Oracle® TimesTen In-Memory Database

Release Notes

11*g* Release 2 (11.2.2)

E61818-06

April 2015

This document provides late-breaking information for **TimesTen 11.2.2.8.3**, 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/database-technologies/timesten/documentation/index.html`

Information about TimesTen 11.2.2 releases before **11.2.2.6.0** can be found at

`http://www.oracle.com/technetwork/products/timesten/documentation/1122-historic-1886173.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, if you opted to install the TimesTen Documentation.

This document contains the following sections:

1 Changes in this release

This section lists changes between releases:

1.1 Changes for Release 11.2.2.8.3 from Release 11.2.2.8.2

- A problem has been fixed where the query plan for an embedded `SELECT` statement that contained a `BETWEEN` condition failed to make use of an index that would improve the performance. (BugDB #20158477 - Backport of BugDB #18917819)
- In this release, TimesTen displays information on the progress of reclaim recovery in the daemon log. (BugDB #20405077 - Backport of BugDB #19921116)
- In previous releases, operations would fail when a cache object name contained a `#` symbol. TimesTen no longer restricts the use of the `#` symbol in cache group object names. (BugDB #20506533 - Backport of BugDB #20397858)
- A problem with `CASE` expressions that involve an inner table's column in the *`SelectList`* of a materialized view was fixed. (BugDB #20558322 - Backport of BugDB #20483583 and BugDB #20587521 - Backport of Bug 20548029))
- An assertion occurred during a nested star join because TimesTen attempted to use memory that had been freed. This is fixed. (BugDB #20603071 - Backport of BugDB #20388269)
- A problem has been fixed where an assertion could occur when a `WITH` table was referenced in a subquery. (BugDB #20781532 - Backport of BugDB #20669157)

1.2 Changes for Release 11.2.2.8.2 from Release 11.2.2.8.1

- A query involving multiple tables and an `OR` condition performed much slower in previous 11.2.2 releases of TimesTen than older releases of TimesTen. This problem is fixed. (BugDB #20250647 - Backport of BugDB #19008503)
- A problem was fixed where concurrent updates or deletes of a b-tree index could cause reclaim to fail during commit. (BugDB #20286973 - Backport of BugDB #18496087)
- Daemon log messages are improved in this release to help track the progress of database shutdown. (BugDB #20404902 - Backport of BugDB #19769918)
- A problem was fixed where the cache agent was leaking Oracle database open cursors. (BugDB #20493505 - Backport of BugDB #20458900)

- A database could fail to be recovered with error messages in the daemon log similar to: "`Validity Error (hpValid.c: 305) sbHpIsValid (): Heap INDEX_0 (id 104888) has invalid free lists`". This is fixed. (BugDB #20515183 - Backport of BugDB #20415801)

1.3 Changes for Release 11.2.2.8.1 from Release 11.2.2.8.0

- This release is supported with 64-bit HP-UX 11i Itanium.

1.4 Changes for Release 11.2.2.8.0 from Release 11.2.2.7.10

Changes in this release include:

1.4.1 New Features

- You can disable commit dependencies for automatic parallel replication for an active standby pair that uses asynchronous replication and does not contain cache groups. This provides parallel replication over multiple threads where TimesTen automatically enforces transactional dependencies on the subscriber database, but does not enforce transactions to be committed in the same order on the subscriber database as on the master database. For more information, see the *Oracle TimesTen In-Memory Database Replication Guide.*

1.4.2 Behavior Changes for ttMigrate

- During migration, TimesTen now always restores a table's rows before it restores the table's indexes and foreign keys. The `-delayFkeys` option no longer is needed.
- For large tables being restored in parallel, after all rows have been restored ttMigrate now prints progress information about table indexes being restored.
- For large tables being restored in parallel, if an index or foreign key cannot be created due to some error, `ttMigrate` does not drop the table.
- When `ttMigrate -r` completes, ttMigrate prints a report that contains:
  - The SQL statements of all the indexes and foreign keys that could not be restored.
  - A list of objects that could not be restored. Objects that encountered "Already exists" errors are not listed in this report.
- When `ttMigrate -c` saves large tables to the data file, it now prints more informative progress information.
- During parallel migration, `ttMigrate` now prints only the time part of a timestamp in its status message.
- Parallel migration is now more resilient when encountering lock contention errors while restoring rows in parallel for a large table.

1.4.3 Other Behavior Changes

- For cache Autorefresh built-in procedures, the parameter *TblSpaceThreshold* is deprecated. It is replaced with the parameter *AutoRefreshLogTblSpaceUsagePCT*.

1.4.4 Bug Fixes

- An error was encountered when running the `ttXactAdmin -logAnalyze` command immediately after either a `ttRepAdmin -duplicate` operation or replication agent startup. This problem is fixed. (BugDB #18387531)
- A problem has been fixed where using ROWNUM in a subquery would return TimesTen error message 2974. (BugDB #20146836 - Backport of BugDB #19776625)
- A problem has been fixed where the estimated time to complete a checkpoint was displayed incorrectly in the daemon log files. (BugDB #20158462 - Backport of BugDB #19769943)
- When a row from a table configured for replication was updated and deleted in the same transaction concurrent with other DML operations on the table, a segmentation violation could occur. This problem is fixed. (BugDB #20146806 - Backport of BugDB #17292350)
- A query that contained the analytic function `RANK()` could return the wrong results. This problem is fixed. (BugDB #20201699 - Backport of BugDB #20143321)
- A temporary `ORA-00601` error that should have been handled during failed application recovery could result in an `ORA-00600` error being returned to the user. This problem is fixed. (BugDB #20293318 - Backport of BugDB #20250083)
- A problem has been fixed that did not allow concurrent DML to be executed while the `ttLoadFromOracle` built-in procedure was running. (BugDB #20306061 - Backport of BugDB #20203113)

