Dali Java Persistence Tools

User Guide

Release 1.0.0 for Eclipse

May 2007

Dali Java Persistence Tools User Guide

Contents

1 Getting started

This section provides information on getting started with the Java Persistence Tools.

- Requirements and installation
- Dali quick start
- Dali basic tutorial

For additional information, please visit the Dali home page at:
`http://www.eclipse.org/webtools/dali/main.php/`.

1.1 Requirements and installation

Before installing Dali, ensure that your environment meets the following *minimum* requirements:

- Eclipse 3.3 (`http://www.eclipse.org/downloads`)
- Java Runtime Environment (JRE) 1.5 (`http://java.com`)
- Eclipse Web Tools Platform (WTP) 2.0 (`http://www.eclipse.org/webtools`)
- Java Persistence API (JPA) for Java EE 5. The reference implementation can be obtained from:

`https://glassfish.dev.java.net/downloads/persistence/JavaPersistence.html`

Refer to `http://www.eclipse.org/webtools/dali/gettingstarted_main.html` for additional installation information.

Review the Dali quick start and Dali basic tutorial to build your first Dali project.

1.2 Dali quick start

This section includes information to help you quickly start using Dali to create relational mappings between Java persistent entities and database tables.

- Creating a new project
- Creating a Java persistent entity
- Mapping an entity

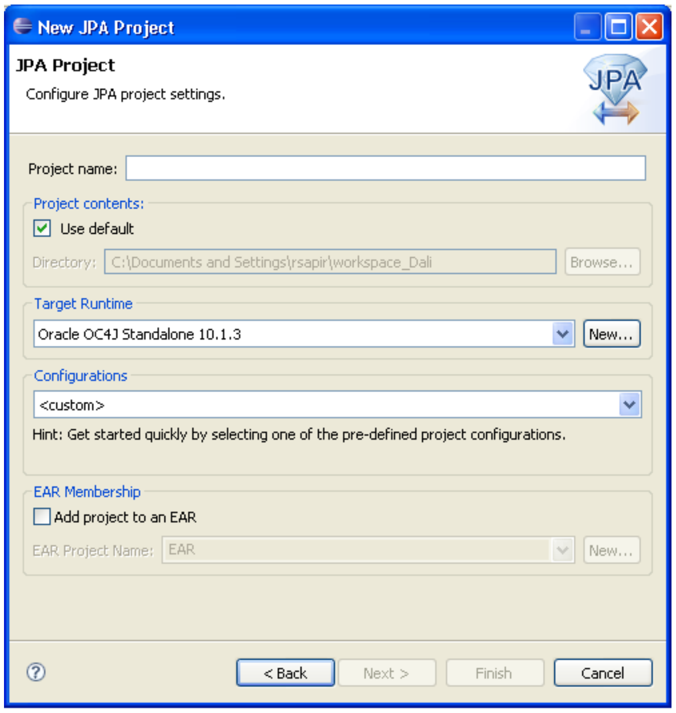
The Dali basic tutorial contains detailed procedures for building you first Dali project.

1.2.1 Creating a new project

This quick start shows how to create a new JPA project.

1. Select **File > New > Project**. The New Project dialog appears.
2. On the New Project dialog, select **JPA > JPA Project** and click **Next**. The Create a Java Project dialog appears.

Figure 1–1 New JPA Project



New JPA Project

JPA Project

Configure JPA project settings.

Project name:

Project contents:

☑ Use default

Directory: C:\Documents and Settings\rsapir\workspace_Dali

Target Runtime

Oracle OC4J Standalone 10.1.3

Configurations

<custom>

Hint: Get started quickly by selecting one of the pre-defined project configurations.

EAR Membership

☐ Add project to an EAR

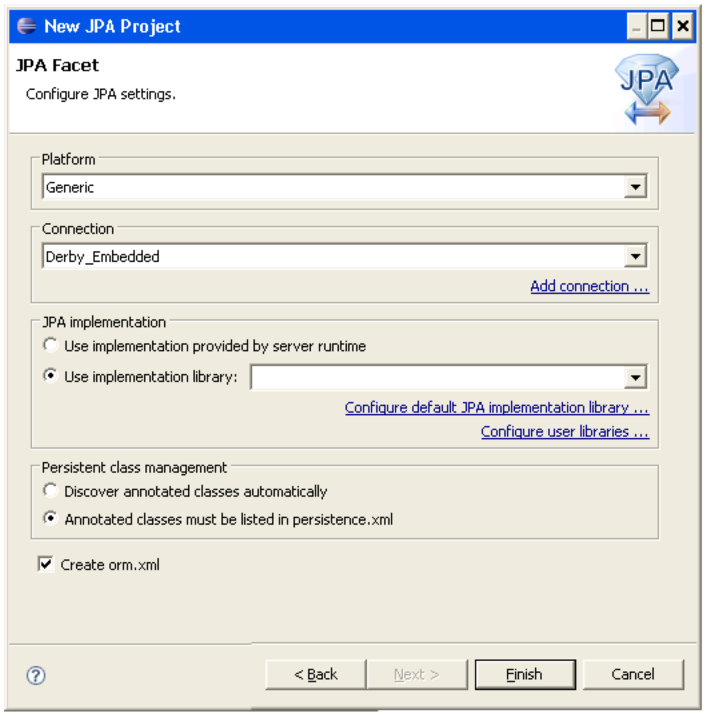
EAR Project Name: EAR

3. On the Create a JPA Project dialog, enter a **Project name** (such as `QuickStart`).
4. Select your **Target Runtime** (such as `Apache Tomcat`) and click **Next**. The Project Facets dialog appears.
5. Verify that the **Java Persistence 1.0** facet is selected and click **Next**. The JPA Facet dialog appears.

> **Note:** You must configure your project to use Java version 5.0 (or higher). See "Requirements and installation" on page 1-1 for more information.

6. On the JPA Facet dialog, select your vendor-specific JPA platform, database connection (or create a new connection), JPA implementation library (such as TopLink Essentials), define how Dali should manage persistent classes, and click **Finish**.

Figure 1–2 JPA Facet Dialog


New JPA Project

JPA Facet

Configure JPA settings.

Platform: Generic

Connection: Derby_Embedded

Add connection ...

JPA implementation

( ) Use implementation provided by server runtime

(•) Use implementation library:

Configure default JPA implementation library ...

Configure user libraries ...

Persistent class management

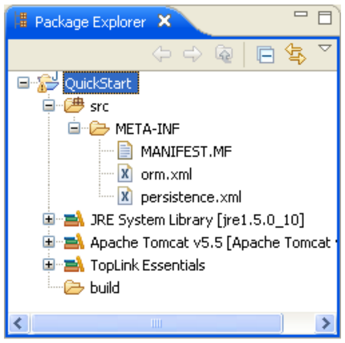
( ) Discover annotated classes automatically

(•) Annotated classes must be listed in persistence.xml

[✓] Create orm.xml

Eclipse adds the project to the workbench and opens the JPA perspective.

Figure 1–3 Project in Package Explorer



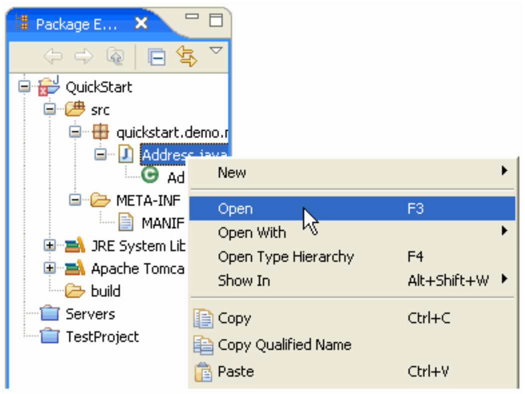
Now that you have created a project with persistence, you can continue with Creating a Java persistent entity.

1.2.2 Creating a Java persistent entity

This quick start shows how to create a new persistent Java entity. We will create an entity to associate with a database table. You will also need to add the ADDRESS table to your database.

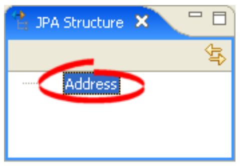
1. Right-click the project in the Package Explorer and select **New > Class**. The New Java Class page appears.
2. On the Java Class page, enter a package name (such as `quickstart.demo.model`), class name (such as `Address`), and click **Finish**.
3. Right-click the `Address.java` file in the Package Explorer and select **Open**.

Figure 1–4 Open Address.java



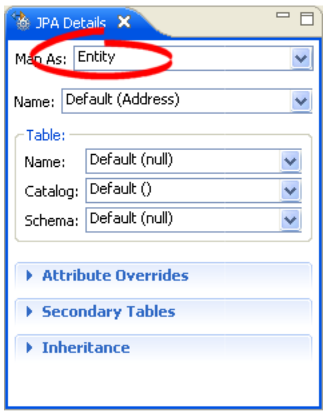
4. Select the `Address` entity in the JPA Structure view.

Figure 1–5 Address Class in JPA Structure View



5. In the JPA Details view, in the Map As field, select **Entity**. In the Table field, select the **ADDRESS** database table.

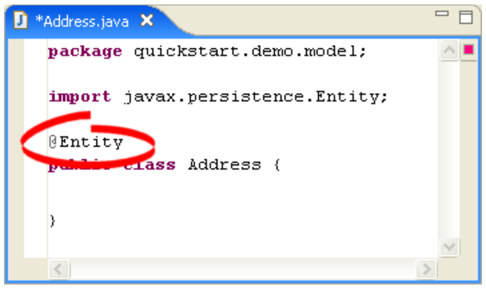
Figure 1–6 Address Entity in JPA Details View



Map As: Entity
Name: Default (Address)
Table:
Name: Default (null)
Catalog: Default ()
Schema: Default (null)

Eclipse creates the persistent entity and adds the `@Entity` annotation to the class.

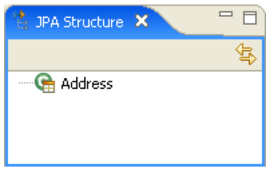
Figure 1–7   Address Entity



```
package quickstart.demo.model;

import javax.persistence.Entity;

@Entity
public class Address {

}
```

Eclipse also displays the **Address** entity in the JPA Structure view:

Figure 1–8   Address Entity

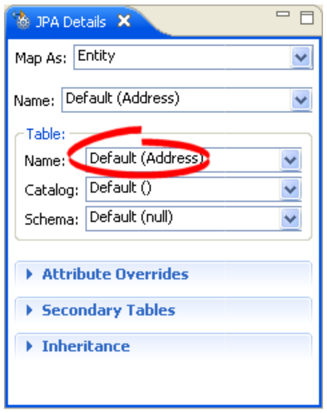


After creating the entity, you must associate it with a database table.

1. Select the **Address** class in the Explorer view.
2. In the Persistence Properties view, notice that Dali has automatically associated the ADDRESS database table with the entity because they are named identically.

> **Note:** Depending on your database connection type, you may need to specify the **Schema**.

Figure 1–9   JPA Details View for Address Entity



Map As: Entity
Name: Default (Address)
Table:
Name: Default (Address)
Catalog: Default ()
Schema: Default (null)

After associating the entity with the database table, you must update the `persistence.xml` file to include this JPA entity.

Right-click the `persistence.xml` file in the Package Explorer and select **JPA Tools > Synchronize Classes**. Dali adds the following to the `persistence.xml` file:

```
<class>quickstart.demo.model.Address</class>
```

Now that you have created a persistent entity, you can continue with Mapping an entity to map the entity's fields to columns on the database table.

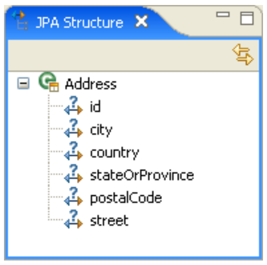
1.2.3 Mapping an entity

This quick start shows how to map fields in a Java persistent entity. Before beginning, add the following fields to the Address class:

```
private Long id;
private String city;
private String country;
private String stateOrProvince;
private String postalCode;
private String street;
```

Eclipse updates the Address entity in the JPA Structure view to show its fields:

Figure 1–10 Address Entity and Fields



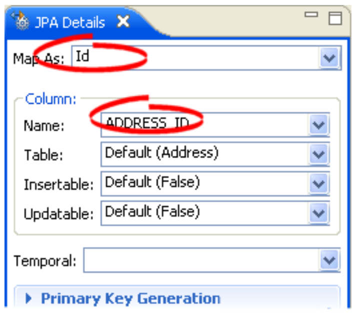
You will also need to add the following columns to the ADDRESS database table:

```
NUMBER(10,0) ADDRESS_ID (primary key)
VARCHAR2(80) PROVINCE
VARCHAR2(80) COUNTRY
VARCHAR2(20) P_CODE
VARCHAR2(80) STREET
VARCHAR2(80) CITY
```

Now we are ready to map each fields in the Address class to a column in the database table.

1. Select the **id** field in the JPA Details view.
2. In the JPA Details view:
   - For the Map As field, select **Id**
   - For the Column field, select **ADDRESS_ID**.

Figure 1–11 JPA Details View for addressId Field



Map As: Id
Column:
Name: ADDRESS_ID
Table: Default (Address)
Insertable: Default (False)
Updatable: Default (False)
Temporal:

Eclipse adds the following annotations to the Address entity:

```
@Id
@Column(name="ADDRESS_ID")
```

3. Map each of the following fields (as **Basic** mappings) to the appropriate database column:

Field	Map As	Database Column
city	Basic	CITY
country	Basic	COUNTRY
postalCode	Basic	P_CODE
provinceOrState	Basic	PROVINCE
street	Basic	STREET

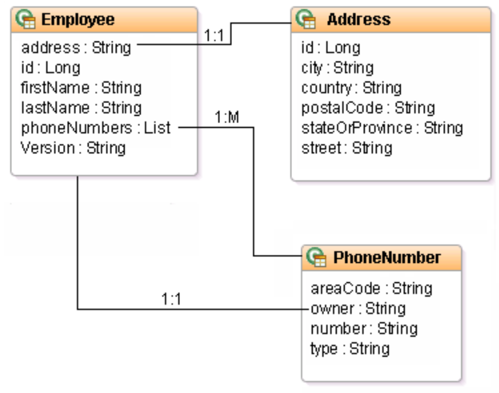
Notice that Dali will automatically map some fields to the correct database column (such as the **city** field to the CITY column) if the names are identical.

