Oracle® TopLink

Getting Started Guide

10*g* Release 3 (10.1.3)

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Oracle TopLink Getting Started Guide, 10*g* Release 3 (10.1.3)

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Preface

This document provides installation procedures to install and configure Oracle TopLink. It also introduces the concepts with which you should be familiar to get the most out of TopLink.

This preface contains these topics:

- Intended Audience
- Documentation Accessibility
- Organization
- Related Documentation
- Conventions

Intended Audience

The *Oracle TopLink Getting Started Guide* is intended for new users who need to install and configure TopLink.

This document assumes that you are familiar with the concepts of object-oriented programming, the Enterprise JavaBeans (EJB) specification, and with your own particular Java development environment.

The document also assumes that you are familiar with your particular operating system (such as Windows, UNIX, or other). The general operation of any operating system is described in the user documentation for that system, and is not repeated in this manual.

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Our goal is to make Oracle products, services, and supporting documentation accessible, with good usability, to the disabled community. To that end, our documentation includes features that make information available to users of assistive technology. This documentation is available in HTML format, and contains markup to facilitate access by the disabled community. Accessibility standards will continue to evolve over time, and Oracle is actively engaged with other market-leading technology vendors to address technical obstacles so that our documentation can be accessible to all of our customers. For more information, visit the Oracle Accessibility Program Web site at: `http://www.oracle.com/accessibility/`.

Accessibility of Code Examples in Documentation Screen readers may not always correctly read the code examples in this document. The conventions for writing code require that closing braces should appear on an otherwise empty line; however, some

screen readers may not always read a line of text that consists solely of a bracket or brace.

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Organization

This document includes the following chapters:

Chapter 1, "Prerequisites for Installing Oracle TopLink"
This chapter contains important prerequisites information.

Chapter 2, "Installing and Configuring TopLink"
This chapter contains instructions for installing and configuring TopLink.

Chapter 3, "Migrating to 10g Release 3 (10.1.3)"
This chapter contains instructions on how to migrate existing TopLink projects to Oracle TopLink 10*g* Release 3 (10.1.3).

Related Documentation

For more information, see these Oracle resources:

- *Oracle TopLink Release Notes*
- *Oracle Application Server Release Notes*
- *Oracle TopLink API Reference*
- *Oracle TopLink Developer's Guide*

Printed documentation is available for sale in the Oracle Store at:

`http://oraclestore.oracle.com`

To download free release notes, installation documentation, white papers, or other collateral, please visit the Oracle Technology Network (OTN). You must register online before using OTN; registration is free and can be done at:

`http://www.oracle.com/technology/membership`

If you already have a username and password for OTN, then you can go directly to the documentation section of the OTN Web site at:

`http://www.oracle.com/technology/docs`

Feedback

If you have questions about TopLink, you can consult the TopLink user's forum at:

`http://forums.oracle.com/forums/forum.jspa?forumID=48`

If you have questions or feedback about this documentation, you can consult the documentation feedback forum at

http://forums.oracle.com/forums/forum.jspa?forumID=165

Conventions

This section describes the conventions used in the text and code examples of this documentation set. It describes:

- Conventions in Text
- Conventions in Code Examples

Conventions in Text

We use various conventions in text to help you more quickly identify special terms. The following table describes those conventions and provides examples of their use.

Convention	Meaning	Example
Italics	Italic typeface indicates book titles or emphasis.	*Oracle10i Database Concepts* Ensure that the recovery catalog and target database do *not* reside on the same disk.
UPPERCASE monospace (fixed-width) font	Uppercase monospace typeface indicates elements supplied by the system. Such elements include parameters, privileges, datatypes, RMAN keywords, SQL keywords, SQL*Plus or utility commands, packages and methods, as well as system-supplied column names, database objects and structures, usernames, and roles.	You can specify this clause only for a `NUMBER` column. You can back up the database by using the `BACKUP` command. Query the `TABLE_NAME` column in the `USER_TABLES` data dictionary view. Use the `DBMS_STATS.GENERATE_STATS` procedure.
lowercase monospace (fixed-width) font	Lowercase monospace typeface indicates executables, filenames, directory names, and sample user-supplied elements. Such elements include computer and database names, net service names, and connect identifiers, as well as user-supplied database objects and structures, column names, packages and classes, usernames and roles, program units, and parameter values. **Note:** Some programmatic elements use a mixture of UPPERCASE and lowercase. Enter these elements as shown.	Enter `sqlplus` to open SQL*Plus. The password is specified in the `orapwd` file. Back up the datafiles and control files in the `/disk1/oracle/dbs` directory. The `department_id`, `department_name`, and `location_id` columns are in the `hr.departments` table. Set the `QUERY_REWRITE_ENABLED` initialization parameter to `true`. Connect as `oe` user. The `JRepUtil` class implements these methods.
lowercase italic monospace (fixed-width) font	Lowercase italic monospace font represents placeholders or variables.	You can specify the *`parallel_clause`*. Run `Uold_release.SQL` where *`old_release`* refers to the release you installed prior to upgrading.

