

Oracle® TimesTen In-Memory Database

Release Notes

Release 11.2.1

E13080-31

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This document provides late-breaking information for **TimesTen release 11.2.1.8.4**, as well as information that is not yet part of the formal documentation. The latest version of this document is the `readme.html` file in your installation directory. Release notes may also be updated from time to time in the documentation library at

<http://www.oracle.com/technetwork/database/timesten/documentation/>

Information about TimesTen 11.2.1 releases before **11.2.1.7.0** can be found at

<http://www.oracle.com/technetwork/database/timesten/documentation/1121-historic-183693.html>

To install the Oracle TimesTen In-Memory Database, run setup from the installation media pack. For installation information, see *Oracle TimesTen In-Memory Database Installation Guide*. This guide can be accessed from `install_dir/doc/` in the installation.

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1 Changes in this release

This section lists changes between releases:

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1.1 Changes for Release 11.2.1.8.4 from Release 11.2.1.8.3

1.1.1 Behavior Changes in Release 11.2.1.8.4

- Because of the fix for bug 12700101 to `OCIDescribeAny()`, the following types now return the proper scale and precision: `BINARY_FLOAT`, `BINARY_DOUBLE`, `NUMBER`, `TIMESTAMP`, `DATE`. In addition, `CHAR` vs. `BYTE` semantics are correctly described for the `NCHAR`, `NVARCHAR` data types. You may need to update OCI applications that use `OCIDescribeAny()`.
- The following statements are prevented from being executed on a standby database in an active standby database pair: `CREATE USER`, `DROP USER`, `ALTER USER`, `GRANT` and `REVOKE`. If the connection attribute `DDLReplication` is set to greater than 1, `CREATE SYNONYM` and `DROP SYNONYM` also cannot be executed.

1.1.2 New features in Release 11.2.1.8.4

- TimesTen is now supported on Oracle Exalogic Elastic Cloud (Exalogic). The Exalogic certification was performed using the TimesTen with a quarter-rack Exalogic version 1.0 server. For details on installing TimesTen on Exalogic, see the *Oracle TimesTen In-Memory Database Installation Guide*.
- Using the `ttcwadmin -beginAlterSchema` command, you can alter an active standby pair scheme managed by Oracle Clusterware. An alter of a replication scheme is typically used to add or drop replicated objects that cannot be replicated automatically using the `DDLReplicationLevel=2` connection attribute. The replicated objects that can be included in an alter operation are cache groups, PL/SQL procedures, sequences, materialized views and indexes on tables with data.

1.1.3 Bug fixes in Release 11.2.1.8.4

- An asynchronous materialized view that was specified with a complete refresh at a specific interval experienced an increasing rate of refreshes. This problem has been fixed. (BugDB 12799775)
- Showing a plan for a query that contained an `OR` predicate involving columns with bitmap indexes defined on them caused an assertion. In this example, bitmap indexes are defined on columns `a` and `b`:

```
EXPLAIN SELECT * FROM bitm WHERE (a=1 OR b=1);
```

Displaying the query plan caused the database to be invalidated. This problem has been fixed. (BugDB 12381228)

- In previous releases, in some cases free blocks were not put onto free list causing a failure during checkpoint. Now, free blocks that are not in the free list are added correctly to the free list during database restart. (BugDB 11930552)
- On Linux systems, the cache agent incorrectly generated daemon log messages indicating that autorefresh had not completed. This release contains diagnostics to understand this problem. (BugDB 12320812)
- When performing an uninstall or upgrade, TimesTen now returns a warning indicating that all files in the install directory will be removed including user-created files. (BugDB 12399683)

- When an `ALTER USER` operation was executed in the standby database of an active standby pair, the standby would respond as if the operation were running in a local transaction. This problem is fixed. The following statements are prevented from being executed on the standby database: `CREATE USER`, `DROP USER`, `ALTER USER`, `GRANT` and `REVOKE`. If the connection attribute `DDLReplication` is set to greater than 1, `CREATE SYNONYM` and `DROP SYNONYM` also cannot be executed. (BugDB 12417310)
- A problem has been fixed where an assertion failure could occur when a query contained two `IN` lists with different data types on the same table. (BugDB 12548271)
- The `ttBulkCp -t ignore|warn` command was not truncating data that contained multi-byte character sets. This problem is fixed. (BugDB 12548957)
- A problem is fixed where a checkpoint failure could occur after a `ttXactAdmin -xactIdRollback` operation. (BugDB 12555790)
- A memory leak in the `TTClasses TTCmd` class has been fixed. (BugDB 12561549)
- In previous releases, the user setting of the `RecoveryThreads` attribute was reset to 1 when using CRS and when `RamPolicy` was set to `always` or `manual`. This problem is fixed. (BugDB 12587494)
- A problem is fixed where the bookmark on the standby database of an active standby pair would not advance when the connection attribute `DDLReplication` was set to 2. (BugDB 12597878)
- A problem has been fixed where after switching the active and standby databases, both databases appeared to be using the same daemon port. (BugDB 12598573)
- A problem has been fixed where an assertion failure could occur when a query contained a subquery that had a `GROUP BY`, `HAVING` and an `ORDER BY` clause. (BugDB 12605257)
- In previous release, a SQL statement could fail to find a table in the `FROM` list on first attempt. This would occur in a query that had a left outer join with a view to define a derived table. This problem is fixed. (BugDB 12616424)
- The OCI client shipped with this release includes patch ARU: 10.2.0.4 ARU 11932704 for Sun Solaris x86-64 systems. The ARU addressed an OCI concurrency issue that prevented the cache agent or an Oracle In-Memory Database Cache application from performing correctly. (BugDB 12629581)
- The daemon log message "Large page alignment failed with error xxx" has been enhanced to indicate that the memory segment was created in normal pages because there was not enough huge pages. (BugDB 12633652)
- The `ttCacheAutorefreshStatsGet` built-in procedure is enhanced to include applied records. (BugDB 12639026)
- In previous releases, multiple calls to the `ttRepSubscriberWait` built-in procedure could increase log file growth. This problem is fixed. (BugDB 12641477)
- In previous releases, a `SELECT ... GROUP BY column` or a `SELECT DISTINCT column FROM` operation could produce incorrect output when the column in the `GROUP BY` clause was a `NUMBER` data type with a `NOT NULL` constraint and there were no indexes on the column. This is fixed. (BugDB 12659721 and 12679817)
- A problem has been fixed where a core dump occurred during a reconnect in the rare case that permissions had been changed on a TimesTen DBI file. (BugDB 12662174)

- A problem has been fixed where a replication log record was missed. In that case, TimesTen returned multiple TT16999 warning messages. (BugDB 12666539)
- A problem has been fixed where the TimesTen cache agent could drop user triggers on the Oracle database during startup. The conditions under which this problem could occur were: user triggers existed in the cache admin schema, the name of the user trigger had a number after the sixth character and the number in the user trigger name corresponded to an Oracle user ID. (BugDB 12668360)
- A problem has been fixed where memory would not be released after a bitmap index was dropped. (BugDB 12681981)
- A problem has been fixed that caused CREATE ACTIVE STANDBY PAIR and CREATE REPLICATION operations to take an excessive time to complete. (BugDB 12689047)
- A problem has been fixed where a segmentation fault could occur during a SELECT COUNT operation on an asynchronous writethrough cache group. (BugDB 12695463)
- Changes were made to the OCIDescribeAny() function to fix a problem where some data types returned incorrect scale and precision. The following types now return the proper scale and precision: BINARY_FLOAT, BINARY_DOUBLE, NUMBER, TIMESTAMP, DATE. In addition, CHAR vs. BYTE semantics are correctly described for the NCHAR, NVARCHAR data types. You may need to update OCI applications that use OCIDescribeAny(). (BugDB 12700101)
- A problem is fixed where lock contention could occur when using the ttOptUpdateStats built-in procedure. (BugDB 12742011)
- In OCI programs that used the TimesTen client driver, batch inserts of input parameters that were Oracle numbers (the SOLT_VNU OCI type) would return invalid string or buffer lengths. This is fixed. (BugDB 12804356)

