

# Oracle® TimesTen In-Memory Database

Release Notes

Release 18.1

E61191-58

May 2021

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This document provides late-breaking information for **TimesTen 18.1.4.11.0**, as well as information that is not yet part of the formal documentation.

On TimesTen Classic, if you are currently using an 18.1.2.x release, you must first upgrade to 18.1.2.5.0 or greater before upgrading to this release. If you are currently using an 18.1.3, you must first upgrade to 18.1.3.5.0 or greater before upgrading to this release.

On TimesTen Scaleout, if you upgrade to this release, you must create a new database using this release. Instructions are in the *Oracle TimesTen In-Memory Database Scaleout User's Guide*.

If you are upgrading to this release from 18.1.1.1.0, please contact Oracle Support.

The latest version of this document is the `README.html` file in your installation directory. Release notes also may be updated from time to time in the documentation library.

You can find the Oracle TimesTen In-Memory Database documentation set at <https://docs.oracle.com/database/timesten-18.1/>

To install the Oracle TimesTen In-Memory Database, unzip the distribution file. For installation information, see *Oracle TimesTen In-Memory Database Installation, Migration, and Upgrade Guide* and the *Oracle TimesTen In-Memory Database Scaleout User's Guide*.

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**Note:** TimesTen release numbers are reflected in items such as TimesTen utility output, file names, and directory names. These are subject to change with every minor or patch release, and the documentation cannot always be up to date. The documentation seeks primarily to show the basic form of output, file names, directory names, and so on. You can confirm the current release number by executing the `ttVersion` utility.

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This document contains the following sections:

- [Changes in this release](#)
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# 1 Changes in this release

This section lists changes between releases:

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## 1.1 Changes for Release 18.1.4.11.0 from Release 18.1.4.9.0

- This release contains new features for the TimesTen Kubernetes Operator. You can learn more in the *Oracle TimesTen In-Memory Database Kubernetes Operator User's Guide*. The new features include:
  - Support for automated upgrades of TimesTen
  - Ability to recover TimesTen if both databases in an active standby pair fail.
  - Ability to manually upgrade TimesTen
  - Ability to suspend the management of a TimesTenClassic object
  - Support for direct mode applications
  - Support for additional CRD syntax elements
  - Enhancements to TimesTenClassicStatus
  - Support for running containers as non-root

## 1.2 Changes for Release 18.1.4.11.0 from Release 18.1.4.8.0

- This release contains two new options for the `ttLoadFromOracle` utility. These options speed up loading large data sets into non-readonly cache groups.

The `SkipCacheChecks` option allows data to be loaded into non-readonly cache group tables with `ttLoadFromOracle` utility. This option is not used by default. Valid values are Y and N.

The `DryRun` option checks if reading data on the Oracle database can be parallelized across multiple fetchers and stops before loading any rows. If parallelizing the reads is possible, `ttLoadFromOracle` returns success. Otherwise it returns an error. This option is not used by default. Valid values are `Y` and `N`.

- An issue that might cause an assertion during checkpointing has been fixed. (BugDB #32449495 - Backport of BugDB #32498023)
- In previous releases, if a large number of connections simultaneously connected to elements on a large grid, queries could fail due to an inability to create communication channels between the elements. This problem is fixed. (BugDB #32654342 - Backport of BugDB #32651929)
- In previous releases, running the `ttOptEstimatesStats` built-in procedure on a standby database could cause a buffer over run assertion. This problem is fixed. (BugDB #32670979 - Backport of BugDB #32307505)

### 1.3 Changes for Release 18.1.4.8.0 from Release 18.1.4.7.0

- Improved log manager diagnostics. (BugDB #32449495 and BugDB #32449521 - Backport of BugDB #32225061 and BugDB #32420187)
- In previous releases, if there were multiple failed connection attempts in a short period of time, defunct child servers would accumulate, resulting in an error indicating that no more processes were available. This problem is fixed. (BugDB #32560604 - Backport of BugDB #29747131)

### 1.4 Changes for Release 18.1.4.7.0 from Release 18.1.4.6.0

- A problem is fixed where rare error conditions could lead to a parallel `LOAD CACHE GROUP` operation using the wrong credentials to select on the Oracle database. (BugDB #32202049 - Backport of BugDB #32480322)

### 1.5 Changes for Release 18.1.4.6.0 from Release 18.1.4.5.0

- An optimizer hint has been added to have the `COUNT` function return a `TT_INTEGER` instead of a `TT_BIGINT`. (BugDB #32466032 - Backport of BugDB #32466016)

### 1.6 Changes for Release 18.1.4.5.0 from Release 18.1.4.4.0

- A problem is fixed where a connection storm could cause new connection requests to be rejected. (BugDB #32214368 - Backport of BugDB #32198508)
- In previous releases client connections could fail if an inconsistent value for the `ForceDisconnectEnabled` connection attribute was supplied in the connection string. This is fixed. (BugDB #32243854 - Backport of BugDB #32228891)
- A rare deadlock between dynamic load and autorefresh could occur and result in an error message in the daemon log. (BugDB #32244827 - Backport of BugDB #32224367)
- In previous releases when a client with many open connections was forced to shut down, many error messages would fill both the daemon and support logs. In this release, the messages now appear as `INFO` and are only sent to the support log. (BugDB #32281255- Backport of BugDB #32228936)

- A problem is fixed where a `ttIsqL` command would try to open a `mesg` file that did not exist. (BugDB #32297690 - Backport of BugDB #32188026)

## 1.7 Changes for Release 18.1.4.4.0 from Release 18.1.4.3.0

- For TimesTen Classic, this release contains several new features for the Oracle TimesTen Kubernetes Operator (TimesTen Operator). For details, see the *Oracle TimesTen In-Memory Database Kubernetes Operator User's Guide*.
- TimesTen supports password management functionality by using profiles. A profile consists of a set of limits on the database password parameters. A profile can be assigned to one or more users. A user who is not assigned a profile is subject to the limits of the `DEFAULT` profile. For details, see the *Oracle TimesTen In-Memory Database SQL Reference*.
- For use with Transport Layer Security (TLS), new options for the `ttCreateCerts` utility allow you to specify the elliptical curve signing algorithm, size of the elliptical curve, and duration for which the certificates are valid. For details, see the *Oracle TimesTen In-Memory Database Security Guide*.
- When a `SELECT` is done in the TimesTen Client/Server driver, a set of `SQLFetch` operations is performed. Each time the buffer is exhausted, another set of rows is requested until all rows have been fetched and returned to the client. Previously, the maximum size of the returned buffer was hard-coded to 256 KB or 200 rows, whichever is reached first. In this release, the user can set custom limits using one of the following operations:

- TimesTen connection attributes for the client connection string or client DSN definition:

`TTC_NetMsgMaxRows`

`TTC_NetMsgMaxBytes`

- ODBC attributes that you can set and get with `SQLSetStmtAttr` and `SQLGetStmtAttr`:

`TT_NET_MSG_MAX_ROWS`

`TT_NET_MSG_MAX_BYTES`

These can also be set with `SQLSetConnectAttr`, which provides initial default values for statement objects created from the connection.