1.5 Changes for Release 11.2.2.7.10 from Release 11.2.2.7.9

- There was a problem with JMS/XLA where an XLA bookmark on infrequently updated tables would not auto-advance, which would prevent checkpoint operations from purging transaction log files correctly. This issue has been fixed, and now JMS/XLA bookmarks on infrequently updated tables will advance themselves at regular intervals. (BugDB #19791341 - Backport of BugDB #19210663)
- A problem that caused TimesTen to use table locks when a primary key/foreign key join condition had many NULL values has been fixed. (BugDB #19816205 - Backport of BugDB #19785297)
- There was a problem where the method `ResultSet.getBigDecimal(String)` leaked memory. This problem has been fixed. (BugDB #19834871 - Backport of BugDB #19818440)
- A problem is fixed where TimesTen could return wrong results from star joins. (BugDB #19843187)
- A bug has been fixed where the detection phase of the `ttCacheAutorefreshLogDefrag` built-in procedure acquired locks on the Oracle database. In this release, we no longer acquire locks on the Oracle database during the detection phase. (BugDB #19849442 - Backport of BugDB #19826227)
- A problem is fixed where TimesTen could return a `"Dictionary Exhausted"` error message with 2-byte compression even when there was enough space to insert

more rows. This would occur only when the database had been previously recovered. (BugDB #19899989)

- A problem has been fixed where TimesTen returned wrong results when a `COUNT(CASE WHEN)` statement was specified on a `NUMBER` data type column. (BugDB #19977347 - Backport BugDB #19910223)
- When a table has an aging policy defined on it, there was a problem where `ttLoadFromOracle` was trying to use a custom query binding which was not applicable to this feature. This has been fixed so that aging policies are ignored when loading tables using `ttLoadFromOracle`. (BugDB #20056025 - Forwardport BugDB #19846932)

1.6 Changes for Release 11.2.2.7.9 from Release 11.2.2.7.8

- An assertion failure could occur during TimesTen replication. This problem is fixed. (BugDB #19072290 - Backport of BugDB #1882912)
- A problem is fixed where replication of an update of a detail table of a materialize view would timeout on the standby database before the query completed. (BugDB #19789940 - Backport of BugDB #19779186)
- If a subscriber had multiple masters and the replication scheme on the subscriber was dropped and recreated without destroying the entire store it could lead to lost transactions transmitted from one of the masters. This problem is fixed. (BugDB #19790271 - Backport of BugDB #19665062)
- A problem is fixed where the TimesTen database could become invalidated after a `ttSize` operation. (BugDB #19791347 - Backport of BugDB #19624821)
- A problem is fixed where the `ttMigrate` utility would not display a warning when user input (for example, a table name) did not match any object in the database. (BugDB #19796458 - Backport of BugDB #19631716)

1.7 Changes for Release 11.2.2.7.8 from Release 11.2.2.7.7

- A performance issue related to outer join was fixed. (BugDB #19392371)
- An issue with the `LIKE` operator with a constant (string) pattern expression of `expr('%')`, for example `x LIKE UPPER ('%')`, was fixed. (BugDB #19598665 - Backport of BugDB #19588950)
- A problem is fixed where transaction logs would accumulate during a `LOAD CACHE GROUP` operation and they could not be purged. (BugDB #19627480 - Backport of BugDB #19184453)
- After a client server failover, the client was not able to connect to the new node and the connection would hang. The behavior occurred when there were more than 100 connections. This problem is fixed. (BugDB #19707264 - Backport of BugDB #19463160)

1.8 Changes for Release 11.2.2.7.7 from Release 11.2.2.7.6

- An assertion failure could occur in an active standby pair. This problem is fixed. (BugDB #19357927 - Backport of BugDB #19311819)
- A problem is fixed where parameterized queries could hang. (BugDB #19357991 - Backport of BugDB #19309880)

- In previous releases, a query with a `WHERE` clause that contained an `ASCIISTR` function would not always return rows when the `WHERE` clause evaluated to `TRUE`. This is fixed. (BugDB #19460760 - Backport of BugDB #19352060)
- The daemon log could contain a large amount of messages. TimesTen now writes less messages to the daemon log. (BugDB #19531532 - Backport of BugDB #19518485)

1.9 Changes for Release 11.2.2.7.6 from Release 11.2.2.7.5

- A problem is fixed where `semop` errors could lead to a `NUMERICAL` out of range error and a process hang. This release also contains new error handling and daemon logging when `semop` errors do occur. (BugDB #19270693 - Forward port of BugDB #19153841)
- A memory leak in the replication agent when using asychronous writethrough cache groups with the `cacheawtmethod` attribute set to `0` was fixed. (BugDB #19286613 - Forward port of BugDB #19173538)
- An assertion failure could occur during a complex query that uses a multi-table join. This problem is fixed. (BugDB #19289266)
- A problem is fixed where an incorrect overflow error could occur when an application used client failover and executed prepared statements that use `DATE/TIME` based parameter values. (BugDB #19358056 - Forward port of BugDB #19302284)
- The query optimizer chose a non-performant query plan when executing a query that used a scalar function, such as `TRIM()`. This problem is fixed. (BugDB #19431195)
- A problem could occur where a query on multiple columns could incorrectly return error `TT4053`, indicating that one of the columns did not exist. This is fixed. (BugDB #19451927 - Backport of BugDB #19422961)

1.10 Changes for Release 11.2.2.7.5 from Release 11.2.2.7.4

- Occasionally, the TimesTen main daemon would crash in a call to `free()`. This problem is fixed. (BugDB #18950190 - This is a backport of BugDB #18107927)
- In the 11.2.2.7.4 release: Fixed an assertion that occurred when a row was deleted twice. (BugDB #19015744 - Backport of BugDB #18420909)
- A problem is fixed where the `ttXactLog` utility would fail when the log file was larger than 2GB. (BugDB #19049579 - Backport of BugDB #19046786)
- A problem is fixed where an invalidation could occur when running multiple concurrent DML operations. (BugDB #19072641 - Backport of BugDB #18650288)
- In previous releases, when adding new daemon options during an upgrade, such as selecting a `TNS_ADMIN` file, the new options would be added to the end of the last line of the `ttendaemon.options` file, instead of being added on a new line. This problem is fixed. (BugDB #19222024)

1.11 Changes for Release 11.2.2.7.4 from Release 11.2.2.7.3

- Effective on June 11, 2014, the "Oracle In-Memory Database Cache" product option under the Oracle Database Enterprise Edition was *renamed* to "Oracle TimesTen Application-Tier Database Cache." Oracle TimesTen Application-Tier Database

Cache enables customers to cache a subset of Oracle Database tables into a TimesTen database to bring the data closer to the applications and to drastically improve transaction response time.