1.2 Changes for Release 11.2.1.8.3 from Release 11.2.1.8.2

- Parallel replication performance is improved by reducing compaction operations. Users are encouraged to call the ttckptblocking built-in procedure or the ttcompact utility during maintenance operations to manage their database space and to avoid long compaction operations during subsequent operations. (BugDB 10279257)
- A problem has been fixed where the subscriber data store in a replication scheme could use more heap memory than the master side and therefore run out of memory, causing replication to fail. (BugDB 11685169)
- A problem has been fixed where TimesTen would pass internal PL/SQL blocks and SQL statements to Oracle in PassThrough mode 3. In this release, only user provided PL/SQL blocks and SQL statements are passed through to Oracle. (BugDB 11711960)
- A problem in which calls to the ttOptGetColStats built-in procedure could cause data store invalidations in the sbBlkReportBadBlock function has been fixed. (BugDB 11722743)
- The message received if a user cannot login after a ttMigrate restore operation has been enhanced to indicate that you must reset user passwords. (BugDB 11785520)

- In previous releases, when a DROP ACTIVE STANDBY operation failed, the `ttCWAdmin -drop` operation exited with 0, which is considered "success." Now, `ttCWAdmin` retries the operation and returns a failure exit code when a DROP ACTIVE STANDBY operation fails. (BugDB 11792124)
- You can now select PassThrough levels 4 and 5 in the Windows TimesTen ODBC Setup dialog. (BugDB 11791297)
- In previous releases, system calls may not have appeared in sequential order in the log. In this release, the log write patterns are sequential. (BugDB 11800993)
- Dynamic load operations for asynchronous writethrough cache groups have been made more efficient by eliminating unnecessary queries against the Oracle database when a child table whose parent table has the same foreign key is already in the TimesTen cache. (BugDB 11818527)
- A problem has been fixed where TimesTen would generate incorrect checkpoint files resulting in a database recovery failure. (BugDB 11850267)
- In previous releases, under certain configurations, bidirectional replication could result in a false failed transaction message in the conflict resolution file after duplicate updates. This problem has been fixed. (BugDB 11870111)
- In previous releases, when using PL/SQL, the TimesTen database would assert when an internal error (ORA-00600) occurred. In this release, the ORA-00600 error is caught and no assertion occurs in the TimesTen database. (BugDB 11871451)
- By default TimesTen Clusterware now replicates the XLA bookmark. (BugDB 11906642)
- In previous releases, create replication failed when a replication scheme included a parent table that had an ON DELETE CASCADE relationship with a child table and that child table was not being replicated. TimesTen now returns error message 12275 "Failed to convert replicated XLA bookmarks to non-replicated for read only subscriber." TimesTen also returns additional error messages that explain why the conversion failed. (BugDB 11937457)
- In previous releases, if an application attempted to retrieve XLA records from a standby or subscriber store using a replicated bookmark, the operation would fail. This problem has been fixed. (BugDB 12347410)
- A problem has been fixed where the row count returned for a detail table and the materialized view were different. (BugDB 12367259)
- A problem has been fixed where a query on a table with two multi-column indexes would return an incorrect result set. (BugDB 12386402)
- A problem has been fixed where values in the systemstats table would only be 0 and would not update. This would occur after a TimesTen installation upgrade for data stores that had been created in a previous release of TimesTen. (BugDB 12394892)
- A problem has been fixed where bitmap indexes could cause incorrect results for an IN or GROUP BY clause. (BugDB 12400780)

1.3 Changes for Release 11.2.1.8.2 from Release 11.2.1.8.1

- A problem has been fixed where specific complex queries that contained a COUNT aggregation in one of the SELECT clauses of a SET operator combined with a UNION statement could return inconsistent results. (BugDB 11711323)
- When an instance needs to be transferred to a new grid member and the current member still needs access to the instance, the thread that moves the instance gives up its lock and retries if there is any chance of a deadlock. The elapsed time of all retries is determined by the lock time out value. (BugDB 11712111)

1.4 Changes for Release 11.2.1.8.1 from Release 11.2.1.8.0

- In previous releases of TimesTen, a maximum of 50 prepared PL/SQL statements per connection was allowed. This release allows a maximum of 5,000 PL/SQL statements per connection. Previous releases also allowed the caching of only 50 recently-used PL/SQL blocks in each session. This limit also has been increased to 5,000. (BugDB 11827656)
- A problem was fixed whereby parallel replication tracks could stall due to starvation waiting on a semaphore. (BugDB 11836584)
- A problem was fixed that could cause parallel replication to get stuck when connections switch tracks and frequently rollback transactions. (BugDB 11893103)

1.5 Changes for Release 11.2.1.8.0 from Release 11.2.1.7.1

1.5.1 New features in Release 11.2.1.8.0

- You can create or drop a table, index or synonym in an active standby pair without stopping the replication agent. You can choose to have these statements replicated to the standby database. You can include a table in an active standby pair when the table is created. Use the `DDLReplicationLevel` and `DDLReplicationAction` connection attributes to control what is replicated. See *Oracle TimesTen In-Memory Database TimesTen to TimesTen Replication Guide*.
- When using Oracle Clusterware, you can add or drop a global cache group while the active database in an active standby pair is attached to a grid. See *Oracle TimesTen In-Memory Database TimesTen to TimesTen Replication Guide*.
- Users of the `ttBulkCp` utility can write null values as empty strings by using the `-nullFormat` option. See *Oracle TimesTen In-Memory Database Reference*. (BugDB 9822277)
- Enhanced messages about final and recovery checkpoints are displayed in the `ttmesg.log` file. (BugDB 9794314)
- ODP.NET support for Oracle TimesTen In-Memory Database and Oracle In-Memory Database Cache is available in the latest release of Oracle Data Access Components (ODAC) 11.2.0.2.1. This release of ODAC supports TimesTen releases 11.2.1.6.1 or later on Microsoft Windows 32-bit and 64-bit platforms.
- TimesTen has been tested with the following application servers and ORM (Object-Relational Mapping) frameworks:
J2EE (EJB 3.0) application servers:
 - Oracle WebLogic Server 11g Release 1 (10.3.3)

- Oracle GlassFish Server 3
- JBoss Application Server 5
- WebSphere Application Server 7

ORM frameworks:

- JPA with EclipseLink 2
 - Hibernate 3
 - JPA with Hibernate 3.5.6
 - JPA with OpenJPA 2
- Oracle Clusterware and TimesTen processes report messages to the `ttcwmmsg.log` file that indicate missing checkpoint files or other causes of database invalidation.

1.5.2 Bug fixes in Release 11.2.1.8.0

- The values set by the `ttAgingLRUConfig` built-in procedure are persistent across daemon restarts. (BugDB 10162337)
- The TimesTen daemon sometimes reported that the cache agent or replication agent was running when it was not. Attempts to stop or start either agent resulted in messages that the agent was already started or already stopped. This problem has been fixed. (BugDB 10014011)
- Oracle error ORA-06550 could occur under these conditions:
 - An AWT cache group is used and the `cacheAWTMethod` connection attribute is set to 1 (PL/SQL execution method)
 - One or more of the columns in the AWT cache table mapped to an Oracle LOB
 - The primary key contained a column with one of the following data types: `CHAR`, `VARCHAR2`, `TIMESTAMP`, `DATE`

This problem has been fixed. (BugDB 10305926)

- In TimesTen OCI, calling `OCIServerVersion()` from a multithreaded program could lead to a segmentation violation. This problem has been fixed. (BugDB 9844710)
- In TimesTen Pro*C, executing a `SELECT` statement with a cursor and fetching an array of values multiple times could lead to bad results. In particular, the second and subsequent executions of the same array select statement could produce incorrect values, whereas the first execution would produce correct values. A symptom of this problem is that the values that should have been last in the array were placed first, with the other values being empty or zero. (BugDB 10238977)
- A `SELECT` statement could generate a different plan when executed within a view than when it was executed directly on a table. This has been fixed. (BugDB 10161402)
- A scaling issue with frequent updates to the `SYS.SYSTEMSTATS` table was fixed. (BugDB 10271481)
- A read performance issue caused by an internal instrumentation of the JDBC driver has been fixed. (BugDB 10236300)
- A read-only cache group was not being automatically refreshed after inserts to the Oracle table for `CHAR` data. This problem has been fixed. (BugDB 10334320)

