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| **Master Note: Overview of Database Checkpoints (Doc ID 1490838.1)** | [IMG_256](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4%26_afrLoop=156456214324937%20/o%20To%20Bottom)  [To Bottom](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\o To Bottom) | IMG_257 |

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| **In this Document**   |  |  | | --- | --- | |  | [Purpose](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l REF_PURPOSE) |  |  |  | | --- | --- | |  | [Scope](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l REF_SCOPE) |  |  |  | | --- | --- | |  | [Details](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l REF_TEXT) |  |  |  | | --- | --- | |  | [Concepts](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section31) |  |  |  | | --- | --- | |  | [Purpose of Checkpoints](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section32) |  |  |  | | --- | --- | |  | [When does a checkpoint happen](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section33) |  |  |  | | --- | --- | |  | [Types of Checkpoints](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section34) |  |  |  | | --- | --- | |  | [Thread checkpoints](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section35) |  |  |  | | --- | --- | |  | [Tablespace and data file checkpoints](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section36) |  |  |  | | --- | --- | |  | [Incremental checkpoints](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section37) |  |  |  | | --- | --- | |  | [Checkpoint Parameters](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section38) |  |  |  | | --- | --- | |  | [LOG\_CHECKPOINT\_INTERVAL](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section39) |  |  |  | | --- | --- | |  | [LOG\_CHECKPOINT\_TIMEOUT](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section310) |  |  |  | | --- | --- | |  | [FAST\_START\_MTTR\_TARGET](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section311) |  |  |  | | --- | --- | |  | [LOG\_CHECKPOINTS\_TO\_ALERT](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section312) |  |  |  | | --- | --- | |  | [Automatic Checkpointing](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section313) |  |  |  | | --- | --- | |  | [Checkpoint Messages](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section314) |  |  |  | | --- | --- | |  | [Incremental checkpoint up to RBA (Redo Block Address)](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section315) |  |  |  | | --- | --- | |  | [Checkpoint Not Complete](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section316) |  |  |  | | --- | --- | |  | [Checkpoint related Wait Events](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section317) |  |  |  | | --- | --- | |  | [Checkpoint Completed](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section318) |  |  |  | | --- | --- | |  | [Log File Switch (checkpoint incomplete)](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section319) |  |  |  | | --- | --- | |  | [Checkpoints and Instance Recovery](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section320) |  |  |  | | --- | --- | |  | [Checkpoint Performance](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section321) |  |  |  | | --- | --- | |  | [Additional Resources](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section322) |  |  |  | | --- | --- | |  | [Known Issues and Resolutions](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l aref_section323) |  |  |  | | --- | --- | |  | [References](https://support.oracle.com/epmos/faces/SearchDocDisplay?_adf.ctrl-state=p4bos33z8_4&_afrLoop=156456214324937 \\l REF) |   IMG_260  **APPLIES TO:**  Oracle Database - Enterprise Edition - Version 9.2.0.8 and later  Information in this document applies to any platform.  \*\*\*Checked for relevance on 02-Jul-2016\*\*\*  **PURPOSE**  To have a overview of Checkpoint process, its parameters, performance and tuning.  **SCOPE**  This document applies to Checkpointing concepts in a non-RAC environment.  **DETAILS**  **Concepts**  A checkpoint corresponds to a data structure that defines a SCN in the redo thread of a database. Checkpoints are recorded in the control file and each datafile header, and are a crucial element of recovery.  When a checkpoint occurs, Oracle must update the headers of all datafiles to record the details of the checkpoint. This is done by the CKPT process. The CKPT process does not write blocks to disk, DBWn (DB Writer Process) always performs that task.  A Checkpoint is a crucial mechanism in consistent database shutdowns, instance recovery, and Oracle Database operation generally. The term checkpoint has the following related meanings:   * A data structure that indicates the checkpoint position, which is the SCN in the redo stream where instance recovery must begin. The checkpoint position is determined by the oldest dirty buffer in the database buffer cache. The checkpoint position acts as a pointer to the redo stream and is stored in the control file and in each data file header. * The writing of modified database buffers in the database buffer cache to disk.   