql
CREATE PROCEDURE test_stored_proc1( IN param1 TEXT, IN param2 INTEGER )
```

following Java call

```java
query.registerStoredProcedureParameter( "param1", Integer.class, ParameterDirection.IN );
query.registerStoredProcedureParameter( "param2", String.class, ParameterDirection.IN );
```

will be transformed into following e.g.

```
{call test_stored_proc1(10, 'abcd')}
```

instead of default

```
{call test_stored_proc1(param1 ⇒ 10, param2 ⇒ 'abcd')}
```

It's important to register parameters in Java in a same order as they specified in the stored procedure.

This code was added there to ensure backward compatibility with older EclipseLink releases.

Normally, `naming_into_indexed` is not required. It's usually required when JDBC driver doesn't support parameters passed to stored procedures by name.

Values

Table 5-51 describes this persistence property's values.

**Table 5-51 Valid Values for jpa.naming_into_indexed**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Transform named parameters into positional/index based.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Do not transform.</td>
</tr>
</tbody>
</table>

Examples

Example 5-55 shows how to use this property in the `persistence.xml` file.

**Example 5-55 Using jpa.naming_into_indexed in persistence.xml**
5.80. jpa.sql-call-deferral

This property defines if SQL calls should be deferred to end of transaction by default or not. When setting this property to `<code>false</code>`, the application assumes the responsibility of ordering the SQL statements and must therefore be aware of any interdependencies between entities.

Values

Table 5-2 describes this persistence property's values.

**Table 5-2 Valid Values for jpa.sql-call-deferral**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default)</td>
</tr>
<tr>
<td>false</td>
<td></td>
</tr>
</tbody>
</table>

Examples

Example 5-3 shows how to use this property in the *persistence.xml* file.

**Example 5-3 Using jpa.sql-call-deferral in persistence.xml**

```xml
<property name="eclipselink.jpa.sql-call-deferral" value="false" />
```

Example 5-4 shows how to use this property in a property map.

**Example 5-4 Using eclipselink.jpa.sql-call-deferral in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.SQL_CALL_DEFERRAL, "true");
```

5.81. jdbc.native-sql

Use the `eclipselink.jdbc.native-sql` property to specify if EclipseLink 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Use platform-specific (&quot;native&quot;) SQL.</td>
</tr>
<tr>
<td>false</td>
<td>Use generic SQL.</td>
</tr>
</tbody>
</table>

### Usage

When using platform-specific SQL (eclipselink.jdbc.native-sql = true), EclipseLink uses platform-specific SQL to customize join syntax, date operators, using sequencing, and so on.

### Examples

**Example 5-52 Using jdbc.native-sql in persistence.xml**

```xml
<property name="eclipselink.jdbc.native-sql" value="false"/>
```

**Example 5-53 Using jdbc.native-sql in a Property Map**

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

### See Also

For more information, see:

- "Querying" in *Understanding EclipseLink*
- "Query Languages" in *Understanding EclipseLink*

---

### 5.82. jdbc.property

Use the `eclipselink.jdbc.property` prefix to pass JDBC driver-specific connection properties to EclipseLink.
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

```xml
<property name="eclipselink.jdbc.property.defaultRowPrefetch" value="25"/>
```

See Also

For more information, see:

- "Using EclipseLink with the Oracle Database" in Solutions Guide for EclipseLink
- "Introduction to Data Access" in Understanding EclipseLink

### 5.83. jdbc.sql-cast

Use the eclipselink.jdbc.sql-cast property to specify if EclipseLink uses platform-specific (that is, "native") CAST SQL operations.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Use platform-specific CAST operations.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Do not use platform-specific CAST operations.</td>
</tr>
</tbody>
</table>

Examples

Example 5-55 shows how to use this property in the persistence.xml file.
### 5.84. `jdbc.uppercase-columns`

Use the `eclipselink.jdbc.uppercase-columns` property to force column names from the metadata to be uppercase.

- **Description**
  - 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Forces all column names from the metadata to uppercase.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Does not force column names from the metadata to uppercase.</td>
</tr>
</tbody>
</table>

**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.

```xml
<property name="eclipselink.jpa.uppercase-columns" value="true"/>
```

**See Also**
For more information, see:

- "jpql.parser"
- "Using EclipseLink with the Oracle Database" in *Solutions Guide for EclipseLink*
- "Introduction to Data Access" in *Understanding EclipseLink*

## 5.85. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>org.eclipse.persistence.internal.jpa.jpql.HermesParser</code></td>
<td>(Default) Current parser, starting with EclipseLink 2.4, that provides extended JPQL support.</td>
</tr>
<tr>
<td><code>org.eclipse.persistence.queries.ANTLRQueryBuilder</code></td>
<td>Old parser, used for backward compatibility (prior to EclipseLink 2.4).</td>
</tr>
</tbody>
</table>

### See Also

For more information, see:

- "jpql.validation"

## 5.86. 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>JDBC metadata returned from the database is returned in uppercase, ensuring fields are the same case. Sets <code>jdbc.uppercase-columns</code> to <code>true</code>.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Does not return JDBC metadata in uppercase.</td>
</tr>
</tbody>
</table>

#### 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**

```xml
<property name="eclipselink.jpa.uppercase-column-names" value="true"/>
```

#### See Also

For more information, see:

- "jdbc.uppercase-columns"
- "Using EclipseLink with the Oracle Database" in *Solutions Guide for EclipseLink*
- "Introduction to Data Access" in *Understanding EclipseLink*

---

### 5.87. 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**

---
<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EclipseLink</td>
<td>(Default) Allows EclipseLink JPAL extensions.</td>
</tr>
<tr>
<td>JPA 1.0</td>
<td>Allows valid JPA 1.0 JPQL only.</td>
</tr>
<tr>
<td>JPA 2.0</td>
<td>Allows valid JPA 2.0 JPQL only.</td>
</tr>
<tr>
<td>JPA 2.1</td>
<td>Allows valid JPA 2.1 JPQL only.</td>
</tr>
<tr>
<td>None</td>
<td>No JPQL validation.</td>
</tr>
</tbody>
</table>

**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*

```xml
<property name="eclipselink.jpql.validation" value="JPA 1.0"/>
```

**See Also**

For more information, see:

- "jpql.parser"
- "Java Persistence Query Language Extensions"

## 5.88. jta.controller

This property allows to override JTA transaction controller class of `ServerPlatform`. If both `eclipselink.target-server` and `eclipselink.jta.controller` properties are set and contain classes implementing `ExternalTransactionController` interface, `eclipselink.target-server` value is used.

**Values**

Table 5-2 describes this persistence property's values.

*Table 5-2 Valid Values for `jta.controller`*

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>Value of this property is a fully qualified name of a class that implements <code>ExternalTransactionController</code> interface (String).</td>
</tr>
</tbody>
</table>
Examples

Example 5-3 shows how to use this property in the persistence.xml file.

**Example 5-3 Using jta.controller in persistence.xml**

```xml
<property name="eclipselink.jta.controller" value="mypackage.MyJTAController" />
```

Example 5-4 shows how to use this property in a property map.