Conventions in Code Examples

Code examples illustrate SQL, PL/SQL, SQL*Plus, or other command-line statements. They are displayed in a monospace (fixed-width) font and separated from normal text as shown in this example:

```
SELECT username FROM dba_users WHERE username = 'MIGRATE';
```

The following table describes typographic conventions used in code examples and provides examples of their use.

Convention	Meaning	Example
[ ]	Brackets enclose one or more optional items. Do not enter the brackets.	`DECIMAL (digits [ , precision ])`
{ }	Braces enclose two or more items, one of which is required. Do not enter the braces.	`{ENABLE | DISABLE}`
|	A vertical bar represents a choice of two or more options within brackets or braces. Enter one of the options. Do not enter the vertical bar.	`{ENABLE | DISABLE}` `[COMPRESS | NOCOMPRESS]`
...	Horizontal ellipsis points indicate either: ■ That we have omitted parts of the code that are not directly related to the example ■ That you can repeat a portion of the code	`CREATE TABLE ... AS subquery;` `SELECT col1, col2, ... , coln FROM employees;`
. . .	Vertical ellipsis points indicate that we have omitted several lines of code not directly related to the example.	
Other notation	You must enter symbols other than brackets, braces, vertical bars, and ellipsis points as shown.	`acctbal NUMBER(11,2);` `acct CONSTANT NUMBER(4) := 3;`
Italics	Italicized text indicates placeholders or variables for which you must supply particular values.	`CONNECT SYSTEM/system_password` `DB_NAME = database_name`

UPPERCASE	Uppercase typeface indicates elements supplied by the system. We show these terms in uppercase in order to distinguish them from terms you define. Unless terms appear in brackets, enter them in the order and with the spelling shown. However, because these terms are not case sensitive, you can enter them in lowercase.	`SELECT last_name, employee_id FROM employees;`
		`SELECT * FROM USER_TABLES;`
		`DROP TABLE hr.employees;`

lowercase	Lowercase typeface indicates programmatic elements that you supply. For example, lowercase indicates names of tables, columns, or files.
	Note: Some programmatic elements use a mixture of UPPERCASE and lowercase. Enter these elements as shown.
		`SELECT last_name, employee_id FROM employees;`
		`sqlplus hr/hr`
		`CREATE USER mjones IDENTIFIED BY ty3MU9;`

1

Prerequisites for Installing Oracle TopLink

This chapter provides information that you should review before installing Oracle TopLink (TopLink). It contains the following topics:

- System Requirements and Certifications
- Supported Databases
- License Information

1.1 System Requirements and Certifications

The complete product requirements list and the latest certification information for 10*g* Release 3 (10.1.3) is available at:

http://www.oracle.com/technology/software/products/ias/files/as_certification_r3_1013.html

Additional Requirements

TopLink requires a Java Virtual Machine (JVM) compatible with JDK 1.4.2 (or higher). TopLink also requires internet access to use URL-based schemas and hosted documentation.

1.2 Supported Databases

TopLink is an infrastructure-based solution that simplifies the integration of Java objects to any JDBC (Java Database Connectivity) compliant database. TopLink supports JDBC 3.0 drivers that comply with JDBC 3.0 object-relational extensions. Contact your database and JDBC vendor to determine which object-relational extensions they support.