- When the owner of a view containing a subquery did not have the `ADMIN` privilege, the owner was unable to select from the view. This problem has been fixed. (BugDB 10270657)
- Manually refreshing a cache group with multiple tables that is replicated in an active standby pair failed with a foreign key violation. This problem has been fixed. (BugDB 10363168)
- A query could give incorrect results if the query had an outer join and a subquery with an `IN` clause and a `SET` operator in the `IN` clause. (BugDB 10152127)
- A `PreparedStatement.setNull(parameterIndex, Types.NULL)` before any non-null `PreparedStatement.setXXX()` could fail. This problem has been fixed. (BugDB 10407225)
- When using the `setup.sh -record` option for the instance home directory, options 1 and 2 create invalid answer files which cause the `-batch` option (silent install) to not work as expected. This problem has been fixed. (BugDB 10207746)
- The output of the query with `IN(value)` clause and `IN(subquery)` clause gave different results, even though the subquery returned the same values as the hardcoded values. This problem has been fixed. (BugDB 10164510)
- In a configuration that is managed by Oracle Clusterware, failover could be triggered by the active database being out of perm space. This has been fixed. (BugDB 11057224)
- See "[TimesTen to TimesTen Replication](#)" on page 24 for information about cross-release migration and manual parallel replication.
- A performance regression for a full table scan was fixed. (BugDB 9622365)
- A `REFRESH CACHE GROUP` operation could result in errors 16090 (failed to check constraints) or 3001 (foreign key violation) This problem has been fixed. (BugDB 10428647)
- The optimizer chose table locks when processing `SELECT` statements with parameterized `FIRST n` or `ROWS m TO n` clauses or a `ROWNUM` condition. It now chooses row locks in these situations unless the use of a table lock is forced by an optimizer hint. (BugDB 1166474)

1.6 Changes for Release 11.2.1.7.1 from Release 11.2.1.7.0

- A problem with the log reader has been fixed. This problem could cause replicated databases to go out of sync. It also could cause TimesTen to return error 16211: "No matching v* value found for table". (BugDB 10226676)
- This release supports cross-release replication and migration from a database that does not have manual parallel replication enabled to a database that does have parallel replication enabled. (BugDB 10232988)

See "[TimesTen to TimesTen Replication](#)" on page 24 for more information about cross-release migration and manual parallel replication.

The following is an example of migrating a database to a manually configured parallel replication scheme.

1. Start with two TimesTen databases from a release earlier than 11.2.1.6.0. Consider two databases, `rep1` and `rep2`, with the following scheme:

```
CREATE REPLICATION r
ELEMENT e DATASTORE MASTER rep1 SUBSCRIBER rep2
```



```

ELEMENT e2 DATASTORE MASTER rep2 SUBSCRIBER rep1
STORE rep1 PORT 12345
STORE rep2 PORT 12346;

```

2. Set the replication state to pause on rep1.

```
ttRepAdmin -state pause rep1
```

3. Stop replication on database rep2:

```
ttAdmin -repStop rep2
```

4. Create a migration file and destroy database rep2:

```

ttMigrate -c -repUpgrade rep2 rep2.mig
ttDestroy rep2

```

5. Set environment to 11.2.1.7.1.

6. Edit rep2 DSNs to include ReplicationApplyOrdering=1,
ReplicationParallelism=n

At this stage no parallelism is in use on database rep2, but you have configured it and the database will have parallel replication once it is communicating with another parallel replication database.

Bidirectional replication is possible between databases rep1 and rep2 after you perform these steps. An ALTER TABLE operation on database rep1 will be applied to database rep2. However, an ALTER TABLE operation on a database that has parallel replication enabled is not permitted. The ALTER TABLE operation on database rep2 fails.

7. On TimesTen 11.2.1.7.1 restore database rep2 with parallel replication from the migration file:

```
ttMigrate -r rep2 rep2.mig
```

8. Start replication on database rep2:

```
ttAdmin -repstart rep2
```

9. Set the replication state on rep1 to start.

```
ttRepAdmin -state start rep1
```

10. Apply a similar procedure to database rep1 to bring both databases up to the latest TimesTen version and to enable parallel replication between both databases. You can use ttRepAdmin -duplicate to upgrade rep1 instead of using ttMigrate.

Bidirectional replication is possible between databases rep1 and rep2 should now be possible and user defined replication through multiple tracks can be used.

Once you have enabled parallel replication between two databases, it is not possible to downgrade one side to a non-parallel version and replicate to the parallel-enabled side.

- A read performance issue caused by an internal instrumentation of the JDBC driver has been fixed. (BugDB 10236300)
- A scaling issue with frequent updates to the SYS.SYSTEMSTATS table was fixed. (BugDB 10271481)

- A problem has been fixed in which a TTClasses application that calls the overloaded TTCmd method `setParam(char*)`, `setParam(void*, int)` or `setParam(SQLWCHAR*, int)` with a parameter whose length is greater than 4000 bytes long could encounter a memory fault, memory corruption or incorrect result. (BugDB 10275365)
- In a bidirectional replication scheme that includes sequences, the memory usage of the replication agent on the "passive" database could appear to grow unbounded when the other database was updated. This problem has been fixed. (BugDB 10282229)
- In previous releases, a replication agent could encounter an assertion failure: `EOLCNT == LOGC->USEDSTRANDCNT`. This problem has been fixed. (Bug 10332533)

1.7 Changes for Release 11.2.1.7.0 from Release 11.2.1.6.6

The `behaviorchanges.txt` file is no longer included in the installation directory. Behavior changes are included in this document.

1.7.1 Behavior changes in Release 11.2.1.7.0

- Previous behavior: If `SUBSTR()` result is longer than the target column, the result is silently truncated and an insert or update succeeds with the truncated string.
New behavior: If the result of `SUBSTR()` is longer than the target column in an insert or update statement, the operation fails with error 982: "String exceeds column width". For example, if column `x` is of type `CHAR(4)`, `SET x=SUBSTR('abcdefg', 2)` results in error 982. `SUBSTRB()` in a multibyte character set continues to silently truncate the string, and insert or update continues to succeed with the truncated string.

1.7.2 New features and changes in Release 11.2.1.7.0

See the "What's New" prefaces in the documentation to see the new features documented in a specific guide.

- You can create an explicitly loaded global cache group in a cache grid. If the cache tables on the local grid member do not contain data that satisfies a query, then the cache instance is transferred from other grid members to the local grid member in a grid data transfer operation. If the grid does not contain the cache instance that satisfies the query, data is not loaded from the Oracle tables and the query returns no results. See *Oracle In-Memory Database Cache User's Guide*.
- Oracle Data Provider for .NET 11.1.0.7.110 is available for Oracle TimesTen In-Memory Database. It enables fast data access for .NET applications using ADO.NET. This data provider supports TimesTen release 11.2.1.6.1 or later on Microsoft Windows 32-bit and 64-bit platforms. It supports the .NET 2.0, 3.0 and 3.5 frameworks with Microsoft Visual Studio 2005 or later, and .NET 4.0 with Visual Studio 2010. The Oracle Data Provider for .NET is available for download on Oracle Technology Network:

<http://www.oracle.com/technetwork/database/timesten/downloads>

For more information, see *Oracle Data Provider for .NET Oracle TimesTen In-Memory Database Support User's Guide*.

Note: Oracle Data Provider for .NET 11.1.0.7.110 supports Oracle TimesTen In-Memory Database only. A future release of Oracle Database Provider for .NET will support both Oracle Database and Oracle TimesTen In-Memory Database.