Cache tables are accessed like regular relational tables for OLTP transactions using SQL and PL/SQL from Java, C++, .NET, and C programs. Transactions are executed in the TimesTen database with automatic local persistence, transactional consistency, and database synchronization with the Oracle Database. For more information, visit the TimesTen product center on OTN.

As a result of the product option name change, two titles in the TimesTen documentation set are changed in this release. The *Oracle TimesTen In-Memory Database Cache Introduction* is now the *Oracle TimesTen Application-Tier Database Cache Introduction*. The *Oracle TimesTen In-Memory Database Cache User's Guide* is now the *Oracle TimesTen Application-Tier Database Cache User's Guide*.

- In this release, the system recovers better when an application dies unexpectedly. (BugDB #19024062 - Backport of BugDB #17375132)

1.12 Changes for Release 11.2.2.7.3 from Release 11.2.2.7.2

- A rollback was taking a very long time and then crashed when a user attempted to create a new hash index on a very large table with millions of rows, but then cancelled the index creation before the index was completely build. The problem is fixed. One might stop the index creation by killing the process that was executing the create index statement. (BugDB #18906585)
- There was a problem with the `ttMigrate -r` command restoring a replication schema that had many subscriber stores and many replication elements. In previous releases, this would core dump. This problem is fixed. (BugDB #18911204)
- A problem is fixed where an assertion failure could occur during a complex query. (BugDB #18951623)
- A problem is fixed where a temporary index was not created on a large materialized view result even when there was enough temporary space. This resulted in performance problems for queries that need a materialized view result. (BugDB #18970221)

1.13 Changes for Release 11.2.2.7.2 from Release 11.2.2.7.1

- A problem is fixed where a `SELECT` query with an aggregate function could return the wrong result when the `CASE` condition was on different columns. (BugDB #18833048)

1.14 Changes for Release 11.2.2.7.1 from Release 11.2.2.7.0

- A problem has been fixed where an assertion could occur when using hash indexes with certain optimizer hints. (BugDB #18726982)
- In Pro*C applications, TimesTen could fail to use arrays of structs of indicators correctly. This resulted in mismatches between the indicator and the array value, that could lead to a `TT0871` error. This is fixed. (BugDB #18721269)

1.15 Changes for Release 11.2.2.7.0 from Release 11.2.2.6.2

Changes in this release include:

- New Features
- Bug Fixes

1.15.1 New Features

- The `DDLReplicationLevel` and `DDLReplicationAction` connection attributes control what objects that are created or dropped by DDL statements are automatically replicated to the databases involved in an active standby pair replication scheme. For this release, a new level of `3` (not the default) for the `DDLReplicationLevel` connection attribute adds replication of the `CREATE VIEW` or `DROP VIEW` statements, the `CREATE SEQUENCE` or `DROP SEQUENCE` statements, and the result of running the `ttCacheUidPwdSet` built-in procedure to set the Oracle cache administration user name and password. When `DDLReplicationLevel=3` and the `DDLReplicationAction` connection attribute is set to `INCLUDE`, then any new sequences and views created are included in the replication scheme. Also, `ALTER TABLE ADD COLUMN NOT NULL DEFAULT` can now be replicated if `DDLReplicationLevel=3`.
- Users migrating to 11.2.2.7.0 from earlier releases will see an increase in disk space utilization for TimesTen daemon logs. The increase is to improve diagnosability of TimesTen. The maximum size of the support log files is now 100MB and the maximum size of the user log is 10 MB. In constrained environments you may want to configure TimesTen to use less disk space. This can be done by setting the following items to the `info/ttendaemon.options` file:

  `-maxuserlogsize` *`nBytes`*

  `-maxsupportlogsize` *`nBytes`*
- There is a new user and support log message designation `RECOVERY`, for messages that report on TimesTen automatic recovery status. This is not a category that you can control through the `ttDaemonLog` utility; the messages cannot be disabled.
- When using Oracle Clusterware, you must execute the new `ttCWAdmin -reauthenticate` command after modifying any user name or password to enable Oracle Clusterware to store these new user names and passwords. For full details, see the *Oracle TimesTen In-Memory Database Replication Guide*.
- You can use the `ttIsql edit` command to edit a file or edit `ttIsql` commands in a text editor. The `ttIsql edit` command starts a text editor such as `emacs`, `gedit`, or `vi`. For more information, see the *Oracle TimesTen In-Memory Database Operations Guide* and the *Oracle TimesTen In-Memory Database Reference*.
- The `ttIsql` utility now also includes the command `waitforresult`. The command is similar to the `waitfor` command, except that the results being checked can have one or more columns. See the *Oracle TimesTen In-Memory Database Reference*.
- The TimesTen preallocation of disk space feature (using the `Preallocate` connection attribute) is improved in this release to use the operating system's native preallocation API when available. In the case that the operating system has this capability, preallocation performance is improved. Users can refer to the operating system documentation to determine if the preallocation API is supported on their platform.
- In this release, checkpoint files can be read in parallel. Checkpoint reads use the value of the `RecoveryThreads` connection attribute when that value is greater than

one. The maximum number of threads used for parallel checkpoint read is eight, regardless of the value of `RecoveryThreads`. Parallel checkpoint reads can improve load time when reading from Solid State Disks (SSD).