**Example 5-4 Using jta.controller in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.JTA_CONTROLLER, "mypackage.MyJTAController");
```

5.89. 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**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Logs the connection name.</td>
</tr>
<tr>
<td>false</td>
<td>Does not log the connection name.</td>
</tr>
</tbody>
</table>

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**
See Also

For more information, see:

- "Configuring WebLogic Server to Expose EclipseLink Logging" in *Solutions Guide for EclipseLink*
- "logging.level"

---

5.90. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Logs exceptions when they are thrown.</td>
</tr>
<tr>
<td>false</td>
<td>Does not log exceptions when they are thrown.</td>
</tr>
</tbody>
</table>

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 5-60 Using logging.exceptions in persistence.xml file**

```xml
<property name="eclipselink.logging.exceptions" value="false" />
```

Example 5-61 shows how to use this property in a property map.

---
Example 5-61 Using `logging.exceptions` in a Property Map

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

See Also

For more information, see:

- "Configuring WebLogic Server to Expose EclipseLink Logging" in *Solutions Guide for EclipseLink*
- "logging.level"

5.91. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>directory name</td>
<td>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.</td>
</tr>
</tbody>
</table>

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 5-62 Using `logging.file` in `persistence.xml` file
Example 5-63 shows how to use this property in a property map.

Example 5-63 Using logging.file in a Property Map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.LOGGING_FILE, "C:\myout");
```

See Also

For more information, see:

- “Configuring WebLogic Server to Expose EclipseLink Logging” in *Solutions Guide for EclipseLink*

## 5.92. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Disables logging. You may want to use <code>OFF</code> during production in order to avoid the overhead of logging.</td>
</tr>
<tr>
<td>SEVERE</td>
<td>Logs exceptions indicating that EclipseLink cannot continue, as well as any exceptions generated during login. This includes a stack trace.</td>
</tr>
<tr>
<td>WARNING</td>
<td>Logs exceptions that do not force EclipseLink to stop, including all exceptions not logged with <code>SEVERE</code> level. This does not include a stack trace.</td>
</tr>
<tr>
<td>Level</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>INFO</td>
<td>(Default) Logs the login/logout per server session, including the user name. After acquiring the session, detailed information is logged.</td>
</tr>
<tr>
<td>CONFIG</td>
<td>Logs only login, JDBC connection, and database information. You may want to use this log level at deployment time.</td>
</tr>
<tr>
<td>FINE</td>
<td>Logs all SQL. You may want to use this log level during debugging and testing, but not at production time.</td>
</tr>
<tr>
<td>FINER</td>
<td>Similar to WARNING, but includes stack trace. You may want to use this log level during debugging and testing, but not at production time.</td>
</tr>
<tr>
<td>FINEST</td>
<td>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.</td>
</tr>
<tr>
<td>ALL</td>
<td>Logs at the same level as FINEST.</td>
</tr>
</tbody>
</table>

**Examples**

Example 5-64 shows how to use this property in the persistence.xml file.

**Example 5-64 Using logging.level in persistence.xml file**

```xml
<property name="eclipselink.logging.level" value="OFF" />
```

Example 5-65 shows how to use this property in a property map.

**Example 5-65 Using logging.level in a Property Map**

```java
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 EclipseLink Logging" in Solutions Guide for EclipseLink
5.93. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custom logger</td>
<td>Fully qualified class name of a custom logger which implements <code>org.eclipse.persistence.logging.SessionLog</code>.</td>
</tr>
<tr>
<td>JavaLogger</td>
<td>Uses <code>java.util.logging</code>.</td>
</tr>
<tr>
<td>ServerLogger</td>
<td>Integrates with the application server's logging.</td>
</tr>
<tr>
<td>DefaultLogger</td>
<td>(Default) Uses EclipseLink's native logger, <code>DefaultSessionLog</code>.</td>
</tr>
</tbody>
</table>

Examples

Example 5-66 shows how to use this parameter in the `persistence.xml` file.

Example 5-66 Using logging.logger in persistence.xml

```xml
<property name="eclipselink.logging.logger" value="JavaLogger"/>
```

Example 5-67 shows how to use this parameter in a property map.

Example 5-67 Using logging.logger in a Property Map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.LOGGING_LOGGER,
                   "acme.loggers.MyCustomLogger);
```

See Also

For more information, see:

5.94. logging.parameters

Use the `eclipselink.logging.parameters` property to define if SQL bind parameters are included in exceptions and logs.

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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Display the parameters.</td>
</tr>
<tr>
<td>false</td>
<td>Do not display the parameters.</td>
</tr>
</tbody>
</table>

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

```xml
<parameter name="eclipselink.logging.parameters" value="false"/>
```

See Also

For more information, see:

- "logging.level"
- "Configuring WebLogic Server to Expose EclipseLink Logging" in Solutions Guide for EclipseLink
5.95. logging.session

Use the `eclipselink.logging.session` property to specify if EclipseLink should include a session identifier in each log message.

Values

Table 5-62 describes this persistence property’s values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Log a session identifier.</td>
</tr>
<tr>
<td>false</td>
<td>Do not log a session identifier.</td>
</tr>
</tbody>
</table>

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.

```
<property name="eclipselink.logging.session" value="false" />
```

Example 5-70 shows how to use this property 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 EclipseLink Logging" in Solutions Guide for EclipseLink
5.96. logging.thread

Use the `eclipselink.logging.thread` property to specify if EclipseLink should include a thread identifier in each log message.

Values

Table 5-63 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Log a thread identifier.</td>
</tr>
<tr>
<td>false</td>
<td>Do not log a thread identifier.</td>
</tr>
</tbody>
</table>

Usage

You should use this property when running multi-threaded applications. EclipseLink will include a hashcode of the thread.

Examples

Example 5-71 shows how to use this property in the `persistence.xml` file.

Example 5-71 Using `logging.thread` in `persistence.xml` file

```xml
<property name="eclipselink.logging.thread" value="false" />
```

Example 5-72 shows how to use this property in a property map.

Example 5-72 Using `logging.thread` in a Property Map

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

See Also
For more information, see:

- "logging.level"
- "Configuring WebLogic Server to Expose EclipseLink Logging" in *Solutions Guide for EclipseLink*

### 5.97. logging.timestamp

Use the `eclipselink.logging.timestamp` property to specify if EclipseLink should include a timestamp in each log message.

**Values**

*Table 5-64* describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Log a timestamp.</td>
</tr>
<tr>
<td>false</td>
<td>Do not log a timestamp.</td>
</tr>
</tbody>
</table>

**Examples**

*Example 5-73* shows how to use this property in the `persistence.xml` file.

*Example 5-73 Using logging.timestamp in persistence.xml file*

```xml
<property name="eclipselink.logging.timestamp" value="false" />
```

*Example 5-74* shows how to use this property in a property map.

*Example 5-74 Using logging.timestamp in a Property Map*

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

**See Also**
For more information, see:

- "Configuring WebLogic Server to Expose EclipseLink Logging" in Solutions Guide for EclipseLink
- "logging.level"

## 5.98. locking.timestamp.local

This property defines if locking policies should default to local time (true) or server time (false).

### Values

Table 5-2 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>use local time</td>
</tr>
<tr>
<td>false</td>
<td>(Default) use server time</td>
</tr>
</tbody>
</table>

### Examples

Example 5-3 shows how to use this property in the persistence.xml file.

**Example 5-3 Using locking.timestamp.local in persistence.xml**

```
<property name="eclipselink.locking.timestamp.local.default" value="true" />
```

Example 5-4 shows how to use this property in a property map.

