Configuring Oracle TimesTen In-Memory Database 11.2.2 for J2EE Application Servers and Object-Relational Mapping Frameworks

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Introduction
Conventions
Prerequisites
Troubleshooting
TimesTen for JBoss EAP 6.2
Configuring the TimesTen JDBC driver
Configuring TimesTen data sources
Using JBoss JPA with Times Ten12
TimesTen for Oracle WebLogic Server 12.1
Configuring the TimesTen JDBC driver
Configuring TimesTen data sources
Using WebLogic Server JPA with TimesTen19
TimesTen for Oracle GlassFish Server 3.1
Configuring the TimesTen JDBC driver
Configuring TimesTen connections
Configuring a TimesTen JDBC connection pool
Configuring a TimesTen JDBC resource
Using Oracle GlassFish Server JPA with TimesTen
TimesTen for WebSphere Application Server 8.5
Configuring Times Ten connections
Configuring a TimesTen JDBC provider
Configuring Times Ten data sources
Using WebSphere Application Server JPA with TimesTen
TimesTen for EclipseLink 2
Configuring the TimesTen JDBC driver for EclipseLink
TimesTen for Hibernate 4
Configuring the TimesTen JDBC driver for Hibernate
Hibernate configuration properties for TimesTen
TimesTen for OpenJPA 2
Configuring the TimesTen JDBC driver for OpenJPA

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INTRODUCTION

This white paper is for application developers who use and administer TimesTen JDBC and for system administrators who configure and manage the TimesTen database. It provides information about configuring J2EE application servers and object–relational mapping frameworks for use with TimesTen 11.2.2.

Additional information and code examples demonstrating the use of TimesTen with Java technologies are available in the TimesTen Quick Start. The TimesTen Quick Start is an optional component of a TimesTen installation.

CONVENTIONS

This document uses the following conventions:

- *tt_install_dir*: The path to the directory where TimesTen is installed.
- *gs_install_dir*: The path to the directory where Oracle GlassFish Server is installed.
- *gs_domain*: The name of the directory that contains an Oracle GlassFish Server domain configuration.
- *jboss_install_dir*: The path to the directory where JBoss Enterprise Application Platform is installed.
- w1_domain_dir: The path to the directory that contains a WebLogic Server domain configuration.

PREREQUISITES

The sample configurations provided in this document require that you install both Times Ten and the target J2EE application server or object-relational mapping framework on the same machine. In addition, the following Times Ten items are required:

- A TimesTen direct driver DSN called SAMPLEDB_1122. This is already defined in the .odbc.ini ODBC configuration file or in the ODBC Data Source Administrator dialog on Windows platforms.
- A TimesTen client/server driver DSN called SAMPLEDBCS_1122. This is already defined in the .odbc.ini ODBC configuration file or in the ODBC Data Source Administrator dialog on Windows platforms. The SAMPLEDBCS_1122 DSN should be configured to connect to the database defined by the SAMPLEDB_1122 direct driver DSN.
- An internal TimesTen user account with the user name 'scott' and password 'tiger' needs to be defined in the database associated with the SAMPLEDB_1122 DSN.

Test and configure the two DSNs and the scott/tiger user account with the TimesTen ttIsql utility before following the procedures and using the configurations included in this document.

TROUBLESHOOTING

- The TimesTen JDBC driver loads native shared libraries at runtime. This requires the Java Virtual Machine (JVM) to use the same architecture as the TimesTen JDBC driver. For example, a 32-bit JVM cannot connect to a TimesTen database using a 64-bit version of the TimesTen JDBC driver and vice versa. Attempts to mix architectures in this way results in a runtime error when the Java application attempts to connect to the TimesTen database.
- The TimesTen JDBC driver includes a tracing facility that can help diagnose problems. To enable the tracing facility you must enable a Java system property called timesten.tracefile for the JVM accessing the TimesTen JDBC driver. You can enable tracing from the Java command line with the syntax -Dtimesten.tracefile=filename where filename is the complete path to a local output file.
- Attempts to establish a connection to a TimesTen database from within the JVM may result in a TimesTen JDBC driver exception with the message: "Cannot attach database shared memory segment". This problem is likely to occur on 32-bit platforms when the system is unable to allocate or map enough contiguous shared memory to hold the TimesTen database. It can also occur when there is a conflict with the value of the PLSQL_MEMORY_ADDRESS TimesTen connection attribute. For detailed instructions on how to resolve this and other similar connection problems see the *Oracle TimesTen In-Memory Database Troubleshooting Procedures Guide* and the *Oracle TimesTen In-Memory Database Installation Guide*. These are the recommended troubleshooting steps:
 - a. Verify that it is possible to connect to the TimesTen database outside of the JVM. You can use the ttIsql utility for this purpose.

- b. Try increasing the maximum amount of shared memory available to the system. See the *Oracle TimesTen In-Memory Database Installation Guide* for platform specific details.
- c. Try decreasing the memory size of the TimesTen database by recreating the database with lower values for the PermSize and TempSize connection attributes.
- d. Try adjusting the value of the PLSQL_MEMORY_ADDRESS connection attribute. If PL/SQL support is not required for the TimesTen database, then disable it by recreating the TimesTen database with the PLSQL connection attribute set to 0.
- e. Terminate any unnecessary processes on the system to make more memory available.
- f. If possible, try a client/server TimesTen JDBC connection instead of a direct connection.
- g. If possible, try a 64-bit version of the TimesTen JDBC driver in conjunction with a 64-bit JVM.

TIMESTEN FOR JBOSS EAP 6.2

Configuring JBoss Enterprise Application Platform and TimesTen This section provides descriptions and examples of configuring the TimesTen JDBC driver for use with JBoss Enterprise Application Platform 6.2. This section requires that you install both TimesTen and JBoss EAP on the same machine, and that a standalone JBoss server instance is in use.

Configuring the TimesTen JDBC driver

Before you can use JBoss with TimesTen databases, the JBoss server environment must have access to the TimesTen shared libraries and the TimesTen JDBC driver jar file.

- 1. Set the LD_LIBRARY_PATH environment variable (or the equivalent variable for your OS) to include the *tt_install_dir*/lib directory where TimesTen shared libraries are located. On Windows, set the PATH environment variable to the *tt_install_dir*/bin directory where the TimesTen DLLs are located. This variable must be set for the environment where JBoss EAP runs.
- 2. Restart the JBoss server for the environment changes to take effect.
- 3. Log in to the JBoss management console. The default web address is http://localhost:9990/console.
- 4. In the top menu of the JBoss management console, select Runtime.
- 5. In the top-left pane of the Runtime tab, expand the **Server** node and, then select **Manage Deployments**.
- 6. In the DEPLOYMENTS tab, click **Add**, and then click **Choose File** in the Create Deployment dialog.
- 7. Specify the location of the TimesTen JDBC driver jar file. If JBoss server is using JDK 1.7, then select the Java 7 runtime version of the TimesTen JDBC driver jar file located at tt_install_dir/lib/ttjdbc7.jar. See Figure 1.1. If JBoss server is using JDK 1.6, then select the tt_install_dir/lib/ttjdbc6.jar file.