1.15.2 Bug Fixes

- On Windows systems, silent install would erroneously add `-tns_names` to `ttendaemon.options` if the `TNS_ADMIN` path was blank, which would cause the server to not start up. (BugDB #17969153)
- A problem is fixed where TimesTen would hold a latch for several seconds when an application deleted many rows. (BugDB #18033792)
- A problem was fixed where executing batches of values against a PL/SQL statement through either JDBC or ODBC could cause bad values to be inserted. This could also cause a constraint violation if the PL/SQL procedure inserted the value into a column with a unique constraint. This applies to bind data types that would require type conversion when passed to the PL/SQL call. (BugDB #18084711)
- A wrong result problem of binding the same variables from PL/SQL to different clauses of a merge statement was fixed. (BugDB #18085214)
- The `ttMigrate` utility has a new option, `-activeDML`. If you are saving a database that has active DML transactions committing during the `ttMigrate -c` operation, and if there are tables that have foreign key relationships in that database, consider using the new `-activeDML` option. This option causes a table lock to be acquired on all tables in a foreign key hierarchy, so that no inconsistencies can be created by the active DML changing the contents of the tables as they are being stored in the `ttMigrate` data file. Because this option takes a table lock, lock contention can occur with concurrent DML on the locked tables resulting in a failure to save the tables. Users of `-activeDML` need to be careful to verify their `ttMigrate` data file was saved successfully by examining the `ttMigrate` return code and all `ttMigrate` output text. (BugDB #18110440)
- A problem has been fixed where an incorrect or empty string would appear for the user count table name in TimesTen error message `TT40132`. (BugDB #18231628)
- A problem has been fixed where TimesTen returned error message 8170 instead of message 6111 when a query timed out while replicating DDL. (BugDB #18251646)
- A problem where an `AUTOREFRESH` query produced an increase in the Oracle Database shared pool size was fixed. (BugDB #18324801)
- A problem is fixed where the replication receiver could core dump. (BugDB #18367811)
- Under certain conditions, log records were not written to the log file. This could lead to assertions later from replication or during database recovery. This problem is fixed. (BugDB #18392922)
- In 11.2.2.6.x releases prior to release 11.2.2.6.5, a problem existed that caused a large amount of deadlocks when inserting records into detail tables associated with a materialized view. The occurrence of deadlocks is greatly reduced in this release. (BugDB #18409839)
- A problem is fixed where the output of a query that contained an `IN` list, did not display the correct name of a column. (BugDB #18417694)
- A performance issue that was caused by a temporary index in queries with an `EXP LIKE '%'` clause was fixed. (BugDB #18420973)

- A problem is fixed where a spurious TimesTen error 871 would be returned when executing an `UPDATE` operation on a detail table. (BugDB #18434738)
- A problem is fixed where lock contention could occur when using `ttMigrate -numThreads` and restoring multiple users at the same time. In this release, the operation retries and succeeds. (BugDB #18439785)
- A problem is fixed where the `ttjdbc7.jar` file was not included during installation on Linux systems. (BugDB #18442611)
- In previous releases, a query that used `ORDER BY` and that also contained a subquery that used `UNION ALL` returned a wrong result or caused the database to disconnect. This is fixed. (BugDB #18501505)
- A problem has been fixed where a call to the `ttOptUpdateStats` built-in procedure would not result in stats being recomputed when a table was empty. (BugDB #18507797)
- There was a problem with the command `ttMigrate -c` saving a PL/SQL object that referenced a synonym. This problem is fixed. (BugDB #18529266)
- The `ttMigrate` utility had a problem saving tables with more than 2.1 billion rows to the `ttMigrate` data file. This problem is fixed. (BugDB #18679794)

1.16 Changes for Release 11.2.2.6.2 from Release 11.2.2.6.1

- A problem is fixed where a `SELECT` on a synchronously maintained materialized view table would not reflect the recent `INSERT` operations into the detail tables. (BugDB #18014207)

1.17 Changes for Release 11.2.2.6.1 from Release 11.2.2.6.0

- The `ttMigrate -r -numThreads` command can now take the new `-delayFkeys` parameter. Using this parameter enables parallel restore operations to defer creation of a table's foreign keys until after all rows in that table have been restored. This can greatly improve the performance of restore operations for tables with foreign keys. (BugDB #17320320)
- A problem has been fixed where a database connection could fail with TimesTen error `6003: Lock request denied because of time-out`, during user authentication. (BugDB #17494158)
- When altering the replication schema for classic replication, there was a degradation in performance when the `ROUTE` clause was used. An unnecessary check was made when adding subscribers. This problem has been fixed. (BugDB #17550646)
- A problem has been fixed where dropping a table that had a foreign key constraint from an active standby pair replication scheme would result in TimesTen error `8192`, even when replication of DDL was enabled. (BugDB #17586598)
- A query that includes multiple outer joins fails. The outer join definition uses Oracle syntax (+) to designate the outer join. This problem has been fixed. (BugDB #17855394)
- A problem has been fixed where an assertion failure could occur in client server mode during a `SELECT` statement. (BugDB #17872526)

- The query optimizer chose a non-performant query plan when evaluating a join query that contains more than 11 tables. This problem has been fixed. (BugDB #17901565)
- When using active standby pairs with a twosafe service, sometimes a small percentage of XLA messages on the active database are not returned to XLA or JMS/XLA readers. This problem has been fixed. (BugDB #17920607)

1.18 Changes for Release 11.2.2.6.0 from Release 11.2.2.5.0

Changes in this release include:

- New Features
- Bug Fixes

1.18.1 New Features

- You can cancel and cleanly stop a `ttLoadfromOracle` operation with either the `SQLCancel(`*`hstmt`*`)` ODBC function or by pressing `Ctrl-C` in the `ttIsql` utility. For more information, see the *Oracle TimesTen In-Memory Database Operations Guide*.
- You can manage the size of the transaction commit buffer for the cache agent used to process autorefresh. You can also manage the size of the transaction commit buffer for the replication agent when using an active standby pair replication scheme that includes autorefresh cache groups. For more details, see the *Oracle TimesTen Application-Tier Database Cache User's Guide* and the *Oracle TimesTen In-Memory Database Reference*.
- This release includes the `ttDbWriteConcurrencyModeSet` and `ttDbWriteConcurrencyModeGet` built-in procedures. These procedures provide control over read optimization during periods of concurrent write operations. For more details, see the *Oracle TimesTen In-Memory Database Operations Guide* and the *Oracle TimesTen In-Memory Database Reference*.
- Support is added for constant expressions, dynamic parameters, and null values in the values lists used for `IN`, `ANY`, `SOME`, or `ALL`. For more information, see the *Oracle TimesTen In-Memory Database SQL Reference*.