Refer to the Dali basic tutorial to map a complete object model using basic and relational mappings.

1.3 Dali basic tutorial

In this tutorial, you will use Dali to map the object model of a company's HR application to track its employees. Figure 1–12 illustrates the object model for the tutorial.

Figure 1–12 Tutorial Object Model



1.3.1 Generate the tutorial database schema

The tutorial application uses three database tables to store each employee's information: EMPLOYEE, ADDRESS and PHONE. Table 1–1 describes the columns for each table.

You can download SQL scripts to build and populate the database tables with sample data from `http://www.eclipse.org/webtools/dali/docs/dbscripts.zip`.

Table 1–1 Tutorial Database Schema

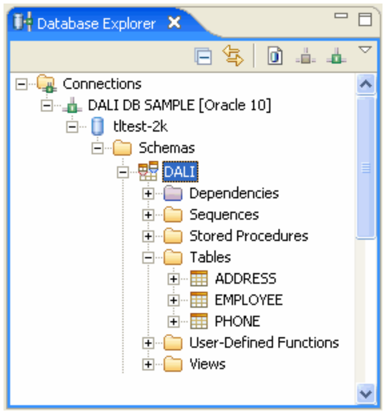
Table	Column	Type	Details
EMPLOYEE	EMP_ID	NUMBER(15)	Primary Key
	F_NAME	VARCHAR(40)	
	L_NAME	VARCHAR(40)	
	ADDR_ID	NUMBER(15)	Foreign Key, references ADDRESS.ADDRES_ID
	VERSION	NUMBER(15)	
ADDRESS	ADDRESS_ID	NUMBER(15)	Primary Key
	PROVINCE	VARCHAR(80)	
	COUNTRY	VARCHAR(80)	
	STREET	VARCHAR(80)	
	P_CODE	VARCHAR(20)	
	CITY	VARCHAR(80)	
PHONE	EMP_ID	NUMBER(15)	Foreign Key, reference to EMPLOYEE.EMP_ID
	AREA_CODE	VARCHAR(3)	
	P_NUMBER	VARCHAR(7)	Primary key
	TYPE	VARCHAR(15)	

1.3.1.1 Create a database connection

After creating the database you will need to create a database connection to use with the tutorial application. An active database connection is required to complete tutorial application.

Use the New Connection wizard to create a database connection.

Figure 1–13 Database Explorer



Now you're ready to Create a JPA project.

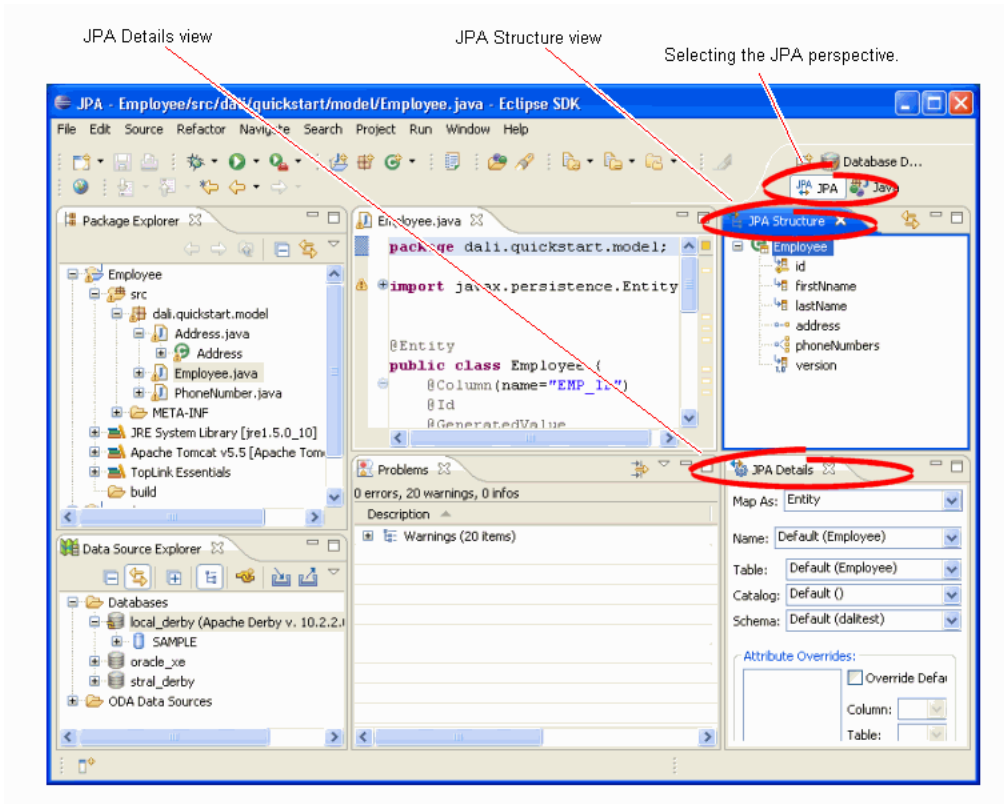
1.3.2 Create a JPA project

In order to begin, you must create a new Java project.

1. Select **File > New > Project**. The New Project dialog appears.
2. On the New Project dialog, select **JPA > JPA Project** and click **OK**. The New JPA Project dialog appears.
3. On the New JPA Project dialog, enter `Employee` as the **Project name** and click **Next**. The Project Facets page appears.
4. Verify that you have selected a Java 5.0 (or higher) and JPA 1.0 facet, and click **Next**. The JPA Facet page appears.
5. Select your vender-specific platform, database connection, and JPA implementation library, and click **Finish**.

Eclipse adds the project to the workbench and opens the Java perspective.

Figure 1–14 Persistence Perspective



```
package dali.quickstart.model;

import javax.persistence.Entity

@Entity
public class Employee {
    @Column(name="EMP_ID")
    @Id
    @GeneratedValue
```

0 errors, 20 warnings, 0 infos

Map As: Entity
Name: Default (Employee)
Table: Default (Employee)
Catalog: Default ()
Schema: Default (daltest)

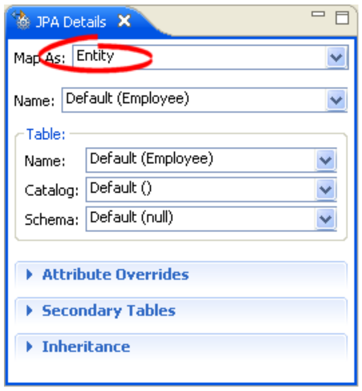
The next step is to Create persistent Java entities.

1.3.3 Create persistent Java entities

The Tutorial Object Model contains three entities: **Employee**, **Address**, and **PhoneNumber**. Use this procedure to add the entities to the project.

1. Right-click the **Employee** project in the Package Explorer and select **New > Class**. The New Java Class dialog appears.
2. On the Java Class dialog, enter a package name (such as `dali.tutorial.model`), class name (such as `Employee`), and click **Finish**. Eclipse adds the Employee entity to the Package Explorer.
3. Select the `Employee` entity in the JPA Structure view.
4. In the JPA Details view, in the Map As field, select **Entity**. In the Table field, select the **EMPLOYEE** database table.

Figure 1–15 Employee Entity in JPA Details View



Map As: Entity

Name: Default (Employee)

Table:

Name: Default (Employee)

Catalog: Default ()

Schema: Default (null)

Eclipse adds the `@Entity` annotation to the class. Repeat this procedure to add the **PhoneNumber** and **Address** entities.

Notice that the Problems view reports several errors for each entity. We'll address these shortly.

1.3.3.1 Add fields to the entities

Before mapping the entities to the database, you must add the necessary fields to each entity.

1. Add the following fields to the **Employee** entity:

```
private Long id;
private String firstNname;
private String lastName;
private String address;
private List<PhoneNumber> phoneNumbers;
private Long version;
```

2. Import **java.util.List**.
3. Generate Getters and Setters for each field.
4. Add the following fields to the **Address** entity:

```
private Long id;
private String street;
private String city;
private String stateOrProvince;
private String country;
private String postalCode;
```

5. Add the following fields to the **PhoneNumber** entity:

```
private String type;
private String areaCode;
private String number;
private Employee owner;
```

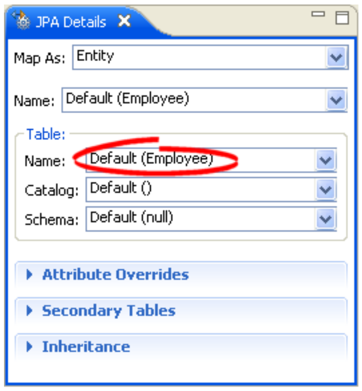
1.3.3.2 Associate the entity with a database table

Now you must associate each entity with its primary database table.

1. Select the **Employee** class in the Explorer view.

2. In the JPA Details view, notice that Dali has automatically selected the EMPLOYEE table as the table name.

Figure 1–16 JPA Details View for the Employee Entity



Map As: Entity
Name: Default (Employee)
Table:
Name: Default (Employee)
Catalog: Default ()
Schema: Default (null)

By default, Dali attempts to associate each entity with a similarly named database table. Notice that although you have not explicitly associated the **Address** entity yet, there is no error in the Problems view because the entity name, Address, is identical to the table name (ADDRESS).

For the **PhoneNumber** entity, however, there is an error. This is because the entity name (PhoneNumber) is different than the database table (PHONE). You must explicitly associate the entity with the PHONE table. Dali adds the `@Table(name="PHONE")` annotation to the entity.

Now you are ready to Create OR mappings.

1.3.4 Create OR mappings

Now you're ready to map the attributes of each persistent entity to columns in the appropriate database table. For the tutorial application, you will use the following mapping types:

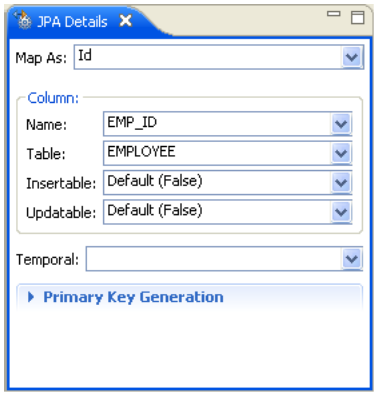
- ID mappings
- Basic mappings
- One-to-one mappings
- Many-to-one mappings
- One-to-many mappings
- Version mappings

1.3.4.1 Create ID mappings

Use an **ID Mapping** to specify the primary key of an entity. Each persistent entity must have an ID. Notice that the Problems view reports that each entity is missing an ID.

1. Select the **Employee** entity in the Package Explorer view.
2. Expand the **Employee** entity in the JPA Structure view and select the **id** field. The JPA Details view (for attributes) displays the properties for the field.
3. In the Map As field, select **ID**.

Figure 1–17 ID Mapping for emp_id Field



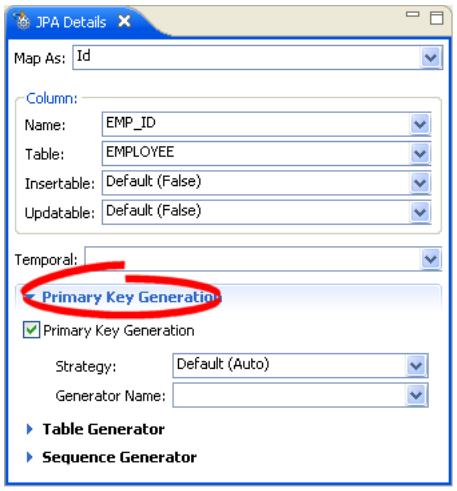
Map As: Id
Name: EMP_ID
Table: EMPLOYEE
Insertable: Default (False)
Updatable: Default (False)
Temporal:

4. Use this table to complete the remaining fields in the JPA Details view.

Property	Description
Map As	Defines this mapping as an **ID Mapping**. Dali adds the `@Id` annotation to the entity.
Column	The database column for the primary key of the table associated with the entity. Select **EMP_ID**. Because the database column (EMP_ID) is named differently than the entity field (id), Dali adds the `@Column(name="EMP_ID")` annotation.

5. Leave all other fields on the tab as their defaults. Expand the **Primary Key Generation** area.

Figure 1–18 Primary Key Generation for emp_id Field



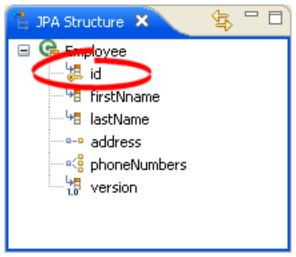
Map As: Id
Name: EMP_ID
Table: EMPLOYEE
Insertable: Default (False)
Updatable: Default (False)
Temporal:
[✓] Primary Key Generation
Strategy: Default (Auto)
Generator Name:

6. Use this table to complete the Primary Key Generation fields in the JPA Details view.

Property	Description
Generated Value	These fields define how the primary key is generated.
Strategy	For the tutorial project, use the **Auto** option.
Generator Name	Leave this field blank.

In the JPA Structure view, the **id** field is identified as the primary key by the following icon:

Figure 1–19 JPA Structure for Employee Entity



Repeat this procedure to map the following primary keys (as shown in Table 1–1, " Tutorial Database Schema"):

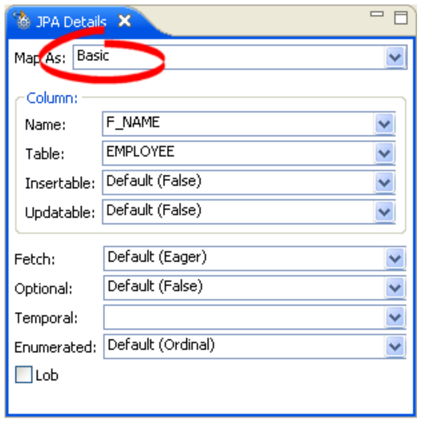
- The **id** field of the **Address** entity to the ADDRESS_ID column of the ADDRESS table.
- The **number** field of the **PhoneNumber** entity to the P_NUMBER column of the PHONE table.

1.3.4.2 Create basic mappings

Use a **Basic Mapping** to map an attribute directly to a database column. In the Tutorial Object Model, the **firstName** field of the **Employee** class maps directly to the F_NAME column of the EMPLOYEE database table.