- JDBC Statement object methods to set or get the attributes:

```
void setTtNetMsgMaxRows(int rows)
```

```
int getTtNetMsgMaxRows()
```

```
void setTtNetMsgMaxBytes(int bytes)
```

```
int getTtNetMsgMaxBytes()
```

You can also call the `set` methods from a `Connection` object, which provides initial default values for statement objects created from the connection.

- The JDBC Statement `getFetchSize()` and `setFetchSize()` methods are mapped to `getTtNetMsgMaxRows()` and `setTtNetMsgMaxRows()` respectively.

## 1.8 Changes for Release 18.1.4.3.0 from Release 18.1.4.2.0

- In this release, a problem is fixed where TimesTen replication could loop while reading log records. The problem would resolve when the user restarted replication. This problem impacted some, but not all subscribers. (BugDB #31939615 and BugDB #31963773 - Backport of BugDB #31931953)
- This release contains improved assertion diagnostics for latch stability. (BugDB #31963787 - Backport of BugDB #31963612)

## 1.9 Changes for Release 18.1.4.2.0 from Release 18.1.4.1.0

- A problem is fixed where an assertion could occur during a dynamic load of a cache group with hash indexes. (BugDB #31806677 - Backport of BugDB #31765975)
- A problem is fixed where checkpoints could fail or take a long time to complete. (BugDB #31849763 and #31902277 - Backport of BugDB #31707345 and #31740312)
- A problem is fixed where parallel load cache group could fail with lock timeouts. (BugDB #31860854 - Backport of BugDB #31805396)

## 1.10 Changes for Release 18.1.4.1.0 from Release 18.1.3.1.0

- [New features](#)
- [Bug fixes](#)

### 1.10.1 New features

- For TimesTen Classic, this release contains the Oracle TimesTen Kubernetes Operator (TimesTen Operator). The TimesTen Operator provides the ability to create and deploy highly available replicated pairs of TimesTen databases to a Kubernetes cluster with minimal effort. In addition, the TimesTen Operator provides the ability to automate failure detection and recovery. For details see the new book, *Oracle TimesTen In-Memory Database Kubernetes Operator User's Guide*.
- For TimesTen Classic, this release has been certified to run in containers managed by Kubernetes. The following environment was used for the certification:
  - Kubernetes v1.13.5 in Oracle Kubernetes Environment (OKE).
  - A container on Oracle Enterprise Linux 7 or a container based on a base SUSE Enterprise Server 15 image.
- You can enable Transport Layer Security (TLS) to provide encrypted network communication for replication agent communication and client/server communication. Client/server over TLS is not supported on Linux32 in this release. Please see the *Oracle TimesTen In-Memory Database Security Guide* for more details.
- When using Oracle TimesTen In-Memory Database Cache, you can now set a time interval for calculating the fragmentation percentage of the change log tables on the Oracle database. Use the `ttCacheConfig` built-in procedure providing the `AutorefreshLogMonitorInterval` as the value parameter.
- In TimesTen Classic, automatic client failover no longer is limited to scenarios that include an active standby pair replication scheme. The client can automatically fail over from one database to another using generic automatic client failover. This is especially useful if you are using read-only cache groups. See "Using automatic

client failover" in *Oracle TimesTen In-Memory Database Operations Guide* for the automatic client failover entry?

- This release contains support for the `VSIZE` SQL function, a scalar function that returns the number of bytes in the internal representation of an expression.
- This release of TimesTen Scaleout has a new type of backup: staged backups. This type of backup eliminates the overhead of creating local copies of the checkpoint and log files and reduces the network traffic of creating a remote copy in the repository. Staged backups are ideal for when you want to make regular backups on a second site that is independent to your main site.
- To increase the performance of database import operations, the `ttGridAdmin dbImport` command now enables you to use multiple threads to import database objects with the use of the `-numThreads` option.
- This release allows you to set a timeout (in milliseconds) for channel create requests to a remote element with the `ChannelCreateTimeout` general connection attribute. This timeout avoids potential channel create hangs due to software issues or network failures. In this release, the default value is 0. (The documentation incorrectly states the default value as 30,000.)
- The `CURRENT_SCHEMA` parameter has been added to the `SYS_CONTEXT` function.
- This release contains support for the `TO_TIMESTAMP` SQL function. `TO_TIMESTAMP` is a datetime function that converts a `CHAR` or `VARCHAR2` data type to a value of `TIMESTAMP` data type.
- This release contains support for the `ACCESSIBLE BY` clause. You can use the `ACCESSIBLE BY` clause in the `CREATE FUNCTION`, `CREATE PROCEDURE`, and `CREATE PACKAGE` statements.

### 1.10.2 Bug fixes

- In previous releases, queries on the `SYS.USER_USERS` or `SYS.DBA_USERS` views could fail with an error indicating an incorrect resource limit value instead of `UNLIMITED`. In this release, the max value for `UNLIMITED` in both of these views is `TT_BIGINT`. (BugDB #28349381 and BugDB #30794417)
- In previous releases, when using TimesTen Scaleout, materialized views that have different distribution schemas than the base tables contain inaccurate information after evict operations. This problem is fixed. (BugDB #30175635)
- A memory leak in the TimesTen server has been fixed. (BugDB #30376195)
- In previous releases, the command to force a connection to disconnect could be ignored by the system. This issue is fixed. (BugDB #30407097)
- An issue is fixed in this release where, under certain system configurations, the `CkptRate` attribute setting was not being honored properly by TimesTen. (BugDB #30533832)
- In previous releases, when a user started the TimesTen daemon without executing the `ttenv.sh/ttenv.csh` script, the cache agent would not start. This problem is fixed. (BugDB #30616019)
- In previous releases a heap buffer corruption during SQL compilation could invalidate the database. TimesTen now returns a runtime error if this problem is detected. (BugDB #30602916 and BugDB #30700586)
- A problem is fixed where a `SEGV` error would occur when a view that did not contain certain columns was part of a join operation inside of a PL/SQL block. (BugDB #30714068)