1.18.2 Bug Fixes

- In previous releases, users could encounter an unexpected full autorefresh of readonly cache groups, due to truncated autorefresh change log tables. This has been fixed. (Bug DB 12331763)
- A problem is fixed where the TimesTen Windows installer did not include the TimesTen JDBC `.jar` files. (BugDB 12385810)
- In previous releases, TimesTen returned the wrong information in error message `TT16045` when a user specified the `ttRepAdmin -duplicate` command without specifying the `-localhost` option. In this release, TimesTen returns useful and correct information in the error message. (Bug DB 12401395)
- A problem existed where the documented path for the `snmp.ini` file was incorrect. In this release, the `snmp.ini` file is in *`install_dir`*`/info/` on UNIX systems and *`install_dir`*`\srv\info\` on Windows platforms. (BugDB 13546123)
- A problem is fixed where certain join queries that contained a `FIRST 1` or a `FIRST` *`N`* clause would take a long time to complete. (BugDB 16171204)

- A `CREATE ACTIVE STANDBY PAIR` statement could fail on an asynchronous writethrough subscriber, when the replication scheme included a fail threshold and there was a backlog in the transaction log. This is fixed. (BugDB 16292638)
- In previous releases, users were required to drop a Clusterware-managed active standby pair when changing the cache administrator or cache user password. In this release, you do not need to drop the active standby pair. The procedure for changing the cache administrator and cache user passwords is documented in the *Oracle TimesTen In-Memory Database Replication Guide.* (BugDB 16364233)
- In previous releases, when the timeout value was too small in an active standby pair scheme that contained an asynchronous writethrough cache group, large transactions could cause the transmitter to fail without restarting immediately. In this case, writethrough to the Oracle database would not occur. This is fixed. (BugDB 16419027)
- In previous releases, an assertion failure could occur in a `TRUNCATE TABLE` operation. This is fixed. (BugDB 16536874)
- A problem is fixed where an assertion failure could occur with a `SELECT` query with the analytical function `ROW_NUM`, `DENSE_RANK` or `RANK`. (BugDB 16629624)
- A problem is fixed where TimesTen changed the column names in the output of a query that contained an `ORDER BY` clause. (BugDB 16714127 and 17021410)
- A problem is fixed where a query executed after calling the built in procedure `ttIndexAdviceCaptureStart(1,0)` would incorrectly return TimesTen error 805. (BugDB 16729095)
- A deadlock could occur when an uncommitted foreign key value was updated while concurrently deleting one or more rows from the parent table. This is fixed. (BugDB 16805039)
- A problem is fixed that could cause a uniqueness violation when a unique value that had been deleted was reused in the same transaction. (BugDB 16805056 and 16805068)
- A performance regression for hash indexes that was seen in releases 11.2.2.4.4 and greater has been fixed. (BugDB 16818440)
- Performance for queries involving left outer joins is improved in this release. (BugDB 16820660, 16843298 and 16895481)
- This release includes diagnostics to gather more information on a `spinlatch` assertion. (BugDB 16855677)
- When managing more than two applications with Oracle Clusterware, TimesTen would return a large number of error messages incorrectly. This is fixed. (BugDB 16859952)
- In previous releases, when automatic client failover happened in the middle of a transaction, uncommitted updates from before the failure were silently discarded when the new connection was made. In this release, applications must specify the attribute `RollbackRequiredOnFailover=1` in the client connection string, instead of the client DSN entry. TimesTen reports the potential loss and asks the application to roll back the transaction before proceeding. (BugDB 16892906)
- In previous releases, an assertion failure could occur when a complex query created a temporary index on a base table. This is fixed. (BugDB 16892974)
- A `DELETE` subquery could cause an out of temporary space error. This is fixed. (BugDB 16921854)

- A deadlock error could occur during a dynamic load of a local dynamic cache group that had an aging policy defined on it. This is fixed. (BugDB 16928152)
- A problem is fixed where the replication agent CPU usage could spike after the state of the subscriber was set to `STOP`. (BugDB 16951511 and 17246933)
- If a latch assertion occurs, we now collect further information in the `.inval` file to help diagnose the root cause of the assertion. (BugDB 16955266)
- TimesTen returns error message `15105` when a user other than the instance administrator attempts to create a database. The error can occur when there is a mismatch between the user ID and the password entered when the user attempts to create the database. In this release, the text for TimesTen error message `15105` is improved to better explain the cause of the error. (BugDB 16963720)
- Daemon log messages for cache groups now contain the name of the cache group when the cache group is altered. (BugDB 17038478)
- A problem is fixed where an assertion failure could occur during recovery of a database that contained tables with compressed columns. (BugDB 17038539 and 17038634)
- A latch assertion failure could occur when an `INSERT` was made into a table that had a non-unique hash index after an application was killed or died during a `SELECT` operation on the same table. This is fixed. (BugDB 17039444)
- An integer overflow could occur when using out-of-line columns. This is fixed. (BugDB 17047291)
- A problem has been fixed where a `SELECT` query with a left outer join could result in a segmentation fault. (BugDB 17321103)
- In previous releases, when specifying the `-numthreads` option with the `ttMigrate` utility when restoring a database that contained a replication scheme, TimesTen could return a TimesTen `8151` error. This is fixed. (BugDB 17056944)
- An assertion failure could occur during a query that did an implicit data type conversion on a column that had a unique index. This problem is fixed. (BugDB 17259103)
- A problem is fixed that could result in database incompatibility after adding a new subscriber to an existing replication scheme. (BugDB 17321440)
- The following daemon log message would not print correctly: `Could not find user count row for table` *`tablename`* `in CACHE_ADMIN.TT_06_LOG_SPACE_STATS. Any autorefreshed cache group containing table` *`tablename`* `will not be refreshed.` This is fixed. (BugDB 17348602)
- A core dump could occur with a client server application that connected, disconnected and did queries from multiple threads. This is fixed. (BugDB 17413183)
- A problem is fixed where a query could return the wrong result when using out-of-line data types in a nested `GROUP BY` clause. (BugDB 17421433)
- Dropping a read only cache group without first excluding it from an active standby pair replication scheme would cause an assertion failure. Now, TimesTen returns an error if a user attempts to drop the read only cache group before excluding it from the active standby pair replication scheme. (BugDB 17484944 and 17484956)