**Example 5-4 Using locking.timestamp.local in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.USE_LOCAL_TIMESTAMP, "true");
```

## 5.99. metadata-source

Use the eclipselink.metadata-source property to specify the MetadataSource implementation EclipseLink uses to read metadata.

### Values
Table 5-65 describes this persistence property's values.

**Table 5-65 Valid Values for metadata-source**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XML</td>
<td>Use XMLMetadataSource.</td>
</tr>
<tr>
<td>Custom metadata source</td>
<td>A custom class name which implements MetadataSource.</td>
</tr>
</tbody>
</table>

**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**

```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"
- "Using an External Metadata Source" in Solutions Guide for EclipseLink

### 5.100. 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.
## Table 5-66 Valid Values for metadata-repository.properties.file

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filename</td>
<td>Name of the metadata source XML file.</td>
</tr>
</tbody>
</table>

### 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

```xml
<property name="eclipselink.metadata-source.properties.file" value="c:\myproperties.xml"/>
```

### See Also

For more information, see:

- "metadata-source"
- "Using an External Metadata Source" in *Solutions Guide for EclipseLink*

### 5.101. metadata-source.send-refresh-command

Use the `eclipselink.metadata-source.send-refresh-command` property with cache coordination for a clustered environment to control how EclipseLink 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) To propagate refresh commands to the cluster, you must configure RCM and use the eclipselink.deploy-on-startup property.</td>
</tr>
<tr>
<td>false</td>
<td>Does not propagate refresh commands to the cluster.</td>
</tr>
</tbody>
</table>

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 5-77 Using metadata-source.send-refresh-command in persistence.xml

```xml
<property name="eclipselink.metadata-source-refresh-command" value="false"/>
```

Example 5-78 shows how to use this property in a property map.

Example 5-78 Using metadata-source-refresh-command in a Property Map

```java
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"
- "Using an External Metadata Source" in Solutions Guide for EclipseLink
5.102. 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>filename</td>
<td>Metadata repository.xml file.</td>
</tr>
</tbody>
</table>

**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

```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"
- "Using an External Metadata Source" in Solutions Guide for EclipseLink

5.103. 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>url</td>
<td>Specifies the metadata repository of the XML URL.</td>
</tr>
</tbody>
</table>

### 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"
- "Using an External Metadata Source" in Solutions Guide for EclipseLink

### 5.104. 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**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
</table>
Multitenant entities will use an protected cache.

true
Multitenant entities will use an protected cache.
false
(Default) Multitenant entities will use an isolated cache.

Usage

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 5-81 Using multitenant.tenants-share-cache in persistence.xml

```xml
<property name="eclipselink.multitenant.tenants-share-cache" value="true" />
```

Example 5-82 shows how to use this property in a property map.

Example 5-82 Using multitenant.tenants-share-cache in a Property Map

```java
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 EclipseLink

5.105. 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Multitenant entities will be used.</td>
</tr>
<tr>
<td>false</td>
<td>Specify a unique session name.</td>
</tr>
</tbody>
</table>

### 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

```xml
<property name="eclipselink_multitenant_tenants_share_emf" value="true" />
```

### See Also

For more information, see:

- "@Multitenant"
- "Using Multitenancy" in *Solutions Guide for EclipseLink*

### 5.106. 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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
</table>

---
## 5.107. 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

<table>
<thead>
<tr>
<th>connection factory</th>
<th>JNDI name or class name of the JCA Connection Factory.</th>
</tr>
</thead>
</table>

### 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**

```xml
<property name="eclipselink.nosql.connection-factory" value="MyConnectionFactory"/>
```

### See Also

For more information, see:

- "@NoSql"
- "nosql.property"
- "Using NoSQL Databases" in *Understanding EclipseLink*
- "Using EclipseLink with Nonrelational Databases" in *Solutions Guide for EclipseLink*
### 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"
- "Using NoSQL Databases" in Understanding EclipseLink
- "Using EclipseLink with Nonrelational Databases" in Solutions Guide for EclipseLink

---

### 5.108. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>property name</td>
<td>A NoSQL property.</td>
</tr>
</tbody>
</table>

### 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

```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.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 EclipseLink
- 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"
5.109. **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**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>USER_NAME</td>
<td>This type uses a user name for authentication when creating a proxy connection.</td>
</tr>
<tr>
<td>DISTINGUISHED_NAME</td>
<td>This type uses a distinguished name for authentication when creating a proxy connection.</td>
</tr>
<tr>
<td>CERTIFICATE</td>
<td>This type uses a digital certificate for authentication when creating a proxy connection.</td>
</tr>
</tbody>
</table>

**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**

```java
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:

```java
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"

5.110. **orm.throw.exceptions**

Use the `eclipselink.orm.throw.exceptions` property to specify if EclipseLink 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Throw an exception.</td>
</tr>
<tr>
<td>false</td>
<td>Log a warning only.</td>
</tr>
</tbody>
</table>

**Examples**

Example 5-87 shows how to use this property in the `persistence.xml` file.

*Example 5-87 Using `orm.throw.exceptions` in persistence.xml*

```xml
<property name="oracle.orm.throw.exceptions" value="false"/>
```
Example 5-88 shows how to use this property in a property map.

Example 5-88 Using `orm.throw.exceptions` in a Property Map

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

See Also

For more information, see:

- "exception-handler"

5.111. `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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Enables schema validation on on <code>orm.xml</code> file.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) No schema validation is performed on the <code>orm.xml</code> file.</td>
</tr>
</tbody>
</table>

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 5-89 Using `orm.validate.schema` in `persistence.xml`
Example 5-90 shows how to use this property in a property map.

**Example 5-90 Using orm.validate.schema in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put(PersistenceUnitProperties.ORM_VALIDATE_SCHEMA, "true");
```

## 5.112. 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**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>An existing, defined <code>PartitioningPolicy</code>.</td>
</tr>
</tbody>
</table>

### Usage

Use this property to partition data for a class across multiple difference 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 Transcription 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**
5.113. `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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>A class that implements the <code>DataPartitioningCallBack</code> interface.</td>
</tr>
</tbody>
</table>

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 5-92 Using `partitioning.callback` in `persistence.xml`

```
<property name="eclipselink.partitioning.callback"
value="mypacakge.MyDataPartitioningCallback"/>
```

Example 5-93 shows how to use this property in a property map.
5.114. **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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Closes the EntityManager after a commit.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Does not close the EntityManager after a commit.</td>
</tr>
</tbody>
</table>

**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` objects created by the factory. Alternatively, to apply the property to specific `EntityManager` objects, 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**

```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

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.PERSISTENCE_CONTEXT_CLOSE_ON_COMMIT, "true");
```

5.115. `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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>true</code></td>
<td>Cascades Entity life-cycle Persist operations to related entities and uses the <code>CascadeType.PERSIST</code> settings.</td>
</tr>
<tr>
<td><code>false</code></td>
<td>(Default) Does not cascade Entity life-cycle Persist operations to related entities and does not use the <code>CascadeType.PERSIST</code> settings.</td>
</tr>
</tbody>
</table>

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 5-96 Using `persistence-context.commit-without-persist-rules` in `persistence.xml`
Example 5-97 shows how to use this property in a property map.

Example 5-97 Using `persistence-context.commit-without-persist-rules` in a Property Map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.PERSISTENCE_CONTEXT_COMMIT_WITHOUT_PERSIST_RULES, "true");
```

5.116. `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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>auto</td>
<td>(Default) Flushing occurs at query execution.</td>
</tr>
<tr>
<td>commit</td>
<td>Flushing occurs at transaction commit.</td>
</tr>
</tbody>
</table>

Usage

The property set in `persistence.xml` or passed to `createEntityManagerFactory` affects all `EntityManager` created by the factory. To apply the property to specific `EntityManager` pass it to the `createEntityManager` method.