The checkpoint process (CKPT) updates the control file and data file headers with checkpoint information and signals DBWn to write blocks to disk. Checkpoint information includes the checkpoint position, SCN, location in online redo log to begin recovery, and so on.    IMG_261                                   Fig 1: Checkpoint Process  **Purpose of Checkpoints**  IMG_262  Oracle Database uses checkpoints to achieve the following goals:   * Reduce the time required for recovery in case of an instance or media failure * Ensure that dirty buffers in the buffer cache are written to disk regularly * Ensure that all committed data is written to disk during a consistent shutdown   ***When does a checkpoint happen***   * At each switch of the redo log files. * When the delay for LOG\_CHECKPOINT\_TIMEOUT is reached. * When the size in bytes corresponding to (LOG\_CHECKPOINT\_INTERVAL\* size of IO OS blocks) is written on the current redo log file. * When ALTER SYSTEM SWITCH LOGFILE command is issued. * When ALTER SYSTEM CHECKPOINT command is issued.   **Types of Checkpoints**  IMG_263  ***Thread checkpoints***  A Redo log thread is a set of operating system files in which an instance records all changes it makes - committed and uncommitted - to memory buffers containing datafile blocks. The redo log is organized into redo threads. The redo log of a single-instance (non-Parallel Server / RAC option) database consists of a single thread. A Parallel Server/Real Application Cluster redo log has a thread per instance.  A thread checkpoint event guarantees that all pre-thread-checkpoint-SCN redo generated in that thread for all online datafiles has been written to disk. The database writes to disk all buffers modified by redo in a specific thread before Thread Checkpoint SCN. The set of thread checkpoints on all instances in a database is a database checkpoint. Thread checkpoints occur in the following situations:   * Consistent database shutdown * ALTER SYSTEM CHECKPOINT statement * Online redo log switch * ALTER DATABASE BEGIN BACKUP statement.   ***Tablespace and data file checkpoints***  The database writes to disk all buffers modified by redo before a specific target. A tablespace checkpoint is a set of data file checkpoints, one for each data file in the tablespace. These checkpoints occur in a variety of situations, including making a tablespace read-only or taking it offline normal, shrinking a data file, or executing ALTER TABLESPACE BEGIN BACKUP.  ***Incremental checkpoints***  An incremental checkpoint is a type of thread checkpoint partly intended to avoid writing large numbers of blocks at online redo log switches. DBWn checks at least every three seconds to determine whether it has work to do. When DBWn writes dirty buffers, it advances the checkpoint position, causing CKPT to write the checkpoint position to the control file, but not to the data file headers.  Other types of checkpoints include instance and media recovery checkpoints and checkpoints when schema objects are dropped or truncated.  Oracle® Database Concepts 11g Release 2 (11.2)  Part Number E25789-01  [http://docs.oracle.com/cd/E25054\_01/server.1111/e25789/startup.htm#BABGDACG](http://docs.oracle.com/cd/E25054_01/server.1111/e25789/startup.htm /l BABGDACG /o Oracle Documentation /t _blank)    **Checkpoint Parameters**  IMG_264  ***LOG\_CHECKPOINT\_INTERVAL***  LOG\_CHECKPOINT\_INTERVAL specifies the frequency of checkpoints in terms of the number of redo log file blocks that can exist between an incremental checkpoint and the last block written to the redo log. This number refers to physical operating system blocks, not database blocks.  Specifying a value of 0 (zero) for LOG\_CHECKPOINT\_INTERVAL has the same effect as setting the parameter to infinity and causes the parameter to be ignored. Only nonzero values of this parameter are considered meaningful.  Default Value : 0  Oracle® Database Reference 11g Release 2 (11.2)  Part Number  E17110-04  [https://docs.oracle.com/cd/E18283\_01/server.112/e17110/initparams130.htm](https://docs.oracle.com/cd/E18283_01/server.112/e17110/initparams130.htm /o Oracle Documentation /t _blank)    ***LOG\_CHECKPOINT\_TIMEOUT***  LOG\_CHECKPOINT\_TIMEOUT specifies (in seconds) the amount of time that has passed since the incremental checkpoint at the position where the last write to the redo log (sometimes called the tail of the log) occurred. This parameter also signifies that no buffer will remain dirty (in the cache) for more than integer seconds.  Specifying a value of 0 for the timeout disables time-based checkpoints. Hence, setting the value to 0 is not recommended unless FAST\_START\_MTTR\_TARGET is set.  Default value : 1800 sec  Oracle® Database Reference 11g Release 2 (11.2)  Part Number E17110-04  [https://docs.oracle.com/cd/E18283\_01/server.112/e17110/initparams131.htm](https://docs.oracle.com/cd/E18283_01/server.112/e17110/initparams131.htm /o Oracle documentation /t _blank)    ***FAST\_START\_MTTR\_TARGET***  FAST\_START\_MTTR\_TARGET enables you to specify the number of seconds the database takes to perform crash recovery of a single instance. When specified, FAST\_START\_MTTR\_TARGET is overridden by LOG\_CHECKPOINT\_INTERVAL.  