1. Select the **Employee** entity in the Package Explorer view.
2. In the JPA Structure view, select the **firstName** field of the **Employee** entity. The JPA Details view (for attributes) displays the properties for the field.
3. In the Map As field, select **Basic**. In the Column field, select **F_NAME**.

Figure 1–20 Basic Mapping for firstName



Map As: Basic

Column:

Name: F_NAME

Table: EMPLOYEE

Insertable: Default (False)

Updatable: Default (False)

Fetch: Default (Eager)

Optional: Default (False)

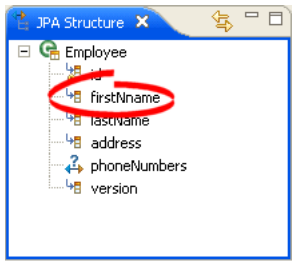
Temporal:

Enumerated: Default (Ordinal)

☐ Lob

Dali adds the `@Column(name="F_NAME")` annotation to the entity. In the JPA Structure, the **firstName** field is identified as a basic mapping as shown in the following figure:

Figure 1–21 JPA Structure for Employee Entity



Repeat this procedure to map each of the following fields as **Basic** mappings:

- Employee entity
  - **lastName** field to L_NAME column
- Address Entity
  - **city** field to CITY column
  - **country** field to COUNTRY column
  - **postalCode** field to P_CODE column
  - **stateOrProvice** field to PROVINCE column
  - **street** field to STREET column

Note: Because the **city**, **country**, and **street** fields are named identically to their database columns, Dali automatically maps the fields; no annotations are required.

- Phone Entity
  - **areaCode** field to AREA_CODE column
  - **type** field to TYPE column

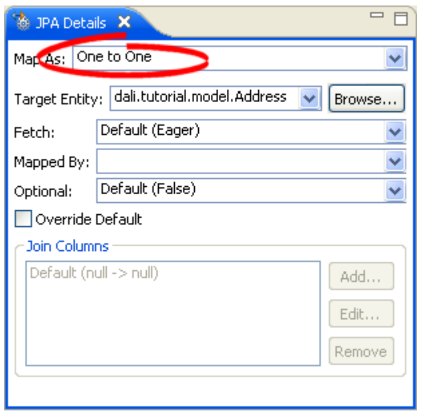
Note: Because the **type** field is named identically to its database column, Dali automatically maps the field. No annotation is required.

1.3.4.3 Create one-to-one mappings

Use a **One-to-One Mapping** to define a relationship from an attribute to another class, with one-to-one multiplicity to a database column. In the Tutorial Object Model, the **address** field of the **Employee** class has a one-to-one relationship to the **Address** class; each employee may have a single address.

1. Select the **Employee** entity in the Package Explorer view.
2. In the JPA Structure view, select the **address** field of the **Employee** entity. The JPA Details view (for attributes) displays the properties for the field.
3. In the Map As field, select **One-to-One**.

Figure 1–22 One-to-one Mapping for address

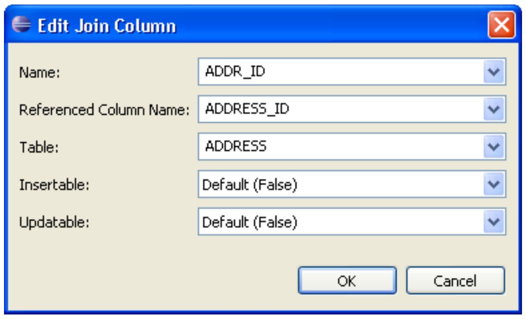


Map As: One to One
Target Entity: dali.tutorial.model.Address
Fetch: Default (Eager)
Mapped By:
Optional: Default (False)
Override Default
Default (null -> null)

4. For the Target Entity, click **Browse** and select the **Address** persistent entity. Dali adds the `@OneToOne(targetEntity=dali.tutorial.model.Address.class)` entity to the class.

   Leave the other fields with their default values.
5. Select the **Override Default** option to specify the relationship between the Employee and Address entities. Because you had to explicitly define the ID field for the Address entity in its ID mapping, you will need to edit the default join relationship.
6. Select the **address_ADDRESS_ID -> ADDRESS_ID** relationship in the Join Columns area and click **Edit**.
7. In the Edit Join Column dialog, select the following options and click **OK**.
   - Name: **ADDR_ID** (from the EMPLOYEE table)
   - Referenced Column Name: **ADDRESS_ID** (from the ADDRESS table)

Figure 1–23 Editing Join Column for Address Mapping

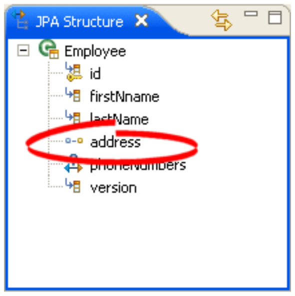


Edit Join Column

Name:	ADDR_ID
Referenced Column Name:	ADDRESS_ID
Table:	ADDRESS
Insertable:	Default (False)
Updatable:	Default (False)

In the JPA Structure, the **address** field is identified as a one-to-one mapping, as shown in the following figure:

Figure 1–24 JPA Structure for Employee Entity

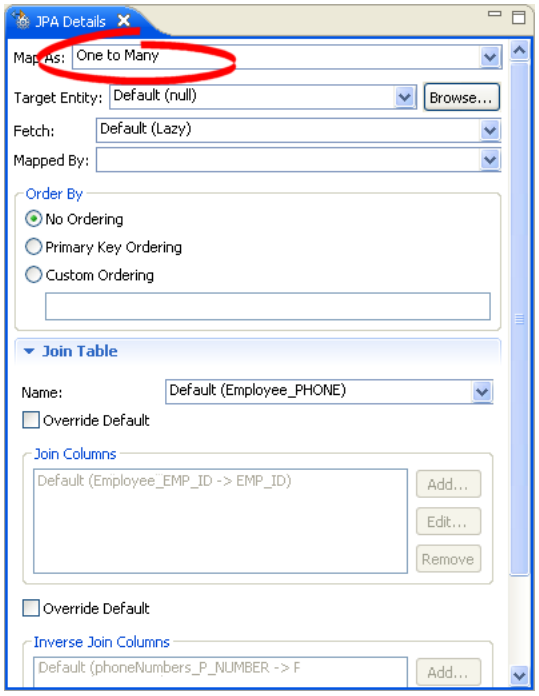


1.3.4.4 Create one-to-many mappings

Use a **One-to-Many Mapping** to define a relationship from an attribute to another class, with one-to-many multiplicity to a database column. In the Tutorial Object Model, the **phoneNumbers** field of the **Employee** class has a one-to-many relationship to the **Phone** class; each employee may have many phone numbers.

1. Select the **Employee** entity in the Package Explorer view.
2. In the JPA Structure view, select the **phoneNumber** field of the **Employee** entity. The JPA Details view (for attributes) displays the properties for the field.
3. In the Map As field, select **One-to-Many**.

Figure 1–25 One-to-many Mapping for phoneNumbers



JPA Details

Map As: One to Many

Target Entity: Default (null) Browse...

Fetch: Default (Lazy)

Mapped By:

Order By

- [✓ No Ordering]
- Primary Key Ordering
- Custom Ordering

Join Table

Name: Default (Employee_PHONE)

Override Default

Join Columns

Default (Employee_EMP_ID -> EMP_ID)

Add... Edit... Remove

Override Default

Inverse Join Columns

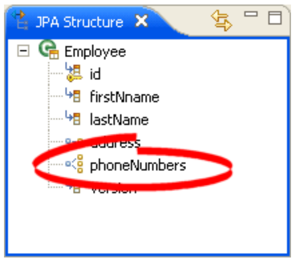
Default (phoneNumbers_P_NUMBER -> F

Add...

4. Select **PhoneNumber** as the Target Entity. Leave the other fields with their default values.
5. In the Join Table area, notice that Dali has selected the correct joins, based on the foreign key associations in the database tables.

In the JPA Structure, the **phoneNumbers** field is identified as a one-to-many mapping as shown in the following figure:

Figure 1–26 JPA Structure for Employee Entity



JPA Structure

Employee
- id
- firstNname
- lastName
- address
- phoneNumbers
- version

1.3.4.5 Create many-to-one mappings

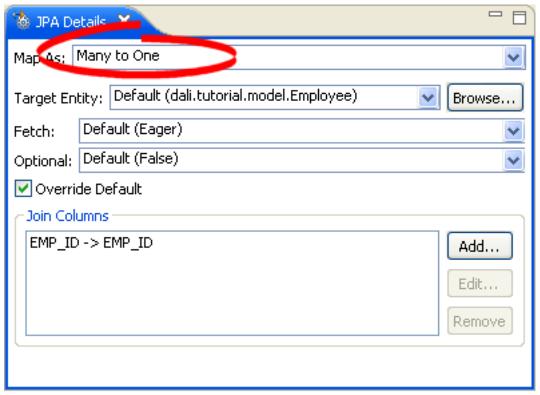
Use a **May-to-One Mapping** to define a relationship from an attribute to another class, with many-to-one multiplicity to a database column. In the Tutorial Object Model, the **owner** field of the **PhoneNumber** class has a one-to-many relationship to the **Employee** class; there are many phone numbers that each employee may have.

This is the "back mapping" of the one-to-many mapping you previously defined.

1. Select the **PhoneNumber** entity in the Package Explorer view.
2. In the JPA Structure view, select the **owner** field of the **PhoneNumber** entity. The JPA Details view (for attributes) displays the properties for the field.

3. In the Map As field, select **Many to One**.

Figure 1–27 Many to One Mapping for owner

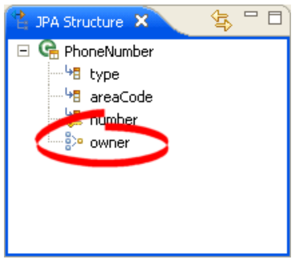


Map As: Many to One
Target Entity: Default (dali.tutorial.model.Employee)
Fetch: Default (Eager)
Optional: Default (False)
☑ Override Default
EMP_ID -> EMP_ID

4. Leave the other fields with their default values. Dali correctly completes the information based on the database structure and previously defined mappings.
5. Use the **Join Columns** area to specify the relationship between the PhoneNumber and Employee entities. Because you had to explicitly define the ID field for the Employee entity in its ID mapping, you will need to edit the default join relationship.
6. Select the **Override Default** option.
7. Select the **owner_EMP_ID -> EMP_ID** relationship in the Join Columns area and click **Edit**.
8. In the Edit Join Column dialog, select the following options and click **OK**.
   - Name: **EMP_ID** (from the PHONE table)
   - Referenced Column Name: **EMP_ID** (from the EMPLOYEE table)

In the JPA Structure, the **owner** field is identified as a many-to-one mapping as shown in the following figure:

Figure 1–28 JPA Structure for PhoneNumber Entity



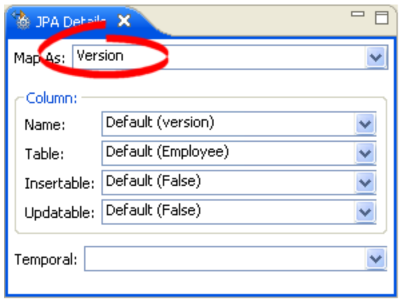
1.3.4.6 Create version mappings

Use a **Version Mapping** to specify the database field used by a persistent entity for optimistic locking.

1. Select the **Employee** entity in the Package Explorer view.
2. In the JPA Structure view, select the **version** field of the **Employee** entity. The JPA Details view (for attributes) displays the properties for the field.

3. In the Map As field, select **Version**.

Figure 1–29 Version Mapping for version



Map As: Version

Column:

Name: Default (version)

Table: Default (Employee)

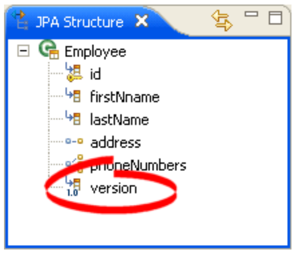
Insertable: Default (False)

Updatable: Default (False)

Temporal:

Dali automatically selects the Version column in the EMPLOYEE database table. In the JPA Structure, the **Version** field is identified as a version mapping, as shown in the following figure:

Figure 1–30 JPA Structure for Employee Entity



Congratulations! All of the entities have been successfully mapped.

2 Concepts

This section contains an overview of concepts you should be familiar with when using Dali to create mappings for Java persistent entities.

- Understanding Java persistence
- Understanding OR mappings
- Understanding EJB 3.0 Java Persistence API

In addition to these sections, you should review the following resources for additional information:

- Eclipse Dali project: `http://www.eclipse.org/webtools/dali`
- Eclipse Web Tools Platform project: `http://www.eclipse.org/webtools`
- JSR 220 EJB 3.0 specification: `http://www.jcp.org/en/jsr/detail?id=220`

2.1 Understanding Java persistence

Persistence refers to the ability to store objects in a database and use those objects with transactional integrity. In a J2EE application, data is typically stored and persisted in the data tier, in a relational database.

Entity beans are enterprise beans that contain persistent data and that can be saved in various persistent data stores. The entity beans represent data from a database; each entity bean carries its own identity. Entity beans can be deployed using *application-managed persistence* or *container-managed persistence*.

2.2 Understanding OR mappings

The Dali OR (object-relational) Mapping Tool allows you to describe how your entity objects *map* to the data source (or other objects). This approach isolates persistence information from the object model–developers are free to design their ideal object model, and DBAs are free to design their ideal schema.

These mappings transform an object data member type to a corresponding relational database data source representation. These OR mappings can also transform object data members that reference other domain objects stored in other tables in the database and are related through foreign keys.

You can use these mappings to map simple data types including primitives (such as `int`), JDK classes (such as `String`), and large object (LOB) values. You can also use them to transform object data members that reference other domain objects by way of association where data source representations require object identity maintenance (such as sequencing and back references) and possess various types of multiplicity and navigability. The appropriate mapping class is chosen primarily by the cardinality of the relationship.

2.3 Understanding EJB 3.0 Java Persistence API

The Java 2 Enterprise Edition(J2EE) Enterprise JavaBeans (EJB) are a component architecture that you use to develop and deploy object-oriented, distributed, enterprise-scale applications. An application written according to the Enterprise JavaBeans architecture is scalable, transactional, and secure.