Examples

Example 5-98 shows how to use this property in the `persistence.xml` file.

Example 5-98 Using `persistence-context.flush-mode` in `persistence.xml`
Example 5-99 shows how to use this property in a property map.

Example 5-99 Using persistence-context.flush-mode in a Property Map

```java
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 EclispeLink

### 5.117. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Searches and persists related non-managed new objects that are cascade persist.</td>
</tr>
<tr>
<td>false</td>
<td>Does not search and persist related non-managed new objects that are cascade persist.</td>
</tr>
</tbody>
</table>

#### 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 5-100 shows how to use this property in the persistence.xml file.

**Example 5-100 Using persistence-context.persist-on-commit in persistence.xml**

```xml
<property name="eclipselink.persistence-context.persist-on-commit" value="false"/>
```

Example 5-101 show how to use this property in a property map.

**Example 5-101 Using persistence-context.persist-on-commit in a Property Map**

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

---

**5.118. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>hard</td>
<td>(Default) EclipseLink 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.</td>
</tr>
</tbody>
</table>
| weak               | References to objects supporting active attribute change tracking (see "@ChangeTracking") 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.

**Note:** 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 "@ChangeTracking"), 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 `EntityManager` created by the factory. To apply the property to specific `EntityManager` pass it to `createEntityManager` method.

**Examples**

*Example 5-102* shows how to use this property in a `persistence.xml` file.

*Example 5-102 Using persistence-context.reference-mode in persistence.xml*

```xml
<property name="eclipselink.persistence-context.reference-mode" value="FORCE_WEAK"/>
```
Example 5-103 shows how to use this property in a property map.

**Example 5-103 Using `persistence-context.reference-mode` in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.PERSISTENCE_CONTEXT_REFERENCE_MODE,
                 ReferenceMode.FORCE_WEAK);
```

See Also

For more information, see:

- "@ChangeTracking"

---

### 5.119. `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, EclipseLink uses all persistence units available in all persistence XML files.

#### Values

Table 5-85 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>names</td>
<td>A comma separated list of persistence units</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong>: When specifying multiple persistence units, you <strong>cannot</strong> include a comma (,) in the name of a persistence unit.</td>
</tr>
</tbody>
</table>

#### Examples

Example 5-104 shows how to use this property in the `persistence.xml` file.

**Example 5-104 Using `persistenceunits` in `persistence.xml`**
5.120. **persistencexml**

Use the `eclipselink.persistencexml` property to specify the full resource name in which to look for the persistence XML files. If omitted, EclipseLink uses the default location: `META-INF/persistence.xml`.

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

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>resource name</td>
<td>Location of the <code>persistence.xml</code> file.</td>
</tr>
</tbody>
</table>

**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 `persistencexml.default`.

**Examples**

*Example 5-105* shows how to use this property in the `persistence.xml` file.

### Example 5-105 Using persistencexml in persistence.xml

```xml
<property name="eclipselink.persistencexml" value="resources/persistence.xml"/>
```

**See Also**

For more information, see:

- "persistancexml.default"
5.121. **persisencexml.default**

Use the `eclipselink.persistencexml.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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>resource location</td>
<td>Default resource location of the <code>persistence.xml</code> file.</td>
</tr>
</tbody>
</table>

**Examples**

*Example 5-106* shows how to use this property in a property map.

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.ECLIPSELINK_PERSISTENCE_XML_DEFAULT, "resources/persistence.xml");
```

5.122. **pessimistic.lock.timeout.unit**

This property configures the query timeout unit value. Allows users more refinement. Used in combination with `PersistenceUnitProperties.PESSIMISTIC_LOCK_TIMEOUT`

**Values**

*Table 5-2* describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>java.util.concurrent.TimeUnit.MILLISECONDS</code></td>
<td>(Default) milliseconds</td>
</tr>
<tr>
<td><code>java.util.concurrent.TimeUnit.SECONDS</code></td>
<td>seconds</td>
</tr>
</tbody>
</table>
Examples

Example 5-3 shows how to use this property in the persistence.xml file.

Example 5-3 Using pessimistic.lock.timeout.unit in persistence.xml

```xml
<property name="eclipselink.pessimistic.lock.timeout.unit"
  value="java.util.concurrent.TimeUnit.SECONDS" />
```

Example 5-4 shows how to use this property in a property map.

Example 5-4 Using pessimistic.lock.timeout.unit in a Property Map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.PESSIMISTIC_LOCK_TIMEOUT_UNIT,
  java.util.concurrent.TimeUnit.SECONDS);
```

5.123. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NoProfiler</td>
<td>(Default) Do not use a performance profiler.</td>
</tr>
</tbody>
</table>
QueryMonitor

Monitor query executions and cache hits (org.eclipse.persistence.tools.profiler.QueryMonitor 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 org.eclipse.persistence.tools.profiler.oracle.DMSPerformanceProfiler. This property is specific to the Oracle Dynamic Monitoring Service (DMS).

Custom profiler

Specify a custom profiler class name which implements SessionProfiler and provides a no-argument constructor.

Examples

Example 5-107 shows how to use this property in the persistence.xml file.

Example 5-107 Using profiler in persistence.xml

```xml
<property name="eclipselink.profiler" value="PerformanceProfiler"/>
```

Example 5-108 shows how to use this property in a property map.

Example 5-108 Using profiler in a Property Map

```java
import org.eclipse.persistence.config.ProfilerType;
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.PROFILER,
ProfilerType.PerformanceProfiler);
```

See Also

For more information, see:
5.124. query-results-cache.validation

This property control (enable/disable) query result cache validation in org.eclipse.persistence.internal.sessions.UnitOfWorkImpl#internalExecuteQuery.

This can be used to help debugging an object identity problem. An object identity problem is when an managed/active entity in the cache references an entity not in managed state. This method will validate that objects in query results (object tree) are in a correct state. As a result there are new log messages in the log. It's related with "read" queries like em.find(...); or JPQL queries like SELECT e FROM Entity e. It should be controlled at query level too by query hint org.eclipse.persistence.config.QueryHints#QUERY_RESULTS_CACHE_VALIDATION.

Values

Table 5-2 describes this persistence property's values.

Table 5-2 Valid Values for query-results-cache.validation

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Validate query result object tree and if content is not valid print diagnostic messages. In this case there should be negative impact to the performance.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Don't validate and don't print any diagnostic messages.</td>
</tr>
</tbody>
</table>

Examples

Example 5-3 shows how to use this property in the persistence.xml file.

Example 5-3 Using query-results-cache.validation in persistence.xml

```xml
<property name="eclipselink.query-results-cache.validation" value="true" />
```

Example 5-4 shows how to use this property in a property map.