- TimesTen now supports `CALL` syntax from any of its programming interfaces to call PL/SQL procedures and functions. TimesTen's name resolution for the `CALL` statement may differ from Oracle's name resolution for the `CALL` statement. Specifically avoid having any public synonym that have the same name as a schema. See *Oracle TimesTen In-Memory Database SQL Reference* for information about the `CALL` statement.
- The `SYS_CONTEXT` expression can be used to retrieve the connection ID. See *Oracle TimesTen In-Memory Database SQL Reference*.
- Tables with aging are not supported with track-based parallel replication. In this release, TimesTen prevents the user from including a table with aging from being part of a replication scheme when `ReplicationApplyOrdering=1`.
- TimesTen is supported for SUSE 11 on Linux x86-64.
- The default value for the `-maxsupportlogsize` daemon option has been changed from 1 to 10 MB. See *Oracle TimesTen In-Memory Database Operations Guide*.
- Aging statistics have been added to the `SYS.SYSTEMSTATS` system table. See *Oracle TimesTen In-Memory Database System Tables and Limits Reference*.
- Using TimesTen with IBM Java SDK 1.6 for 32-bit and 64-bit on Linux x86 is supported. To use this Java SDK, a fix from IBM is required, published as APAR IZ76406, which is included in Java 6 SR8 FP1.
- The `ScriptInstallDir` attribute is not required to configure Oracle Clusterware with TimesTen. The attribute is deprecated in this release.

1.7.3 Bug fixes in Release 11.2.1.7.0

- The `ttMigrate` utility returns exit codes. See *Oracle TimesTen In-Memory Database Reference*. (BugDB 8637795)
- In previous releases, `ttBulkCp` failures returned an incorrect code. This problem has been fixed. (BugDB 9414206)
- In previous releases, the `-showdate` daemon option was not enabled for the Server process. This problem has been fixed. (BugDB 9722055)
- A `CREATE VIEW` statement fails if the view definition contains a union, and one side of the union is a query that selects from a derived table that is a join. In this release, TimesTen returns an error message that describes the problem. (BugDB 9864076)
- Create cache group checks if the user has the appropriate Oracle privilege. For example, it checks if the user has `SELECT` `ON` privileges on each table in the cache group. In the 11.2.1.7.0 release, the code checks for individual privileges, as well as those granted through a role. In earlier releases, it was not checking against role privileges. (BugDB 9873532)
- When grid failed to allocate memory a message will be logged to the daemon log to indicate this fact. The message will have the following format: Member

`'memberName'` failed to allocate temp space, `errorcode='errNo'`
- `'errMessage'`. (BugDB 9893472)

- Public access to TimesTen objects in the Oracle database that are used for cache operations is no longer allowed. (BugDB 9957021)
- In previous releases, the fractional second field of an Oracle `TIMESTAMP` value contained in a PL/SQL variable buffer was inadvertently modified when it was prepared for conversion into the TimesTen `TT_TIMESTAMP` format. This problem has been fixed. (BugDB 9903966)
- SQL operations executed internally by PL/SQL may generate warnings, for example, because of low memory or replication failures. In previous releases these warnings could cause ORA-0600 errors to be emitted. In this release ORA-0600 errors do not result from these temporary warning conditions. (BugDB 9916812)
- In a client/server configuration, errors in starting child server processes resulted in an "unexpected server exit" and no additional information. Now startup errors are reported. (BugDB 9934387)
- Internal trace buffers are now flushed when the database is loaded into memory. Previously, trace data left over from a prior load of the database could interfere with new traces, causing errors that could result in database invalidation. (BugDB 9939628)
- In previous releases, a call to the `ttOptEstimateStats` built-in procedure could result in an assertion when a concurrent transaction committed after deleting a large number of rows. In this release, TimesTen returns an error if TimesTen cannot perform the estimate. The new error has the form: "Estimate statistics on *owner.table* failed due to too some concurrent operation; try again." (BugDB 9954300)
- In previous releases, altering a cache group could cause a core dump when the TimesTen configuration tables on the Oracle database were empty. This problem has been fixed. (BugDB 9956288)
- The message for error 6226 has been changed to replace the obsolete `LogBuffSize` connection attribute name with `LogBufMB`. (BugDB 9961676)
- The stability of TimesTen PL/SQL after unexpected application failures is improved. (BugDB 10011855)
- In previous releases, a master-master replication scheme with two-safe enabled could create a backlog of replication records that were never sent to a subscriber database. This problem has been fixed. (BugDB 10029655)
- In previous releases, calls to the `ttOptSetFlag` built-in procedure incorrectly reset the values set by the `ttOptUseIndex` built-in procedure. This problem has been fixed. (BugDB 10034510)
- Dynamic load operations on a root table use the SQL command cache more efficiently than in previous releases. When performing these load operations, the `SELECT` statement must contain a foreign key condition. For asynchronous writethrough cache groups, dynamic load operations still try to query the Oracle database even though the parent row is already in the TimesTen cache if the table containing the parent row is not the root table. (BugDB 10036751)
- The `log.commit.file.reads` statistic in the `SYS.SYSTEMSTATS` system table keeps track of how often TimesTen reads from the file system during commit processing. In previous releases, this statistic was higher than `log.file.reads`,

which keeps track of total file system reads. The `log.commit.file.reads` statistic is now calculated correctly. (BugDB 10134912)

- In previous releases, a replication agent or an XLA application could encounter an assertion failure `blklen <= startIdMap->offset` in the `sbLogBufLRNNextLocate` function. This problem has been fixed. (BugDB 10145152)
- A problem has been fixed in which the replication agent would crash with the assertion failure `"SbBlkNoInStrandCmp(strandInfo.startBlkNo, blkNo) <= 0"` or `"blklen <= startIdMap->offset"` when reading near the end of the logs. This problem is specific to the SPARC architecture. (BugDB 10194728 and 10196227)
- A problem has been fixed where an assertion could occur while executing `SELECT` statement through a procedure from a JDBC application. (BugDB 10167873)
- In previous releases, the replication agent could crash and invalidate the database when the replication agent was reading close to the end of the in-memory logs. This problem could occur when the value of the connection attribute `LogBufParallelism` was greater than 1. In that case, one particular log record could cause a log strand reader to block and cause other strand-readers to read records in an incorrect order. This problem has been fixed. (BugDB 10174319 and 10176689)
- In previous releases, a bad pointer caused an assertion in the `sbLogCtnWrapComplete` function. This problem has been fixed. (BugDB 10176825)
- A problem has been fixed where timing issues after a `ttCWAdmin -init` operation could generate false positives. (BugDB 10208113)
- In previous releases, global dynamic AWT cache groups checked the Oracle tables for unique primary keys when inserts were performed on the TimesTen cache tables. This uniqueness check no longer occurs, which enables inserts to take place in TimesTen cache tables when the Oracle database is not available. (BugDB 10211940)
- In previous releases, when a direct-linked application was terminated abnormally, other active connections or subsequent connections could cause database invalidation. This problem has been fixed. (BugDB 10008657 and 10214446)
- An assertion could occur when parallel replication was enabled. The transmitter would crash when reading close to the end of the log, causing an incorrect check that failed when a connection changed its replication track number. This problem has been fixed. (BugDB 10218953)
- A problem has been fixed where parallel replication would hang while running `ttrepadmin -dsn DSN -receiver list`. (BugDB 10223328)

2 Platforms

Environment	32-bit	64-bit	Compiler notes
Microsoft Windows 2000, Windows XP, Windows Vista and Windows Server 2003 and 2008 for Intel IA-32 and EM64T and AMD64 CPUs.	Yes	Yes	Compiled and tested with Intel 8. VS .NET 2003, VS 2005 and VS 2008 are also supported. To use the TimesTen debug library, you <i>must</i> use VS .NET 2003.
Asianux 2.0 and 3.0 for Intel IA-32 and EM64T and AMD64 CPUs.	Yes	Yes	Compiled and tested with Intel 9.1. gcc 3.4.6 and 4.1.0 are also supported.
Solaris 9 and 10 for UltraSparc CPUs.	Yes	Yes	64-bit compiled with Sun Studio 11. 32-bit shipped with a TimesTen client library compiled with gcc 3.4.6 and a client library compiled with SunStudio 11.
Solaris 10 for x86-64.	No	Yes	Compiled with Sun Studio 10. Tested on AMD64 CPUs.
SUSE Linux Enterprise Server 10 for Intel IA-32 and EM64T and AMD64 CPUs.	Yes	Yes	Compiled and tested with Intel 9.1. gcc 3.4.6 and 4.1.0 are also supported.
SUSE Linux Enterprise Server 10 for Itanium2 CPUs.	No	Yes	Compiled and tested with Intel 9.1. gcc 3.4.5 and 4.1.0 are also supported.
SUSE Linux Enterprise Server 11 for Linux x86-64	No	Yes	gcc 4.3
Red Hat Enterprise Linux 4 and 5 for Intel Itanium2 CPUs.	No	Yes	Compiled and tested with Intel 9.1. gcc 3.4.5 and 4.1.0 are also supported.
Red Hat Enterprise Linux 4 and 5 for Intel IA-32 and EM64T and AMD64 CPUs.	Yes	Yes	Compiled and tested with Intel 9.1. gcc 3.4.6 and 4.1.0 are also supported.
Oracle Linux 4 and 5 for Intel IA-32 and EM64T and AMD64 CPUs.	Yes	Yes	Compiled and tested with Intel 9.1. gcc 3.4.6 and 4.1.0 are also supported.
Monta Vista Linux Carrier Grade Edition Release 4.0 and 5.0 for Intel IA-32, EM64T and AMD64 CPUs.	Yes	Yes	Compiled and tested with Intel 9.1. gcc 3.4.6 and 4.1.0 are also supported.