- In this release, a performance regression is fixed. In previous releases, some operations could take an extra long time to complete when the database was under a high workload. (BugDB #30752313)
- A problem is fixed where some TimesTen diagnostics files used large amounts of disk space. (BugDB #30762459)
- In this release, TimesTen uses less temp space during recovery. (BugDB #30814797)
- A problem is fixed where a specific Oracle error caused by running Database Replay on the Oracle database could lead the autorefresh cycle to be a full autorefresh for incremental autorefresh cache groups when autorefresh select limit is used. (BugDB #30870273)
- A problem is fixed where replica sets could fail to recover during LBCU recovery, when using TimesTen Scaleout. (BugDB #30880449)
- A problem is fixed where a SEGV error would occur when processing ref cursors in a C function in a Pro\*C or OCI program. (BugDB # 30998539)
- An overflow issue with a large number of IN list values is fixed in this release. (BugDB #31020480)
- This release contains a fix for a performance degradation that caused TimesTen to read more often from persistent storage. (BugDB #31147999)
- On NUMA machines with a large number of CPUs TimesTen could crash while loading a database into RAM. This problem is fixed. (BugDB #31295922)

## 1.11 Changes for Release 18.1.3.1.0 from Release 18.1.2.2.0

Changes in this release include:

- [New features](#)
- [Bug fixes](#)

### 1.11.1 New features

- TimesTen is now certified to support these additional platforms:
  - Solaris 11.3 and 11.4 on Intel and Sparc 64-bit
  - Linux SUSE Enterprise Server 15
  - IBM AIX 7.2
  - macOS 10.9.2, 10.11, 10.13.6 and 10.14.6
  - Linux 32-bit client only
- In this release, TimesTen adds support of Python and Node.js through the Oracle Database Programming Interface for C (ODPI-C). For each language, there is an open source package, or driver, available through GitHub and maintained by Oracle. See *Oracle TimesTen In-Memory Database Open Source Languages Support Guide* for information.
- The ACTION, CLIENT\_INFO, and MODULE parameters have been added to the SYS\_CONTEXT function. See *Oracle TimesTen In-Memory Database SQL Reference* for more information.
- TimesTen now supports these scalar functions: ACOS, ASIN, ATAN, ATAN2, COS, COSH, EXP, LN, LOG, SIN, SINH, TAN, TANH. See *Oracle TimesTen In-Memory Database SQL Reference* for more information.

- Cache group autorefresh interval set to 0 milliseconds enables continuous autorefresh, where the next autorefresh cycle is scheduled immediately after the last autorefresh cycle has ended.
- The syntax for table name in the `SELECT` statement allows optional parenthesis. This is also true for the `SELECT` clause of the `INSERT . . . SELECT` and `CREATE TABLE AS SELECT` statements. See *Oracle TimesTen In-Memory Database SQL Reference* for more details.
- Setting the `CacheCommitDurable` cache configuration parameter to 0 with the `ttCacheConfig` built-in procedure reduces the occurrence of lock contention between autorefresh and dynamic load requests in the same application. See *Oracle TimesTen Application-Tier Database Cache User's Guide* for details.
- This release adds support in TimesTen Classic for the `-open` and `-close` options for the `ttAdmin` utility. You open and close a database in order to direct whether users may connect to that database. If a database is closed, user connection attempts are refused. When a database is closed only the instance administrator can connect to it. In TimesTen Classic, databases are open by default. See *Oracle TimesTen In-Memory Database Operations Guide* for details.
- The `SYS.V$SESSION` view contains data for each current connection in TimesTen Classic. For details, see *Oracle TimesTen In-Memory Database System Tables and Views Reference*.
- SNMP traps were not shipped in previous 18.1 releases. Support for SNMP is included in this release of 18.1. See *Oracle TimesTen In-Memory Database Error Messages and SNMP Traps*, for details.

### 1.11.2 Bug fixes

- Cache agent thread contentions are reduced in this release. (BugDB #27446726)
- This release contains a feature to support Oracle connection pooling for client/server cache connections. By configuring the pool appropriately, applications can limit the number of open Oracle connections. (BugDB #28503586 - Forward Port of BugDB #27453129)
- In previous releases, the `SELECT` privilege on the Oracle database `ARDL_CG_COUNTER` prevented dynamic load with the reduced contention feature enabled. This problem is fixed. (BugDB# 29809872 - Backport of BugDB #29809244)
- Column types returned by TimesTen to JDBC applications are different than the ones returned by the Oracle database in a TimesTen cache. This release contains the Java property `timesten.oracle.type.mapping` that returns the expected column types. (BugDB #30160298)

To enable the fixed mapping, run your applications with:

```
java -Dtimesten.oracle.type.mapping=true myJavaProgram myParams
```

- In previous releases, in the event of a critical event (such as database invalidation) the TimesTen daemon log messages might be lost. In this release, to help diagnose the cause of the critical event, TimesTen collects a copy of a few minutes of daemon log entries at the time that a critical event occurs. (BugDB #30206361)
- A problem has been fixed where a query with nested aggregates could cause an assertion. (BugDB #30258456)
- A memory leak in the main TimesTen daemon has been fixed. (BugDB #30385213)



- In previous releases, when trying to delete an instance, TimesTen deleted the current working directory instead. This problem is fixed. (BugDB #30399673)
- A memory leak in the TimesTen server has been fixed. (BugDB #30580882 - Backport BugDB #30376195)

## 1.12 Changes for Release 18.1.2.2.0 from Release 18.1.2.1.0

Changes in this release include:

- [New features](#)
- [Behavior change](#)
- [Bug fixes](#)

### 1.12.1 New features

- You can use the `SQLQueryTimeoutMsec` connection attribute to specify the time limit in milliseconds within which the database should execute SQL statements. The value of `SQLQueryTimeoutMsec` can be any integer equal to or greater than 0. The default value is 0. A value of 0 indicates that the query does not time out. This attribute does not affect TimesTen Cache operations that are being processed on an Oracle database. This includes passthrough statements, flushing, manual loading, manual refreshing, synchronous writethrough, and propagating. Both `SQLQueryTimeout` and `SQLQueryTimeoutMsec` attributes are internally mapped to one timeout value in milliseconds. If different values are specified for these attributes, TimesTen retains the value specified by the `SQLQueryTimeoutMsec` connection attribute.
- TimesTen active standby pair replication is supported with Oracle Clusterware 18c.

### 1.12.2 Behavior change

- Users should no longer issue the `ttGridAdmin dbDistribute -evict` command with the `-add` or `-remove` options.