Figure 1.1 Deployment Selection dialog

- 8. Click Next.
- 9. Click Save.
- 10. In the DEPLOYMENTS tab, a new deployment called ttjdbc7.jar or ttjdbc6.jar is now displayed. Select **En/Disable**. See Figure 1.2. Click **Confirm** to enable the TimesTen JDBC driver.

RED HAT JBOSS ENTERPRISE	APPLICATION PLATFORM 6.2	0.GA Success: enabled ttjdbc7.jar.	Messages: 7 🔺 jboss
Profile Runtime Adn	ninistration		
- Server	DEPLOYMENTS		
Overview Manage Deployments Status Platform JVM Environment Subsystems Detasources JPA JNDI View Transaction Logs Transactions Web Webservices	Deployments Currently deployed application of Available Deployments > ttjdbc7.jar	Add Remove	En/Disable Replace
206 Seel order 1	Name: ttjdbc7.j Runtime Name: ttjdbc7.j	ar	Teal Continent

Figure 1.2 Available Deployments

Configuring TimesTen data sources

The TimesTen JDBC driver supports four different types of connections to TimesTen databases.

- **Direct access with local transactions only** This configuration provides the fastest database performance. The TimesTen database must reside on the same machine as the JBoss server.
- Direct access with XA distributed transaction support This configuration uses JTA to support distributed transactions. The TimesTen database must reside on the same machine as the JBoss server.
- Client/server access with local transactions only The TimesTen database can reside on a remote machine that is running the TimesTen server.
- Client/server access with XA distributed transaction support This configuration uses JTA to support distributed transactions. The TimesTen database can reside on a remote machine that is running the TimesTen server.

Each type of TimesTen JDBC driver connection requires a unique JBoss data source configuration. The key difference between the configurations is the TimesTen driver class name and the TimesTen URL. TimesTen connections that support local

transactions use the com.timesten.jdbc.TimesTenDriver class. Connections that require distributed transaction support through JTA use the com.timesten.jdbc.xa.TimesTenXADataSource class.

The next procedure describes how to configure a direct access TimesTen data source that supports local transactions by the use of the JBoss management console.

- 1. Log in to the JBoss management console. The default web address is http://localhost:9990/console.
- 2. In the top menu of the JBoss management console, select **Profile**.
- 3. In the top-left pane of the Profile tab, expand the **Subsystems** node, then expand **Connector** node, and then select **Datasources**.
- 4. Click Add.
- 5. In the Datasource Attributes step of the Create Datasource dialog, enter a name and a JNDI name for the new data source. See Figure 1.3.

RED HAT JBOSS ENTERPR	ISE APPLICATION PLATFORM 6.2.	0.GA	Messages: 10 🗳 jbo
Subsystems	DATASOURCES	XA DATASOURCES	
Connector JCA	JDBC Datasources		
Datasources	Create Datasource	~	c
Resource Adapters Mail Container Core Infinisoan	Step 1/3: Datasource Attribu	ites Need Help?	Remove Disable
Security Web General Configuration	Name: TptbmDirect	DS	<< 1-1 of 0 > >>>
Interfaces Socket Binding Paths System Properties			Need Help?
		Cancel Next »	
	Driver Class:		
	Share Prepared Statemen Statement Cache Size:	ts:	
2.0.6.Final-redhat-1			▲Tools ⊁ Settin

Figure 1.3 Step 1/3: Datasource Attributes

6. Click Next.

7. In the JDBC Driver step of the Create Datasource dialog, select the TimesTen JDBC driver deployment called ttjdbc7.jar or ttjdbc6.jar. See Figure 1.4.

RED HAT JBOSS ENTERPRIS	E APPLICATION PLATFORM 6.2.0.GA	Messages: 10 jboss
= Subsystems	DATASOURCES XA DATASOURCES	
Connector JCA	JDBC Datasources	_
Resource Adapters	Create Datasource	×
Mail + Container	Step 2/3: JDBC Driver	Remove Disable
Core Infinispan Security	Select one of the deployed JDBC driver. Detected Driver Specify Driver	
General Configuration	Name tijdbc7.jar	≪ < 1-1 of 0 ≥ ≫
Interfaces Socket Binding	h2 《 〈 1-2 of 2 〉 》	
Paths System Properties		Need Heip?
	Cancel Next	»
	Driver Class:	
	Share Prepared Statements:	
	Statement Cache Size:	
2.0.6.Final-redhat-1		▲Tools ≁Settings

Figure 1.4 Step 2/3: JDBC Driver

- 8. Click Next.
- 9. In the Connection Settings step of the Create Datasource dialog, enter the TimesTen JDBC URL and TimesTen database user credentials for the connection. See Figure 1.5.

RED HAT JBOSS ENTERPRIS	E APPLICATION PLATFORM 6.2.	0.GA		Messages: 10	≗ jboss
Profile Runtime Ad					
- Subsystems	DATASOURCES	XA DATASOURCES			
Connector JCA	JDBC Datasources				
Datasources	Create Datasource		2 ×		
Resource Adapters Mail Container Core	Step 3/3: Connection Settin	gs	Need Help?	Remove Disable	
 Infinispan Security Web 	Connection URL:	ten:direct:SampleDb_1122		(1-1 of 0)))	
General Configuration Interfaces Socket Binding	Username: scott				
Paths System Properties	Password:		_	Need Help?	
	Security Domain:	[Cancel Done		
	Share Prepared Statement	LS:			

Figure 1.5 Step 3/3: Connection Settings

10. Click Done.

- 11. In the DATASOURCES tab, click **Enable**, and then click **Confirm** to enable the data source.
- 12. To verify that the data source can connect to TimesTen, click the **Connection** link, and then click **Test Connection**. See Figure 1.6.



Figure 1.6 Datasource Connection dialog

Using JBoss JPA with TimesTen

JBoss server utilizes the Hibernate object-relational mapping framework to support the Java Persistence API (JPA). Times Ten supports Hibernate applications by providing a custom SQL dialect class called TimesTenDialect1122. This dialect class should be used for JBoss applications that connect to TimesTen using the Hibernate framework. For more information on the use of the TimesTen SQL dialect, see the "TimesTen for Hibernate 4" section in this document and the TimesTen Quick Start. Configuring Oracle WebLogic Server and TimesTen

TIMESTEN FOR ORACLE WEBLOGIC SERVER 12.1

This section provides descriptions and examples of configuring the TimesTen JDBC driver for use with Oracle WebLogic Server 12.1.2.0. This section requires that you install both TimesTen and Oracle WebLogic Server on the same machine.

Configuring the TimesTen JDBC driver

Before you can use WebLogic Server to connect to TimesTen databases, the server environment must have access to the TimesTen JDBC driver jar file and the native TimesTen shared libraries.