Environment	32-bit	64-bit	Compiler notes
HP-UX 11i v2 and 11iv3 for PA-RISC.	Yes	Yes	Compiled and tested with the HP compiler.
HP-UX 11i v2 and 11iv3 for Itanium2.	Yes	Yes	Compiled and tested with the HP compiler.
AIX 5L 5.3 and 6.1 for POWER CPUs.	Yes	Yes	Compiled and tested with the AIX compiler.
Mac OS X 10.6	Yes	No	Compiled and tested with gcc 4.2.1.

TimesTen is supported on Oracle VM guest x86 and x86-64 operating systems on Oracle Linux 4 and 5 or Red Hat Enterprise Linux 4 and 5 systems.

TimesTen is certified on the Oracle Exalogic Elastic Cloud (Exalogic). It was tested on the version 1.0 server.

3 Software requirements

For software requirements, refer to *Oracle TimesTen In-Memory Database Installation Guide*.

4 Deliverables

You should receive the following with your copy of the Oracle TimesTen In-Memory Database:

- **Release Notes.** This document (which you are now reading) covers late-breaking information not included in the formal documentation.
- **Oracle TimesTen Media Pack.** The media pack includes the Oracle TimesTen libraries and executables, demo programs, utilities and online documentation. The documentation included on the media pack consists of:
 - **Oracle TimesTen In-Memory Database Release Notes (Part Number E13080).** See the description above.
 - **Oracle TimesTen In-Memory Database Installation Guide (Part Number E13063).** See the description above.
 - **Oracle In-Memory Database Cache Introduction (Part Number E14261).** This guide describes the features of Oracle In-Memory Database Cache and provides information to help developers plan an IMDB Cache application.
 - **Oracle TimesTen In-Memory Database Operations Guide (Part Number E13065).** This guide provides information about configuring TimesTen and using the `ttIsql` utility to manage a database. It also provides a basic tutorial for TimesTen.
 - **Oracle TimesTen In-Memory Database C Developer's Guide (Part Number E13066).** This guide describes how to compile and link your C application with Oracle TimesTen and how to set up and work with Oracle TimesTen databases. It covers topics that include error handling, event management and performance tuning. It also provides a reference for C language-specific APIs.
 - **Oracle TimesTen In-Memory Database Java Developer's Guide (Part Number E13068).** This guide describes how to compile and link your Java

application with Oracle TimesTen and how to set up and work with Oracle TimesTen databases. It covers topics that include error handling, event management and performance tuning. It also provides a reference for Java language-specific APIs.

- **Oracle TimesTen In-Memory Database TTClasses Guide (Part Number E13074).** This guide describes the Oracle TimesTen C++ Interface Classes library. The library provides wrappers around the most common ODBC functionality.
- **Oracle TimesTen In-Memory Database PL/SQL Developer's Guide (Part Number E13076).** This guide describes and explains how to use PL/SQL in the TimesTen database. It is intended for anyone developing PL/SQL-based applications for the Oracle TimesTen In-Memory Database.
- **Oracle TimesTen In-Memory Database PL/SQL Packages Reference (Part Number E14000).** This guide provides a reference to all PL/SQL packages available for use with the TimesTen database. It is intended for anyone developing PL/SQL-based applications for the Oracle TimesTen In-Memory Database.
- **Oracle Data Provider for .NET Oracle TimesTen In-Memory Database Support User's Guide (Part Number E18485).** ODP.NET support for Oracle TimesTen In-Memory Database (TimesTen) enables ADO.NET data access from .NET client applications to TimesTen databases. This document covers features specific to ODP.NET support of and use with TimesTen.
- **Oracle TimesTen In-Memory Database Reference (Part Number E13069).** This guide provides a reference to all Oracle TimesTen utilities, built-in procedures and attributes and provides a reference to other features of TimesTen.
- **Oracle TimesTen In-Memory Database SQL Reference (Part Number E13070).** This guide contains a complete reference to all TimesTen SQL statements, expressions and functions, including TimesTen SQL extensions.
- **Oracle TimesTen In-Memory Database Error Messages and SNMP Traps (Part Number E13071).** This guide contains a complete reference to the TimesTen error messages and information about using SNMP traps with TimesTen.
- **Oracle TimesTen In-Memory Database System Tables and Limits Reference (Part Number E17114).** This document provides a reference for TimesTen system tables, replication tables and system limits.
- **Oracle TimesTen In-Memory Database TimesTen to TimesTen Replication Guide (Part Number E13072).** This guide provides background information to help you understand how Oracle TimesTen replication works and step-by-step instructions and examples that show how to perform the most commonly needed tasks. It includes information about TimesTen integration with Oracle Clusterware.
- **Oracle In-Memory Database Cache User's Guide (Part Number E13073).** This guide provides background information to help you understand how to create and manage Oracle In-Memory Database Cache and cache grid.
- **Oracle TimesTen In-Memory Database Troubleshooting Procedures Guide (Part Number E13075).** This guide describes how to troubleshoot some of the problems users encounter when using TimesTen.

- **Oracle TimesTen In-Memory Database JDBC Extensions Java API Reference (Part Number E13083) and Oracle TimesTen In-Memory Database JMS/XLA Java API Reference (Part Number E13084).** These references describe TimesTen extensions to JDBC classes and interfaces and the TimesTen JMS/XLA package.
- **Oracle Enterprise Manager System Monitoring Plug-in for Oracle TimesTen In-Memory Database Release Notes (Part Number E13081) and Oracle Enterprise Manager System Monitoring Plug-in for Oracle TimesTen In-Memory Database Installation Guide (Part Number E13082).** This guide and the release notes document describe the Oracle Enterprise Manager Plug-in for TimesTen.

If any of these items is missing, contact Oracle TimesTen support. See "[Contacting support](#)" on page 27.

5 Advance notice

This section lists deprecated and removed items and desupport of platforms, Oracle releases, JDK releases and compilers.

5.1 Deprecated items in Release 11.2.1.8.0

The `MonInterval` Clusterware attribute

5.2 Deprecated items in Release 11.2.1.7.0

The `ScriptInstallDir` Clusterware attribute

5.3 Removed items in Release 11.2.1.4.0

The `-lsn` option of the `ttXactAdmin` utility

5.4 Deprecated items in Release 11.2.1.1.0

- `LogBuffSize` attribute. Use `LogBufMB` instead. The units have changed from kilobytes to megabytes.
- Including sequence values in a `CREATE VIEW` statement is deprecated.

5.5 Removed items in Release 11.2.1.1.0

- `Authenticate` attribute
- It is not possible to set the `Logging` attribute to 0. The only possible value is 1.
- Built-in procedures: `ttCommitLSN`, `ttLogBufPrint`, `ttuser`, `ttUserPrivileges`
- The `-at` and `-af` options of the `ttXactLog` utility have been removed.

5.6 Deprecated items in Release 11.2.1.0.0

- The `GroupRestrict` and `Authenticate` attributes are deprecated. They are scheduled to be removed in a later release.