- Timesten error `3017` would be issued when creating a table with a foreign key with `ON DELETE CASCADE` on a database containing an active standby pair replication scheme. This error should not be issued when `DDLReplicationLevel` is `2`. This is fixed. (BugDB 17504656 and 17504720)
- An assertion failure could occur for a query that used a subquery with aggregate or `rownum`. This is fixed. (BugDB 17512072)
- This release includes some improvements to transaction list handling in the replication transmitter to avoid performance issues when a backlog is being processed in a bi-directional replication scheme. (BugDB 17554372)
- A problem is fixed where the TimesTen installer would incorrectly determine that a port was already in use when configuring the TimesTen daemon or TimesTen Server. (BugDB 17576641)
- A problem has been fixed where an `UPDATE` operation would run slowly and then fail with a constraint violation. (BugDB 17579344)
- A problem is fixed where the status of the standby database in an active standby pair replication scheme changed to `IDLE` after migration using the `ttMigrate` utility. (BugDB 17577970 and 17577929)
- The cache agent could falsely report the following error: `The sequence number for table` *`tablename`* `had changed but the table was not refreshed. The cache group in data store` *`database_name`* `is out of sync.` This is fixed. (BugDB 17610433)
- An assertion failure could occur when one connection was trying to access a column with an index on it while another connection was altering the index. This is fixed. (BugDB 17641951)

2 Platforms and configurations

This section includes:

2.1 Platforms and compilers

Platform or operating system	C/C++ compiler support	JDK support[1]
Linux x86-32 and x86-64: ■ Oracle Enterprise Linux 4, 5, and 6 ■ Oracle Enterprise Linux 7 (x86-64 only) ■ Red Hat Enterprise Linux 4, 5 and 6 ■ Red Hat Enterprise Linux 7 (x86-64 only) ■ SUSE Enterprise Server 10 and 11 ■ SUSE Enterprise Server 12 (x86-64 only) ■ MontaVista Linux CGE 5.0 and 6.0x[2] ■ Asianux 3.0 TimesTen supports Native POSIX threads but not LinuxThreads.	Intel icc 10.1, gcc 4.3 and 4.5 Oracle Linux 6 is tested and compiled with gcc 4.4. Oracle Linux 7 is tested and compiled with gcc 4.8.	Oracle JDK 5.0 and 6 JRockit JDK 5.0 and 6.0 IBM JDK 6.0. **NOTE:** The IBM Java 6 SDK requires `Java SE Version 6 SR9-FP2` or above for both Linux x86 and x86-64
Microsoft Windows x86-32: ■ Windows XP, Windows Vista, Windows Server 2003, Windows Server 2003 Release 2, Windows Server 2008, Windows 7, Windows 8.1.	Visual Studio 2010, 2008 and 2005 for Windows	Oracle JDK 5.0 and 6 JRockit JDK 5.0 and 6.0
Microsoft Windows x86-64: ■ Windows XP, Windows Vista, Windows Server 2003, Windows Server 2003 Release 2, Windows Server 2008 R2, Windows 7, Windows 8.1, Windows 2012 Server R2	Visual Studio 2010, 2008 and 2005 for Windows	Oracle JDK 5.0 and 6 JRockit JDK 5.0 and 6.0
Solaris SPARC 64-bit: ■ Oracle Solaris 10, 11 and 11.2	Solaris Studio 12 for Solaris SPARC	Oracle JDK 5.0 and 6 JRockit JDK 5.0 and 6.0
Solaris x86-64: ■ Oracle Solaris 10, 11 and 11.2	Solaris Studio 12 for Solaris x86-64	Oracle JDK 5.0 and 6
Solaris SPARC 32-bit (client only): ■ Oracle Solaris 10 and 11	Solaris Studio 12 for Solaris SPARC	Oracle JDK 5.0 and 6
HP-UX 11i Itanium 64-bit: ■ HP-UX 11.31	HP C/aC++	Oracle JDK 5.0, 6 and 7

Platform or operating system	C/C++ compiler support	JDK support[1]
IBM AIX 32-bit (client only): ■ AIX 6.1 and 7.1	IBM Compiler for AIX 32-bit	IBM JDK 5.0 and 6.0
IBM AIX 64-bit: ■ AIX 6.1 and 7.1	IBM Compiler for AIX	IBM JDK 5.0 and 6.0
Mac OS X Mavericks 10.9 (client only)	gcc 4.2.1.	AppleJDK 6.0 and Oracle JDK 7.0

[1] The TimesTen `ttjdbc6.jar` has been certified to work with the Oracle Java 7 runtime environment (JRE) and Oracle Java 8 JRE. TimesTen does not support JDBC 7 or JDBC 8 features. The `ttjdbc7.jar` and the `ttjdbc8.jar` files are each a copy of the `ttjdbc6.jar`.

[2] On MontaVista CGE Linux, TimesTen only supports IMDB core functionality and replication. The following features are not supported on this platform: TimesTen Cache and cache grid, the OCI API, Pro*C, PL/SQL, Clusterware and connections from Windows clients.

TimesTen is supported in virtual machines provided by Oracle VM.

2.2 Client/Server configurations

A TimesTen client on any supported platform can connect to a TimesTen server on any platform where TimesTen is supported.

For configuration details see "Configuring TimesTen Client and Server" in the *Oracle TimesTen In-Memory Database Operations Guide*.

2.3 TimesTen Cache

Oracle TimesTen Application-Tier Database Cache (TimesTen Cache) enables you to cache Oracle database data in TimesTen. The TimesTen installation includes Oracle Instant Client. The following Oracle server releases are supported with the TimesTen Cache option:

- Oracle Database 10*g* Release 2 (10.2.0.5.0 or above)
- Oracle Database 11*g* Release 1 (11.1.0.7.0 or above)
- Oracle Database 11*g* Release 2 (11.2.0.2.0 or above)
- Oracle Database 12c

2.4 Replication configurations

TimesTen replication is supported only between identical platforms and bit-levels.