Example 5-4 Using query-results-cache.validation in a Property Map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.QUERY_RESULTS_CACHE_VALIDATION, "true");
```

5.125. query.timeout.unit

This property configures the query timeout unit value. Allows users more refinement. Used in combination with PersistenceUnitProperties.QUERY_TIMEOUT.
Values

Table 5-2 describes this persistence property's values.

### Table 5-2 Valid Values for query.timeout.unit

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>java.util.concurrent.TimeUnit.MILLISECONDS</td>
<td>(Default) milliseconds</td>
</tr>
<tr>
<td>java.util.concurrent.TimeUnit.SECONDS</td>
<td>seconds</td>
</tr>
<tr>
<td>java.util.concurrent.TimeUnit.MINUTES</td>
<td>minutes</td>
</tr>
</tbody>
</table>

Examples

Example 5-3 shows how to use this property in the persistence.xml file.

**Example 5-3 Using query.timeout.unit in persistence.xml**

```xml
<property name="eclipselink.query.timeout.unit" value="java.util.concurrent.TimeUnit.SECONDS" />
```

Example 5-4 shows how to use this property in a property map.

**Example 5-4 Using query.timeout.unit in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.QUERY_TIMEOUT_UNIT, "true");
```

5.126. se-puinfo

This property specifies a org.eclipse.persistence.internal.jpa.deployment.SEPersistenceUnitInfo that is used create an EntityManagerFactory. That datastructure is used in lieu of a persistence.xml. IMPORTANT: This property is only supported for use in testing.

Values

Table 5-2 describes this persistence property's values.

### Table 5-2 Valid Values for se-puinfo

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>org.eclipse.persistence.internal.jpa.deployment.SEPersistenceUnitInfo</td>
</tr>
</tbody>
</table>

Examples
**Example 5-4** shows how to use this property in a property map.

**Example 5-4 Using se-puinfo in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;

private SEPersistenceUnitInfo createSEPUInfo(String puName, List<String> classes, List<String> mappingFiles, Properties persistenceProperties) {
    SEPersistenceUnitInfo pu = new SEPersistenceUnitInfo();
    pu.setClassLoader(Thread.currentThread().getContextClassLoader());
    pu.setPersistenceUnitName(puName);
    pu.setManagedClassNames(classes);
    pu.setMappingFileNames(mappingFiles);
    try {
        pu.setPersistenceUnitRootUrl(new File(".").toURI().toURL());
    } catch (MalformedURLException e) {
        e.printStackTrace();
    }
    pu.setProperties(persistenceProperties);
    return pu;
}
...

SEPersistenceUnitInfo pu = createSEPUInfo("test_pu", classes, mappingFiles, persistenceProperties);
propertiesMap.put(PersistenceUnitProperties.ECLIPSELINK_SE_PUINFO, pu);
```

### 5.127. sequencing.start-sequence-at-nextval

By default, EclipseLink generates sequence values at \((\text{NEXTVAL} - \text{allocationSize})\). For instance, if NEXTVAL returns a value of 100 and the allocationSize is 50 (default), EclipseLink will begin sequence values at \(100 - \text{allocationSize}\). When the `eclipselink.sequencing.start-sequence-at-nextval` property is set to true, the ID values generated from sequences starting at NEXTVAL and proceeding forward.

**Values**

Table 5-2 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>ID values generated from sequences starting at NEXTVAL and proceeding forward.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Uses default behavior of next value - allocationSize.</td>
</tr>
</tbody>
</table>

### Examples

**Example 5-3** shows how to use this property in the `persistence.xml` file.

**Example 5-3 Using sequencing.start-sequence-at-nextval in persistence.xml**

```xml
<property name="eclipselink.sequencing.start-sequence-at-nextval" value="true"/>
```

**Example 5-4** shows how to use this property in a property map.

**Example 5-4 Using sequencing.start-sequence-at-nextval in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.SEQUENCING_START_AT_NEXTVAL, "true");
```

---

### 5.128. `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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>class name</td>
<td>Fully qualified class name of a <code>SessionCustomizer</code> class.</td>
</tr>
</tbody>
</table>

#### 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 5-109 Using session.customizer in persistence.xml**

```xml
<property name="eclipselink.session.customizer" value="acme.sessions.MySessionCustomizer"/>
```

Example 5-110 shows how to use this property in a property map.

**Example 5-110 Using session.customizer in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.SESSION_CUSTOMIZER, "acme.sessions.MySessionCustomizer");
```

See Also

For more information, see:

- "session-event-listener"

---

### 5.129. 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**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Copying is enabled.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Copying is disabled.</td>
</tr>
</tbody>
</table>

**Examples**
Example 5-111 shows how to use this property in the persistence.xml file.

**Example 5-111 Using session.include.descriptor.queries in persistence.xml**

```xml
<property name="eclipselink.session.include.descriptor.queries" value="true"/>
```

Example 5-112 shows how to use this property in a property map.

**Example 5-112 Using session.include.descriptor.queries in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.INCLUDE_DESCRIPTOR_QUERIES, "true");
```

5.130. **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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class name</td>
<td>A qualified class name for a class that implements the <code>org.eclipse.persistence.sessions.SessionEventListener</code> interface.</td>
</tr>
</tbody>
</table>

**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.
5.131. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Unique session name to use instead of the default, EclipseLink-generated session name.</td>
</tr>
</tbody>
</table>

**Usage**

By default, EclipseLink 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 5-115 Using session-name in persistence.xml**

```xml
<property name="eclipselink.session-name" value="MySession"/>
```

Example 5-116 shows how to use this property in a property map.

**Example 5-116 Using session-name in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.SESSION_NAME, "MySession");
```

See Also

For more information, see:

- "sessions-xml"

---

### 5.132. 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 EclipseLink 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**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>configuration file</td>
<td>The resource name of the sessions XML file. If you do not specify the value for this property, it will not be used.</td>
</tr>
</tbody>
</table>

**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**

![Diagram showing the process of using the `sessions-xml` property](image)

Description of "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 5-117 Using sessions-xml in the persistence.xml file**

```
<property name="eclipselink.sessions-xml" value="mysession.xml"/>
```

**Example 5-118** shows how to use this property in a property map.

**Example 5-118 Using sessions-xml in a Property Map**

```
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.SESSIONS_XML, "mysession.xml");
```

**See Also**

For more information, see:

- "Overriding and Merging"
5.133. **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**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
</table>

---
Defined in the `TargetDatabase` class or a fully qualified class name that extends `DatabasePlatform`.

Specify your database:

- **Attunity**
- **Auto** (Default): EclipseLink attempts to access the database and the JDBC metadata to determine the target database.
- **Cloudscape**
- **Database**: Use a generic database, if your target database is not listed and your JDBC driver does not support the metadata required for **Auto**.
  - **DB2**
  - **DB2Mainframe**
  - **DBase**
  - **Derby**
  - **HSQL**
  - **Informix**
  - **JavaDB**
  - **MaxDB**
  - **MySQL**
  - **MySQL4**
  - **Oracle**
  - **Oracle10**
  - **Oracle11**
  - **Oracle8**
  - **Oracle9**
  - **PointBase**
  - **PostgreSQL**
  - **SQLAnywhere**
  - **SQLServer**
  - **Sybase**
  - **Symfoware**
  - **TimesTen**

**Usage**

If `eclipselink.validation-only = true`, you cannot use a **Auto** class name or short name.

**Examples**
Example 5-119 shows how to use this property in the persistence.xml file.

**Example 5-119 Using target-database in persistence.xml**

```xml
<property name="eclipselink.target-database" value="Oracle"/>
```

or

```xml
<property name="eclipselink.target-database"
value="org.eclipse.persistence.platform.database.HSQLPlatform"/>
```

Example 5-120 shows how to use this property in a property map.

**Example 5-120 Using target-database in a Property Map**