5.7 Removed items in Release 11.2.1.0.0

- `SELECT FOR UPDATE ON ORACLE SQL` statement
- `DURATION` clause in `CREATE CACHE GROUP` and `ALTER CACHE GROUP SQL` statements
- The `ttCacheAgingMemoryThresholdSet` and `ttCacheAgingIntervalSet` built-in procedures
- The `TransparentLoad` attribute and the `TT_TRANSPARENT_LOAD` ODBC option have been removed. Use dynamic cache groups instead.
- The `OracleID` attribute has been removed. Use `OracleNetServiceName` instead.
- The `ExclAccess` attribute has been removed.
- The Cache Administrator (web-based user interface) has been removed.
- TimesTen no longer supports these platforms: AIX 5.2, HP-UX 11i v1, RedHat 3, Solaris 8 (Sparc), Solaris 10 x86 32-bit, SUSE Linux 9 and TRU 64.
- TimesTen no longer supports Oracle9i or Oracle 10.1.0.x.
- TimesTen no longer supports JDK 1.4.x on all platforms. Also, `classes15.jar` and `classes16.jar` have been removed.
- TimesTen no longer supports the gcc 3.2.3 compiler, Visual C++ 6.0, Visual Studio .NET 2002 and Sun Studio 10.

6 Known problems and limitations

This section contains known problems and limitations.

6.1 Installing and uninstalling TimesTen

- TimesTen is not supported with these Oracle Linux 5 kernels: Oracle Linux 5 GA with virtualization option (2.6.18-8.el5xen), Oracle Linux 5 Update 1 with virtualization option (2.6.18-53.el5xen), Oracle Linux 5 Update 2 with virtualization option (2.6.18-92.el5xen).

TimesTen is supported with these Oracle Linux 5 kernels: Oracle Linux 5 kernel version 2.6.18* without the `xen` suffix and without the virtualization option, Oracle Linux 5 Update 4 with virtualization option (2.6.18-164.el5xen), Oracle Linux 5 Update 5 with virtualization option (2.6.18-194.el5xen).

The `uname -r` Linux command displays the Linux kernel version.

- If you are installing Oracle TimesTen on a new 64-bit RedHat Linux system, you may find that it is not enabled for 32-bit applications. According to the Redhat Enterprise Linux installation guide: 'Users of AMD64, Intel(R) EM64T, and Itanium systems who want support for developing or running 32-bit applications are encouraged to select the Compatibility Arch Support and Compatibility Arch Development Support packages to install architecture specific support for their systems.'
- On Windows 64-bit systems, TimesTen 32-bit and 64-bit instances cannot coexist on the same system.
- On Windows systems, you cannot perform a modified or incremental installation. For example, if you originally installed only the Oracle TimesTen Client and later

wanted to install the Oracle TimesTen Data Manager, you need to uninstall TimesTen and reinstall all of the components you wish to have on your system.

- When uninstalling TimesTen on Windows, the `oci.dll` file shipped with the TimesTen installation sometimes cannot be removed because it is in use by a process that is not part of TimesTen.
- To run TimesTen 32-bit on AIX, you must install the appropriate fix or higher mentioned at:

<http://www-01.ibm.com/support/docview.wss?uid=isg1fixinfo105065>

Without this operating system patch, core dumps or other serious problems may occur when running TimesTen.

The root IBM APAR is: IZ10231: R27 OVERWRITTEN AFTER DLSYM EXECUTION APPLIES TO AIX 5300-06.

See <http://www-01.ibm.com/support/docview.wss?uid=isg1IZ10231>.

- For releases 11.2.1.5.0 and later, you must relink applications on AIX after installing TimesTen. Failure to do so results in an application execution error similar to the following:

```
Could not load program _application_:
Dependent module _tt_inst_dir_/lib/libtten.a(libtten.so) could not be loaded.
File _tt_inst_dir_/lib/libtten.a is not an archive or the file could not be
read properly.
System error: Exec format error
```
- When re-installing TimesTen on UNIX, existing `sys.odbc.ini` and `sys.ttconnect.ini` files are optionally saved as `sys.odbc.ini.old` and `sys.ttconnect.ini.old` files and new demo files are installed. In this case, you must manually merge any additional DSNs that may have been defined after reinstalling.

6.2 Upgrading TimesTen

- The `ttMigrate` utility cannot migrate foreign key dependencies between objects owned by different users to TimesTen release 11.2.1.1.0 and later without a workaround. To work around this problem, first restore the parent tables. Then grant the owner of the child tables the appropriate `REFERENCES` privileges on its parent tables. Finally, restore the child tables.
- The `ttMigrate` utility cannot migrate materialized views to TimesTen release 11.2.1.1.0 and later without a workaround. To work around this problem, first restore the detail tables referenced by the materialized view. Then grant the owner of the materialized view `SELECT` privileges on every detail table. Finally, restore the materialized view.

6.3 Log Files

- Support log files do not rotate properly on Windows operating systems. When the `MaxSupportLogFiles` limit is reached, new log files should overwrite old files in the order they were created. On Windows systems, new log files randomly overwrite the old files.

6.4 PL/SQL

- The `OPEN_CURSOR` function section of the `DBMS_SQL` chapter of the *Oracle TimesTen In-Memory Database PL/SQL Packages Reference* documents support for levels 0, 1 and 2 for the `security_level` parameter. TimesTen, however, only supports `security_level=0`.
- PL/SQL is not supported on Solaris x86 and Linux Itanium systems.
- `PLSQL_CODE_TYPE=NATIVE` can be specified, but it is implemented as `INTERPRETED`.
- JRockit on 32-bit Linux allocates a default heap that is 50 percent of available physical memory up to 1 gigabyte. Users of JRockit on 32-bit platforms may need to choose a value for `PLSQL_MEMORY_ADDRESS` other than the default (10000000). Consider values such as B0000000, which ensures that the PL/SQL shared memory is not part of the JRockit heap.
- Using `q' (quoting syntax) is not supported.`
- The `EXECUTE IMMEDIATE` statement cannot be used to execute a PL/SQL anonymous block.
- `UTL_FILE` access is limited to a temporary directory located in `install_dir/plsql/utl_file_temp`. The instance administrator can grant access to `UTL_FILE` to specific database users. Users can reference the directory using `UTL_FILE` if and only if they provide the string 'UTL_FILE_TEMP' for the location parameter string.
- With Java 6 on 32-bit AIX, connections to a PL/SQL-enabled database using the TimesTen direct driver may fail because of a memory address conflict between the Java memory segment and the TimesTen PL/SQL memory segment. Such a failure is reported as error TT8517:

```
SQLException: [TimesTen][TimesTen 11.2.1.4.0 ODBC Driver][TimesTen]TT8517:  
Cannot attach PL/SQL shared memory;  
PLSQL_MEMORY_ADDRESS not valid or already in use
```

The conflict can be resolved by specifying a smaller Java memory maximum size using the `-Xmx` option to `java` or the `IBM_JAVA_OPTIONS` environment variable. For example: `java -Xmx64M`. Use `java -verbose:sizes` to see the current default Java memory size.

An alternative solution is to explicitly set the TimesTen `PLSQL_MEMORY_ADDRESS` connection attribute to a value that does not conflict with the Java segment. Potential good values for `PLSQL_MEMORY_ADDRESS` may include 0xe0000000 and 0xa0000000, depending on the environment and other factors. See the AIX documentation for a complete discussion of how Java uses memory on AIX.

6.5 TimesTen OCI support

See "Oracle Call Interface Support" in *Oracle TimesTen In-Memory Database C Developer's Guide* for detailed information about known problems and limitations.

- TimesTen OCI is not supported on Solaris x86 or Linux Itanium systems.
- Certain PL/SQL blocks with `OUT` parameters, when executed against TimesTen OCI, can generate an ORA-12899 error when the data coming back from the PL/SQL block overflows the bound output buffer. This occurs only when the parameters are bound with the UTF16 character set.

- If `NLS_LANG` is set to a value that is not supported by TimesTen, spurious errors such as "Cannot connect" may result.
- When an `INSERT` or `UPDATE` statement is executed which has an array of structures bound as parameters (using `OCIBindArrayOfStruct`), the first execution of the statement succeeds. Subsequent executions may result in a numeric overflow error, a uniqueness constraint violation or a truncation error.

6.6 TimesTen support for Oracle Pro*C/C++ Precompiler

See "TimesTen Support for Oracle Pro*C/C++ Precompiler" in *Oracle TimesTen In-Memory Database C Developer's Guide* for detailed information about known problems and limitations.