- In the environment where the server starts, set the CLASSPATH environment variable to include the TimesTen JDBC driver jar file. Use the Java 7 runtime version of the TimesTen driver jar file located at tt_install_dir/lib/ttjdbc7.jar. You can also set this environment variable within the domain's environment configuration script located at wl_domain_dir/bin/setDomainEnv.sh on UNIX systems or at wl_domain_dir/bin/setDomainEnv.cmd on Windows.
- 2. In the UNIX environment where the server starts, set the LD_LIBRARY_PATH (or equivalent variable for your OS) to include the TimesTen shared libraries located at tt_install_dir/lib. For servers on Windows platforms, append the PATH environment variable with the tt_install_dir/bin directory where TimesTen DLLs are located. You can also set these environment variables within the domain's environment configuration script located at wl_domain_dir/bin/setDomainEnv.sh on UNIX systems or at wl_domain_dir/bin/setDomainEnv.cmd on Windows.
- 3. Restart WebLogic Server for these changes to take effect.

Configuring TimesTen data sources

The TimesTen JDBC driver supports four types of connections to TimesTen databases:

- Direct access with non-XA transactions This configuration provides the best database performance. The TimesTen database must reside on the same machine as WebLogic Server. The WebLogic Administration Console lists this driver type as Oracle TimesTen Direct Connection's Driver (Type 4).
- Direct access with XA distributed transactions The driver uses JTA to support distributed transactions. The TimesTen database must reside on the same machine as WebLogic Server. The WebLogic Administration Console lists this driver type as Oracle TimesTen Direct Connection's Driver (Type 4 XA).

- Client/server access with non-XA transactions The TimesTen database can reside on a remote machine that is running the TimesTen server. The WebLogic Administration Console lists this driver type as Oracle TimesTen Client Connection's Driver (Type 4).
- Client/server access with XA distributed transactions The driver uses JTA to support distributed transactions. The TimesTen database can reside on a remote machine that is running the TimesTen server. The WebLogic Administration Console lists this driver type as Oracle TimesTen Client Connection's Driver (Type 4 XA).

Each type of TimesTen JDBC driver connection requires a unique WebLogic Server data source configuration. The next example references a TimesTen direct connection DSN named SAMPLEDB_1122. This DSN must be configured in the .odbc.ini or sys.odbc.ini file or the Windows Data Source Administrator before the example can work.

Use the next procedure as an example for configuring a TimesTen data source within the WebLogic Server Administration Console.

- 1. Connect to the WebLogic Server Administration Console.
- 2. In the Domain Structure tree, expand the **Services** node, and then click **Data Sources**.
- 3. Click New, and then select Generic Data Source.
- 4. Enter a name for the data source in the **Name** field.
- 5. Enter the JNDI name for the data source in the **JNDI Name** field.
- 6. In the Database Type drop-down list, select **Oracle TimesTen Direct Connection** for a direct connection DSN or **Oracle TimesTen Client Connection** for a client/server DSN. See Figure 2.1.

🙆 Home Log Out Preferen	nces 🚵 Record Help		٩	Welcome, weblogic	Connected to: timesten	_domaii
Home >Summary of JDBC Dat	a Sources >Summary of Sen	vices >Summary of JI	DBC Data S	ources		
Create a New JDBC Data S	ource					
Back Next Finish	Cancel					
JDBC Data Source Prop	erties					
The following properties w	ill be used to identify your	new JDBC data sour	ce.			
* Indicates required fields						
What would you like to nam	e your new JDBC data sou	urce?				
艂 * Name:	TptbmDS]			
What JNDI name would you	like to assign to your new	v JDBC Data Source?				
街 JNDI Name:						
jdbc/TptbmDS		~ ~				
What database type would y	ou like to select?					
Database Type:	Oracle TimesTen Di	irect Connection	~			
Back Next Finish	Cancel					

Figure 2.1 JDBC Data source properties

- 7. Click Next.
- 8. In the resulting screen, the Database Driver drop-down list will include two of the next four options:
 - Oracle TimesTen Direct Connection's Driver (Type 4)
 - Oracle TimesTen Direct Connection's Driver (Type 4 XA)
 - Oracle TimesTen Client Connection's Driver (Type 4)
 - Oracle TimesTen Client Connection's Driver (Type 4 XA)

Select one of these options based on application requirements. The non-XA versions of the TimesTen driver result in the best performance. Click **Next**.

9. At the Transaction Options screen, check the Supports Global Transactions checkbox. For the best performance, select the One-Phase Commit option. Note that if in the previous step you selected a XA version of the TimesTen driver, then these transaction options are not available. See Figure 2.2 for an example when using a non-XA driver type.

L Ho Home	me Log Out Preferences 🚵 Record Help Welcome, weblogic Connected to: timesten >Summary of JDBC Data Sources >Summary of Services >Summary of JDBC Data Sources
reate	a New JDBC Data Source
Back	Next Finish Cancel
Tran	isaction Options
You	have selected non-XA JDBC driver to create database connection in your new data source.
Does t	this data source support global transactions? If yes, please choose the transaction protocol for this data source.
🗸 Su	upports Global Transactions
Select <i>Last R</i>	this option if you want to enable non-XA JDBC connections from the data source to participate in global transactions using the <i>Log</i> Resource (LLR) transaction optimization. Recommended in place of Emulate Two-Phase Commit.
() La	pgging Last Resource
Select JTA. S	this option if you want to enable non-XA JDBC connections from the data source to emulate participation in global transactions us felect this option only if your application can tolerate heuristic conditions.
() Er	nulate Two-Phase Commit
Select phase	this option if you want to enable non-XA JDBC connections from the data source to participate in global transactions using the one commit transaction processing. With this option, no other resources can participate in the global transaction.
<u>ا</u> (ne-Phase Commit
Back	Next Finish Cancel

Figure 2.2 Transaction Options

- 10. Click Next.
- 11. In the Connection Properties screen, enter a name in the Database Name field. You must use the name of the TimesTen DSN that the data source will connect to. This example uses the name SAMPLEDB_1122. The Host Name field and Port field are not relevant to TimesTen and may be left blank. Specify the TimesTen database user name in the Database User Name field and the TimesTen database user password in the Password and Confirm Password fields. See Figure 2.3.

🟦 Home Log Out Preferences 🔤 Record He		Welco	me, weblogic	Connected to: timesten_domai
Home >Summary of JDBC Data Sources >Summary of	f Services >Summary of JDBC	Data Sources		
Create a New JDBC Data Source				
Back Next Finish Cancel				
Connection Properties				
Define Connection Properties.				
What is the name of the database you would like	to connect to?			
Database Name:	SampleDb_1122			
What is the name or IP address of the database	server?			
Host Name:				
What is the port on the database server used to	connect to the database?			
Port:				
What database account user name do you want	o use to create database conn	ections?		
Database User Name:	scott			
What is the database account password to use to	create database connections?	•		
Password:	•••••	•		
Confirm Password:	•••••			
Back Next Finish Cancel				

Figure 2.3 Connection Properties

- 12. Click Next.
- 13. In the **Test Database Connection** screen, fill all available fields. Figure 2.4 shows an example with a DSN named SAMPLEDB_1122 and a TimesTen database user called scott.