```java
import org.eclipse.persistence.config.TargetDatabase;
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.TARGET_DATABASE, TargetDatabase.Oracle);
```

See Also

For more information, see:

- "validation-only"

## 5.134. target-database-properties

This property configures additional properties for the configured target-database.

Allowed Values:

A comma delimited key=value pairs (ie: key1=value1,key2=value2). Each key is expected to be a set[key_name] method on the configured target-database. The value must be the Stringified value to be passed into the set[key] method.

> Keys and values cannot contain '=' or ','

If an invalid property is located a ConversionException will be thrown.

**Values**

Table 5-2 describes this persistence property's values.
Table 5-2 Valid Values for target-database-properties

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>Stringified value</td>
</tr>
</tbody>
</table>

Examples

Example 5-3 shows how to use this property in the persistence.xml file.

**Example 5-3 Using target-database-properties in persistence.xml**

```xml
<property name="eclipselink.target-database-properties" value="shouldBindLiterals=true"/>
```

Example 5-4 shows how to use this property in a property map.

**Example 5-4 Using eclipselink.target-database-properties in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.TARGET_DATABASE_PROPERTIES, "StoredProcedureTerminationToken=test");
```

5.135. target-server

Use the eclipselink.target-server property to configure the ServerPlatform that will be used to enable integration with a host container. If this property is not specified, the runtime will attempt to detect which ServerPlatform should be used. If detection fails, Default will be used.

Values

Table 5-95 describes this persistence property's values.

Table 5-95 Valid Values for target-server

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
</table>
Defined in the TargetServer class

Specify your application server:

- **JBoss**: JBoss Application Server
- **OC4J**: OC4J persistence provider
- **SAPNetWeaver_7_1**: SAP NetWeaver Application Server 7.1 (and higher)
- **SunAS9**: Sun Application Server 9
- **WebLogic**: Oracle WebLogic Server
- **WebLogic_10**: Oracle WebLogic Server 10
- **WebLogic_9**: Oracle WebLogic Server 9
- **WebSphere**: IBM WebSphere
- **WebSphere_6_1**: IBM WebSphere 6.1
- **WebSphere_7**: IBM WebSphere 7
- **WebSphere_Liberty**: IBM WebSphere Liberty
- **Default** *(TargetServer.None)*

**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 5-121 Using target-server in persistence.xml**

```
<property name="eclipselink.target-server" value="OC4J_10_1_3"/>
```

**Example 5-122** shows how to use this property in a property map.

**Example 5-122 Using target-server in a Property Map**

```java
import org.eclipse.persistence.config.TargetServer;
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.TARGET_SERVER,
```
5.136. **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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Changes to the object are detected. Disables weaving of attribute change tracking.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Changes to the object itself are not detected.</td>
</tr>
</tbody>
</table>

**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 5-123 Using temporal.mutable in persistence.xml**

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

**Example 5-124** shows how to use this property in a property map.

**Example 5-124 Using temporal.mutable in a Property Map**
5.137. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>Name of the default context property.</td>
</tr>
</tbody>
</table>

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 5-125 Using tenant-id in persistence.xml

```xml
<property name="eclipselink.tenant-id" value="Oracle"/>
```

- Example 5-126 shows how to use this property in a property map.

  Example 5-126 Using tenant-id in a Property Map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put(PersistenceUnitProperties.MULTI_TENANT_PROPERTY_DEFAULT,
```
5.138. tenant-schema-id

This property specifies the context property used to distinguish tenants when using global schema per tenant multitenant strategy. It is expected to be set by user when creating an EntityManager.

Values

Table 5-2 describes this persistence property's values.

**Table 5-2 Valid Values for tenant-schema-id**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>(String) Schema name.</td>
</tr>
</tbody>
</table>

Examples

*Example 5-3* shows how to use this property in the persistence.xml file.

**Example 5-3 Using tenant-schema-id in persistence.xml**

```
<property name="eclipselink.tenant-schema-id" value="Oracle" />
```

*Example 5-4* shows how to use this property in a property map.

**Example 5-4 Using eclipselink.tenant-schema-id in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.MULTITENANT_SCHEMA_PROPERTY_DEFAULT, "Oracle");
```

5.139. thread.extended.logging

This property control (enable/disable) some additional logging messages like print error message if cached Entity is picked by different thread, or if EntityManager/UnitOfWork is reused/passed to different thread.

Values

Table 5-2 describes this persistence property's values.

**Table 5-2 Valid Values for thread.extended.logging**
<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>To enable thread extended logging.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) To disable thread extended logging.</td>
</tr>
</tbody>
</table>

### Examples

**Example 5-3** shows how to use this property in the `persistence.xml` file.

**Example 5-3 Using thread.extended.logging in persistence.xml**

```xml
<property name="eclipselink.thread.extended.logging" value="true" />
```

**Example 5-4** shows how to use this property in a property map.

**Example 5-4 Using thread.extended.logging in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.THREAD_EXTENDED_LOGGING, "true");
```

### 5.140. thread.extended.logging.threaddump

This property controls (enable/disable) the store and display of thread dump. This is an extension to `eclipselink.thread.extended.logging` which must be enabled. It prints additional log messages presented by `eclipselink.thread.extended.logging` creation and current thread stack traces.

### Values

**Table 5-2** describes this persistence property's values.

**Table 5-2 Valid Values for thread.extended.logging.threaddump**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>To display thread dump in the extended log thread message.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Don't display.</td>
</tr>
</tbody>
</table>

### Examples

**Example 5-3** shows how to use this property in the `persistence.xml` file.

**Example 5-3 Using thread.extended.logging.threaddump in persistence.xml**
Example 5-4 shows how to use this property in a property map.

Example 5-4 Using thread.extended.logging.threaddump in a Property Map

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.THREAD_EXTENDED_LOGGING_THREADDUMP, "true");
```

## 5.141. tolerate-invalid-jpql

This property allows an `EntityManager` to be created even in the event that an application has invalid JPQL statements declared in annotations or xml.

### Values

Table 5-2 describes this persistence property's values.

**Table 5-2 Valid Values for tolerate-invalid-jpql**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Tolerate invalid JPQL statements.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Don’t tolerate invalid JPQL statements.</td>
</tr>
</tbody>
</table>

### Examples

Example 5-3 shows how to use this property in the `persistence.xml` file.

**Example 5-3 Using tolerate-invalid-jpql in persistence.xml**

```xml
<property name="eclipselink.tolerate-invalid-jpql" value="true"/>
```

Example 5-4 shows how to use this property in a property map.

**Example 5-4 Using cache.tolerate-invalid-jpql in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put(PersistenceUnitProperties.JPQL_TOLERATE, "true");
```
5.142. **transaction.join-existing**

Use the `eclipselink.transaction.join-existing` property to force the persistence context to read through the JTA-managed ("write") connection in case there is an active transaction.

**Values**

Table 5-98 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Forces the persistence context to read through the JTA-managed connection.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Does not force the persistence context to read through the JTA-managed connection.</td>
</tr>
</tbody>
</table>

**Usage**

The property set in persistence.xml or passed to `createEntityManagerFactory` affects all `EntityManagers` 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 `EntityManagers`, pass it to `createEntityManager` method.

**Examples**

**Example 5-127** shows how to use this property in the `persistence.xml` file.

**Example 5-127 Using transaction.join-existing in persistence.xml**

```xml
<property name="eclipselink.transaction.join-existing" value="true"/>
```

**Example 5-128** shows how to use this property in a property map.

**Example 5-128 Using transaction.join-existing in a Property Map**

```java
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 EclipseLink*

5.143. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>standard</td>
<td>(Default) Uses the standard tuner and does not change any of the default configuration settings.</td>
</tr>
<tr>
<td>safe</td>
<td>Configures the persistence unit for debugging. This disables caching and several performance optimizations. The purpose is to provide a simplified development and debugging configuration.</td>
</tr>
<tr>
<td>custom tuner</td>
<td>Specifies the full class name of an implementation of the <code>org.eclipse.persistence.tools.tuning.SessionTu ner</code> interface.</td>
</tr>
</tbody>
</table>

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*

```xml
<property name="eclipselink.tuning" value="safe"/>
```
### 5.144. validate-existence

Use the `eclipselink.validate-existence` property to specify if EclipseLink should verify an object's existence on `persist()`.