### 1.12.3 Bug fixes

- A problem is fixed where a segmentation fault could occur when `TypeMode=1` and a query tries to convert an empty string to a number type. (BugDB #25501615)
- A problem that caused timeouts of materialized views that had self joins of inner tables is fixed in this release. (BugDB #29014221)
- In previous releases, the `ttRestore` utility did not respect the value of the `Preallocate` connection attribute when the value was 1. This problem impacted databases created by using the `ttRepAdmin -duplicate` command or the `ttRestore` utility. This problem is fixed. (BugDB #29214692)
- A problem is fixed where an `ALTER STANDBY PAIR ... DROP SUBSCRIBER` or an `ALTER REPLICATION ... DROP SUBSCRIBER` statement is given priority over user workloads to avoid deadlocks when dropping a subscriber. (BugDB #29278422)
- A problem is fixed where the output of columns in a Replication Conflict Resolution report were truncated (which were not previously truncated) resulting in the generation of invalid XML in the report. (BugDB #29359698)

- A compilation heap corruption could invalidate the database if the compilation heap header was corrupted. This problem is fixed. (BugDB #29371488)
- A problem has been fixed where replication between hosts that have TimesTen 18.x releases and pre-18.x releases installed could break due to incorrect table aging comparison errors. (BugDB #29456369)
- In previous releases, it was possible for the `ttGridAdmin modelApply` command to delete the current version of the model if the current version of the model was older than the `Retain Days` value. This problem is fixed. (BugDB #29642503)

Before upgrading a grid to the 18.1.2.2.0 release, ensure that you perform these steps:

1. Take note of the current values for `Retain Days` and `Retain Versions` in your grid.

```
% ttGridAdmin gridDisplay
...
Retain Days:          30
Retain Versions:      10
...
```

2. Set the values for `Retain Days` and `Retain Versions` to 0.

```
% ttGridAdmin gridModify -retainDays 0 -retainVersions 0
```

3. After the upgrade, restore the values for `Retain Days` and `Retain Versions` in your grid.

```
% ttGridAdmin gridModify -retainDays 30 -retainVersions 10
```

- A performance issue related to B-tree latch contention has been fixed. (BugDB #29664356)
- A problem is fixed where a complex query returned TimesTen error 4053 : Internal error: Failed to get offset. The command failed. (BugDB #29178157)
- In previous releases, running an anonymous block could result in an internal error. In this release the `ttTraceMon` utility is enhanced to include new traces for PL/SQL compilation. Trace level 1 is for PL/SQL compilation and Trace level 2 is for PL/SQL execution. (BugDB #29863040 - Forward port of BugDB #20625183)
- In previous releases, when recovering from a fuzzy checkpoint after activating replication for the first time, an assertion could occur. This problem is fixed. (BugDB #30025064)
- An assertion failure in the function `sbTupRefCountDecMacro` is fixed in this release. (BugDB #3008138 - Forward port of BugDB #29916932)
- In a previous release, an assertion failure could happen without printing a message to indicate the SQL statement in which the error occurred. In this release, TimesTen prints out the failing SQL statement. (BugDB #30179366 - Backport of BugDB #30119077)

### 1.13 Changes for Release 18.1.2.1.0 from Release 18.1.1.3.0

Changes in this release include:

- [New features](#)
- [Behavior change](#)
- [Bug fixes](#)

### 1.13.1 New features

- This release supports TimesTen Classic In-Memory Database, in addition to TimesTen Scaleout.
- This release includes the *Oracle TimesTen In-Memory Database Installation, Migration, and Upgrade Guide*. The procedures for completing an installation have changed since the TimesTen 11.2.2 release.
- You can attempt a re-synchronization of your data if the data distribution process is interrupted or fails to complete. Re-synchronization involves executing the `ttGridAdmin dbDistribute -resync` operation. See "Recovering from a data distribution error" in the *Oracle TimesTen In-Memory Database Scaleout User's Guide* for further details.
- The TimesTen JDBC driver implements the JDBC 4.2 API (Java 8) and is certified to work with Java 8, 9, and 10 runtime environments (JRE). This includes support for standard REF CURSORS, large update counts, `SQLType`, and `DatabaseMetaData` enhancements.
- You can gracefully shut down the database by disconnecting applications in an orderly fashion. The new forced disconnect option asynchronously disconnects all connected applications from the database, including those that are idle or unresponsive. See "Disconnecting from a database" in the *Oracle TimesTen In-Memory Database Operations Guide*, "ForceDisconnectEnabled", "Force disconnect" for Classic, and "Force all connections to disconnect (dbDisconnect)" for TimesTen Scaleout in *Oracle TimesTen In-Memory Database Reference*.
- The `ttCkptHistory` built-in procedure was updated to add information about the number of actual transaction log files purged by a checkpoint and the reason for a transaction log hold. See "Displaying checkpoint history and status" in the *Oracle TimesTen In-Memory Database Operations Guide* for full details.
- Some applications choose incremental autorefresh instead of full autorefresh mode for performance reasons. However, a full autorefresh could still be requested in some situations. You can set the `DisableFullAutorefresh` cache configuration parameter to 1 to disallow any full autorefresh requests for all cache groups defined with incremental autorefresh. See "Disabling full autorefresh for cache groups" in the *Oracle TimesTen Application-Tier Database Cache User's Guide* for details.
- The `PLSQL_SESSION_CACHED_CURSORS` connection attribute specifies the number of session cursors to cache. The default value is 50 and the range is 1-65535. Also see "PLSQL\_SESSION\_CACHED\_CURSORS" in *Oracle TimesTen In-Memory Database Reference*.
- `PLSQL_OPEN_CURSORS` is a `ttDBConfig` parameter that specifies the maximum number of PL/SQL cursors that can be open in a session at one time. The default value is 50 and the range is 1-65535. Also see "ttDBConfig" in *Oracle TimesTen In-Memory Database Reference*.
- For TimesTen Scaleout, you can find proxy connection information by specifying the command `ttGridAdmin dbStatus -proxies`.

### 1.13.2 Behavior change

- In previous releases, a call to the ODBC 2.5 `SQLColAttribute` function returned a blank field. In this release, a call to `SQLColAttribute` returns the owner name. This is a behavior change.