🏦 Home Log Out Preferences 🔤 R	ecord Help		٩	Welcome, weblogic	Connected to: timesten	_domai
Home >Summary of JDBC Data Sources >	TptbmDS > Sum	mary of JDBC Data S	ources			
A Connection test succeeded						
Connection test succeeded.						
Create a New JDBC Data Source						
Test Configuration Back Next	Finish	ancel				
Test Database Connection						
Test the database availability and the	connection pro	perties you provided.				
What is the full package name of JDBC	driver class use	ed to create database	connec	tions in the connection p	ool?	
(Note that this driver class must be in t	he classpath of	any server to which	it is depl	oyed.)		
Driver Class Name:	com.timest	en.jdbc.Obser				
What is the URL of the database to cor	nect to? The fo	rmat of the URL varie	es by JD	BC driver.		
URL:	jdbc:timest	en:direct:Sam				
What database account user name do	you want to use	to create database o	connectio	ons?		
Database User Name:	scott					
What is the database account password	d to use to crea	te database connecti	ons?			
(Note: for secure password manageme	nt, enter the pa	ssword in the Passwo	ord field	instead of the Properties	s field below)	
Password:	•••••	•••••				
Confirm Provinsi						
Commin Password:	•••••	•••••				
What are the properties to pass to the	JDBC driver wh	en creating database	connect	ions?		
Properties:						
user=scott		~				
		~				

Figure 2.4 Test Database Connection

14. Click Test Configuration.

A correct configuration results in the following message: "Connection test successful". If the test fails, then review previous configuration steps. Common causes for failure include: CLASSPATH or LD_LIBRARY_PATH environment variables (or equivalent variable for your OS) configured incorrectly, or an incorrect TimesTen DSN name.

Click Next.

- 15. In the **Select Targets** screen, select the WebLogic servers to be associated with the data source. Click **Finish**.
- 16. The message "All changes have been activated. No restarts are necessary." indicates that the configuration is complete.

Using WebLogic Server JPA with TimesTen

WebLogic Server supports the Java Persistence API (JPA) through the EclipseLink object-relational mapping framework. TimesTen supports EclipseLink applications. For additional information, see the "TimesTen for EclipseLink 2" section in this document and the TimesTen Quick Start.

Configuring Oracle GlassFish Application Server and TimesTen TIMESTEN FOR ORACLE GLASSFISH SERVER 3.1

This section provides descriptions and examples of configuring the TimesTen JDBC driver for use with Oracle GlassFish Server 3.1. This section requires that you install both TimesTen and Oracle GlassFish Server on the same machine.

Configuring the TimesTen JDBC driver

Before you can use Oracle GlassFish Server to access TimesTen databases, the server environment must have access to the TimesTen JDBC driver jar file and the TimesTen shared libraries.

- Copy the TimesTen JDBC driver jar file called ttjdbc6.jar from tt_install_dir/lib to the gs_install_dir/glassfish/domains/gs_domain/lib directory.
- 2. Set the LD_LIBRARY_PATH environment variable (or the equivalent variable for your OS) to include the tt_install_dir/lib directory. On Windows platforms, set the PATH environment variable to the tt_install_dir/bin directory where TimesTen DLLs are located. This variable must be set for the environment where the Oracle GlassFish Server runs.
- 3. Restart the Oracle GlassFish Server.

Configuring TimesTen connections

The TimesTen JDBC driver supports four different types of database connections:

- **Direct access with local transactions only** This configuration provides the fastest database performance. The TimesTen database must reside on the same machine as Oracle GlassFish Server.
- Direct access with XA distributed transaction support The driver uses JTA to support distributed transactions. The TimesTen database must reside on the same machine as Oracle GlassFish Server.
- Client/server access with local transactions only The TimesTen database can reside on a remote machine that is running the TimesTen server.
- Client/server access with XA distributed transaction support The driver uses JTA to support distributed transactions. The TimesTen database can reside on a remote machine that is running the TimesTen server.

Properties of TimesTen connections

To configure TimesTen connections in Oracle GlassFish Server use the next settings:

• Direct access with local transactions only:

TimesTen Class: com.timesten.jdbc.ObservableConnectionDS

Example URL Property: jdbc:timesten:direct:SAMPLEDB_1122

Direct access with XA distributed transaction support:

TimesTen Class: com.timesten.jdbc.xa.TimesTenXADataSource

Example URL Property: jdbc:timesten:direct:SAMPLEDB_1122

• Client/server access with local transactions only:

TimesTen Class: com.timesten.jdbc.ObservableConnectionDS

Example URL Property: jdbc:timesten:client:SAMPLEDBCS_1122

• Client/server access with XA distributed transaction support:

TimesTen Class: com.timesten.jdbc.xa.TimesTenXADataSource

Example URL Property: jdbc:timesten:client:SAMPLEDBCS_1122

Configuring a TimesTen JDBC connection pool

To configure a TimesTen JDBC connection pool in Oracle GlassFish Server follow the next steps:

- 1. Connect to the Oracle GlassFish Server administration console.
- 2. In the left pane, expand **Resources**, then expand **JDBC**, and select **JDBC Connection Pools**.
- 3. Click New.
- 4. In the New JDBC Connection Pool (Step 1 of 2) screen, enter a name for the new pool in the **Name** field. In the Resource Type drop-down list, select javax.sql.ConnectionPoolDataSource, if the application requires only local transaction support. If the application requires XA distributed transaction support, then select

javax.sql.XADataSource. In the **Database Driver Vendor** dropdown list, select 'Oracle'. See Figure 3.1.

Home About User: admin Domain: domain1 Ser Oracle GlassFish™ Server	rver: localhost	_	Help Java
۲			
Tree Common Tasks	New JDBC Connect Identify the general settings for General Settings	tion Pool (Step 1 of 2) The connection pool	Next Cancel
Standalone Instances Standalone Instances Applications Lifewole Medules	Pool Name: * Resource Type: Database Driver Vendor:	TptbmPool javax sql.ConnectionPoolDataSource Implements more than 1 of the interface.	
Cliecycle Modules Securces JDBC DBC DBC Resources JDBC Connection Paols DerbyPool	Database Driver Vertaur.	Vracie Select or enter a database driver vendor	
 ☐TimerPool ▶ A connectors A Resource Adapter Configs ▶ # JMS Resources ☐ JavaMail Sessions 			
 ► , JNDI ∠ Performance Tuner ▼			

Figure 3.1 New JDBC Connection Pool

- 5. Click Next.
- In the New Connection Pool (Step 2 of 2) screen, enter com.timesten.jdbc.ObservableConnectionDS in the Datasource Classname field for local transactions. Enter com.timesten.jdbc.xa.TimesTenXADataSource for XA distributed transactions.