For TopLink Workbench to retrieve table information from the database, the database driver must support the following JDBC methods:

- `getTables ( )`
- `getTablesTypes ( )`
- `getImportedKeys ( )`
- `getCatalogs ( )`
- `getPrimaryKeys ( )`

1.3 License Information

TopLink does not require a license file for TopLink Foundation Library or TopLink Workbench; however, you are not allowed to ship the TopLink Workbench or expose any of the TopLink APIs as part of an end-user application. Refer to the software license agreement for information about the limitations on including the Oracle TopLink Foundation Library JAR files, as part of a packaged end-user application.

Licensing information is available at

http://oraclestore.oracle.com

1.3.1 Third-Party License Information

TopLink uses and includes the following software:

- Antlr
- DOM
- Java Runtime Environment
- ASM

1.3.1.1 Antlr

http://www.antlr.org/rights.html

TopLink uses Antlr for EJB QL parsing. Antlr (ANother Tool for Language Recognition), is a language tool that provides a framework for constructing recognizers, compilers, and translators from grammatical descriptions containing C++ or Java actions. The ANTLR parser and translator generator is fully in the public domain.

1.3.1.2 DOM

http://www.w3.org/Consortium/Legal/copyright-software.html

The Document Object Model (DOM) is a specification that defines some programming language-neutral interfaces that can be used to manipulate XML and HTML documents. W3C maintains this specification. W3C also provides a Java "binding" for these interfaces. TopLink uses this "binding" to parse and manipulate XML documents.

This program contains third-party code from the World Wide Web Consortium ("W3C"). Under the terms of the W3C license, Oracle is required to provide the following notices. Note, however, that the Oracle program license that accompanied this product determines your right to use the Oracle program, including the W3C software, and the terms contained in the following notices do not change those rights.

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1.3.1.3 Java Runtime Environment

http://java.sun.com/j2se/

The Java Runtime Environment is maintained by Sun Microsystems, Inc. The Oracle TopLink installation includes JRE 1.5 by default. You may configure TopLink to run using any other compliant Java 2 VM. Java and all Java-based trademarks and logos are trademarks or registered trademarks of Sun Microsystems, Inc., in the U.S. and other countries.

1.3.1.4 ASM

ASM is a Java bytecode manipulation framework. It can be used to dynamically generate stub classes or other proxy classes, directly in binary form, or to dynamically modify classes at load time, that is, just before they are loaded into the Java Virtual Machine.

http://asm.objectweb.org/license.html

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2

Installing and Configuring TopLink

This chapter includes the following information to install and configure Oracle TopLink on your computer:

- TopLink Installation Types
- Installing TopLink
- Configuring TopLink Runtime Environment
- Configuring TopLink Workbench Environment
- Starting TopLink Workbench
- TopLink Tutorial
- Installation Troubleshooting
- Installing Patch Sets

2.1 TopLink Installation Types

The Oracle Universal Installer includes TopLink with the basic Oracle Application Server install. To install only TopLink, select the Advanced installation type, then choose Oracle TopLink. This will install the TopLink Foundation Library and TopLink Workbench.

2.2 Installing TopLink

Use the following procedures to install TopLink (including TopLink Foundation Library and TopLink Workbench). Before you install TopLink, back up all existing project data.

> **Warning:** **If you are upgrading from a pre-Release 1 (9.0.3), you must convert the package names before you open your TopLink project(s) in 10*g* Release 3 (10.1.3). Refer to "Package Rename" on page 3-2 for more information after installing TopLink.**

This section includes information on:

- Using Oracle Universal Installer
- Installing Silently

2.2.1 Using Oracle Universal Installer

Use this procedure to start the Oracle Universal Installer and install TopLink 10*g* Release 3 (10.1.3).

1. For **Windows** operating systems:
   - Ensure that you are logged in to the computer as a member of the Windows Administrators group.
   - When configuring TopLink for use with J2EE containers, you must modify the **System Variables**—not the **User Variables**.

   For **Unix or other non-Windows** operating systems:
   - Ensure that you *are not* logged in as the **root** user when you start the Oracle Universal Installer. If you are, then only the root user will have permissions to manage TopLink.
   - Log in as the `oracle` user.
2. Insert the TopLink installation disk into the CD-ROM drive to launch Oracle Universal Installer, or download the installer from:

   `http://www.oracle.com/technology/products/ias/toplink/index.html`

   For **Windows** operating systems:
   - If your computer supports the auto run feature, the installer will automatically launch on your computer.
   - If your computer does not support the auto run feature, execute the `G:\setup.exe` program (where `G` is the letter for your CD-ROM drive) to start the installer.