Oracle Clusterware 11.2.0.2, 11.2.0.3 and 11.2.0.4 are supported with TimesTen active standby pair replication. For more details, see *Oracle TimesTen In-Memory Database Replication Guide.*

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 E61818, formerly E21630).** See the description above.
  - **Oracle TimesTen In-Memory Database Installation Guide (Part Number E21632).** This guide provides information about installing and upgrading TimesTen.
  - **Oracle TimesTen Application-Tier Database Cache Introduction (Part Number E21631).** This guide describes the features of Oracle TimesTen Application-Tier Database Cache and provides information to help developers plan an TimesTen Cache application.
  - **Oracle TimesTen In-Memory Database Operations Guide (Part Number E21633).** 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 E21637).** 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 E21638).** This guide describes how to compile 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 E21640).** 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 E21639).** 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 E21645).** 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 E21641)**. ODP.NET support for Oracle

TimesTen In-Memory Database (TimesTen) enables ADO.NET data access from .NET client applications to TimesTen databases. This oument covers features specific to ODP.NET 11.2 support of and use with TimesTen.

- **Oracle Data Provider for .NET Oracle TimesTen In-Memory Database Support User's Guide (Part Number E38358)**. 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 12.1 support of and use with TimesTen.
- **Oracle TimesTen In-Memory Database Reference (Part Number E21643).** This guide provides a reference to all Oracle TimesTen utilities, built-in procedures, attributes and system limits. Also provides a reference to other features of TimesTen.
- **Oracle TimesTen In-Memory Database SQL Reference (Part Number E21642).** 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 E21646).** 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 Views Reference (Part Number E21644).** This document provides a reference for TimesTen system tables and views and replication tables.
- **Oracle TimesTen In-Memory Database Replication Guide (Part Number E21635).** 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 TimesTen Application-Tier Database Cache User's Guide (Part Number E21634).** This guide provides background information to help you understand how to create and manage Oracle TimesTen Application-Tier Database Cache and cache grid.
- **Oracle TimesTen In-Memory Database Troubleshooting Guide (Part Number E21636).** 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 E21647)** and **Oracle TimesTen In-Memory Database JMS/XLA Java API Reference (Part Number E21648).** 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 Installation Guide (Part Number E21649)** and **Oracle Enterprise Manager System Monitoring Plug-in for Oracle TimesTen In-Memory Database Release Notes (Part Number E21650)**. The guide and release notes describe the Oracle Enterprise Manager 11*g* Plug-in for TimesTen.
- **Oracle® Enterprise Manager for Oracle TimesTen In-Memory Database User's Guide (Part Number E58955, formerly E28645)** and **Oracle® Enterprise Manager for Oracle TimesTen In-Memory Database Release**

Notes (Part Number E58956, formerly E28646). The guide and release notes describe the Oracle Enterprise Manager 12*c* Plug-in for TimesTen.

If any of these items is missing, contact Oracle TimesTen support. See "Access to Oracle Support" on page 27.

5 Advance notice

This section lists deprecated and removed items.

5.1 Deprecated items in Release 11.2.2.1.0

Using a deprecated item results in a warning.

- The `-repUpgrade` option of `ttMigrate` has been changed to `-exactUpgrade` to be consistent with the replication `STORE` clause `TABLE DEFINITION CHECKING EXACT`. This is the default.
- The `-noRepUpgrade` option of `ttMigrate` has been changed to `-relaxedUpgrade` to be consistent with the replication `STORE` clause `TABLE DEFINITION CHECKING RELAXED`.
- The `-rename` option has been removed from the `ttMigrate` utility.
- Features for XLA non-persistent mode have been deprecated and removed from the documentation. Use utilities and APIs for persistent XLA only.
- Support has been removed for TTClasses methods that take a `TTStatus` object as the last argument and do not return exceptions.

6 Known problems and limitations

This section contains known problems and limitations in these categories:

- New issues in this release
- Cache Advisor
- TimesTen Cache
- Installing and uninstalling TimesTen
- JDBC
- ODBC
- PL/SQL
- Replication
- SQL, utilities and procedures
- SQL*Plus
- TimesTen integration with Oracle Clusterware
- TimesTen OCI support
- TimesTen Pro*C/C++ Support
- TTClasses
- Upgrading TimesTen

- XLA and JMS/XLA

6.1 New issues in this release

- Do not set `ReceiverThreads` to `2` if parallel replication is enabled. This setting can result in performance degradation.

6.2 Cache Advisor

- The list of known problems and limitations for the Cache Advisor is in the `readme.html` file in *`install_dir`*`/ttcacheadv` in your TimesTen instance (Linux x8664 only).

6.3 Client/Server

- In the Windows ODBC **Client DSN Setup** dialog box, when the **Server Name** refers to a UNIX host, pressing 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 work normally.
- 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.

6.4 TimesTen Cache

- TimesTen does not support extended data types. An extended data type is a `VARCHAR2` or `NVARCHAR2` data type with a declared size greater than 4000 bytes, or a `RAW` data type with a declared size greater than 2000 bytes.

  If a user attempts to cache an Oracle database table that contains a column that uses extended data types, TimesTen returns an error.

  If a user tries to do a `SELECT` on a column that uses an extended database type in `passthrough=3` mode, TimesTen returns an error and the command fails.

  Alternatively, to access the Oracle data, use SQL*Plus or other methods to query the Oracle database.

- When using Oracle TimesTen Cache, we recommend that you enable full core dumps by adding the line

  ```
  DIAG_RESTRICTED=FALSE
  ```

  in the `sqlnet.ora` file that is included with your Oracle Database client installation.

  This setting enables core dumps upon an assertion failure. For more details, see your *Oracle Database Readme* file.

- Dynamic load might not occur under the following condition: The query specifies more than one table of the cache group and the first table in the plan is a cache group table without a dynamic load condition. Such a plan is possible when the cache group is empty.

  This can be fixed by either:

  - Setting the join order so the table with the dynamic load condition is the left-most table of the join, or
  - Setting fake statistics so the tables without the dynamic load condition are not empty.

- Global cache group operations are not supported on Windows systems.
- In the following scenario:

  - There are multiple AWT cache groups.
  - There are pending DML operations to be applied to be propagated to Oracle for an AWT cache group.
  - The AWT cache group is dropped and then recreated.

  The expected behavior is that the pending DML will not be applied to the Oracle database. A problem exists where the pending DML is applied to Oracle. To work around this problem, do one of the following:

  - Drop all AWT cache groups before any cache group is recreated.