The EJB 3.0 Java Persistence API (JPA) improves the EJB architecture by reducing its complexity through the use of metadata (annotations) and specifying programmatic defaults of that metadata.

2.3.1 The persistence.xml file

The JPA specification requires the use of a `persistence.xml` file for deployment. This file defines the database and entity manager options, and may contain more than one persistence unit. Dali can use the Eclipse XML Editor to create and maintain this information. See "Managing the persistence.xml file" on page 3-3 for more information.

2.3.2 The orm.xml file

Although the JPA specification emphasizes the use of annotations to specify persistence, you can also the `orm.xml` file to store this metadata. Dali can use the Eclipse XML Editor to create and maintain this information. The metadata must match the XSD specification of your selected JPA implementation. See "Managing the orm.xml file" on page 3-5 for more information.

3 Tasks

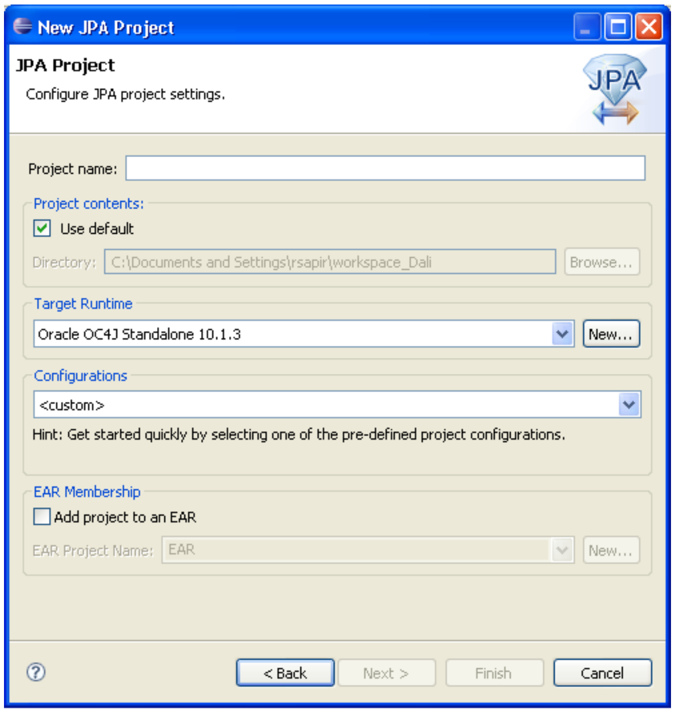
This section includes detailed step-by-step procedures for accessing the Dali OR mapping tool functionality.

3.1 Creating a new JPA project

Use this procedure to create a new JPA project.

1. Select **File > New > Other**. The New Project dialog appears.
2. On the New Project dialog, select **JPA > JPA Project** and click **Next**. The New JPA Project wizard appears.

Figure 3–1 New JPA Project



New JPA Project

JPA Project

Configure JPA project settings.

Project name:

Project contents:

☑ Use default

Directory: C:\Documents and Settings\rsapir\workspace_Dali

Target Runtime

Oracle OC4J Standalone 10.1.3

Configurations

<custom>

Hint: Get started quickly by selecting one of the pre-defined project configurations.

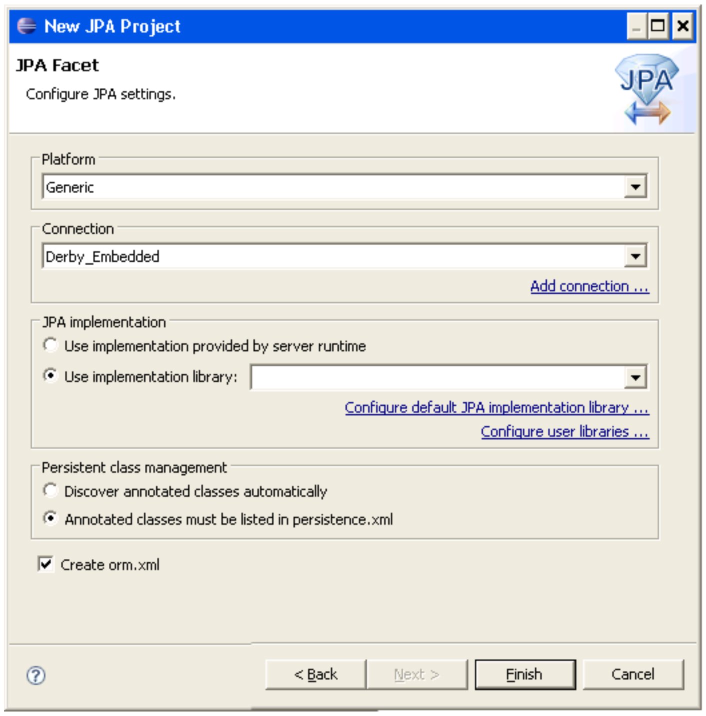
EAR Membership

☐ Add project to an EAR

EAR Project Name: EAR

3. Complete the fields on the New JPA Project page to specify the project name and location, target runtime, and pre-defined configuration.
4. Click **Next**. The Project Facets page appears.
5. Select the project facets to use to create the project and click **Next**. The JPA Facet page appears.

Figure 3–2 New JPA Project


New JPA Project
JPA Facet
Configure JPA settings.
JPA
Platform
Generic
Connection
Derby_Embedded
Add connection ...
JPA implementation
Use implementation provided by server runtime
Use implementation library:
Configure default JPA implementation library ...
Configure user libraries ...
Persistent class management
Discover annotated classes automatically
Annotated classes must be listed in persistence.xml
Create orm.xml
< Back
Next >
Finish
Cancel

6. Complete the fields on the JPA Facet page to specify your vender-specific platform, database connection, and JPA implementation library.

> **Note:** If the server runtime does not provide a JPA implementation, you must explicitly select a JPA implementation library.
>
> To insure the portability of your application, you must explicitly list the managed persistence classes that are included in the persistence unit. If the server supports EJB 3.0, the persistent classes will be discovered automatically.

7. Click **Finish**. You should now open the JPA Development perspective.

3.2 Managing the persistence.xml file

When creating a JPA project, (see "Creating a new JPA project") you can also create the `persistence.xml` file.

Eclipse creates the `META-INF\persistence.xml` file in your project's directory:

```
<?xml version="1.0" encoding="UTF-8"?>
<persistence version="<PERSISTENCE_VERSION>"
      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
      http://java.sun.com/xml/ns/persistence/persistence_1_0.xsd">
  <persistence-unit name="<PERSISTENCE_UNIT_NAME>">
    <provider="<PERSISTENCE_PROVIDER>" />
  </persistence-unit>
</persistence>
```

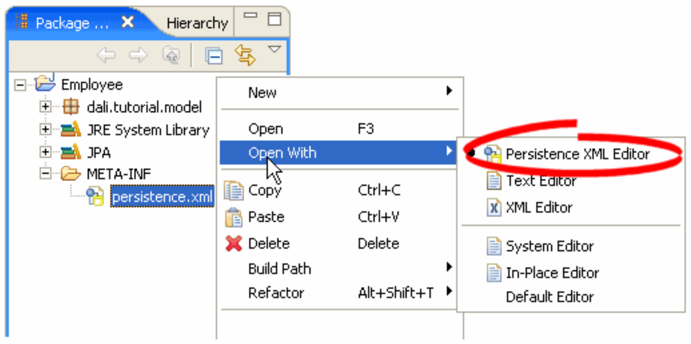
3.2.1 Working with persistence.xml file

You can work with the `persistence.xml` by using the XML Editor.

Use this procedure to work with the `persistence.xml` file:

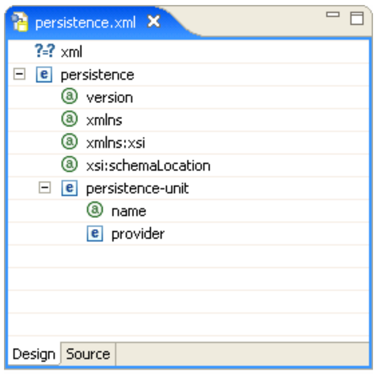
1. Right-click the `persistence.xml` file in the Package Explorer and select **Open With > XML Editor**.

Figure 3–3 Opening the Persistence XML Editor



2. Use the Persistence XML Editor to edit the `persistence.xml` file.

Figure 3–4 Persistence XML Editor



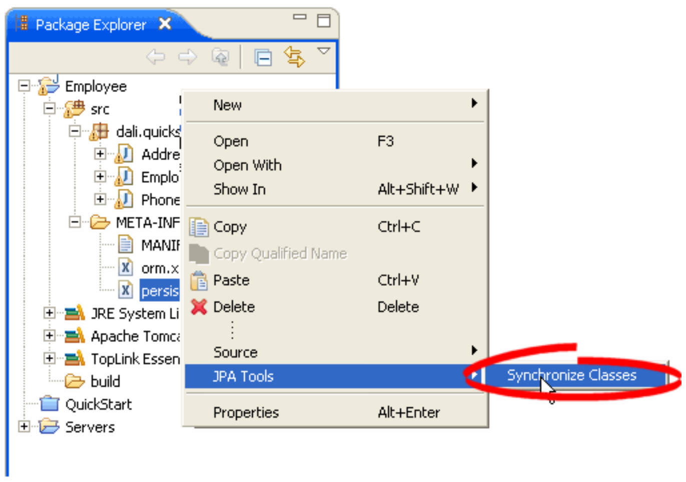
3.2.2 Synchronizing classes

As you work with the classes in your Java project, you will need to update the `persistence.xml` file to reflect the changes.

Use this procedure to synchronize the `persistence.xml` file:

1. Right-click the `persistence.xml` file in the Package Explorer and select **JPA Tools > Synchronize Classes**.

Figure 3–5 Synchronizing the persistence.xml File



Dali adds the necessary `<class>` elements to the `persistence.xml` file.

2. Use the Persistence XML Editor to continue editing the `persistence.xml` file.

3.3 Managing the orm.xml file

When creating a JPA project, (see "Creating a new JPA project") you can also create the `orm.xml` file that defines the mapping metadata and defaults.

Eclipse creates the `META-INF\orm.xml` file in your project's directory:

```
<?xml version="1.0" encoding="UTF-8"?>
<persistence version="<PERSISTENCE_VERSION>"
      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
      http://java.sun.com/xml/ns/persistence/persistence_1_0.xsd">
  <persistence-unit name="<PERSISTENCE_UNIT_NAME>">
    <provider="<PERSISTENCE_PROVIDER>" />
  </persistence-unit>
</persistence>
```

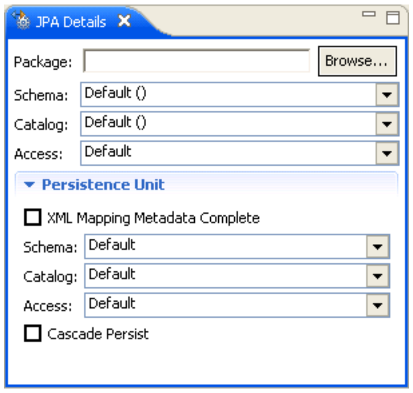
3.3.1 Working with orm.xml file

You can work with the `orm.xml` by using the JPA Details view.

Use this procedure to work with the `orm.xml` file:

1. Right-click the `orm.xml` file in the Package Explorer and select **Open**.
2. In the JPA Structure view, select **EntityMappings**.
3. Use the JPA Details view to configure the entity mapping and persistence unit defaults.

Figure 3–6 JPA Details view for EntityMappings (orm.xml)



Package:
Schema: Default ()
Catalog: Default ()
Access: Default

Persistence Unit

☐ XML Mapping Metadata Complete
Schema: Default
Catalog: Default
Access: Default
☐ Cascade Persist

3.4 Adding persistence to a class

You can make a Java class into one of the following persistent types:

- Entity
- Embeddable
- Mapped superclass

3.4.1 Entity

An **Entity** is a persistent domain object.

An entity *can be*:

- Abstract or concrete classes. Entities may also extend non-entity classes as well as entity classes, and non-entity classes may extend entity classes.

An entity *must have*:

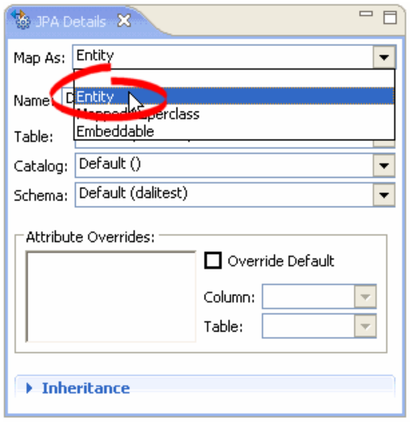
- A no-arg constructor (public or protected); the entity class may have other constructors as well.

Each persistent entity must be mapped to a database table and contain a primary key. Persistent entities are identified by the `@Entity` annotation.

Use this procedure to add persistence to an existing entity:

1. Open the Java class in the Package Explorer.
2. Select the class in the JPA Structure view.
3. In the JPA Details view, use the **Map As** field to select **Entity**.

Figure 3–7 Selecting Entity Persistence



4. Complete the remaining JPA Details view (for entities).

3.4.2 Embeddable

An **Embedded** class is a class whose instances are stored as part of an owning entity; it shares the identity of the owning entity. Each field of the embedded class is mapped to the database table associated with the owning entity.

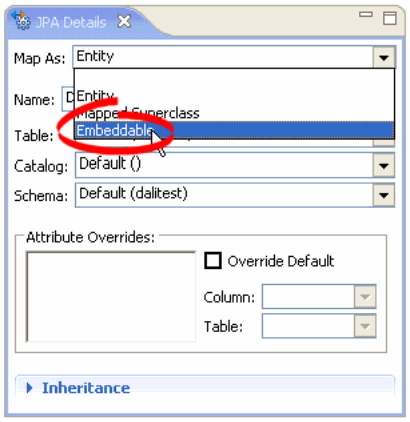
To override the mapping information for a specific subclass, use the `@AttributeOverride` annotation for that specific class.

An embeddable entity is identified by the `@Embeddable` annotation.

Use this procedure to add embeddable persistence to an existing entity:

1. Open the Java class in the Package Explorer.
2. Select the class in the JPA Structure view.
3. In the JPA Details view, use the **Map As** drop-list to select **Embeddable**.