Scroll down to the Additional Properties section at the bottom of the screen, and click **Add Property**. Select the checkbox in the new row that appears. Type 'url' in the **Name** column. In the **Value** column, enter the URL for the TimesTen database associated with the connection pool. A TimesTen URL takes the form:

jdbc:timesten:[direct|client]:DSN. Specify the name of the TimesTen database user for the connection in the **Value** field of the 'user' property. Specify the TimesTen user password in the **Value** field of the 'password' property. Figure 3.2 shows an example for a connection to a direct DSN named SAMPLEDB_1122 using the TimesTen user account scott/tiger.

Home About User: admin Domain: domain1 So Oracle GlassFish [™] Server	erver: localhost							Help Jav
💞 Tree <		attributes						
Common Tasks	Description:							
- 🚱 Domain	Pool Settings							
server (Admin Server)	Initial and Minimum Pe	ool Size: 8 Minimum and	Con	nections				
 Standalone Instances R Nodes 	Maximum Pool Size:	32	Con	nections	requests			
Applications	Pool Resize Quantity:	2	Con	nections	requests			
 Resources BJDBC 	Idle Timeout:	300	Sec	nds				
JDBC Resources JDBC Connection Pools Deturbed	Max Wait Time:	60000 Amount of time	Milli Caller w	seconds aits before connection timeout is sent				
	Transaction Non Transactional Con Transaction Isolation: Isolation Level: Additional Properties (1	nections: I Enabled Returns non-l If unspecified, I Guarante All connection	ransactio v use defa ad use sa	nal connections ult level for JDBC Driver me isolation level; requires Transaction Isolati	on			
Server-coning Get Update Tool	How	y Delete Properties						
	Name		t 4	Value	15	Description	a:	14
	portNumber			Jube.timesten.direct.3AMPEEDD_1122	_			
	□ databaseName		1		-			_
	datasourceName		1		7			
	roleName		j					
	networkProtocol							
	serverName							
	✓ user			scott				
	Password			tiger				
						Previous	Finish	Cancel

Figure 3.2 Additional Properties

7. Click **Finish**. The TimesTen connection pool configuration is now complete.

Configuring a TimesTen JDBC resource

You must create a JDBC resource and associate it to the TimesTen connection pool for applications to access the TimesTen database. To perform this task, follow the next steps:

- 1. Connect to the Oracle GlassFish Server administration console.
- 2. In the left pane, expand **Resources**, then expand **JDBC**, and expand **JDBC Resources**.
- 3. Click New.
- 4. In the **New JDBC Resource** screen, enter a JNDI name for the resource. In the **Pool Name** field, select the name of the TimesTen connection pool you previously created. Figure 3.3 shows an example for a TimesTen connection pool called TptbmPool.

Home About					Help
User: admin Domain: domain1 Ser	rver: localhost				
Oracle GlassFish [™] Server					java
8					
Tree <		D			
🔲 Common Tasks	Specify a unique .	Resource	s the JDBC resource yo	u want to create	e. The name must contain only alphanumeric, underscore, dash,
Ormain Server (Admin Server) Standalone Instances Modes Applications Lifecycle Modules Sessurces JDBC 0.0000 Creasures	or dot characters. JNDI Name: * Pool Name: Description: Status:	jdbo/TptbmDS TptbmPool V Use the JDBC Connect V Enabled	ion Pools page to creat	e new pools]
JDBC Connection Pools	Additional Pro	perties (0)			
DerbyPool	Add Property	Delete Properties			
TptbmPool	Name		Value		Description:
TimerPool	No items found.				

Figure 3.3 New JDBC Resource

5. Click **OK**. The TimesTen database configuration for Oracle GlassFish Server is now complete.

Using Oracle GlassFish Server JPA with TimesTen

Oracle GlassFish Server uses the EclipseLink object-relational mapping framework to support the Java Persistence API (JPA). TimesTen supports EclipseLink applications. For additional information, see the "TimesTen for EclipseLink 2" section in this document and the TimesTen Quick Start.

Configuring IBM WebSphere Application Server and TimesTen

TIMESTEN FOR WEBSPHERE APPLICATION SERVER 8.5

This section provides descriptions and examples of configuring the TimesTen JDBC driver for use with IBM WebSphere Application Server 8.5.5.1. This section requires that you install both TimesTen and WebSphere Application Server on the same machine.

Configuring TimesTen connections

The TimesTen JDBC driver supports four different types of database connections.

- **Direct access with local transactions only** This configuration provides the fastest database performance. The TimesTen database must reside on the same machine as WebSphere Application Server.
- Direct access with XA distributed transaction support The driver uses JTA to support distributed transactions. The TimesTen database must reside on the same machine as WebSphere Application Server.
- Client/server access with local transactions only The TimesTen database can reside on a remote machine that is running the TimesTen server.
- Client/server access with XA distributed transaction support The driver uses JTA to support distributed transactions. The TimesTen database can reside on a remote machine that is running the TimesTen server.

Properties of TimesTen connections

To configure TimesTen connections in WebSphere use the next settings:

• Direct access with local transactions only:

TimesTen Class: com.timesten.jdbc.ObservableConnectionDS

Example URL Property: jdbc:timesten:direct:SAMPLEDB_1122

• Direct access with XA distributed transaction support:

TimesTen Class: com.timesten.jdbc.xa.TimesTenXADataSource

Example URL Property: jdbc:timesten:direct:SAMPLEDB_1122

• Client/server access with local transactions only:

TimesTen Class: com.timesten.jdbc.ObservableConnectionDS

Example URL Property: jdbc:timesten:client:SAMPLEDBCS_1122

• Client/server access with XA distributed transaction support:

TimesTen Class: com.timesten.jdbc.xa.TimesTenXADataSource

Example URL Property: jdbc:timesten:client:SAMPLEDBCS_1122

Configuring a TimesTen JDBC provider

Before you can use WebSphere to access TimesTen databases, you must set the server environment to have access to the TimesTen JDBC driver jar file and the native shared libraries. In WebSphere, you can do this by configuring a JDBC provider in the WebSphere administration console. Follow the next steps:

- 1. Connect to the WebSphere administrative console.
- 2. In the left pane, expand **Resources**, then expand **JDBC**, and then select **JDBC Providers**.
- 3. Select a **Scope** from the drop-down list.
- 4. Click New.
- 5. In the Create new JDBC provider screen, select User-defined for Database type. If the application requires distributed XA transaction support, enter com.timesten.jdbc.xa.TimesTenXADataSource in the Implementation class name field. Otherwise, enter

com.timesten.jdbc.ObservableConnectionDS.Enter a name for the configuration in the **Name** field. See Figure 4.1.