### 1.13.3 Bug fixes

- In previous releases, when dropping a table and creating a new table during a replication backlog, the replication agent could transmit work for a table that had been dropped. This problem is fixed. (BugDB #6053644)
- When using asynchronous writethrough under no workload, the AWT sorter thread could consume 100% of the CPU. This problem is fixed. (BugDB #21556263 - ForwardPort BugDB #21452176)
- A deadlock could occur when trying to add a subscriber to a replication scheme. This problem is fixed. (BugDB #26546964 and BugDB #27433418- ForwardPort BugDB #26383257)
- A problem has been fixed where TimesTen would return Error 8110: Connection not permitted. This store may require master catchup, when an active store had closed abruptly and the standby was marked failed. (BugDB #27433402 - ForwardPort BugDB #24007219)
- A problem has been fixed where slow performance occurred because the cache agent executed PL/SQL using literal SQL strings instead of bind variables. (BugDB #27444093 - ForwardPort BugDB #25906163)
- This release contains a new built-in procedure for changing the frequency at which "Waiting for latch . . ." messages are printed. The built-in procedure is `ttLatchWaitMsgTimeout`. (BugDB #27692915 - ForwardPort BugDB #27388330)
- A problem is fixed where multiple dynamic load executions from the same TimesTen connection could lead to a memory corruption. (BugDB #27840782 - ForwardPort BugDB #27753072)
- A problem is fixed where connection errors could occur when trying to create many simultaneous client/server connections. (BugDB #28084560)
- A problem is fixed where a full autorefresh could be triggered after manually loading a cache group. (BugDB #28130065 - ForwardPort BugDB #27953067)
- A problem related to reuse of constant expressions in NVL and CAST clauses of a SELECT operation is fixed in this release. (BugDB #28361914 - ForwardPort BugDB #28325161)
- An assertion could occur when a CREATE VIEW operation returned long view query results. This problem is fixed. (BugDB #28640816 - ForwardPort BugDB #28618970)
- A problem is fixed where memory from one shared cursor could consume most of the memory specified by the `PLSQL_MEMORY_SIZE` connection attribute and TimesTen would return error 4030. (BugDB #28715222 - ForwardPort BugDB #18829074)
- A problem is fixed where the `ttRepAdmin -showstatus -detail` command could show multiple entries for the same peer relationship and return confusing output. (BugDB #28716671)
- An assertion failure that could occur at SQL parsing and at heap compilation when querying system tables now returns an error instead of asserting. (BugDB #28717010 and #27976616- ForwardPort BugDB #27928747)

- In previous releases, a compilation heap assertion failure could invalidate the database. This problem is fixed. (BugDB #28717013 - ForwardPort BugDB #26535068)
- Performance for certain SELECT queries was slower than in an older release of TimesTen. This problem is fixed. (BugDB #28717014 - ForwardPort BugDB #)
- A problem is fixed where a segmentation fault could occur during a query that contained a CASE statement and a GROUPBY clause. (BugDB #28448399)
- A problem that caused a delay in a log-based catchup (LBCU) operation is fixed. (BugDB #28852175)
- For TimesTen Scaleout, when upgrading from an 18.1.1.x release to this release, there was a problem that would prevent the creation of a duplicate grid management store from the previous release or duplicating a grid management store to the previous release. This problem was fixed. (BugDB #28890812)
- An assertion failure during latch handling that caused database invalidation is fixed in this release. (BugDB #28902021)
- A problem that caused a loop of disconnect failure for log-based catchup (LBCU) operation is fixed in this release. (BugDB #28920075)
- In previous releases, a background checkpoint could fail if the system was waiting on an epoch. This would cause excess log records to accumulate. In this release, TimesTen retries the background checkpoint as soon as possible. (BugDB #28931970 - Forward Port of BugDB #29039498)
- An application using a mini-client produced by `ttmkLiteClient` could core dump when trying to connect. This problem is fixed. (BugDB #29286011)

#### 1.14 Changes for Release 18.1.1.3.0 from Release 18.1.1.2.1

- This release contains new options to the `ttGridAdmin dbStatus` command that provide information about connections. For details, see the *Oracle TimesTen In-Memory Database Reference*.
- A problem is fixed where a query could return different results depending on the position of the optimizer hint. (BugDB #27424470 - Forward port of BugDB #27237541)
- A problem is fixed where TimesTen could return a wrong result for a query with an aggregate push down when concurrent update operations involved tables used in the query. (BugDB #27444108 - Forward port of BugDB #25647667)
- A problem is fixed where an assertion failure could happen during an update operation. (BugDB #28390068 - Forward port of BugDB #28289058)
- In previous releases, if the `ttGridAdmin modelApply` command executed numerous times with a database created, eventually subsequent executions of `ttGridAdmin modelApply` failed. This is fixed. (BugDB #28425254)
- A problem with batch insert with duplicate key is fixed. (BugDB #28522995)

#### 1.15 Changes for Release 18.1.1.2.1 from Release 18.1.1.2.0

- This release contains changes to the client-server driver, that can be used to configure the Oracle connection pool for IMDB Cache, which was added in TimesTen 11.2.2.8.33.

- In previous releases, an import operation (`ttGridAdmin dbImport`) would fail on a grid with multiple instances that had the same instance name. This problem is fixed. (BugDB #28489389 - Backport of BugDB #28488704)

## 1.16 Changes for Release 18.1.1.2.0 from Release 18.1.1.1.0

Changes in this release include:

- [New features](#)
- [Bug fixes](#)

### 1.16.1 New features

- TimesTen Scaleout now contains the `TT_CommitDMLOnSuccess` optimizer option that forces simple DML transactions to commit automatically on both elements of the replica set.
- TimesTen Scaleout includes a new client routing API that enables C and Java client applications to route connections to an element based on the key value for a hash distribution key. This feature enables the client application to connect to the element that stores the row with the specified key value, avoiding unnecessary communication between the element storing the row and the one connected to your application. For more information, see the *Oracle TimesTen In-Memory Database C Developer's Guide* and *Oracle TimesTen In-Memory Database Java Developer's Guide*.
- This release contains system table and system view changes that are not documented. These changes are reserved for a future release.