Figure 3–8 Selecting Embeddable Persistence



4. Complete the remaining JPA Details view (for entities).

3.4.3 Mapped superclass

An entities that extend a **Mapped Superclass** class inherit the persistent state and mapping information from a superclass. You should use a mapped superclass to define mapping information that is common to multiple entity classes.

A mapped superclass *can be*:

- Abstract or concrete classes

A mapped superclass *cannot be*:

- Be queried or passed as an argument to Entity-Manager or Query operations
- Be the target of a persistent relationship

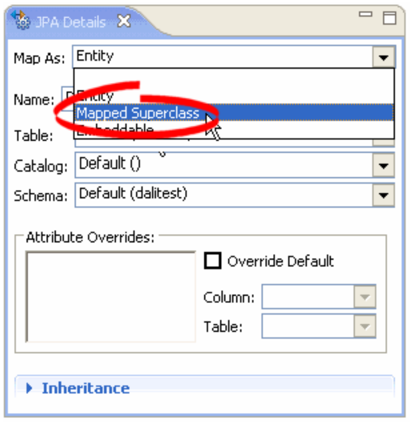
A mapped superclass does not have a defined database table. Instead, its mapping information is derived from its superclass. To override the mapping information for a specific subclass, use the `@AttributeOverride` annotation for that specific class.

A mapped superclass is identified by the `@MappedSuperclass` annotation.

Use this procedure to add Mapped Superclass persistence to an existing entity:

1. Open the Java class in the Package Explorer.
2. Select the class in the JPA Structure view.
3. In the JPA Details view, use the **Map As** drop-list to select **Mapped Superclass**.

Figure 3–9 Selecting Mapped Superclass Persistence



4. Complete the remaining JPA Details view (for entities).

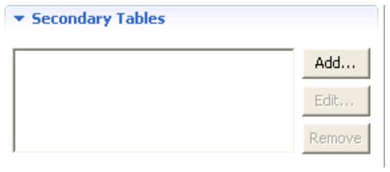
3.5 Specifying additional tables

An entity may inherit properties from other entities. You can specify a specific strategy to use for inheritance.

Use this procedure to specify inheritance (`@Inheritance)` for an existing entity (`@Entity`):

1. Select the entity in the Package Explorer.
2. In the JPA Details view, select the **Secondary Tables** information.

Figure 3–10 Specifying Secondary Tables



3. Click **Add** to associate an additional table with the entity. The Edit Secondary Table dialog appears
4. Select the **Name**, **Catalog**, and **Schema** of the additional table to associate with the entity.

Eclipse adds the following annotations the entity:

```
@SecondaryTable(name="NAME", catalog = "CATALOG", schema = "SCHEMA"
```

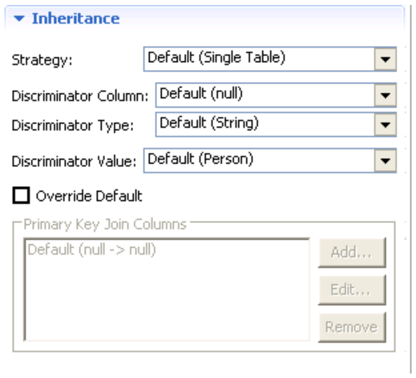
3.6 Specifying entity inheritance

An entity may inherit properties from other entities. You can specify a specific strategy to use for inheritance.

Use this procedure to specify inheritance (`@Inheritance)` for an existing entity (`@Entity`):

1. Select the entity in the Package Explorer.
2. In the JPA Details view, select the **Inheritance** information.

Figure 3–11 Specifying Inheritance



Strategy: Default (Single Table)
Discriminator Column: Default (null)
Discriminator Type: Default (String)
Discriminator Value: Default (Person)
Default (null -> null)

3. In the **Strategy** list, select one of the following the inheritance strategies:
   - A single table (default)
   - Joined table
   - One table per class
4. Use the following table to complete the remaining fields on the tab. See "Inheritance information" on page 4-3 for additional details.

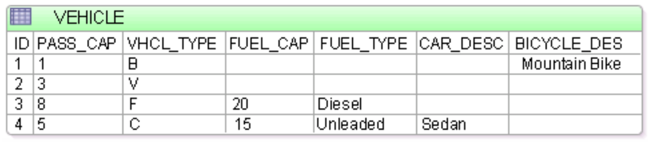
Property	Description	Default
Discriminator Column	Name of the discriminator column when using a **Single** or **Joined** inheritance strategy. This field corresponds to the `@DiscriminatorColumn` annotation.	
Discriminator Type	Set the discriminator type to `Char` or `Integer` (instead of its default: `String`). The **Discriminator Value** must conform to this type.	String
Discriminator Value	Specify the discriminator value used to differentiate an entity in this inheritance hierarchy. The value must conform to the specified **Discriminator Type**. This field corresponds to the `@DiscriminatorValue` annotation.	
Override Default	Use this field to specify custom primary key join columns. This field corresponds to the `@PrimaryKeyJoinClumn` annotation.	

Eclipse adds the following annotations the entity field:

```
@Inheritance(strategy=InheritanceType.<INHERITANCE_STRATEGY>)
@DiscriminatorColumn(name="<DISCRIMINATOR_COLUMN>",
    discriminatorType=<DISCRIMINATOR_TYPE>)
@DiscriminatorValue(value-"<DISCRIMINATOR_VALUE>")
@PrimaryKeyJoinColumn(name="<JOIN_COLUMN_NAME>",
    referencedColumnName = "<REFERENCED_COLUMN_NAME>")
```

The following figures illustrates the different inheritance strategies.

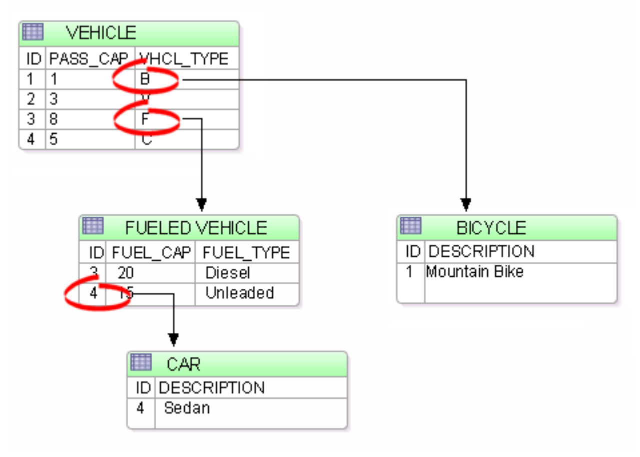
Figure 3–12 Single Table Inheritance



VEHICLE

ID	PASS_CAP	VHCL_TYPE	FUEL_CAP	FUEL_TYPE	CAR_DESC	BICYCLE_DES
1	1	B				Mountain Bike
2	3	V				
3	8	F	20	Diesel		
4	5	C	15	Unleaded	Sedan	

Figure 3–13 Joined Table Inheritance



VEHICLE

ID	PASS_CAP	VHCL_TYPE
1	1	B
2	3	V
3	8	F
4	5	C

FUELED VEHICLE

ID	FUEL_CAP	FUEL_TYPE
3	20	Diesel
4	15	Unleaded

BICYCLE

ID	DESCRIPTION
1	Mountain Bike

CAR

ID	DESCRIPTION
4	Sedan

3.7 Mapping an entity

Dali supports the following mapping types for Java persistent entities:

- Basic mapping
- Embedded mapping
- Embedded ID mapping
- ID mapping
- Many-to-many mapping
- Many-to-one mapping
- One-to-many mapping
- One-to-one mapping
- Transient mapping
- Version mapping

3.7.1 Basic mapping

Use a **Basic Mapping** to map an attribute directly to a database column. Basic mappings may be used only with the following attribute types:

- Java primitive types and wrappers of the primitive types
- `java.lang.String, java.math.BigInteger`
- `java.math.BigDecimal`
- `java.util.Date`
- `java.util.Calendar, java.sql.Date`
- `java.sql.Time`
- `java.sql.Timestamp`
- `byte[]`

- `Byte[]`
- `char[]`
- `Character[]`
- enums
- any other type that implements `Serializable`

To create a basic mapping:

1. In the JPA Structure view, select the field to map. The JPA Details view (for attributes) displays the properties for the selected field.
2. In the Map As field, select **Basic**.
3. Use this table to complete the remaining fields on the JPA Details view.

Property	Description	Default
Map As	Defines this mapping as a **Basic Mapping**. This field corresponds to the `@Basic` annotation.	Basic
Column	The database column mapped to the entity attribute. See "Column" on page 4-5 for details.	By default, the Column is assumed to be named identically to the attribute and always included in the `INSERT` and `UPDATE` statements.
Table	Name of the database table.	
Fetch	Defines how data is loaded from the database. See "Fetch Type" on page 4-5 for details. ▪ Eager ▪ Lazy	Eager
Optional	Specifies if this field is can be null.	Yes
Lob	Specifies if this is a large objects (BLOB or CLOB). See "Lob" on page 4-5 for details.	
Temporal	Specifies the type of data. See "Temporal" on page 4-5 for details. ▪ Date ▪ Time ▪ Timestamp	

Eclipse adds the following annotations to the field:

```
@Column(name="<COLUMN_NAME>", table="<COLUMN_TABLE>",
    insertable=<INSERTABLE>, updatable=<UPDATABLE>)
@Basic(fetch=FetchType.<FETCH_TYPE>, optional = <OPTIONAL>)
@Temporal(TemporalType.<TEMPORAL>)
```

3.7.2 Embedded mapping

Use an **Embedded Mapping** to specify a persistent field or property of an entity whose value is an instance of an embeddable class.

1. In the JPA Structure view, select the field to map. The JPA Details view (for attributes) displays the properties for the selected field.
2. In the Map As field, select **Embedded**.
3. Use this table to complete the remaining fields on the JPA Details view.

Property	Description	Default
Map As	Defines this mapping as a **Embedded**. This field corresponds to the `@Embedded` annotation.	Embedded
Attribute Overrides	Specify to override the default mapping of an entity's attribute. Select **Override Default**.	
Columns	The database column (and its table) mapped to the entity attribute. See "Column" on page 4-5 for details. ▪ Name – Name of the database column. ▪ Table – Name of the database table.	

Eclipse adds the following annotations to the field:

```
@Embedded
@AttributeOverride(column=@Column(table="<COLUMN_TABLE>", name = "<COLUMN_NAME>"))
```

3.7.3 Embedded ID mapping

Use an **Embedded ID Mapping** to specify the primary key of an embedded ID. These mappings may be used with a Embeddable entities.

1. In the JPA Structure view, select the field to map. The JPA Details view (for attributes) displays the properties for the selected field.
2. In the Map As field, select **Embedded Id**.
3. Use this table to complete the remaining fields on the JPA Details view.

Property	Description	Default
Map As	Defines this mapping as a **Embedded Id**. This field corresponds to the `@EmbeddedId` annotation.	Embedded Id

Eclipse adds the following annotations to the field:

```
@EmbeddedId
```

3.7.4 ID mapping

Use an **ID Mapping** to specify the primary key of an entity. ID mappings may be used with a Entity or Mapped superclass. Each Entity must have an ID mapping.

1. In the JPA Structure view, select the field to map. The JPA Details view (for attributes) displays the properties for the selected.
2. In the Map As field, select **ID**.
3. Use this table to complete the General information fields in the JPA Details view.

Property	Description	Default
Map As	Defines this mapping as an **ID Mapping**. This field corresponds to the `@Id` annotation.	ID
Column	The database column mapped to the entity attribute. See "Column" on page 4-5 for details.	By default, the Column is assumed to be named identically to the attribute.
Table	The database table mapped to the entity attribute.	By default, the Table is assumed to be identical to the table associated with the entity.
Temporal	Specifies the type of data. See "Temporal" on page 4-5 for details. ■ Date ■ Time ■ Timestamp	

4. Use this table to complete the fields in Primary Key Generation information area in the JPA Details view.

Property	Description	Default
Primary Key Generation	These fields define how the primary key is generated.	
Strategy	See "Primary Key Generation" on page 4-7 for details. ■ Auto ■ Sequence ■ Identity ■ Table	Auto
Generator Name	Name of the primary key generator specified in the **Strategy**	

Additional fields will appear in the Primary Key Generation information area, depending on the selected Strategy. See "JPA Details view (for attributes)" on page 4-4 for additional information.

Eclipse adds the following annotations to the field:

```
@Id
@Column(name="<COLUMN_NAME>", table="<TABLE_NAME>", insertable=<INSERTABLE>,
    updatable=<UPDATABLE>)
@Temporal(<TEMPORAL>)
@GeneratedValue(strategy=GeneratorType.<STRATEGY>, generator="<GENERATOR_NAME>")
@TableGenerator(name="<TABLE_GENERATOR_NAME>", table = "<TABLE_GENERATOR_TABLE>",
    pkColumnName = "<TABLE_GENERATOR_PK>",
    valueColumnName = "<TABLE_GENERATOR_VALUE_COLUMN>",
    pkColumnValue = "<TABLE_GENERATOR_PK_COLUMN_VALUE>")
@SequenceGenerator(name="<SEQUENCE_GENERATOR_NAME>",
    sequenceName="<SEQUENCE_GENERATOR_SEQUENCE>")
```

3.7.5 Many-to-many mapping

Use a **Many-to-Many Mapping** to define a many-valued association with many-to-many multiplicity. A many-to-many mapping has two sides: the *owning side* and *non-owning side*. You must specify the join table on the owning side. For bidirectional mappings, either side may be the owning side.

1. In the JPA Structure view, select the field to map. The JPA Details view (for attributes) displays the properties for the selected.
2. In the Map As field, select **Many-to-Many**.
3. Use this table to complete the General information fields of the JPA Details view.