Figure 4.1 Create new JDBC provider

Click Next.

6. In the Enter database class path information screen, enter the path to the TimesTen JDBC driver located at

tt_install_dir/lib/ttjdbc6.jar.See Figure 4.2.

WebSphere. software			Welcome	Help Logout	IBM.
View: All tasks	Cell=VelocityNode01Cell, Profile=A	ppSrv01		Clo	ose page
- Welcome	Create a new IDBC Provider			Help	
Guided Activities					
± Servers	Create a new JDBC Provider			Field help A list of paths or JAR f	ile
Applications	Step 1: Create new	Enter database class path information		names that, together, the location for the res	form
Services	JDBC provider	To configure your upper defined 1DBC provider, specify the full	anth anmos	provider classes.	
E Resources	Step 2: Enter database class path	of the JDBC driver class files that you installed. Type the file p	ath names as		
- Schedulers	information	Do not use path separator characters (such as ':' or ': '). Us	d in the field. se Enter to		
Object pool managers The same	Step 3: Summary	separate your class path entries.			
I JDBC		Characterity .			
JDBC providers		Cilass path Cil/TimesTen/tt1122_64\lib\ttidbc6.jan	-		
Data sources			~		
Data sources (WebSphere Application Server V4)					
Carba instances					
H Mail			~		
I URL					
Resource Environment					
Security	Previous Next Can	cel			
Environment					
System administration					
Users and Groups					
± Monitoring and Tuning					
* Troubleshooting					
Service integration					
I UDDI					

Figure 4.2 Enter database class path information

Click Next.

- 7. In the summary screen, click **Finish**.
- 8. In the JDBC providers screen, click the TimesTen provider name that you just created.
- 9. In the General Properties section of Configuration tab, enter the path to the TimesTen shared libraries in the **Native library path** field. On UNIX platforms, the path is *tt_install_dir/*lib. On Windows platforms, the path is *tt_install_dir/*bin. See Figure 4.3.

View: All tasks	Cell=VelocityNode01Cell, Profile=AppSrv01	Close pag
Welcome	10PC providers	Holo
Guided Activities		- nep
Servers	Messages	Field help
Applications	Modifying the implementation class name will eliminate the ability to create data approximate the approximate of form together.	native libraries (*.dll, *.
5 Services	Changes have been made to your local configuration. You can:	Native path entries are separated by using the I
Descurren	 <u>Save</u> directly to the master configuration. 	key and must not conta
Schedulers	 <u>Review</u> changes before saving or discarding. 	(such as ';' or ':'). Nativ
Object pool managers	The server may need to be restarted for these changes to take effect.	paths can contain varia (symbolic) names that
⊞ JMS		be substituted using a
∃ JDBC	1000 11 N.T. T. 10000 11	variable map.
JDBC providers	JUBC providers > Timesten JUBC Provider	Page help
Data sources Data sources (WebSphere Application Server V/)	Use this page to edit properties of a Java Database Connectivity (JDBC) provider. The JDBC provider object encapsulates the specific JDBC driver implementation class for access to the specific vendor database of your environment.	More information about page
Resource Adapters	Configuration	
Asynchronous beans		
Cache instances	General Properties Additional Properties	
🗄 Mail	t Scope	
1 URL	cells:VelocityNode01Cell:nodes:VelocityNode01:servers:server1 = Data sources (WebSphere	
Resource Environment	Application Server V4)	
Security	TimesTen JDBC Provider	
Environment	Description	
Curtae education	Custom JDBC2.0-compliant Provider configuration	
	^	
Users and Groups	~	
C Monitoring and Tuning		
5 Troubleshooting	Class path	
Service integration	C:\TimesTen\tt1122_64\ib\ttjdbc6.jar	
E UDDI		
	×	
	Native library nath	
	C:\TimesTen\tt1122_64\bin	
	^	
	~	
	Isolate this resource provider	
	* Implementation class name	
	com.timesten.jdbc.ObservableConnectionDS	
	Apply OK Reset Cancel	

Figure 4.3 General properties

Click **Apply**.

10. Click Save to save the new configuration.

Configuring TimesTen data sources

WebSphere data sources are associated to the specific JDBC providers defined in the previous section. Follow these steps to configure TimesTen data sources from the WebSphere administration console.

- 1. Connect to the WebSphere administration console.
- 2. In the left pane, expand **Resources**, then expand **JDBC**, and then select **Data sources**.
- 3. Select a **Scope** from the drop-down list.
- 4. Click New.
- 5. In the Enter basic data source information screen, enter a name and a JNDI name for the data source. Click **Next**.
- 6. In the Select JDBC provider screen, select the TimesTen JDBC Provider you created in the previous section. Click **Next**.
- 7. In the Enter database specific properties for the data source screen, use com.ibm.websphere.rsadapter.GenericDataStoreHelpe

r for the **Data store helper class name** field. Make sure that the **Use this database in container managed persistence (CMP)** checkbox is checked. Click **Next**.

- 8. In the Setup security aliases screen, click Next.
- 9. In the following summary screen, click **Finish**.
- 10. In the Data sources screen, click on the name of the TimesTen data source that you just created.
- 11. Click the **Custom properties** link.
- 12. Click the **url** property. (If the property does not exist, then create it by clicking **New**.)
- 13. In the **value** field, enter the TimesTen JDBC URL for the DSN that this data source should connect to. A TimesTen URL takes the form: jdbc:timesten:<direct|client>:<DSN>. Click **OK**.
- 14. Click the **user** property, and enter the TimesTen database user name for the connection in the **value** field. Click **OK**.
- 15. Click the **password** property, and enter the TimesTen database password for the connection in the **value** field. Click **OK**.
- 16. Click the **webSphereDefaultIsolationLevel** property and enter '2' in the **value** field. Click **OK**.

Figure 4.4 shows an example for a direct DSN.

WebSphere, software				Welcome	Help	Logou	d 11
View: All tasks V	Cell=Velocit	tyNode01Cell, Profile=AppSrv01					Close pag
Welcome	Data sour	ces		2			Help
Guided Activities							er-141
Servers		🖾 Messages					For field
Applications	Changes have been made to your local configuration. You can:						select a
Services		• Review c	hanges before saving or discarding.				is displa
Resources							Page
Schedulers		d> The server may i	need to be restarted for these changes to	take effect.			More in
Object pool managers							page
E IMS	Data s	iources > <u>TptbmDS</u> > Custom pr	operties				
= JDBC	Use thi factorie	is page to specify custom properties es that you configure. For example,	s that your enterprise information system most database vendors require additiona	I (EIS) requires for the resource providers an al custom properties for data sources that ac	d resource		
Data sources	databa	se.					
 Data sources (WebSphere Application Server V4) 	+ Pre	ferences					
E Resource Adapters	Nev	v Delete					
Asynchronous beans							
± Cache instances							
± Mail	Select	Name 🗘	Value 🔿	Description	Required ①		
± URL	You c	an administer the following resource	*				
		initialPoolSize			false		
nicon ment							
stem administration		password	******		talse		
/sers and Groups		oraclePassword			false		
lonitoring and Tuning		maxStatements			false		
roubleshooting							
ervice integration		un	jdbc:timesten:direct:SampleDb_1122		false		
DDI							
		loginTimeout			false		
		logWriter			false	1	
		minPoolSize			false		
		propertyCycle			false		
		maxPoolSize			false		
		description			false		
		maxIdleTime			false		
		user	SCOTT		false		
		freeResourcesOnClose	false	Controls whether or not the application server automatically frees Arrays, Blobs, Clobs, NCIObs, SQLXMLs, InputStream, and Readers when the object that created them is closed. The ability to free resources is contingent on the JDBC driver	false		

Figure 4.4 Data Sources Custom Properties

- 17. Click the **Save** link near the top of the screen to save the new configuration.
- 18. Restart the WebSphere server before attempting to make connections to the new TimesTen data source.