   For **UNIX or other non-Windows** operating systems:
   - If your computer supports the auto run feature, the installer will automatically launch on your computer.
   - If your computer does not support the auto run feature, enter: `prompt> mount_point/as_1013disk/runInstaller` to launch the installer.

   Caution: Do not start the installation inside the `mount_point` directory. If you do, then you may not be able to eject the installation disk.
3. Complete each screen of the installer.
4. When the installation is complete, you must configure the TopLink Workbench environment.

   For more information, see "Configuring the TopLink Workbench Environment" in the *Oracle TopLink Developer's Guide*.
5. Refer to *<ORACLE_HOME>*`\toplink\doc\index.htm` for the latest Oracle TopLink Release Notes.

2.2.2 Installing Silently

Silent installation mode is available for all installation types. You can use the silent installation when you wish to make multiple installations simultaneously or when you

perform installations from a remote location. Silent installation eliminates the need to monitor the installation because there is no graphical output and no input by the user.

1. Insert the TopLink installation disk into the CD-ROM drive.
2. Open the `\Stage\Response` directory and select the `oracle.as.j2ee.top.toplink.rsp` file.
3. Copy the `oracle.as.j2ee.top.toplink.rsp` file to a temporary (`tmp`) location.
4. Edit the following parameters in the `oracle.as.j2ee.top.toplink.rsp` file:

   ORACLE_HOME
   ORACLE_HOME_NAME
   GROUP_NAME (for Unix or other non-Windows operation systems only)
   FROM_LOCATION

5. Start the installer.

   For **Windows** operating systems, open a command prompt window and enter:

   ```
   setup.exe -responseFile c:/oracle.as.j2ee.top.toplink.rsp -silent
   ```

   For **UNIX and other non-Windows** operating systems, open a command prompt window and enter:

   ```
   ./runInstaller -responseFile /tmp/oracle.as.j2ee.top.toplink.rsp -silent
   ```

If your installation was successful, the `silentInstall.log` file contains the line:

"The installation of TopLink was successful."

2.3 Configuring TopLink Runtime Environment

At runtime, the TopLink Foundation Library requires the Java Runtime Environment 1.3 (or higher). By default, the TopLink installation includes the JRE 1.5.

To configure TopLink for a different version of the JRE, change the *<ORACLE_HOME>*`/toplink/bin/setenv` file to point `JAVA_HOME` to the alternate directory.

2.4 Configuring TopLink Workbench Environment

After installing TopLink Workbench, you must configure the following:

- JRE Version
- Online Help and Documentation

2.4.1 JRE Version

TopLink Workbench requires the Java Runtime Environment 1.4.2_06 (or higher). By default, the TopLink installation includes the JRE 1.5.

To configure TopLink for a different version of the JRE, change the *<ORACLE_HOME>*`/toplink/bin/setenv` file to point `JAVA_HOME` to the alternate directory.

Java Cryptography Extension (JCE)

The TopLink Workbench uses JCE to encrypt database login information. JCE is included with JDK 1.4 (or higher).

2.4.2 Online Help and Documentation

By default, TopLink installs only a portion of TopLink Workbench online help system on your PC. To access the complete documentation from Oracle, ensure that your PC is connected to the internet and the your proxy information (if necessary) is correct.

For more information on how to specify the help mode, see the *Oracle TopLink Developer's Guide*.

From the TopLink Workbench menu, select **Tools > Preferences**. On the Preferences dialog, select **General** to configure your proxy information.

2.4.3 Driver Classpath Environment Variable

Depending on the TopLink Workbench project, you are required to update the `DRIVER_CLASSPATH` environment variable to add the location of the following (if necessary):

- JDBC drivers – If you are using relational projects.
- J2EE Connector Architecture (J2C) adapters – If you are using TopLink Workbench Enterprise Information System (EIS) projects.
- Oracle Database *<ORACLE_HOME>*`/rdbms/jlib/xdb.jar` file – If you are using direct to XML type mappings with an Oracle9i or higher database.
- Custom `Collection` class that you use to override the default `Collection` class that TopLink uses with a mapping container policy.

For more information on how to update the `DRIVER_CLASSPATH` environment variable, see "Configuring the TopLink Workbench Environment" section in the Using TopLink Workbench chapter in the *Oracle TopLink Developer's Guide*.