Property	Description	Default
Map As	Defines this mapping as a **Many to Many Mapping**. This field corresponds to the `@ManyToMany` annotation.	Many to Many
Target Entity	The entity to which this attribute is mapped.	null You do not need to explicitly specify the target entity, since it can be inferred from the type of object being referenced.
Fetch	Defines how data is loaded from the database. See "Fetch Type" on page 4-5 for details. ▪ Eager ▪ Lazy	Lazy
Mapped By	The database field that owns the relationship.	
Order By	Specify the default order for objects returned from a query. See "Order By" on page 4-6 for details. ▪ No ordering ▪ Primary key ▪ Custom	No ordering

4. Use this table to complete the fields in the Join Table Information area in the JPA Details view.

Property	Description	Default
Name	Name of the join table that contains the foreign key column.	You must specify the join table on the owning side. By default, the name is assumed to be the primary tables associated with the entities concatenated with an underscore.

Property	Description	Default
Join Columns	Select **Override Default**, then Add, Edit, or Remove the join columns.	By default, the name is assumed to be the primary tables associated with the entities concatenated with an underscore.
Inverse Join Columns	Select **Override Default**, then Add, Edit, or Remove the join columns.	By default, the mapping is assumed to have a single join.

5. To add a new Join or Inverse Join Column, click **Add**.

   To edit an existing Join or Inverse Join Column, select the field to and click **Edit**.

Eclipse adds the following annotations to the field:

```
@JoinTable(joinColumns=@JoinColumn(name="<JOIN_COLUMN>"),
    name = "<JOIN_TABLE_NAME>")
@ManyToMany(cascade=CascadeType.<CASCADE_TYPE>, fetch=FetchType.<FETCH_TYPE>,
    targetEntity=<TARGET_ENTITY>, mappedBy = "<MAPPED_BY>")
@OrderBy("<ORDER_BY>")
```

3.7.6 Many-to-one mapping

Use a **Many-to-One** mapping to defines a single-valued association to another entity class that has many-to-one multiplicity.

1. In the JPA Structure view, select the field to map. The JPA Details view (for attributes) displays the properties for the selected.
2. In the Map As field, select **Many-to-One**.
3. Use this table to complete the General information fields JPA Details view.

Property	Description	Default
Target Entity	The entity to which this attribute is mapped.	null You do not need to explicitly specify the target entity, since it can be inferred from the type of object being referenced.
Fetch Type	Defines how data is loaded from the database. See "Fetch Type" on page 4-5 for details. ▪ Eager ▪ Lazy	Eager

4. Use this table to complete the fields on the Join Columns Information tab in the JPA Details view.

Property	Description	Default
Join Column	Specify a mapped column for joining an entity association. This field corresponds to the `@JoinColum` attribute. Select **Override Default**, then Add, Edit, or Remove the join columns.	By default, the mapping is assumed to have a single join.

Eclipse adds the following annotations to the field:

```
@JoinTable(joinColumns=@JoinColumn(name="<JOIN_COLUMN>"),
    name = "<JOIN_TABLE_NAME>")
@ManyToOne(targetEntity=<TARGET_ENTITY>, fetch=<FETCH_TYPE>,
    cascade=<CASCADE_TYPE>)
```

3.7.7 One-to-many mapping

Use a **One-to-Many Mapping** to define a relationship with one-to-many multiplicity.

1. In the JPA Structure view, select the field to map. The JPA Details view (for attributes) displays the properties for the selected.
2. In the Map As field, select **One-to-many**.
3. Use this table to complete the General information fields JPA Details view.

Property	Description	Default
Target Entity	The entity to which this attribute is mapped.	
Fetch Type	Defines how data is loaded from the database. See "Fetch Type" on page 4-5 for details. ▪ Eager ▪ Lazy	Eager
Mapped By	The database field that owns the relationship.	
Order By	Specify the default order for objects returned from a query. See "Order By" on page 4-6 for details. ▪ No ordering ▪ Primary key ▪ Custom	No ordering

4. Use this table to complete the Join Table Information fields in the JPA Details view.

Property	Description	Default
Name	Name of the join table	By default, the name is assumed to be the primary tables associated with the entities concatenated with an underscore.
Join Columns	Specify two or more join columns (that is, a primary key).	
Inverse Join Columns	The join column on the owned (or inverse) side of the association: the owned entity's primary key column.	

Eclipse adds the following annotations to the field:

```
@OneToMany(targetEntity=<TARGET_ENTITY>)
@Column(name="<COLUMN>")
```

```
@OneToMany(targetEntity=<TARGET_ENTITY>.class, cascade=CascadeType.<CASCADE_TYPE>,
    fetch = FetchType.<FETCH_TYPE>, mappedBy = "<MAPPED_BY>")
@OrderBy("<ORDER_BY>")
@JoinTable(name="<JOIN_TABLE_NAME>", joinColumns=@JoinColumn(name=
    "<JOIN_COLUMN_NAME>", referencedColumnName="<JOIN_COLUMN_REFERENCED_COLUMN>"),
    inverseJoinColumns=@JoinColumn(name="<INVERSE_JOIN_COLUMN_NAME>",
    referencedColumnName="<INVERSE_JOIN_COLUMN_REFERENCED_COLUMN>"))
```

3.7.8 One-to-one mapping

Use a **One-to-One Mapping** to define a relationship with one-to-many multiplicity.

1. In the JPA Structure view, select the field to map. The JPA Details view (for attributes) displays the properties for the selected.
2. In the Map As field, select **One-to-one**.
3. Use this table to complete the General information fields in the JPA Details view.

Property	Description	Default
Target Entity	The entity to which this attribute is mapped.	null You do not need to explicitly specify the target entity, since it can be inferred from the type of object being referenced.
Fetch Type	Defines how data is loaded from the database. See "Fetch Type" on page 4-5 for details. ■ Eager ■ Lazy	Eager
Mapped By	The database field that owns the relationship.	

4. Use this table to complete the Join Columns Information fields in the JPA Details view.

Property	Description	Default
Join Column	Specify a mapped column for joining an entity association. This field corresponds to the `@JoinColum` attribute. Select **Override Default**, then Add, Edit, or Remove the join columns.	By default, the mapping is assumed to have a single join.

Eclipse adds the following annotations to the field:

```
@OneToOne(targetEntity=<TARGET_ENTITY>, cascade=CascadeType.<CASCADE_TYPE>,
    fetch = FetchType.<FETCH_TYPE>, mappedBy = "<MAPPED_BY>")
@JoinColumn(name="<JOIN_COLUMN_NAME>", referencedColumnName=
    "<JOIN_COLUMN_REFERENCED_COLUMN>", insertable = <INSERTABLE>,
    updatable = <UPDATABLE>)
```

3.7.9 Transient mapping

Use the Transient Mapping to specify a or field of the entity class that *is not* persistent.

To create a version mapping:

1. In the JPA Structure view, select the field to map. The JPA Details view (for attributes) displays the properties for the selected.
2. In the Map As field, select **Transient**.

Eclipse adds the following annotation to the field:

```
@Transient
```

3.7.10 Version mapping

Use a **Version Mapping** to specify the field used for optimistic locking. If the entity is associated with multiple tables, you should use a version mapping only with the primary table. You should have only a single version mapping per persistent entity. Version mappings may be used only with the following attribute types:

- `int`
- `Integer`
- `short, Short`
- `long, Long`
- `Timestamp`

To create a version mapping:

1. In the JPA Structure view, select the field to map. The JPA Details view (for attributes) displays the properties for the selected.
2. In the Map As field, select **Version**.
3. Use this table to complete the remaining fields in the JPA Details view.

Property	Description	Default
Column	The database column mapped to the entity attribute. See "Column" on page 4-5 for details.	By default, the Column is assumed to be named identically to the attribute and always included in the `INSERT` and `UPDATE` statements.
Table	Name of the database table. This must be the primary table associated with the attribute's entity.	
Temporal	Specifies the type of data. See "Temporal" on page 4-5 for details. ▪ Date ▪ Time ▪ Timestamp	

Eclipse adds the following annotations to the field:

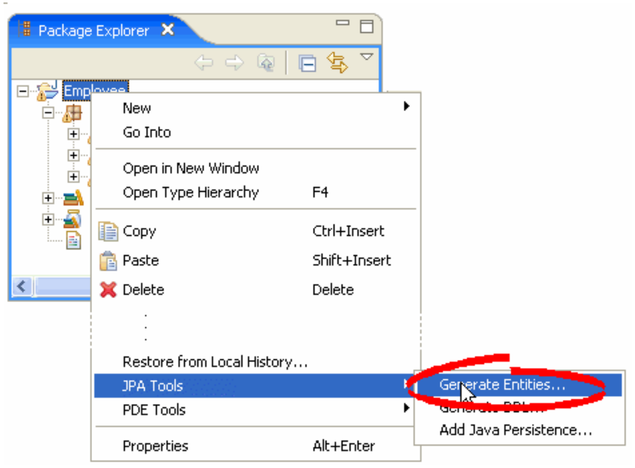
```
@Version
@Column(table="<COLUMN_TABLE>", name="<COLUMN_NAME>")
```

3.8 Generating entities from tables

Use this procedure to generate Java persistent entities from database tables. You must create a JPA project and establish a database connection *before* generating persistent entities. See "Creating a new JPA project" on page 3-1 for more information.

1. Right-click the JPA project in the Package Explorer and select **JPA Tools > Generate Entities**.

Figure 3–14 Generating Entities



2. If you are not currently connected to the database, the Database Connection page appears. Select your database connection and schema, and click **Reconnect**.

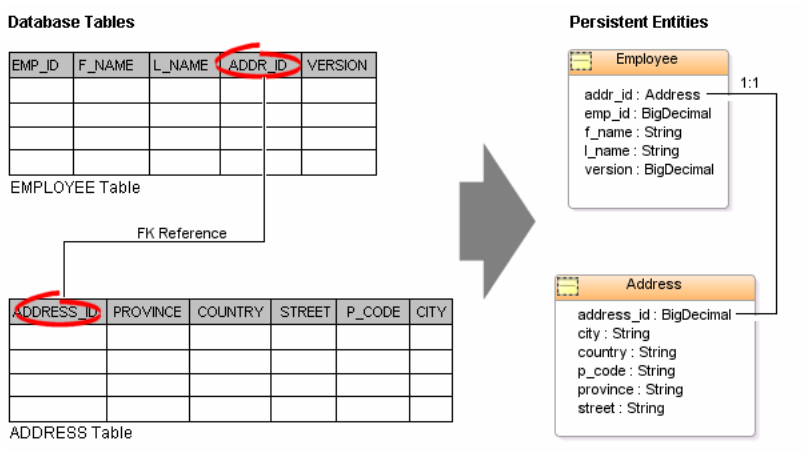
   To create a new database connection, click **Add connection**.

   After connecting to the database, click **Next**.

3. On the Generate Entities from Tables dialog dialog, select the tables from which to generate Java persistent entities and click **Finish**.

Eclipse creates a Java persistent entity for each database table. Each entity contains fields based on the table's columns. Eclipse will also generate entity relationships (such as one-to-one) based on the table constraints. Figure 3–15 illustrates how Eclipse generates entities from tables.

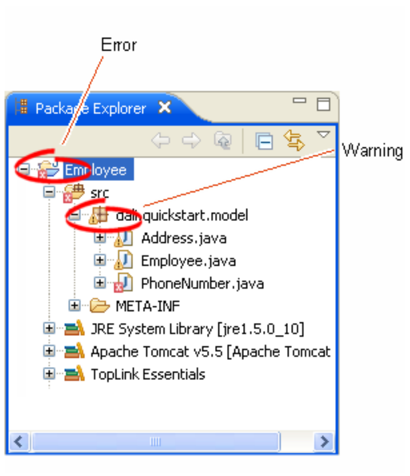
Figure 3–15 Generating Entities from Tables



3.9 Validating mappings and reporting problems

Errors and warnings on persistent entities and mappings are indicated with a red error or yellow warning next to the resource with the error, as well as the parent containers up to the project.

Figure 3–16 Sample Errors and Warnings



This section contains information on the following:

- Error messages
- Warning messages

3.9.1 Error messages

This section contains information on error messages (including how to resolve the issue) you may encounter while working with Dali.

Attribute "*<ATTRIBUTE__NAME>*" has invalid mapping type in this context

The mapped attribute is invalid. Either change the mapping type or change the entity type.

See "Mapping an entity" on page 3-11 for more information.

Attribute "*<ATTRIBUTE_NAME>*" cannot be resolved.

Dali cannot map the attribute to a database table and column. Verify that you database connection information is correct.

See "Creating a new JPA project" on page 3-1 for more information.

Class "*<CLASS_NAME>*" is not annotated as a persistent class.

The class has not been identified as a persistent class. Configure the class as an Entity, Mapped Superclass, or Embeddable persistent entity.

See "Adding persistence to a class" on page 3-6.

Column "*<COLUMN_NAME>*" cannot be resolved.

You mapped an entity's field to an incorrect or invalid column in the database table. By default, Dali will attempt to map each field in the entity with an identically named row in the database table. If the field's name differs from the row's name, you must explicitly create the mapping.

Map the field to a valid row in the database table as shown in "Mapping an entity" on page 3-11.

Duplicate class "*<CLASS_NAME>*".

You created to persistence classes with the same name. Each Java class must have a unique name. See "Adding persistence to a class" on page 3-6 for more information.

Entity does not have an Id or Embedded Id.

You created a persistent entity without identifying its primary key. A persistent entity must have a primary key field designated with an `@Id` or `@EmbeddedId` annotation.

Add an ID mapping to the entity as shown in "ID mapping" on page 3-13 or "Embedded ID mapping" on page 3-13.

Multiple persistence.xml files in project.

You created a JPA project with more than one `persistence.xml` file. Each JPA project must contain a *single* `persistence.xml` file.

See "Managing the persistence.xml file" on page 3-3 for more information.

No generator named "*<GENERATOR_NAME>*" is defined in persistence unit.

You created a persistence entity that uses sequencing, but did not define include the sequence generator in the `psersistence.xml` file. Synchronize the `persistence.xml` file with your current project.

See "Synchronizing classes" on page 3-4 for more information.

No persistence unit defined.

There is no `<persistence-unit-metadata>` information in the `orm.xml` file. Add the default persistence unit information.

See "Managing the orm.xml file" on page 3-5 for more information.

No persistence.xml file in project.

You created a JPA project without a `persistence.xml` file. Each JPA project must contain a *single* `persistence.xml` file.

See "Managing the persistence.xml file" on page 3-3 for more information.

Referenced column "*<COLUMN_NAME>*" in join column "*<COLUMN_NAME>*" cannot be resolved.