Using WebSphere Application Server JPA with TimesTen

WebSphere Server supports the Java Persistence API (JPA) using the OpenJPA object-relational mapping framework. TimesTen supports OpenJPA applications. For additional information, see the "TimesTen for OpenJPA 2"section in this document and the TimesTen Quick Start.

TIMESTEN FOR ECLIPSELINK 2

Configuring EclipseLink 2 and TimesTen

This section provides descriptions and examples of configuring the TimesTen JDBC driver for use with EclipseLink 2.5.1 JPA. EclipseLink is a further development of the Oracle TopLink object-relational mapping framework. This section requires that you install both TimesTen and EclipseLink on the same machine.

Configuring the TimesTen JDBC driver for EclipseLink

To access a TimesTen database from an EclipseLink application, you must set the CLASSPATH environment variable to include the TimesTen JDBC driver jar file. When using the Java 6 runtime, add *tt_install_dir*/lib/ttjdbc6.jar to the CLASSPATH. When using the Java 7 runtime, add the *tt_install_dir*/lib/ttjdbc7.jar file to the CLASSPATH.

Set the LD_LIBRARY_PATH (or equivalent for your OS) environment variable to include the path to the TimesTen shared libraries located at $tt_install_dir/lib$. On Windows platforms, the PATH environment variable should be set to the $tt_install_dir/bin$ directory where TimesTen DLLs are located.

The EclipseLink distribution includes a platform class called org.eclipse.persistence.platform.database.TimesTen7Platform. This is the recommended platform class for TimesTen use with EclipseLink applications. An example persistence-eclipselink2.xml configuration file for EclipseLink JPA and TimesTen is located under the quickstart directory in your TimesTen installation.

Example persistence.xml configuration file for EclipseLink

<?xml version="1.0" encoding="UTF-8"?>

```
<persistence xmlns="http://java.sun.com/xml/ns/persistence"</pre>
             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"
             version="1.0">
  <persistence-unit name="TptbmEclipseLink" transaction-</pre>
type="RESOURCE_LOCAL">
    <provider>org.eclipse.persistence.jpa.PersistenceProvider</provider>
    <class>com.timesten.tptbmas.Tptbm</class>
    <properties>
      <property name="eclipselink.logging.level" value="INFO"/>
      <property name="eclipselink.target-database'
value="org.eclipse.persistence.platform.database.TimesTen7Platform"/>
      <property name="javax.persistence.jdbc.driver"</pre>
value="com.timesten.jdbc.TimesTenDriver"/>
      <property name="javax.persistence.jdbc.url"</pre>
value="jdbc:timesten:direct:SAMPLEDB_1122"/>
      <property name="javax.persistence.jdbc.password" value="tiger"/>
      <property name="javax.persistence.jdbc.user" value="SCOTT"/>
    </properties>
  </persistence-unit>
```

</persistence>

TIMESTEN FOR HIBERNATE 4

Configuring Hibernate and TimesTen

This section provides descriptions and examples of configuring the TimesTen JDBC driver for use with Hibernate 4. This section requires that you install both TimesTen and Hibernate on the same machine.

Configuring the TimesTen JDBC driver for Hibernate

To access a TimesTen database from a Hibernate application, you must set the CLASSPATH environment variable to include the TimesTen JDBC driver jar file. When using the Java 6 runtime, add *tt_install_dir/lib/ttjdbc6.jar* to the CLASSPATH. When using the Java 7 runtime, add the *tt_install_dir/lib/ttjdbc7.jar* file to the CLASSPATH.

Set the LD_LIBRARY_PATH (or equivalent for your OS) environment variable to include the path to the TimesTen shared libraries located at $tt_install_dir/lib$. On Windows platforms, the PATH environment variable should be set to the $tt_install_dir/bin$ directory where TimesTen DLLs are located.

A Hibernate SQL dialect class called

org.hibernate.dialect.TimesTenDialect1122 has been developed for use with TimesTen. This dialect is optimized for the latest SQL features of TimesTen, and it is the recommended dialect for TimesTen use with Hibernate applications. This dialect is not included in current versions of the Hibernate distribution. The dialect is available as part of the TimesTen Quick Start example programs that are included as an optional component of a TimesTen installation. The java source code for the dialect is located in the *tt_install_dir/* quickstart/sample_code/orm/config/hibernate4 directory of the TimesTen installation. This directory includes an Ant build script and instructions for compiling and using the dialect in TimesTen in conjunction with Hibernate applications.

Hibernate configuration properties for TimesTen

Hibernate uses properties defined in a hibernate.properties file or a hibernate.cfg.xml configuration file to determine which JDBC driver and which SQL dialect class to use for a session.

When using TimesTen with Hibernate, set the next property values:

hibernate.dialect=org.hibernate.dialect.TimesTenDialect1122
hibernate.connection.driver_class=com.timesten.jdbc.TimesTenDriver
hibernate.connection.url=jdbc:timesten:<direct|client>:<DSN>

The following property values are recommended when using TimesTen with Hibernate:

hibernate.connection.isolation=2
hibernate.jdbc.use_get_generated_keys=false
hibernate.jdbc.use_scrollable_resultset=false
hibernate.jdbc.batch_size=256

An example hibernate.cfg.xml configuration file is located under the quickstart directory in your TimesTen installation.