**Values**

Table 5-100 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>EclipseLink verifies the object's existence.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) EclipseLink assumes the object is new, if it is not in the persistence context.</td>
</tr>
</tbody>
</table>

**Usage**

EclipseLink 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.

```xml
<property name="eclipselink.validate-existence" value="true"/>
```

*Example 5-131* shows how to use this property in a property map.

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put(PersistenceUnitProperties.VALIDATE-EXISTENCE, "true");
```
5.145. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>true</code></td>
<td>EclipseLink will initialize the descriptors but not log in.</td>
</tr>
<tr>
<td><code>false</code></td>
<td>(Default) EclipseLink will initialize the descriptors and log in.</td>
</tr>
</tbody>
</table>

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.

```xml
<property name="eclipselink.validation-only" value="true"/>
```

*Example 5-133* shows how to use this property in a property map.

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertyMap.put(PersistenceUnitProperties.VALIDATION_ONLY, "true");
```

See Also

For more information, see:
5.146. weaving

Use the `eclipselink.weaving` property to specify if EclipseLink 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Weave the entity classes dynamically.</td>
</tr>
<tr>
<td>false</td>
<td>Do not weave the entity classes.</td>
</tr>
<tr>
<td>static</td>
<td>Weave the entity classes statically.</td>
</tr>
</tbody>
</table>

Examples

Example 5-134 shows how to use this property in the `persistence.xml` file.

**Example 5-134 Using weaving in persistence.xml**

```xml
<property name="eclipse.weaving" value="false"/>
```

Example 5-135 shows how to use this property in a property map.

**Example 5-135 Using weaving in a Property Map**

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

See Also

For more information, see:
5.147. 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>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Enables this property.</td>
</tr>
<tr>
<td>false</td>
<td>Disables this property.</td>
</tr>
</tbody>
</table>

Examples

Example 5-136 shows how to use this property in the persistence.xml file.

Example 5-136 Using weaving.changetracking in persistence.xml

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

Example 5-137 shows how to use this property in a property map.
**Example 5-137 Using weaving.changetracking in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put
(Persistence.Unit.Properties.WEAVING_CHANGETRACKING,
value="false");
```

- *See Also*

For more information, see:

- "weaving"

---

**5.148. weaving.eager**

Use the `eclipselink.weaving.eager` property to specify if EclipseLink uses indirection on eager relationships.

**Values**

Table 5-104 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>Enables indirection on eager relationships through weaving.</td>
</tr>
<tr>
<td>false</td>
<td>(Default) Disables indirection on eager relationships through weaving.</td>
</tr>
</tbody>
</table>

**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 5-138 Using weaving in persistence.xml**

```
<property name="eclipselink.weaving.eager" value="true"/>
```

**Example 5-139** shows how to use this extension in a property map

**Example 5-139 Using weaving in a Property Map**