The column that you selected to join a relationship mapping does not exist on the database table. Either select a different column on the Join Table Information or create the necessary column on the database table.

See "JPA Details view (for attributes)" on page 4-4 for more information.

Schema "*<SCHEMA_NAME>*" cannot be resolved for table/join table "*<TABLE_NAME>*".

Define the default database schema information in the persistence unit.

See "Managing the orm.xml file" on page 3-5 for more information.

Table "*<TABLE_NAME>*" cannot be resolved.

You associated a persistent entity to an incorrect or invalid database table. By default, Dali will attempt to associate each persistent entity with an identically named database table. If the entity's name differs from the table's name, you must explicitly create the association.

Associate the entity with a valid database table as shown in "Adding persistence to a class" on page 3-6.

3.9.2 Warning messages

This section contains information on warning messages (including how to resolve the issue) you may encounter while working with Dali.

Connection "*<CONNECTION_NAME>*" is not active. No validation will be done against the data source.

The database connection you specified to use with the JPA project is not active. The JPA project requires an active connection.

No connection specified for the project. No data-specific validation will be performed.

You created a JPA project without specifying a database connection. The JPA project requires an active connection.

See "Creating a new JPA project" on page 3-1 or "Modifying persistent project properties" on page 3-23 for information on specifying a database connection.

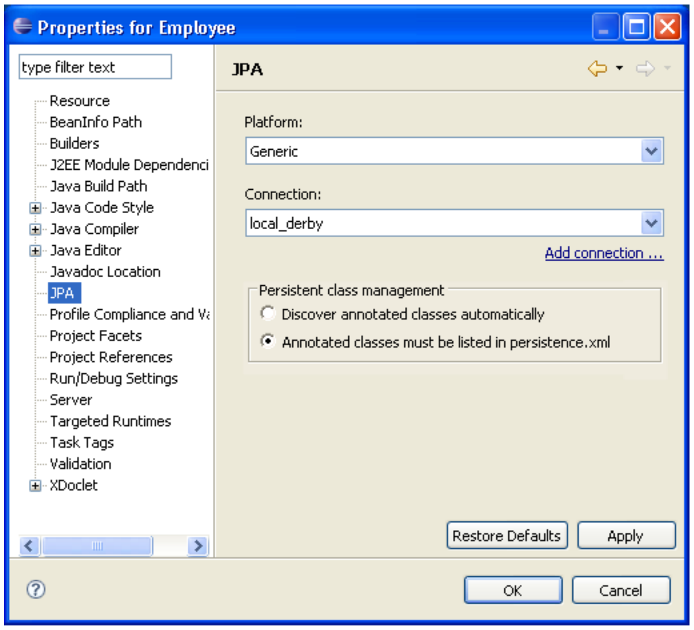
3.10 Modifying persistent project properties

Each persistent project must be associated with a database connection. To create a new database connection, click **Database Connection** use the New Connection wizard.

Use this procedure to modify the vender-specific platform and database connection associated with your JPA project.

1. Right-click the project in the Explorer view and select **Properties**. The Properties page appears.

Figure 3–17 Properties – Persistence Page



Platform: Generic

Connection: local_derby

Persistent class management

( ) Discover annotated classes automatically

(•) Annotated classes must be listed in persistence.xml

2. Use this table to complete the remaining fields on the Properties – JPA page and click **OK**.

Property	**Description**
Platform	Select the vendor-specific platform for the JPA implementation.
Database Connection	Database connection to use to store the persistent entities. To create a new connection, click **Add Connection**.

To create a new connection, click **Add connections**.

4 Reference

This section includes detailed help information for each of the following elements in the Dali OR Mapping Tool:

- Wizards
- Property pages
- Preferences
- Dialogs
- JPA Development perspective
- Icons and buttons
- Dali Developer Documentation

4.1 Wizards

This section includes information on the following wizards:

- Create New JPA Project wizard

4.1.1 Create New JPA Project wizard

The Create New JPA Project wizard allows you to create a new Java project using JPA. The wizard consists of the following pages:

- New JPA Project page
- Project Facets page
- JPA Facet page

4.1.1.1 New JPA Project page

This table lists the properties available on the New JPA Project page of the Create New JPA Project wizard.

Property	Description	Default
Project name	Name of the Eclipse JPA project.	
Project contents	Location of the workspace in which to save the project. Unselect The **Use Default** option and click **Browse** to select a new location.	Current workspace

Property	Description	Default
Target runtime	Select a pre-defined target for the project. Click **New** to create a new environment with the New Server Runtime wizard.	
Configurations	Select a project configuration with pre-defined facets. Select **<custom>** to manually select the facets for this project.	Utility JPA project with Java 5.0
EAR membership	Specify if this project should be included in an EAR file for deployment. Select the **EAR Project Name**, or click **New** to create a new EAR project.	

4.1.1.2 JPA Facet page

This table lists the properties available on the JPA Facet page of the Create New JPA Project wizard.

Property	Description	Default
Platform	Vendor-specific JPA implementation.	Generic
Connection	Select the database connection to use with the project. Dali requires an active database connection to use and validate the persistent entities and mappings. Click **Add connection** to create a new database connection.	
JPA Implementation	Select to use the **JPA implementation provided by the server at runtime**, or select a specific **implementation library** that contain the Java Persistence API (JPA) and entities to be added to the project's Java Build Path. Click **Configure default JPA implementation library** to create a default library for the project or click **Configure user libraries** to define additional libraries.	Determined by server.
Persistent class management	Specify if Dali will **discover annotated classes automatically**, or if the **annotated classes must be listed in the persistence.xml** file. **Note**: To insure application portability, you should explicitly list the managed persistence classes that are included in the persistence unit.	Determined by server.
Create orm.xml	Specify if Dali should create a default `orm.xml` file for your entity mappings and persistence unit defaults.	Selected

4.2 Property pages

This section includes information on the following property pages:

- JPA Details view (for entities)
- JPA Details view (for attributes)
- JPA Details view (for orm.xml)
- JPA Structure view

4.2.1 JPA Details view (for entities)

The JPA Details view displays the persistence information for the currently selected entity and contains the following tabs:

- General information
- Secondary table information
- Inheritance information

4.2.1.1 General information

This table lists the General information fields available in the JPA Details view for each entity type.

Property	Description	Default	Available for Entity Type
Map As	Specify the type of entity: **Entity**, Mapped Superclass, Embeddable.	Entity	Entity, Embeddable, and Mapped superclass
Name	The name of this entity. By default, the class name is used as the entity name.		Entity
Table	The primary database table associated with the entity.		Entity
Catalog	The database catalog that contains the **Table**.	As defined in `orm.xml`.	Entity
Schema	The database schema that contains the **Table**.	As defined in `orm.xml`.	Entity
Attribute Overrides	Specify a property or field to be overridden (from the default mappings). Select **Override Default**.		Entity
Column	The database column (from the **Table Name**) mapped to the entity.		Entity
Table	Name of the database table that contains the selected column.		Entity

4.2.1.2 Secondary table information

Use the Secondary Tables area in the Java Details view to associate additional tables with an entity. Use this area if the data associated with an entity is spread across multiple tables.

Refer to "Specifying additional tables" on page 3-9 for additional information.

4.2.1.3 Inheritance information

This table lists the fields available on the Inheritance area in the Java Details view for each entity type.

Property	Description	Default
Strategy	Specify the strategy to use when mapping a class or class hierarchy: ■ Single table – All classes in the hierarchy are mapped to a single table. ■ Joined – The root of the hierarchy is mapped to a single table; each child maps to its own table. ■ Table per class – Each class is mapped to a separate table.	Single table
Discriminator Column	Use to specify the name of the discriminator column when using a **Single** or **Joined** inheritance strategy.	
Discriminator Type	Set this field to set the discriminator type to `Char` or `Integer` (instead of its default: `String`). The **Discriminator Value** must conform to this type.	String
Discriminator Value	Specify the discriminator value used to differentiate an entity in this inheritance hierarchy. The value must conform to the specified **Discriminator Type**.	
Primary Key Join Columns	Select **Override Default**. This field corresponds with @PrimaryKeyJoinColumn annotation.	

Refer to "Specifying entity inheritance" on page 3-9 for additional information.

4.2.2 JPA Details view (for attributes)

The JPA Details view displays the persistence information for the currently selected mapped attribute and contains the following areas:

- General information
- Join Table Information
- Join Columns Information
- Primary Key Generation information

See "Mapping an entity" on page 3-11 for more information.

4.2.2.1 General information

This table lists the General properties available in the Java Details view for each mapping type.

Property	Description	Default	Available for Mapping Type
Map As	Define the mapping type for the attribute	Basic	All mapping types

Property	Description	Default	Available for Mapping Type
Column	The database column that contains the value for the attribute. This field corresponds to the `@Column` annotation.	By default, the Column is assumed to be named identically to the attribute.	Basic mapping, Embedded mapping, ID mapping, Version mapping
Name	Name of the database column. This field corresponds to the `@Column` annotation.		Basic mapping, Embedded mapping, ID mapping
Table	Name of the database table that contains the selected column.		Basic mapping, Embedded mapping, ID mapping
Fetch Type	Defines how data is loaded from the database: ■ Eager – Data is loaded in before it is actually needed. ■ Lazy – Data is loaded only when required by the transaction.	Eager	Basic mapping, One-to-one mapping
Optional	Specifies if this field is can be null.	Yes	Basic mapping, One-to-one mapping
Lob	Specify if the field is mapped to `java.sql.Clob` or `java.sql.Blob`. This field corresponds to the `@Lob` annotation.		Basic mapping
Temporal	Specifies if this field is one of the following: ■ Date – `java.sql.Date` ■ Time – `java.sql.Time` ■ Timestamp – `java.sql.Timestamp` This field corresponds to the `@Temporal` annotation.		Basic mapping, ID mapping
Enumerated	Specify how to persist enumerated constraints if the `String` value suits your application requirements or to match an existing database schema. ■ ordinal ■ `String` This field corresponds to the `@Enumerated` annotation.	Ordinal	
Target Entity	The persistent entity to which the attribute is mapped.		One-to-one mapping,, One-to-many mapping Many-to-many mapping, Many-to-one mapping

Property	Description	Default	Available for Mapping Type
Cascade Type	Specify which operations are propagated throughout the entity. ■ All – All operations ■ Persist ■ Merge ■ Move		One-to-one mapping
Mapped By	The field in the database table that "owns" the relationship. This field is required only on the non-owning side of the relationship.		One-to-one mapping, One-to-many mapping
Order By	Specify the default order for objects returned from a query: ■ No ordering ■ Primary key ■ Custom ordering This field corresponds to the `@OrderBy` annotation.	Primary key	One-to-many mapping. Many-to-many mapping, Many-to-one mapping
Attribute Overrides	Overrides the column mappings from the mapped, entity tabled. (for example, if the inherited column name is incompatible with a pre-existing data model, or invalid as a column name in your database).		Embedded mapping Embedded mapping

4.2.2.2 Join Table Information

Use area to specify a mapped column for joining an entity association. By default, the mapping is assumed to have a single join.

This table lists the fields available on the Join Table area in the JPA Details view for One-to-many mapping and Many-to-many mapping mapping types.

Property	Description	Default
Name	Name of the join table that contains the foreign key column.	By default, the name is assumed to be the primary tables associated with the entities concatenated with an underscore.
Join Columns	Specify a mapped column for joining an entity association. This field corresponds to the `@JoinColum` attribute. Select **Override Default**, then Add, Edit, or Remove the join columns.	By default, the mapping is assumed to have a single join.
Inverse Join Columns	Select **Override Default**, then Add, Edit, or Remove the join columns.	

4.2.2.3 Join Columns Information

This table lists the fields available in the Join Table area in JPA Details view for Many-to-one mapping and One-to-one mapping mapping types.

Property	Description	Default
Join Column	Specify a mapped column for joining an entity association. This field corresponds to the `@JoinColum` attribute. Select **Override Default**, then Add, Edit, or Remove the join columns.	By default, the mapping is assumed to have a single join.

4.2.2.4 Primary Key Generation information

This table lists the fields available in the Primary Key Generation area in JPA Details view for ID mapping types.

Property	Description	Default
Primary Key Generation	These fields define how the primary key is generated. These fields correspond to the `@GeneratedValue` annotation.	Generated Value
Strategy	▪ Auto ▪ Identity – Values are assigned by the database's **Identity** column. ▪ Sequence – Values are assigned by a sequence table (see Sequence Generator). ▪ Table – Values are assigned by a database table (see Table Generator).	Auto
Generator Name	Unique name of the generated value.	
Table Generator	These fields define the database table used for generating the primary key and correspond to the `@TableGenerator` annotation. These fields apply only when **Strategy** = **Table**.	
Name	Unique name of the generator.	
Table	Database table that stores the generated ID values.	
Primary Key Column	The column in the table generator's **Table** that contains the primary key.	
Value Column	The column that stores the generated ID values.	
Primary Key Column Value	The value for the **Primary Key Column** in the generator table.	

Property	Description	Default
Sequence Generator	These fields define the specific sequence used for generating the primary key and correspond to the `@SequenceGenerator` annotation. These fields apply only when **Strategy** = **Sequence**.	
Name	Name of the sequence table to use for defining primary key values.	
Sequence	Unique name of the sequence.	

4.2.3 JPA Details view (for orm.xml)

The JPA Details view displays the default mapping and persistence information for the project and contains the following areas:

- General information
- Persistence Unit information

These defaults can be overridden by the settings on a specific entity or mapping.

4.2.3.1 General information

This table lists the General information fields available in the JPA Details view for each entity type.

Property	Description	Default
Package	The Java package that contains the persistent entities. Click **Browse** and select the package	
Schema	The database schema that contains the **Table**. This field corresponds to the `<schema>` element in the `orm.xml` file.	
Catalog	The database catalog that contains the **Table**. This field corresponds to the `<catalog>` element in the `orm.xml` file.	
Access	Specify the default access method for the variables in the project: ▪ Property ▪ Field This field corresponds to the `<access>` element in the `orm.xml` file.	