Example of hibernate.cfg.xml configuration file

```
<?xml version='1.0' encoding='utf-8'?>
<!DOCTYPE hibernate-configuration PUBLIC
"-//Hibernate/Hibernate Configuration DTD//EN"
"http://hibernate.sourceforge.net/hibernate-configuration-3.0.dtd">
```

<hibernate-configuration>

```
<!-- a SessionFactory instance -->
<session-factory name="Tptbm">
                 <!-- properties -->
                 <property name="hibernate.connection.url"></property name="hibernate.connection.url">
                                  jdbc:timesten:direct:SAMPLEDB_1122
                 </propertv>
                 <property name="hibernate.connection.username">SCOTT</property></property>
                 <property name="hibernate.connection.password">tiger</property></property>
                 <property name="hibernate.connection.driver_class">
                                  com.timesten.jdbc.TimesTenDriver
                 </property>
                 <property name="hibernate.dialect">
                                 org.hibernate.dialect.TimesTenDialect1122
                 </property>
                 <!-- Connection.TRANSACTION_READ_COMMITTED = 2 -->
                 <property name="hibernate.connection.isolation">2</property></property>
                 <property name="hibernate.jdbc.fetch_size">32</property></property>
                 <property name="hibernate.jdbc.batch_size">256</property></property>
                 <property name="hibernate.jdbc.batch_versioned_data"></property name="hibernate.jdbc.batch_versioned_data">
                                  True
                 </property>
                 <property name="hibernate.jdbc.use_streams_for_binary"></property name</property name="hibernate.jdbc.use_streams_for_binary"></property name="hibernate.jdbc.use_streams_for_binary"></property name="hibernate.jdbc.use_streams_for_binary"></property name="hibernate.jdbc.use_streams_for_binary"></property name="hibernate.jdbc.use_streams_for_binary"></property name</property name</propert
                                 False
                 </property>
                 <property name="hibernate.jdbc.use_get_generated_keys"></property name="hibernate.jdbc.use_get_generated_keys">
                                 False
                 </property>
                 <property name="hibernate.jdbc.use_scrollable_resultset"></property name="hibernate.jdbc.use_scrollable_resultset"</pre>
                                False
                 </property>
                 <property name="hibernate.cache.use_query_cache"></property name="hibernate.cache.use_query_cache">
                                  False
                 </property>
                 <property name="hibernate.cache.use_second_level_cache"></property name="hibernate.cache.use_second_level_cachee"</pre>
                                  False
                 </property>
                 <property name="hibernate.show_sql">false</property></property>
                 <property name="hibernate.connection.pool_size">4</property></property>
                 <!-- mapping file -->
                 <mapping resource="META-INF/Tptbm.hbm.xml"/>
</session-factory>
```

When using Hibernate with the JPA API, the same TimesTen properties can be specified in the persistence.xml configuration file. An example JPA configuration file (persistence-hibernate.xml) for a TimesTen Hibernate application is located under the quickstart directory in your TimesTen installation.

Example of the persistence.xml configuration file

```
<?xml version="1.0" encoding="UTF-8"?>
<persistence xmlns="http://java.sun.com/xml/ns/persistence"</pre>
             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"
             version="1.0">
  <persistence-unit name="TptbmHibernate" transaction-</pre>
type="RESOURCE_LOCAL">
    <provider>org.hibernate.ejb.HibernatePersistence</provider>
    <class>com.timesten.tptbmas.Tptbm</class>
    <properties>
      <property name="hibernate.connection.url"</pre>
                value="jdbc:timesten:direct:SAMPLEDB_1122"/>
      <property name="hibernate.connection.username" value="SCOTT"/>
      <property name="hibernate.connection.password" value="tiger"/>
      <property name="hibernate.connection.driver_class"</pre>
                value="com.timesten.jdbc.TimesTenDriver"/>
      <property name="hibernate.dialect"
                value="org.hibernate.dialect.TimesTenDialect1122"/>
      <!-- Connection.TRANSACTION_READ_COMMITTED = 2 -->
      <property name="hibernate.connection.isolation" value="2"/>
      <property name="hibernate.jdbc.fetch_size" value="32"/>
      <property name="hibernate.jdbc.batch_size" value="256"/>
      <property name="hibernate.jdbc.batch_versioned_data"</pre>
value="true"/>
      <property name="hibernate.jdbc.use_streams_for_binary"</pre>
                value="false"/>
      <property name="hibernate.jdbc.use_get_generated_keys"</pre>
                value="false"/>
      <property name="hibernate.jdbc.use_scrollable_resultset"</pre>
                value="false"/>
      <property name="hibernate.cache.use_query_cache" value="false"/>
      <property name="hibernate.cache.use_second_level_cache"</pre>
                value="false"/>
      <property name="hibernate.show_sql" value="false"/>
      <property name="hibernate.connection.pool_size" value="4"/>
    </properties>
  </persistence-unit>
</persistence>
```

TIMESTEN FOR OPENJPA 2

Configuring OpenJPA 2 and TimesTen This section provides descriptions and examples of configuring the TimesTen JDBC driver for use with OpenJPA 2.2.2. This section requires that you install both TimesTen and OpenJPA on the same machine.

Configuring the TimesTen JDBC driver for OpenJPA

When accessing a TimesTen database from an OpenJPA application, you must set the CLASSPATH environment variable to include the TimesTen JDBC driver jar file. When using the Java 6 runtime, add

tt_install_dir/lib/ttjdbc6.jar to the CLASSPATH. When using the Java 7 runtime, add the *tt_install_dir/lib/ttjdbc7.jar* file to the CLASSPATH.

Set the LD_LIBRARY_PATH (or equivalent for your OS) environment variable to include the path to the TimesTen shared libraries located at $tt_install_dir/lib$. On Windows platforms, the PATH environment variable should be set to the $tt_install_dir/bin$ directory where TimesTen DLLs are located.

You can configure OpenJPA with a property called openjpa.jdbc.DBDictionary, which defines a SQL dialect for a database provider. For TimesTen connections, the recommended value for this property is 'oracle'. An example persistence-openjpa2.xml configuration file for OpenJPA and TimesTen is located under the quickstart directory in your TimesTen installation.

Example persistence.xml configuration file for OpenJPA

<?xml version="1.0" encoding="UTF-8"?>

```
<persistence xmlns="http://java.sun.com/xml/ns/persistence"</pre>
             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"
             version="1.0">
  <persistence-unit name="TptbmOpenJPA" transaction-</pre>
type="RESOURCE_LOCAL">
<provider>org.apache.openjpa.persistence.PersistenceProviderImpl</provid
er>
    <class>com.timesten.tptbmas.Tptbm</class>
    <class>com.timesten.tptbmas.TptbmPKey</class>
    <properties>
      <property name="openjpa.ConnectionUserName" value="SCOTT"/>
      <property name="openjpa.ConnectionPassword" value="tiger"/>
      <property name="openjpa.ConnectionURL"
value="jdbc:timesten:direct:SAMPLEDB_1122"/>
      <property name="openjpa.ConnectionDriverName"</pre>
value="com.timesten.jdbc.TimesTenDriver"/>
      <property name="openjpa.jdbc.DBDictionary" value="oracle"/>
      <property name="openjpa.ConnectionRetainMode" value="always"/>
      <property name="openjpa.Multithreaded" value="true"/>
    </properties>
  </persistence-unit>
</persistence>
```



Configuring Oracle TimesTen In-Memory Database 11.2.2 for Application Servers and Object-Relational Mapping Frameworks April 2014

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