    OR

  - Call the `ttRepSubscriberWait` build-in procedure against the Oracle database to ensure that all pending DML are applied to Oracle before dropping the cache group.

- If a foreign key on an Oracle database corresponds to cached tables, the foreign key must have an index on it. If there is no index on the foreign key, TimesTen returns an error at the time of cache group creation. This restriction applies for AWT cache groups when parallel propagation is enabled.
- 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.
- 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 10*g* releases 10.2.0.3 and above but does not occur in Oracle Database 11*g*. There are two solutions:

  - Set the `CURSOR_SHARING` Oracle server parameter to `EXACT`.
  - Install the appropriate Oracle patch for Oracle release 10.2.0.5.

  See My Oracle Support 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. (BugDB 8243193)

- For TimesTen 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, TimesTen 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. (BugDB 7033084)
- 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. (BugDB 5735286)

6.5 Installing and uninstalling TimesTen

- When upgrading to this release, TimesTen does not automatically check for missing constraints on AWT tables created in releases 11.2.2.1.x and earlier releases of 11.2.2.2.x. Run the `ttCacheCheck` built-in procedure after upgrading to this release.
- For improved JDBC Performance on TimesTen, when using a XenNet virtual device with a Windows 2003 virtual machine on Oracle VM hypervisor, configure the `LargeSendOffload` parameter to `FALSE`. By default, the `LargeSendOffload` parameter is set to `TRUE` for the XenNet virtual device. You can modify this parameter in the **Advanced** tab of the XenNet properties dialog.
- For databases on Linux systems where `PermSize+TempSize+LogBufMB`+20MB > 256 GB, you must have Large Pages configured to accommodate the size of the shared segment.
- On Windows 64-bit systems, you need to compile the QuickStart TTClasses demos before you can use them.
- 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 TimesTen on a new 64-bit Linux system, you may find that it is not enabled for 32-bit applications. Select the Compatibility Arch Support and Compatibility Arch Development Support packages to install architecture specific support for your 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.

- 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.

- 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.

6.6 JDBC

- TimesTen does not support Positioned Updates and Deletes. Calls to setCursorName and getCursorName methods are ignored.
- If a JDBC application running in a time zone that has Daylight Savings Time selects a nonexistent 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'.
- SQL statements 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 statement to avoid characters that are not in the database character set in the query text.

6.7 ODBC

- The ODBC SQLExtendedFetch function appears in TimesTen header files. However, TimesTen does not support this function.

6.8 PL/SQL

- 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 GB. 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.

- 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.

6.9 Replication

- The default handling of cache groups when duplicating databases is inconsistent between the ttRepAdmin -duplicate command line utility and the ODCB ttRepDuplicateEX utility. When using ttRepAdmin, cache groups are converted to regular tables by default (-noKeepCG). When using ttRepDuplicateEX, cache groups are retained by default.
- 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.
- 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.

6.10 SQL, utilities and procedures

- To use this release of the ttStats utility with databases created in previous releases of TimesTen, you must migrate the database to 11.2.2.6.0.
- Foreign key constraints are not enforced by the execution of the ttLoadFromOracle built-in procedure. When using this built-in procedure (or the ttIsql command) to load rows into a table that is the referencing table (child table) of a foreign key, it is possible that a row without any matching parent is loaded. TimesTen does not detect this foreign key violation. If the data loaded from Oracle may violate a foreign key constraint, verify the foreign key constraint manually after loading both the child and the parent table.

- TimesTen BINARY_DOUBLE and BINARY_FLOAT are approximate data types. When storing and retrieving data of these types, the least significant digits may be rounded or truncated. You should avoid using columns of these types in primary keys, unique keys and foreign keys.
- When the same column alias name is used in a view definition and a query that accesses the view, TimesTen might incorrectly issue the TT2210: Column reference of XXX is ambiguous error. The workaround is to explicitly assign a different column alias name to the column.
- Deleting rows from a table that has out-of-line columns and dropping that table in the same transaction results in an assertion failure when using DDLCommitBehavior=1. To work around this problem, add a commit between the DELETE statement and the DROP TABLE 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 statements 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 statement to avoid characters that are not in the database character set in the query text.

6.11 SQL*Plus

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

6.12 TimesTen integration with Oracle Clusterware

- A problem exists with TimesTen support for Oracle Clusterware where killing the ttCRSMaster process of the active database results in a role switch.
- TimesTen does not support Clusterware on Windows platforms.
- 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.

6.13 TimesTen OCI support

- If `NLS_LANG` is set to a value that is not supported by TimesTen, spurious errors such as "Cannot connect" may result.

6.14 TimesTen Pro*C/C++ Support

- On Windows platforms, the 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 compiling a Pro*C/C++ demo, this message may appear: "`System default option values taken from: install_dir/ttoracle_home/instantclient_11_2/precomp/admin/pcscfg.cfg`." The path name may be incorrect.

6.15 TTClasses

- The `TTCmd::setParamNull()` method cannot be used to set `NULL` LOB data in an Oracle Database table using passthrough. Instead, use literals in `INSERT` or `UPDATE` statements.

6.16 Upgrading TimesTen

- The `ttMigrate` utility cannot migrate foreign key dependencies between objects owned by different users to TimesTen release 11.2.1 and later from release 7.0 and older 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 and later from release 7.0 and older 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.

6.17 XLA and JMS/XLA

See *Oracle TimesTen In-Memory Database C Developer's Guide* for details about XLA (Transaction Log API). See *Oracle TimesTen In-Memory Database Java Developer's Guide* for details about JMS/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 are always R, indicating regular indexes, regardless of the actual index type.

- This limitation applies to JMS/XLA, ODBC/XLA and TTClasses/XLA. When a modification of a LOB column is committed, XLA does not return the value of the LOB. XLA does indicate the following:
  - Whether the LOB has been inserted, updated or deleted
  - Whether the value of the LOB column is NULL or not NULL
  - Whether the length of the LOB is zero
  - Whether the value of the LOB is undefined
- TimesTen does not generate an XLA record for CREATE MATERIALIZED VIEW LOG operations.
- 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.
- 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.

7 Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at
http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit
http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit
http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

Oracle TimesTen In-Memory Database Release Notes, 11*g* Release 2 (11.2.2)
E61818-06