### 1.16.2 Bug fixes

- A problem is fixed where TimesTen returned errors 1699 and 907 on the standby, when there were unique hash indexes on a replicated table. (BugDB #27086859)
- 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 #27433379 - Forward port of BugDB #21124942)
- A problem has been fixed where a deadlock could occur during an `ALTER REPLICATION` operation. (BugDB #27433413 - Forward port BugDB #26050592)
- A problem is fixed where an assertion failure and database invalidation could happen during an update operation. (BugDB #27445399 - Forward port BugDB #27210882)
- A problem is fixed where calling to a particular PL/SQL procedure when the database is empty would throw error `TimesTen: ORA-06508: PL/SQL: Could not find program unit being called`. (BugDB #27509032 - Forward port BugDB #27503945)
- With very large group entries, the daemon startup could fail with a message like `"{groupname}" is not a valid value for the -group option`. This problem is fixed. (BugDB #28025300)
- A problem is fixed where a final checkpoint could fail with a negative reference count on a slot inside a tuple page. (BugDB #28094755)
- A problem is fixed where an `INSERT SELECT` operation with a `UNION` would fail to insert some rows. (BugDB #28188267)

- Space allocation latch contention related to point queries such as `SELECT 1 FROM A_TABLE WHERE PK=?` has been fixed. (BugDB #28336156)

## 1.17 Changes for Release 18.1.1.1.0 from Release 11.2.2.8.29

Changes in this release include:

- [New features](#)
- [Behavior changes](#)
- [Bug fixes](#)

### 1.17.1 New features

- This release includes a new mode referred to as "TimesTen Scaleout," or "grid." TimesTen Scaleout is a grid of interconnected hosts running TimesTen instances that work together to provide fast, fault tolerance, and high availability for in-memory data. A grid contains one or more databases and each database is distributed across all instances of the grid. The features are documented in the *Oracle TimesTen In-Memory Database Scaleout User's Guide*.

TimesTen Scaleout supports a maximum of 64 instances in this release.

NOTE: Oracle TimesTen In-Memory Database "in classic mode" or "TimesTen Classic" refers to single-instance environments and databases as in previous releases.

- Newly included with this release are these documents: the *Oracle TimesTen In-Memory Database Security Guide*, the *Oracle TimesTen In-Memory Database Scaleout User's Guide*, *Oracle TimesTen In-Memory Database Accessibility Guide* and *Oracle TimesTen In-Memory Database Licensing Information*.
- Installation information for this release is included in the *Oracle TimesTen In-Memory Database Scaleout User's Guide*.
- TimesTen adds ODBC 3.51 core interface conformance to the previous support for ODBC 2.5. If you use a driver manager for ODBC 3.5 applications, you must explicitly specify which ODBC version you are using. In this release, it is advisable to recompile and relink existing ODBC applications. Some applications may require code changes. See "ODBC API incompatibilities with previous versions of TimesTen" in the *Oracle TimesTen In-Memory Database C Developer's Guide* for more details.

### 1.17.2 Behavior changes

- Cache Advisor is removed from TimesTen in this release.
- Cache grid and all its components are removed in this release.
- Asynchronous WriteThrough cache groups are only supported with active standby pair replication schemes in this release.
- The default value for the `Preallocate` connection attribute is 1.
- The `RangeIndexType` connection attribute is removed in this release. By default, TimesTen uses B-tree indexes.
- The default value for the `CkptFrequency` connection attribute is 0.
- The default value for the `CkptLogVolume` connection attribute is now the value of the `LogFileSize` connection attribute.

- The default value for the Connections attribute is the minimum of 2000 or the value of the kernel setting SEMMNS-15.
- The values returned by some attributes to the ODBC call SQLGetInfo are changed. This affects both ODBC and JDBC.

These are the changes to SQLGetInfo output:

```
SQL_IBLE_PROCEDURES  "N" ==> "Y"
SQL_PROCEDURES       "N" ==> "Y"
SQL_FETCH_DIRECTION  [Not Supported] ==> SQL_FD_FETCH_NEXT
SQL_TXN_CAPABLE       [SQL_TC_ALL] ==> [SQL_TC_DDL_COMMIT]
SQL_MAX_BINARY_LITERAL_LEN [0] ==> [16384]
SQL_MAX_CURSOR_NAME_LEN  [0] ==> [18]
SQL_MAX_INDEX_SIZE      [0] ==> [4194304]
SQL_MAX_ROW_SIZE        [0] ==> [4194304]
SQL_TIMEDATE_FUNCTIONS Added SQL_FN_TD_NOW to bitmask.
SQL_OWNER_USAGE,        Added SQL_OU_PROCEDURE_INVOCATION +
SQL_OU_PRIVILEGE_DEFINITION to bitmask.
```

- If the number of columns provided in an INSERT AS SELECT statement is less than number of columns in a table, TimesTen now returns error message 843.
- The default value for the LogBufMB connection attribute is 1024 MB.
- The default value for the LogFileSize connection attribute is now the value of the LogBufMB connection attribute.
- The default value for the CommitBufferSizeMax is 10 MB per connection.
- The -delayFkeys option is removed from the ttMigrate utility. In this release, ttMigrate always delays the foreign keys check.
- PL/SQL is always enabled.
- Only Oracle mode is supported for duplicate bind mode.
- DDL is always auto-committed.
- ttDataStoreStatus builtin procedure did not separately classify client/server connections. This release includes a flag to indicate whether a connection is direct connect of a client server connection.
- In the past, the TimesTen Connection.setAutoCommit method would result in a commit whenever it was called, regardless of whether the setting of the AUTOCOMMIT flag actually changed. Beginning in this release, there is a commit only when the method call actually changes the setting of AUTOCOMMIT.
- Obsolete errors: sb\_ErrCkptBlocked (606) and sb\_ErrBackupBlocked (607) are not used anymore. They are replaced by sb\_ErrCkptReserveBlocked (625). To prevent the new behavior from changing application logic, replace the obsolete errors (606 and 607) with sb\_ErrCkptReserveBlocked (625).
- The database ID of the latch is now included in the output of ttXactAdmin -latch command. This database ID can be used to externally release the latch.
- Error message 907 (Unique constraint violation) is improved to include column names and values.
- The sb\_ErrOcDupKey error msg is improved to contain the column name and value of the row causing a load or autorefresh failure.