2.4.4 Third-party Libraries

If you plan to use additional, third-party libraries (such as XMLType Mappings or EIS with Attunity), when deploying your Oracle TopLink project, you must copy the appropriate JAR file to *<ORACLE_HOME>*`/toplink/jlib`. Additionally, you must include the libraries on you server's classpath.

2.5 Starting TopLink Workbench

To start TopLink Workbench, simply execute the `workbench.cmd` or `.sh` file in the *<INSTALL_DIR>*`/toplink/bin` directory. The TopLink Welcome Screen appears.

If you receive a "Cannot Find Main Class" error, ensure that you have configured `JAVA_HOME` correctly. See "JRE Version" on page 2-3.

> **Note:** On Microsoft Windows XP platforms with mapped network drives, the TopLink Workbench File Chooser dialogs (such as Save File or Open File) may experience slow responses for opening and traversing directory trees. Unmapping the network drives eliminates this behavior.

2.6 TopLink Tutorial

TopLink provides a tutorial with which you can create an Employment Management System for your company to be deployed in a three-tier environment using JSP

servlets. The tutorial shows you how to store data from a Java class into a relational database and access existing database information from Java classes.

Specifically, you will learn how to:

- Create a new TopLink Workbench project
- Enable and add Java classes
- Create and import database tables
- Associate descriptors to tables
- Implement direct and relationship mappings (including self-relationships)
- Use indirection and value holders
- Apply several advanced features such as multiple tables and optimistic locking
- Write TopLink queries
- Create and manage database sessions
- Package and deploy a TopLink application

For more information about the tutorial, see the *Oracle TopLink Developer's Guide*. See also the TopLink Tutorial at:

`http://download.oracle.com/otn_hosted_doc/toplink/1013/MAIN/_html/prt_tut.htm`

2.7 Installation Troubleshooting

After you install TopLink, if you encounter problems either starting the application or connecting to a database, try the following solutions:

- Ensure that the driver class name is correct. Many vendors have several different driver classes to choose from.
- Check your login information.
- Ensure that your path includes all `.dll` files your driver requires.
- Check with your database administrator that:
  - Any drivers that require special set-up in the database server (such as Sybase JConnect) have been set up correctly.
  - Any drivers that require special permissions in the database server have been set up correctly.
  - You are not exceeding the number of available concurrent connections to your database. This may occur during development time, when many people are testing connections.
- If you use database servers that requires an extra Windows NT service to be running for JDBC connections, ensure that one is running.
- Check with your vendor to ensure that you are using the latest version of both your JDBC driver and the database to which it is connecting.
- If it takes an extremely long time to start TopLink Workbench after the splash screen appears (for example, more than 30 seconds), ensure that your proxy help mode and proxy information is correct. See "Online Help and Documentation" on page 2-4 for details.

2.8 Installing Patch Sets

When available, you can download the latest patch sets for 10*g* Release 3 (10.1.3) from OracleMetaLink at:

http://metalink.oracle.com

OracleMetaLink is the Oracle Support Services site where customers can get information about released patches and outstanding bugs.

3

Migrating to 10*g* Release 3 (10.1.3)

This chapter describes how to migrate existing Oracle TopLink projects to TopLink 10*g* Release 3 (10.1.3).

This chapter includes the following sections:

- Upgrading TopLink Workbench Projects
- Package Rename
- Updating Sessions XML Files
- Using Hosted XSD

Refer to the *Oracle TopLink Developer's Guide* for information on migrating existing OC4J or WebLogic persistence to TopLink.

Note: If you receive `ClassNotFound` exceptions after you migrate a project, ensure the **JDBC_CLASSPATH** variable does not include any Java classes for your persistent business objects. Paths for persistent business objects are set within an TopLink Workbench project. For more information on how to set up a path for a project, see the *Oracle TopLink Developer's Guide*.

Also check your project classes for any references to legacy TopLink classes.

3.1 Upgrading TopLink Workbench Projects

Use Table 3–1 to upgrade both your TopLink Workbench project (`.mwp`) and, if necessary, `your project.xml` file from a previous version of TopLink.