```java
import org.eclipse.persistence.config.PersistenceUnitProperties;
propertiesMap.put
(PersistenceUnitProperties.WEAVING_EAGER, "true");
```

**See Also**

For more information, see:

- "weaving"

---

**5.149. 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**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Enables FetchGroups through weaving.</td>
</tr>
<tr>
<td>false</td>
<td>Disables FetchGroups through weaving.</td>
</tr>
</tbody>
</table>
Examples

Example 5-140 shows how to use this property in the persistence.xml file.

Example 5-140 Using weaving.fetchgroups in persistence.xml

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

Example 5-141 shows how to use this property in a property map.

Example 5-141 Using weaving.fetchgroups in a Property Map

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

See Also

For more information, see:

- "weaving"

5.150. weaving.internal

Use the eclipselink.weaving.internal property to specify if EclipseLink uses internal optimizations through weaving.

Values

Table 5-106 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Enables internal optimizations through weaving.</td>
</tr>
<tr>
<td>false</td>
<td>Disables internal optimizations through weaving.</td>
</tr>
</tbody>
</table>
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 5-142 Using weaving in `persistence.xml`

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

Example 5-143 shows how to use this property in a property map.

Example 5-143 Using weaving in a Property Map

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

See Also

For more information, see:

- "weaving"

5.151. `weaving.mappedsuperclass`

This property configures whether `MappedSuperclass`es with no direct sub-classes will be woven.

This property will only be considered if weaving is enabled.

Values

Table 5-2 describes this persistence property's values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>true</code></td>
<td>(Default) Weave <code>MappedSuperclass</code>es.</td>
</tr>
<tr>
<td><code>false</code></td>
<td>Don't weave <code>MappedSuperclass</code>es.</td>
</tr>
</tbody>
</table>
Examples

Example 5-3 shows how to use this property in the persistence.xml file.

**Example 5-3 Using weaving.mappedsuperclass in persistence.xml**

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

Example 5-4 shows how to use this property in a property map.

**Example 5-4 Using cache.beanvalidation.no-optimisation in a Property Map**

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

5.152. weaving.lazy

Use the `eclipselink.weaving.lazy` property to specify if EclipseLink 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**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>(Default) Enables lazy one-to-one and many-to-one mappings through weaving.</td>
</tr>
<tr>
<td>false</td>
<td>Disables lazy one-to-one and many-to-one mappings through weaving.</td>
</tr>
</tbody>
</table>

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 5-144 Using weaving.lazy in persistence.xml**

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

Example 5-145 shows how to use this property in a property map.

**Example 5-145 Using weaving.lazy in a Property Map**

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

**See Also**

For more information, see:

- "weaving"
Chapter 6. eclipselink-orm.xml Schema Reference

This chapter describes how you can use EclipseLink'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.

Using the *eclipselink-orm.xml* mapping file enables many EclipseLink 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 EclipseLink. 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

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](http://wiki.eclipse.org/EclipseLink/XSDs).

This chapter includes the following sections:

- **Overriding and Merging**

### 6.1. 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.

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

EclipseLink 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**

<table>
<thead>
<tr>
<th>entity-mappings/persistence-unit-metadata</th>
<th>Rule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>xml-mapping-metadata-complete</code></td>
<td>Full override</td>
<td>If specified, the complete set of mapping metadata for the persistence unit is contained in the XML mapping files for the persistence unit.</td>
</tr>
<tr>
<td>persistence-unit-defaults/schema</td>
<td>Full override</td>
<td>If a <code>schema</code> setting exists, then the <code>eclipselink-orm.xml schema</code> setting overrides the existing setting or creates a new <code>schema</code> setting.</td>
</tr>
<tr>
<td>persistence-unit-defaults/catalog</td>
<td>Full override</td>
<td>If a <code>catalog</code> setting exists, then the <code>eclipselink-orm.xml catalog</code> setting overrides the existing setting or creates a new <code>catalog</code> setting.</td>
</tr>
<tr>
<td>persistence-unit-defaults/access</td>
<td>Full override</td>
<td>If an <code>access</code> setting exists, then the <code>eclipselink-orm.xml access</code> setting overrides the existing setting, or creates a new <code>access</code> setting.</td>
</tr>
<tr>
<td>entity-mappings/persistence-unit-metadata/persistence-unit-defaults/cascade-persist</td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td>entity-mappings/persistence-unit-metadata/persistence-unit-defaults/entity-listeners</td>
<td>Merge</td>
<td>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.</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>entity-mappings/</th>
<th>Rule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>package</td>
<td>None</td>
<td>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.</td>
</tr>
<tr>
<td>Element</td>
<td>Override</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>catalog</code></td>
<td>None</td>
<td>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.</td>
</tr>
<tr>
<td><code>schema</code></td>
<td>None</td>
<td>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.</td>
</tr>
<tr>
<td><code>access</code></td>
<td>None</td>
<td>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.</td>
</tr>
<tr>
<td><code>sequence-generator</code></td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td><strong>table-generator</strong></td>
<td>Full override</td>
<td>A table-generator is unique by name. The table-generator defined in the eclipselink-orm.xml will override a table-generator of the same name defined in another mapping file. 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.</td>
</tr>
<tr>
<td><strong>named-query</strong></td>
<td>Full override</td>
<td>A named-query is unique by name. The named-query defined in the eclipselink-orm.xml will override a 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-queries with the same name are defined in one or across multiple mapping files.</td>
</tr>
<tr>
<td><strong>named-native-query</strong></td>
<td>Full override</td>
<td>A named-native-query is unique by name. The named-native-query defined in the eclipselink-orm.xml will override a 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-queries with the same name are defined in one or across multiple mapping files.</td>
</tr>
</tbody>
</table>
A `sql-result-set-mapping` is unique by name. The `sql-result-set-mapping` defined in the `eclipselink-orm.xml` will override a `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` 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

<table>
<thead>
<tr>
<th>entity-mappings/mapped-superclass</th>
<th>Rule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>id-class</td>
<td>Full override</td>
<td>If an <code>id-class</code> exists, then the <code>eclipselink-orm.xml id-class</code> setting overrides the existing setting, or creates a new <code>id-class</code> setting.</td>
</tr>
<tr>
<td>exclude-default-listeners</td>
<td>Full override</td>
<td>If an <code>exclude-default-listeners</code> exists, then the <code>eclipselink-orm.xml 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.</td>
</tr>
<tr>
<td>Setting</td>
<td>Override Type</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>exclude-superclass-listeners</code></td>
<td>Full override</td>
<td>If an <code>exclude-superclass-listeners</code> setting exists, then the <code>eclipselink-orm.xml exclude-superclass-listeners</code> setting will be applied. If exclude-superclass-listeners setting is not specified, it will not override an existing setting, that is essentially turning it off.</td>
</tr>
</tbody>
</table>
| `entity-listeners`            | Merge and full override | If an `entity-listeners` setting exists, then the `eclipselink-orm.xml entity-listeners` setting will override and merge with an existing setting, or creates a new `entity-listeners` setting all together.  

**Note:** 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. |
<p>| <code>pre-persist</code>                 | Full override         | If a <code>pre-persist</code> setting exists, then the <code>eclipselink-orm.xml pre-persist</code> setting overrides the existing setting, or creates a new <code>pre-persist</code> setting. |
| <code>post-persist</code>                | Full override         | If a <code>post-persist</code> setting exists, then the <code>eclipselink-orm.xml post-persist</code> setting overrides the existing setting, or creates a new <code>post-persist</code> setting. |
| <code>pre-remove</code>                  | Full override         | If a <code>pre-remove</code> setting exists, then the <code>eclipselink-orm.xml pre-remove</code> setting overrides the existing setting, or creates a new <code>pre-remove</code> setting. |</p>
<table>
<thead>
<tr>
<th>Setting</th>
<th>Override Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>post-remove</td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td>pre-update</td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td>post-update</td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td>post-load</td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td>attributes</td>
<td>Merge and mapping level override</td>
<td>If the attribute settings (such as <code>id</code>, <code>embedded-id</code>, <code>basic</code>, <code>version</code>, <code>many-to-one</code>, <code>one-to-many</code>, or <code>one-to-one</code>) exist at the mapping level, then the eclipselink-orm.xml attributes merges or overrides the existing settings, else creates new attributes.</td>
</tr>
<tr>
<td>class</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>access</td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td>metadata-complete</td>
<td>Full override</td>
<td>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.</td>
</tr>
</tbody>
</table>
**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**

<table>
<thead>
<tr>
<th>entity-mappings/entity</th>
<th>Rule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>table</td>
<td>Full override</td>
<td>The table definition overrides any other table setting (with the same name) for this entity. There is no merging of individual table values.</td>
</tr>
<tr>
<td>secondary-table</td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td>primary-key-join-column</td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td>id-class</td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td>inheritance</td>
<td>Full override</td>
<td>If an inheritance setting exists, then the eclipselink-orm.xml's inheritance setting overrides the existing setting, or creates a new inheritance setting.</td>
</tr>
<tr>
<td>Setting</td>
<td>Override Type</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------</td>
<td>---------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>discriminator-value</td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td>discriminator-column</td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td>sequence-generator</td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td>table-generator</td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td><strong>tag</strong></td>
<td><strong>Action</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>named-query</strong></td>
<td>Merge and full override</td>
<td>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.</td>
</tr>
<tr>
<td><strong>named-native-query</strong></td>
<td>Merge and full override</td>
<td>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.</td>
</tr>
<tr>
<td><strong>sql-result-set-mapping</strong></td>
<td>Merge and full override</td>
<td>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.</td>
</tr>
<tr>
<td><strong>exclude-default-listeners</strong></td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td>Setting</td>
<td>Override Type</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>exclude-superclass-listeners</td>
<td>Full override</td>
<td>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.</td>
</tr>
</tbody>
</table>
| 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.  
**Note:** 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. |
<p>| 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.                                                                 |</p>
<table>
<thead>
<tr>
<th>Setting</th>
<th>Override Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>post-removal</td>
<td>Full override</td>
<td>If a post-removal setting exists, then the eclipselink-orm.xml's post-removal setting overrides the existing setting, or creates a new post-removal setting.</td>
</tr>
<tr>
<td>pre-update</td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td>post-update</td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td>post-load</td>
<td>Full override</td>
<td>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.</td>
</tr>
<tr>
<td>attributes</td>
<td>Merge and mapping level override</td>
<td>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.</td>
</tr>
<tr>
<td>association-override</td>
<td>Merge and mapping level override</td>
<td>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.</td>
</tr>
<tr>
<td>name</td>
<td>Full override</td>
<td>If a name setting exists, then the eclipselink-orm.xml's name setting overrides the existing setting, or creates a new name setting.</td>
</tr>
<tr>
<td>class</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>
**Table 6-4** lists the individual override rules Embeddable classes.

**Table 6-5 Overriding and Merging Embeddable Classes**

<table>
<thead>
<tr>
<th>entity-mappings/ embeddable</th>
<th>Rule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>attributes</td>
<td>Override and merge</td>
<td>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.</td>
</tr>
<tr>
<td>class</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>access</td>
<td>Full override</td>
<td>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.</td>
</tr>
</tbody>
</table>
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 EclipseLink 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 EclipseLink 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 EclipseLink 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 EclipseLink project contains:

- META-INF/orm.xml – Defines Entity A with mappings b and c.
- META-INF/extensions/eclipselink-orm.xml – 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 EclipseLink 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 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).