### 1.17.3 Bug fixes

- A problem is fixed where performance would slow because commands were accumulated in the command cache instead of being freed. (BugDB #13891496)
- The database ID of the latch was included into the latch name. This database ID can be used to externally release the latch. (BugDB #14578460)
- The WE8DEC character set is not supported in TimesTen. A problem is fixed where users could choose the character set WE8DEC although it is not supported. (BugDB #17557587)
- A problem is fixed where an integer overflow would occur when calling `SELECT COUNT (1)` from a large table. (BugDB #18692578)
- In previous releases, TimesTen returned an `EOF failure` when the database could not be loaded because it was not in the expected location. In this release the error message contains the expected path to the database to help with troubleshooting. (BugDB #18899144)
- An assertion would occur when using `cachesqlget` with `oracle_ddl_tracking`. This problem is fixed. (BugDB #19619587)
- If the wrong `UID/PWD` was provided to a connection attempt and client failover was configured, the connect request would hang for the number of seconds specified by the `TTC_TIMEOUT` connection attribute. In this release an appropriate error is returned. (BugDB #19828640)
- This release contains more diagnostics when an error occurs while checkpointing. (BugDB #19914524)
- A problem is fixed where SQL-92 queries ran slowly. (BugDB #20198488)
- This release contains more diagnostics when TimesTen returns Error 805. (BugDB #20477397)
- A memory leak in the JDBC driver has been fixed. The issue would occur when the daemon was down and the application continuously tried to connect. (BugDB #21225265)
- A problem has been fixed where an invalid out-of-line value would be found in the `SYS.CACHE.GROUP` table when attempting to use the `ttRepAdmin -duplicate` command. (BugDB #21260424)
- A problem is fixed where replication would stop replicating to all nodes on a system that involved more than 8 nodes. (BugDB #21695235)
- The `ttCheck` utility failed with Error 15009, when a user logged into the operating system as a user other than the instance administrator, or with Error 7001, when the external user logged in as a user in the same group as the instance administrator. These problems are fixed. (BugDB #24285271)
- In this release, a commit for a replicated transaction that is using either `TWOSAFE` or `RETURN RECEIPT` will not observe any SQL query timeout setting. It will only return after the time indicated by the wait value configured in the replication scheme. (BugDB #25039883)

## 2 Platforms and configurations

This section includes:

- [Platforms and compilers](#)

- [Client/Server configurations](#)
- [TimesTen Cache](#)
- [Replication configurations](#)

## 2.1 Platforms and compilers

Platform or operating system	C/C++ compiler support	JDK support <sup>1</sup>
Linux x86-64: <ul style="list-style-type: none"> <li>■ Oracle Linux 6, 7 and 8.2</li> <li>■ Red Hat Enterprise Linux 6 and 7</li> <li>■ SUSE Enterprise Server 12 and 15</li> </ul> TimesTen supports Native POSIX threads but not LinuxThreads.	Intel icc 17.0.2.174, gcc 4.4.7 or higher	Oracle JDK 8, 9, 10, 11, 12, 13 and 14 OpenJDK 8, 9, 10, 11, 12, 13 and 14
Linux x86-32 (Client only): <ul style="list-style-type: none"> <li>■ Oracle Linux 6</li> </ul> TimesTen supports Native POSIX threads but not LinuxThreads.	Intel icc 17.02.174, gcc 4.7 or higher	Oracle JDK 8 and 9
Solaris SPARC 64: <ul style="list-style-type: none"> <li>■ Solaris 11.3</li> <li>■ Solaris 11.4</li> </ul>	Solaris Studio 12u3 for Solaris SPARC	Oracle JDK 8, 9, 10, 11, and 13
Solaris x86-64: <ul style="list-style-type: none"> <li>■ Solaris 11.3</li> <li>■ Solaris 11.4</li> </ul>	Solaris Studio 12u3	Oracle JDK 8, 9 and 10
Microsoft Windows x86-64 (Client only): <ul style="list-style-type: none"> <li>■ Windows Server 2019</li> <li>■ Windows Server 2016</li> <li>■ Windows Server 2012 R2</li> <li>■ Windows 10</li> <li>■ Windows 8.1</li> </ul>	Intel Compiler 14 Visual Studio 2012 (VC11)	Oracle JDK 8, 9, 10 and 11
IBM AIX Power PC 64-bit: <ul style="list-style-type: none"> <li>■ AIX 7.1 and 7.2</li> </ul>	IBM xLC 13.1.0 Compiler for AIX	IBM JDK 8
macOS 64-bit (Client only): <ul style="list-style-type: none"> <li>■ 10.13 High Sierra</li> <li>■ 10.14 Mojave</li> <li>■ 10.15 Catalina</li> </ul>	Apple Xcode 5.1.1	Oracle JDK 8, 11 and 14

<sup>1</sup> TimesTen ttjdbcn.jar files generally include the JDBC driver for use with the JRE version that corresponds to the number in the file name. In the current release, ttjdbc9.jar, ttjdbc10.jar, and ttjdbc11.jar are copies of ttjdbc8.jar, implementing JDBC 4.2 (Java 8) only. When using JREs more recent than JRE 11, use ttjdbc11.jar.

TimesTen is supported in virtual machines provided by Oracle VM.

## 2.2 Oracle Database

TimesTen ships the Oracle Database 12.1.0.2 version of Instant Client. In addition, TimesTen PL/SQL and other internal components are based on Oracle Database 12.1.0.2.

## 2.3 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*.

## 2.4 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. TimesTen Cache is supported with TimesTen Classic only.

The following Oracle server releases are supported with the TimesTen Cache option:

- Oracle Database Release 12.1
- Oracle Database Release 12.2
- Oracle Database Release 18c
- Oracle Database Release 19c

## 2.5 Replication configurations

TimesTen replication is supported only between identical platforms. TimesTen replication is supported with TimesTen Classic only.

TimesTen active standby pair replication is supported with Oracle Clusterware 12.2, 18c and 19c.

For more details, see *Oracle TimesTen In-Memory Database Replication Guide*.

## 3 Software requirements

For software requirements, refer to *Oracle TimesTen In-Memory Database Scaleout User's Guide*.

## 4 Advance notice

This section lists deprecated items. In this release, using a deprecated feature can, but do not necessarily, result in a warning. Deprecated items are permanently removed in a future release.

- TimesTen supports SNMP V1 in this release. In a future release, TimesTen plans to support SNMP V3 and deprecate SNMP V1.
- Because PL/SQL is now always enabled, the `PLSQL` connection attribute is deprecated.
- Because now only Oracle mode is supported, the `DuplicateBindMode` connection attribute is deprecated.

- Because DDL is now always auto-committed, the `DDLCommitBehavior` connection attribute is deprecated.
- The `ttSyslogCheck` utility is deprecated in this release. (BugDB #29436501)
- The `TT_DECIMAL` data type and the `TIMESTEN8` character set are deprecated in this release.
- Setting the `ReplicationApplyOrdering` connection attribute to a value of 1 is deprecated.
- The `ttSQLCmdCacheInfo2` builtin procedure is removed in this release. The `ttSQLCmdCacheInfo` builtin procedure supports the features of this builtin procedure.
- The `RangeIndexType` connection attribute is deprecated.
- Asynchronous Materialized Views are deprecated in this release.
- The `-convertTypestoTT` and `-convertTypeToOra` command line options to the `ttMigrate` utility are deprecated.
- The `TypeMode` connection attribute is deprecated. Oracle type mode is the default.
- The `OPTIMIZED FOR READ` clause of the `CREATE TABLE` statement is deprecated.
- The `ttCompactTS` builtin procedure is deprecated.
- The `CacheGridEnable` connection attribute is removed.
- For `TTClasses`, error checking must now be accomplished through `{try/catch}` blocks. Use of `TTStatus&` method parameters, previously deprecated, is now desupported, as are the `TTStatus::DO_NOT_THROW` setting and the `-DTTEXCEPT` compiler flag. (Compiling with `-DTTEXCEPT` will not produce an error, but will have no effect.) Application code that previously used `TTStatus&` parameters must be updated, as these parameters are no longer in the method signatures.
- For `TTClasses`, The `TTCmd::RePrepare()` method is deprecated in this release. If the statement handle for a prepared statement becomes invalidated, call the `TTCmd::Prepare()` method again.