Table 3–1 Upgrading TopLink Workbench Projects

To Upgrade From...	Use This Procedure...
Release 2 (9.0.4)	1. Open the existing project with the 10*g* Release 3 (10.1.3) TopLink Workbench. 2. Save the new TopLink Workbench project to a new location.

Table 3–1 (Cont.) Upgrading TopLink Workbench Projects

To Upgrade From...	Use This Procedure...
Release 1 (9.0.3)	1. Open the existing project with the 10*g* Release 3 (10.1.3) TopLink Workbench. 2. Delete the passwords from all configured logins. 3. Re-enter the passwords as plain (not encrypted) text for all configured logins. 4. Export the `project.xml`. When you export the `project.xml`, the TopLink Workbench writes the login passwords using Java Cryptograph Extension (JCE) encryption (when using JDK 1.4 or higher). Use this new `project.xml` file at runtime. 5. Save the new TopLink Workbench project to a new location.

3.2 Package Rename

Beginning with Release 1 (9.0.3), the base package for the entire TopLink product changed to **`oracle.toplink`**. To upgrade existing application source code which refers to TopLink API packages and existing TopLink Workbench projects previous to Release 1 (9.0.3), you must use the **Package Rename** tool.

You cannot use the TopLink Workbench's Rename Package function when migrating projects from earlier versions – you must use the Package Rename tool.

Note: If you are upgrading from a version prior to Release 1 (9.0.3), you must convert the package names before you open your TopLink project(s) in 10*g* Release 3 (10.1.3).

Use the Package Rename tool on your:

- Source code
- Configuration files
- TopLink Workbench project files (`.mwp`) that contain references to pre-Release 1 (9.0.3) API packages

The Package Rename tool works on plain text files and ***must not*** be used with binary files (such as `.jar`).

3.2.1 Running the Package Rename Tool

Use this procedure to upgrade your existing pre-Release 1 (9.0.3) application source code and TopLink Workbench projects to version 10*g* Release 3 (10.1.3).

1. At the command prompt, execute the `packageRename.cmd/sh` program located in the `<ORACLE_HOME>toplink/bin` directory. You need to specify three parameters on the command line:
   - the complete directory path that contains the Java source code of your existing project
   - the complete directory path that will contain the upgraded 10*g* Release 3 (10.1.3) project

- the name of a log file. If no file is specified, the logging messages will print to standard output.

2. Press **Enter** and the Package Rename tool will upgrade your project. The Package Rename tool requires approximately 15 minutes for a 1MB file. Larger files may require additional time.
3. Repeat this procedure for your:
   - Source code
   - Configuration files
   - TopLink Workbench project files (`*.mwp`, `*.xml`)

3.3 Updating Sessions XML Files

TopLink Workbench 10*g* Release 3 (10.1.3) can automatically update your `sessions.xml` file, as needed. Simply open the file in 10*g* Release 3 (10.1.3), update your data source information (if needed), and save the file.

In 10*g* Release 3 (10.1.3), the `sessions.xml` file includes a `<login>` element that will override any login information included in your `project.xml`. Use one of the following approaches to correctly configure the session login:

- Use the 10*g* Release 3 (10.1.3) `sessions.xml` (XSD) **with** the `<login>` element. You should include all login information in the `sessions.xml`.
- Use the 10*g* Release 3 (10.1.3) seesions.xml (XSD) **without** the <login> element. Include all login information in the `project.xml` (or project class).
- Use the `project.xml` (or project class) without `sessions.xml`. Include all login information in the `project.xml` (or project class).
- Use the 9.0.4 `sessions.xml` file (DTD). The login information included in the `sessions.xml` will override any login information in the `project.xml` (or project class).

See the *Oracle TopLink Developer's Guide* for complete details.

3.4 Using Hosted XSD

For 10*g* Release 3 (10.1.3), the XSD files for use with Oracle TopLink are included with the standard TopLink installation or available on OTN at:

`http://www.oracle.com/technology/oracleas/schema/`

Specifically, you can use the following XSD files:

- `http://www.oracle.com/technology/oracleas/schema/object-persistence_1_0.xsd`
- `http://www.oracle.com/technology/oracleas/schema/sessions_10_1_3.xsd`
- `http://www.oracle.com/technology/oracleas/schema/toplink-object-persistence_10_1_3.xsd`

- http://www.oracle.com/technology/oracleas/schema/toplink-was-ejb-jar_10_1_3.xsd

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