- TimesTen Pro*C/C++ is not supported on Solaris x86 or Linux Itanium systems.
- The windows link line for a Pro*C application that uses `SQLLIB` functions should include both `OCI.LIB` and `ORASQL11.LIB`. The correct order is `OCI.LIB` first, then `ORASQL11.LIB`. Reversing the order can lead to the `SQLLIB` functions not working.
- When a variable is declared as `long long` on 32-bit Solaris and 32-bit HP-UX platforms, Pro*C generates its size as `long`.
- When compiling a Pro*C/C++ demo, this message may appear: "System default option values taken from:
`install_dir/ttoracle_home/instantclient_11_1/precomp/admin/pcscfg.cfg`." The path name may be incorrect.

6.7 JDBC

- On HP-UX 11 systems, 32-bit JDBC client and direct drivers cannot coexist in one JVM due to some problems with loading shared libraries.
- If a JDBC application running in a time zone that has Daylight Savings Time selects a non-existent time using `ResultSet.getTimestamp()`, it gets a time that is an hour behind. For example, in Pacific Standard Time, on the day when the time changes from Standard to Daylight Savings Time, the time between 2:00 a.m. and 2:59 a.m. does not exist. So, if a JDBC application running in Standard Time selects a value of '2002-04-07 02:00:00' using `getTimestamp()` it gets '2002-04-07 01:00:00'.
- JDBC applications may see some memory leak if JDBC objects are not properly closed and have not been garbage collected before the corresponding `Connection` is closed.

6.8 XLA and JMS/XLA

- TimesTen does not generate an XLA (Transaction Log API) record for `CREATE MATERIALIZED VIEW LOG` operations. See *Oracle TimesTen In-Memory Database C Developer's Guide* for other details about XLA.
- XLA and JMS/XLA return incorrect information for index types for a `CREATE INDEX` statement. The value reflected in the `flag` field of `ttXlaCreateIndexTup_t` in XLA and the `INDEX_TYPE` value of `CREATE_INDEX` in JMS/XLA, always return "R," indicating regular indexes, regardless of the actual index type.

- To use XLA bookmarks in an active standby pair that is managed by Oracle Clusterware, create the XLA bookmark after starting the active standby pair replication scheme (`ttCWAdmin -start`). Use `ttCWAdmin -status` to ensure that the role of the standby database has become 'STANDBY'.
- JMS/XLA depends on the Oracle GDK for internationalization support. TimesTen distributions include a version of `orai18n.jar` in `install_dir/lib` that JMS/XLA is tested against. JMS/XLA may work with other versions of `orai18n.jar` but those versions are not supported. See *Oracle TimesTen In-Memory Database Java Developer's Guide* for other details.
- To achieve the highest throughput, JMS/XLA applications running on Linux should follow performance guidelines presented in the section entitled "Handling high event rates" in *Oracle TimesTen In-Memory Database Java Developer's Guide* to work around these issues.

6.9 Cache grid

- If an insert of a new instance in one grid node does not propagate to the Oracle database before a dynamic load operation for the same instance is executed on a child table in another grid node, then the dynamic load operation results in "0 rows found."

6.10 IMDB Cache

- When trying to create a global cache group, the database can become invalidated if there are more than 15 errors in the cache group definition. This only happens when connecting to the 11.2.0.1 Oracle Server. The workaround is to use Oracle Server release 10g, 11gR1, or an 11gR2 release higher than 11.2.0.1.0.
- There is a known issue (BugDB 9359437) that during a `FLUSH CACHE GROUP` operation, TimesTen may lock the tables and rows in the cache group tables. This can cause blocking or a deadlock if your application attempts to update the rows concurrently.
- If an application performs more than one `UNLOAD BY ID` operation on a cache group, there is potential for a deadlock with the autorefresh transaction executed by the cache agent. The deadlock occurs only if those same rows are being updated on the Oracle database at the same time.
- `CREATE`, `ALTER` and `DROP CACHE GROUP` statements are not supported in serializable isolation mode.
- If DDL tracking is enabled on the Oracle database, destroying a database that has cache groups may result in the DDL trigger on a cached table not being dropped from the Oracle database. The user must manually drop each of these triggers using the `DROP TRIGGER` statement on the Oracle database. The DDL trigger name of a table with an Oracle object with identifier *X* is `TT_X_DDL_T`. The object identifier of an Oracle table can be retrieved from the `V$ALL_OBJECTS` view on the Oracle database.
- For autorefresh cache groups, after a transaction that executes several DML operations on an Oracle base table (for example in a bulk insert), we recommend that you coalesce the autorefresh log table index (the `logseq` column in the change table). Use `ALTER INDEX index_name COALESCE`.
- Oracle server bug 7512227 causes TimesTen autorefresh to miss inserts and updates on the Oracle base table. Autorefresh does not miss deletes. The Oracle

Server bug applies to Oracle 10g releases 10.2.0.3 and above but does not occur in Oracle Database 11g. There are two solutions:

- Set the `CURSOR_SHARING` Oracle server parameter to `EXACT`.
- Install the appropriate Oracle patch for Oracle release 10.2.0.3 or above.

See Metalink document 793948.1.

- Caching an Oracle synonym that is owned by a different user results in error 5140: Could not find owner.synonym in Oracle. May not have privileges. The workarounds are:
 - The owner of the synonym can create the cache group.
 - Create a new private synonym that points to the original synonym and then create the cache group. The user who owns the cache group that caches the synonym must match the owner of the synonym.
- For IMDB Cache to work correctly, the value returned by the `hostname` command and the `uname -n` command (UUCP address) must be the same. If `hostname` and `uname -n` return different values, IMDB Cache may report constraint violation failures on Oracle. Alternatively, you can use `uname -s` to make sure that the Internet and the UUCP addresses are the same.
- Set `SQLNET.SEND_TIMEOUT` and `SQLNET.RCV_TIMEOUT` to a value large enough to avoid unnecessary timeouts during normal operations. For example, setting each parameter to 100 seconds forces any communication call from TimesTen to Oracle to time out within 200 seconds.
- With `Passthrough=3`, if a JDBC application calls `setTimestamp()` on a passthrough statement when binding more than one field, the session `NLS_TIMESTAMP_FORMAT` is lost. You can work around this issue by changing the SQL statement to use `TO_TIMESTAMP(?, 'yyyy-mm-dd hh24:mi:ss.ff9')` and `TO_DATE(?, 'yyyy-mm-dd hh24:mi:ss')`.
- The description of the `Passthrough` general connection attribute in *Oracle TimesTen In-Memory Database Reference* should include this statement: "Passthrough execution of DDL statements does not result in commits on TimesTen."
- Nullable foreign keys can result in rows without a corresponding parent row. The rows may become stale and may not be refreshed properly through a manual refresh or autorefresh operation. They may not get removed through unload or aging operations, and they may not be updated on Oracle through a flush statement.
- When using IMDB Cache, the following JDBC methods are not supported with Oracle pass-through modes 1 through 3:
`PreparedStatement.setAsciiStream()`,
`PreparedStatement.setUnicodeStream()`,
`PreparedStatement.setBinaryStream()`,
`PreparedStatement.setCharacterStream()`.

6.11 TimesTen integration with Oracle Clusterware

- When you perform one of these actions:
 - Answer the prompt for which host should be designated as the host for the active database.
 - Enter the `ttCWAdmin -create` command.

You receive the message:

```
"Warning!! Data store on host(s) host list may be destroyed
in Order to be duplicated from active after the roll out.
Please back up this data store manually if necessary, before
executing ttCWAdmin -start".
```

If a database with the specified DSN exists on the host for the standby database, the old database will be destroyed and replaced with the database that is created by the `ttCWAdmin -create` command.

The warning has no meaning if there is no database with the specified DSN on the standby host.

- Spurious internal errors in the logs may be generated during TimesTen Clusterware operations. These errors are benign. Run `ttCWAdmin -status` to verify the status of the system.