## 5 Known problems and limitations

This section contains known problems and limitations in these categories:

- [New in this release](#)
- [TimesTen Scaleout](#)
- [Client/Server](#)
- [JDBC](#)
- [PL/SQL](#)
- [SQL, utilities and procedures](#)
- [SQL\\*Plus](#)
- [TimesTen OCI support](#)
- [TTClasses](#)
- [Upgrade](#)

- [Backup/Restore](#)

## 5.1 New in this release

- On the Oracle Linux and RedHat 8.x systems, the user must install the `ncurses-compat-libs` package (`sudo yum install ncurses-compat-libs`), otherwise cursor-based command recall and editing does not work in `ttIsql`.
- In this release, due to the TimesTen upgrade to Oracle Database 12.1.0.2, customers using Oracle Call Interface and APIs based on OCI will need to relink their applications with the new OCI library due to a name change. You may also need to update your Makefiles accordingly.
- The instant client included with TimesTen Cache requires `/usr/lib64/libnsl.so.1`. By default, `libnsl.so.1` is not installed with Oracle Enterprise Linux 8.0. Without this package, TimesTen OCI, Cache and passthrough may not work. To install `libnsl.so.1`, run: `yum install libnsl`.
- `ttLoadFromOracle` may fail with error message `ORA-01466, can't flashback because table definition too new`. This problem may be the result of a missing patch in Oracle Database (Bug 6598432). This bug leads to `ORA-01466` when the Oracle database timezone and the system timezone are different. If the user hits this problem, verify that the corresponding patch is applied.
- On a macOS host, if you are running TimesTen JDBC or JMS/XLA applications, ensure you include the following in the java command line:  
`-Djava.library.path=${TIMESTEN_HOME}/install/lib`
- Due to an upgraded Zookeeper version in this release, make sure your zookeeper server configuration file (`zoo.cfg`) contains this allowed command list:  
`4lw.commands.whitelist=stat, ruok, conf, isro`
- This sequence of operations involving PL/SQL and CLOBs or NCLOBs does not work correctly.
  1. Create a temporary CLOB
  2. Set the temporary CLOB value
  3. Assign the value of the temporary CLOB to another CLOB variable
  4. Free the temporary CLOB
  5. Try to use the temporary CLOB

At step 5, an error `ORA-22275` is supposed to be generated, and an exception is supposed to be raised. In TimesTen 18.1.4, the correct error is generated, but no exception is raised.
- If you encounter problems upgrading a CRS cluster to 12.1, ensure that the permissions on certain TimesTen directories are set correctly.

These are the commands to ensure correct permissions:

```
# chmod 777 /opt/grid/gridbase/diag
# chmod 777 /opt/grid/gridbase/diag/crs/hostname
# chmod -R 775 /opt/grid/gridbase/diag/crs/hostname/crs_timesten
```

## 5.2 TimesTen Scaleout

- TimesTen Scaleout supports a maximum of 64 data instances in this release.
- Instances in a grid connect with each other over TCP/IP using ports within the dynamic port range. For this reason any active firewall needs to be configured to allow TCP/IP traffic over all possible ports in each host's dynamic port range. On Linux you can determine the port range as follows:

```
$ cat /proc/sys/net/ipv4/ip_local_port_range
9000      65500
```

In this case the host may allocate ports in the range 9000 through 65500.

- Each process connected to a TimesTen Scaleout database keeps at least one operating system file descriptor open. Additional file descriptors may be opened for a connection when the connection commits or rolls back a transaction. If you receive an error that all file descriptors are in use when attempting to connect to a database, increase the allowable number of file descriptors. (BugDB #25815090)

## 5.3 Client/Server

- On UNIX, when using `ttlocalhost`, a client of one TimesTen instance cannot connect with a server of another TimesTen instance. 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.

## 5.4 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.

## 5.5 PL/SQL

- `PLSQL_CODE_TYPE=NATIVE` can be specified, but it is implemented as `INTERPRETED`.
- Using `q'` (quoting syntax) is not supported.

- UTL\_FILE is limited to a temporary directory located in *install\_dir/plsql/utl\_file\_temp*. The instance administrator can grant 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.

## 5.6 SQL, utilities and procedures

- When SQL query timeouts are used (SQLQueryTimeout or SQLQueryTimeoutMsec), TimesTen behavior is on a best-effort basis. It is not possible to guarantee that the timeout will actually occur within the specified time. (BugDB #29671762)
- 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 es 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.
- In TimesTen Scaleout, the ALTER SESSION statement should return an error when attempting to alter an unsupported feature. Instead, no error is returned.
- 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.
- If you execute an ALTER SESSION statement anytime after the initial connection, you must re-execute the statement after a failover. (BugDB #29444131)

## 5.7 SQL\*Plus

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

## 5.8 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.

## 5.9 TTClasses

- TTClasses source code is not shipped with the product. The TTClasses libraries are included in this release.

## 5.10 Upgrade

- Enhancements to the replication protocol mean that to perform an online upgrade between 11.2.2.8 and 18.1, the 11.2.2.8 release must be 11.2.2.8.27 or higher. If you are using a version prior to the 11.2.2.8.27, you must upgrade to a newer 11.2.2.8 release and then perform an online upgrade to this release using the documented online upgrade steps.
- On TimesTen Classic, if you are on 18.1.2, you must first upgrade to 18.1.2.5.0 or greater before upgrading to this release. If you are on 18.1.3, you must first upgrade to 18.1.3.5.0 or greater before upgrading to this release.

## 5.11 Backup/Restore

- Restoring a grid backup (using the `ttGridAdmin dbRestore` command) succeeds only when all instances in the grid are running.

## 6 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.

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Oracle TimesTen In-Memory Database Release Notes, Release 18.1  
E61191-58

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