4.2.3.2 Persistence Unit information

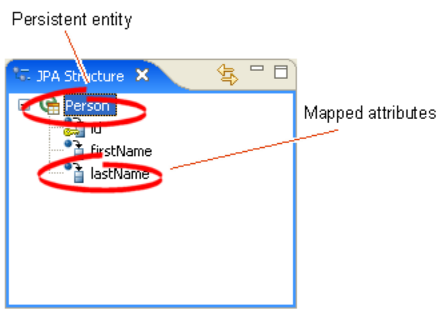
This table lists the Persistence Unit information fields available in the JPA Details view for each entity type. These fields are contained in the `<persistence-unit-metadata>` element in the `orm.xml` file.

Property	Description	Default
XML Mapping Data Complete	Specifies that the Java classes in this persistence unit are fully specified by their metadata. Any annotations will be ignored. This field corresponds to the `<xml-mapping-metadata-complete>` element in the `orm.xml` file.	
Package	The Java package that contains the persistent entities for this persistence unit. Click **Browse** and select the package	
Schema	The database schema that contains the **Table**. This field corresponds to the `<schema>` element in the `orm.xml` file.	
Catalog	The database catalog that contains the **Table**. This field corresponds to the `<catalog>` element in the `orm.xml` file.	
Cascade Persist	Adds cascade-persist to the set of cascade options in entity relationships of the persistence unit. This field corresponds to the `<cascade-persist>` element in the `orm.xml` file.	

4.2.4 JPA Structure view

The JPA Structure view displays an outline of the structure (its attributes and mappings) of the entity that is currently selected or opened in the editor. The structural elements shown in the outline are the entity and its fields.

Figure 4–1 Sample JPA Structure View



4.3 Preferences

This section includes information on the following preference pages:

- Project Properties page – JPA Options

4.3.1 Project Properties page – JPA Options

Use the JPA options on the Properties page to select the database connection to use with the project.

This table lists the properties available in the Persistence Properties page.

Property	**Description**
Platform	Select the vendor-specific platform.
Connection	The database connection used to map the persistent entities. ■ To create a new connection, click **Add Connections**. ■ To reconnect to an existing connection, click **Reconnect**.

See "Modifying persistent project properties" on page 3-23 for additional information.

4.4 Dialogs

This section includes information on the following preference pages:

- Generate Entities from Tables dialog
- Edit Join Columns Dialog

4.4.1 Generate Entities from Tables dialog

Use the Generate Entities dialog to create Java persistent entities from your database tables and columns.

This table lists the properties available in the Generate Entities dialog.

Property	**Description**
Source Folder	Enter a project folder name in which to generate the Java persistent entities, or click **Browse** to select an existing folder.
Package	Enter a package name in which to generate the Java persistent entities, or click **Browse** to select an existing package.
Tables	Select the tables from which to create Java persistent entities. The tables shown are determined by the database connection that you defined in the Project Properties page – JPA Options.

See "Generating entities from tables" on page 3-20 for more information.

4.4.2 Edit Join Columns Dialog

Use the Join Columns dialog to create or modify the join tables and columns in relationship mappings.

This table lists the properties available in the Join Columns dialog.

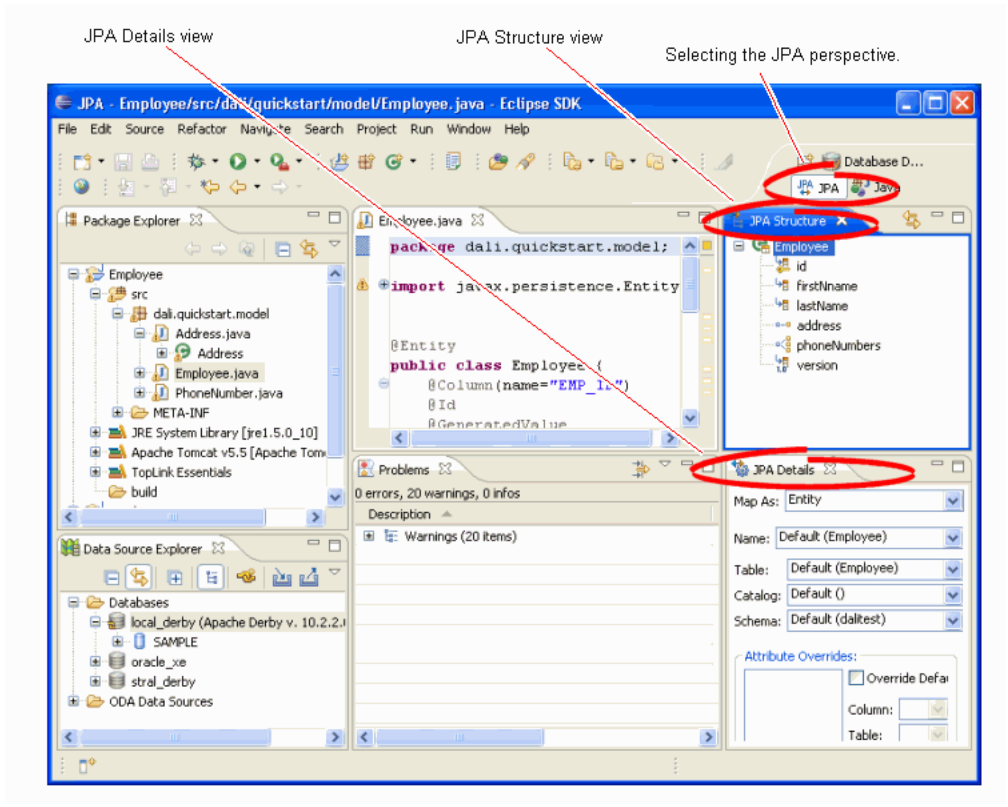
Property	**Description**
Name	Name of the joint table column that contains the foreign key column.
Referenced Column Name	Name of the database column that contains the foreign key reference for the entity relationship.

4.5 JPA Development perspective

The **JPA Development perspective** defines the initial set and layout of views in the Workbench window when using Dali. By default, the JPA Development perspective includes the following vies:

- JPA Structure view
- JPA Details view (for entities)
- JPA Details view (for attributes)
- JPA Details view (for orm.xml)

Figure 4–2 Sample JPA Development Perspective



```
package dali.quickstart.model;

import javax.persistence.Entity

@Entity
public class Employee {
    @Column(name="EMP_ID")
    @Id
    @GeneratedValue
```

4.6 Icons and buttons

This section includes information on each of the icons and buttons used in the Dali OR Mapping Tool.

- Icons
- Buttons

4.6.1 Icons

The following icons are used throughout the Dali OR Mapping Tool.

Icon	Description
	Nonpersistent class
	Entity
	Embeddable entity
	Mapped superclass
	Basic mapping
	Embedded mapping
	Embedded ID mapping
	ID mapping
	Many-to-many mapping
	Many-to-one mapping
	One-to-many mapping
	One-to-one mapping
	Transient mapping
	Version mapping

4.6.2 Buttons

The following buttons are used throughout the Dali OR Mapping Tool.

Icon	Description
JPA	JPA Development perspective

4.7 Dali Developer Documentation

Additional Dali documentation is available online at:

`http://wiki.eclipse.org/index.php/Dali_Developer_Documentation`

This developer documentation includes information about:

- Dali architecture
- Plugins that comprise the Dali JPA Eclipse feature
- Extension points

5

Tips and tricks

The following tips and tricks give some helpful ideas for increasing your productivity.

- Database Connections
- Schema-based persistence.xml

Tip	Description
Database Connections	When starting a new workbench session, be sure to reconnect to your database (if you are working online). This allows Dali to provide database-related mapping assistance and validation.
Schema-based persistence.xml	If you are behind a firewall, you may need to configure your Eclipse workspace proxy in the Preferences dialog (**Preferences > Internet > Proxy Settings**) to properly validate a schema-based `persistence.xml` file.

6
What's new

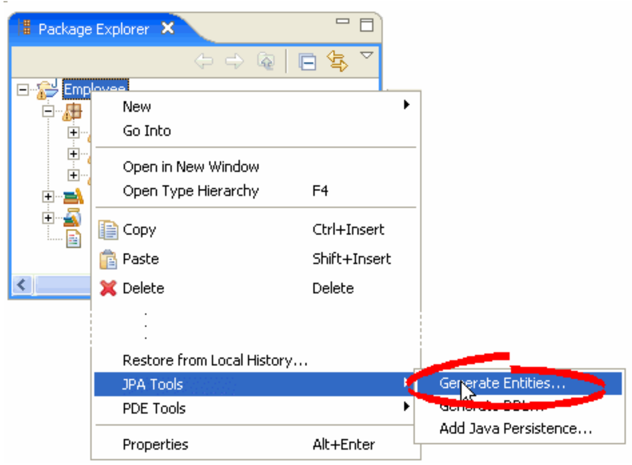
This section contains descriptions of the following new feature and significant changes made to the Dali OR Mapping Tool for Release 1.0.0:

- Generate Persistent Entities from Tables wizard
- Create and Manage the persistence.xml file
- Create and Manage the orm.xml file

6.1 Generate Persistent Entities from Tables wizard

Use the Generate Entities from Tables wizard to quickly create JPA entities from your database tables.

Figure 6–1 Generating Entities

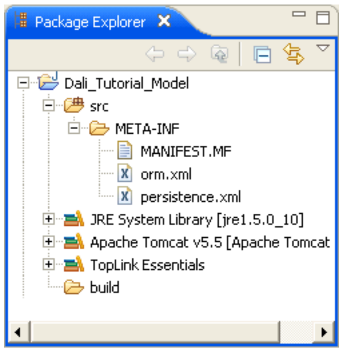


Dali automatically creates the necessary OR mappings, based on your database table constraints.

6.2 Create and Manage the persistence.xml file

When creating a JPA project, Dali automatically creates the `perssistence.xml` file.

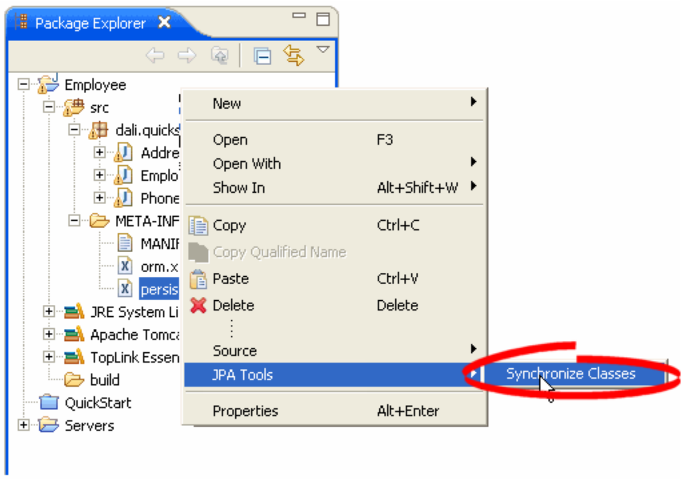
Figure 6–2 JPA Project with persistence.xml File



Use the XML editor to edit the `persistence.xml` file.

After adding your JPA entities, use the **Java Persistence > Synchronize Classes** option to add the classes to the `persistence.xml` file.

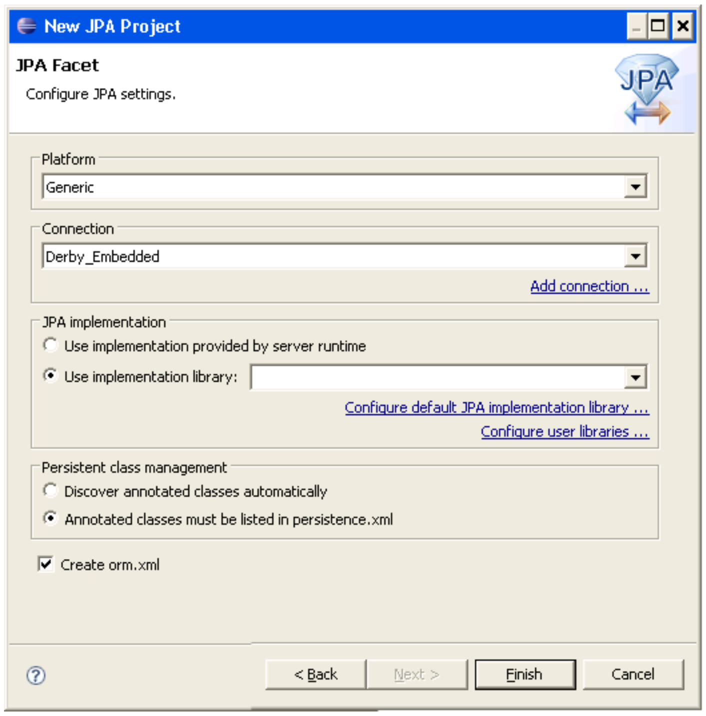
Figure 6–3 Synchronizing the persistence.xml File.



6.3 Create and Manage the orm.xml file

When creating a JPA project, you can also create the `orm.xml` file. Select the **Create orm.xml** option on the JPA Facet page page of the Create New JPA Project wizard.

Figure 6–4 JPA Facet Dialog



JPA Facet

Configure JPA settings.

Platform: Generic

Connection: Derby_Embedded

Add connection ...

JPA implementation

( ) Use implementation provided by server runtime

(•) Use implementation library:

Configure default JPA implementation library ...

Configure user libraries ...

Persistent class management

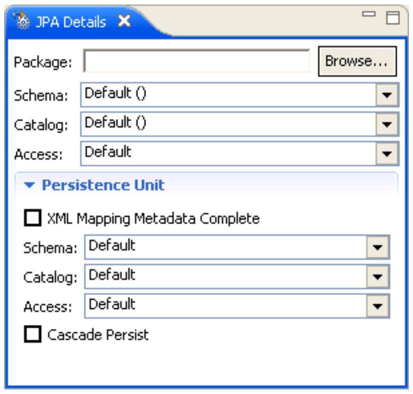
( ) Discover annotated classes automatically

(•) Annotated classes must be listed in persistence.xml

[✓] Create orm.xml

Use the `orm.xml` file to define the project and persistence unit defaults.

Figure 6–5 JPA Details view for orm.xml file.



Package:

Schema: Default ()

Catalog: Default ()

Access: Default

Persistence Unit

[ ] XML Mapping Metadata Complete

Schema: Default

Catalog: Default

Access: Default

[ ] Cascade Persist

7 Legal

7.1 About this content

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May 5, 2007

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Index