6.12 TimesTen to TimesTen Replication

- Cross-release replication and migration from a database that does not have manual parallel replication enabled to a database that does have manual parallel replication enabled does not work when one of the databases is release 11.2.1.6.x or 11.2.1.7.x. Migration from a database without manual parallel replication to a database with manual parallel replication is possible for the following release combinations:

- Before 11.2.1.6.0 to 11.2.1.6.0
- Before 11.2.1.6.0 to 11.2.1.8.0 or later
- 11.2.1.8.0 or later to 11.2.1.8.0 or later

To migrate from an 11.2.1.6.x or 11.2.1.7.x database without manual parallel replication to a database with manual parallel replication, upgrade each database to 11.2.1.8.0 without manual parallel replication first.

- Replication for an altered table can fail if the replication agent is stopped immediately after the `ALTER TABLE` statement has been issued and the agent has not advanced past the end of the `ALTER TABLE` transaction. This problem can occur regardless of return service policy. If you need to stop the replication agent after an `ALTER TABLE` transaction, issue a `ttRepSubscriberWait` call to ensure that the replication agent restart point has advanced beyond the alter table operation.
- TimesTen can return error message TT6003 when using master-subscriber two-safe replication and autorefresh cache groups. This can occur, specifically, if the first replicated two-safe transaction has either a `LOAD CACHE GROUP` or an `ALTER CACHE GROUP SET AUTOREFRESH STATE` operation on an autorefresh cache group. To work around this problem, either avoid doing a `LOAD` or `ALTER` on the first replication transaction or use active standby pair replication.
- Access to the `NEXTVAL SQL` function of a sequence is not supported in a query on a standby node of an active standby pair.
- If the first operation in a two-safe user session is an `ALTER TABLE` operation, the `ALTER TABLE` is not replicated. The workaround is to do some other operation on the table in the same session before altering the table.

- Under very rare circumstances, it is possible for a pair of replicated detail tables and their corresponding materialized view to diverge. This divergence can only happen if the materialized view satisfies both of the following conditions:
 - The view definition has two or more predicates.
 - One of the predicates contains an expression that can generate an exception such as numeric overflow, division by zero or string truncation.

Replicating an update to a detail table can cause divergence if differences in the order of predicate evaluation on the two databases cause a predicate to be evaluated and generate an exception only on the receiving database. The store then rejects the update, resulting in divergence of the detail table and the materialized view. To prevent such divergence, users should avoid replicating materialized views that have predicates that can generate exceptions during expression evaluation. The SQL CAST operator can be used in some cases to avoid arithmetic overflow.

- Foreign key and uniqueness constraints cannot be checked at the statement level if ttXlaApply is used to implement replication.
- When changing the state of a replication receiver (that is, to start or stop) when replication has been configured to use a secondary IP address, a misconfiguration of the /etc/hosts file may cause ttRepAdmin to print the error: Alter replication with 'ALTER REPLICATION...port 0' failed: TT0907: Unique constraint (REPSTORESIX) violated. This error is caused by replication not recognizing the local database. This situation can be confirmed by the following query:

```
SELECT * FROM ttrep.ttstores WHERE is_local_store <> 0x0;
```

If this query returns no rows, or returns a row with the main host name of the database set to the result of the hostname command rather than the host you specified, you have encountered a configuration problem with /etc/hosts.

To correct the problem, you must make sure that the special host name you are using is defined in /etc/hosts and that there is an IP address in common between your special host name and the result of the hostname command.

Example: your hostname command returns softswitch and your system has two Ethernet cards with the addresses 10.10.15.136 and 192.168.15.136. Then the IP addresses defined for softswitch should include both IP addresses.

6.13 SQL*Plus

- TimesTen does not support SQL*Plus connections to TimesTen databases. Use ttIsql.

6.14 SQL, utilities and procedures

- Timesten does not update the following statistics because of scalability issues caused by updating them frequently: db.table.rows_read, db.table.rows_inserted, db.table.rows_updated, db.table.rows_deleted, db.index.hash.inserts, db.index.hash.deletes, db.index.hash.rows_fetched.count, db.index.range.inserts.count, db.index.range.deletes, db.index.range.updates, db.index.range.rows_fetched.count, db.index.temporary.rows_fetched.count.

- Executing a query against multiple outer joins with the set operators UNION, MINUS or INTERSECT can result in abnormal termination. To work around this problem, define a view to encapsulate each of the outer joins. Then execute the query against the views.
- When using scalar functions that accept TIME, DATE or TIMESTAMP data types as arguments, you must prefix the function with a literal indicating the data type. For example:

```
SELECT GREATEST (TIME '10:10:10', TIME '12:12:12' ) FROM DUAL;
```

If you do not specify the datetime literal, TimesTen treats the data type as CHAR. Functions that accept datetime literals as arguments are: GREATEST, LEAST, ROUND and ADD_MONTHS.

- The ORDER BY clause is not supported in a CREATE TABLE AS SELECT statement.
- The maximum sum of the total number of tables specified in a query and all temporary aggregates needed to handle the query is 32. A temporary aggregate is needed to handle scalar or aggregate subqueries. A query fails with the message Statement that needs more than 31 nesting levels has not been implemented when the sum of tables and temporary aggregates in a query is greater than 32.
- COUNT distinct with CHAR type uses binary sorting order and binary comparison semantics even when the NLSSORT attribute was set to a value different than binary.
- When the NLS_SORT session parameter is set to a multilingual sort (for example, FRENCH_M), the LIKE operator may produce incorrect results when the pattern match wild-card symbols are applied to the space character.
- SQL query strings in JDBC applications should contain only characters from the database character set. Unicode characters not in the database character set are converted to replacement characters during parsing of the query. Potential workarounds include:
 - Using AL32UTF8 as the database character set.
 - Parameterizing the query to avoid non-database character set characters in the query text.
- The TO_CHAR SQL function provides inconsistent results (truncates or rounds) when applied to BINARY_FLOAT and BINARY_DOUBLE values. TO_CHAR also truncates some NUMBER values that should instead be rounded.
- If an application process on HP-UX is connected to a TimesTen database and if the application process calls the ttXactIdRollback utility API for a transaction associated with the same database, the call may fail due to the inability to attach to the shared memory segment for the database.
- The fourth argument (stats) to the ttOptSetColIntvlStats built-in procedure is a compound structure that cannot be parameterized using ODBC functions. This means that a statement such as the following fails:

```
SQLPrepare(hstmt, "call ttOptSetColIntvlStats('t1', 'c1', 1, ?)", SQL_NTS);
```

Similarly, the ttIsql describe command fails because the "stats" argument does not have one of the known types.

6.15 TTClasses

- A problem with TTClasses causes NCHAR or NVARCHAR2 parameters and columns to be bound incorrectly. This results in parameter and column data being transferred to or from the database without a null terminator.
- When recompiling TTClasses on AIX 5.3, ensure that the C++ compiler is at least version 8, patch release 13 (8-feb2007). Older versions may cause programs to fail to connect to TimesTen.

6.16 Client/Server

- In the Windows ODBC **Client DSN Setup** dialog box, when the **Server Name** refers to a UNIX host, the **Refresh** button to get the list of DSNs on that server sometimes fails to obtain the list. Enter a known DSN in the **Server DSN** field to create the client DSN entry successfully. TimesTen connections from Windows using that client DSN workX normally.
- When setting multiple client connections to a TimesTen server, do not set the stack size (using the `-ServerStackSize` daemon option or `ServerStackSize` attribute) to less than 64KB on 64-bit systems and 48KB on 32-bit systems. If the stack size is too small, the TimesTen Server dies with `SIGSEGV` on most UNIX system, or `SIGBUS` on HP-UX. The default stack size is 128 KB on 32-bit systems and 256 KB on 64-bit systems.
- On UNIX, when using `ttlocalhost`, a client of one TimesTen instance cannot connect with a server of another TimesTen instance. For example, a 32-bit TimesTen client cannot connect to a 64-bit TimesTen server when using `ttlocalhost`. The workaround is to use `ttShmHost` (shared memory IPC) or `localhost` (127.0.0.1).
- While using shared memory as IPC, the application may see the error message 24 from the client driver if the application reaches the system-defined, per process file descriptor limit. This may happen during a connect operation to the Client DSN when the `shmat` system call fails because the application has more open file descriptors than the system-defined per-process file descriptor limit.

7 Contacting support

For information about obtaining technical support for Oracle TimesTen products, go to the following Web address: <http://www.oracle.com/support/contact.html>

8 Documentation Accessibility

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