Note:  You must disable or remove the FAST\_START\_IO\_TARGET, LOG\_CHECKPOINT\_INTERVAL, and LOG\_CHECKPOINT\_TIMEOUT initialization parameters when using FAST\_START\_MTTR\_TARGET. Setting these parameters interferes with the mechanisms used to manage cache recovery time to meet FAST\_START\_MTTR\_TARGET.  FAST\_START\_IO\_TARGET in 9i is replaced by FAST\_START\_MTTR\_TARGET parameter from 10g.  Default Value : 0  Oracle® Database Performance Tuning Guide 11g Release 2 (11.2)  Part Number E17110-04  [https://docs.oracle.com/cd/E18283\_01/server.112/e17110/initparams086.htm](https://docs.oracle.com/cd/E18283_01/server.112/e17110/initparams086.htm /o Oracle Documentation /t _blank)    ***LOG\_CHECKPOINTS\_TO\_ALERT***  LOG\_CHECKPOINTS\_TO\_ALERT lets you log your checkpoints to the alert file. Doing so is useful for determining whether checkpoints are occurring at the desired frequency.  Default Value - False    **Automatic Checkpointing**  IMG_265  Oracle Database 10g supports automatic checkpoint tuning which takes advantage of periods of low I/O usage to advance checkpoints and therefore improve availability. Automatic checkpoint tuning is in effect if the FAST\_START\_MTTR\_TARGET database initialization parameter is set to a nonzero value.  Observe the following recommendations to take advantage of automatic checkpoint tuning.   * If it is necessary to control the time to recover from an instance or node failure, then set FAST\_START\_MTTR\_TARGET to the desired MTTR in seconds. If targeting a specific MTTR is unnecessary, then set FAST\_START\_MTTR\_TARGET to a nonzero value to enable automatic checkpoint tuning. * Fast-start checkpointing can be disabled by setting FAST\_START\_MTTR\_TARGET=0. Disable fast-start checkpointing only when system I/O capacity is insufficient with fast-start checkpointing enabled and achieving a target MTTR is not important. * Enabling fast-start checkpointing increases the average number of writes per transaction that DBWn issues for a given workload (when compared with disabling fast-start checkpointing). However, if the system is not already near or at its maximum I/O capacity, then fast-start checkpointing has a negligible impact on performance. * The percentage of additional DBWn writes with very aggressive fast-start checkpointing depends on many factors, including the workload, I/O speed and capacity, CPU speed and capacity, and the performance of previous recoveries. * If FAST\_START\_MTTR\_TARGET is set to a low value, then fast-start checkpointing is more aggressive, and the average number of writes per transaction that DBWn issues is higher in order to keep the thread checkpoint sufficiently advanced to meet the requested MTTR. * Conversely, if FAST\_START\_MTTR\_TARGET is set to a high value, or if automatic checkpoint tuning is in effect (that is, FAST\_START\_MTTR\_TARGET is set to a nonzero value), then fast-start checkpointing in less aggressive, and the average number of writes per transaction that DBWn issues is lower. * Fast-start checkpointing can be explicitly disabled by setting FAST\_START\_MTTR\_TARGET=0. Disabling fast-start checkpointing leads to the fewest average number of writes per transaction for DBWn for a specific workload and configuration, but also results in the highest MTTR.   [Note 265831.1](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=265831.1 \\o Note 265831.1 \\t _blank) Automatic Checkpoint Tuning in Oracle 10g  **Checkpoint Messages**  IMG_266  ***Incremental checkpoint up to RBA (Redo Block Address)***  Incremental checkpoint up to RBA [0x4.f3c41.0], current log tail at RBA [0x4.f4127.0]  Messages like these will be logged in the alert log when the parameter LOG\_CHECKPOINTS\_TO\_ALERT is set to TRUE. Those messages in the alert.log are all fine, and are expected behavior.  ***Checkpoint Not Complete***  Thread 1 advanced to log sequence 2234      Current log# 4 seq# 2234 mem# 0: /orcl/oradata/logs/redo\_logs04.log    Thread 1 cannot allocate new log, sequence 2234    Checkpoint not complete  This message indicates that Oracle wants to reuse a redo log file, but the current checkpoint position is still in that log. In this case, Oracle must wait until the checkpoint position passes that log. Because the incremental checkpoint target never lags the current log tail by more than 90% of the smallest log file size, this situation may be encountered if DBWR writes too slowly, or if a log switch happens before the log is completely full, or if log file sizes are too small. You may also have this situation when there id rapid redo generation in the database.When the database waits on checkpoints,redo generation is stopped until the log switch is done.In this situation, you need to review the redo log sizes and resize it accordingly.    **Checkpoint related Wait Events**  IMG_267  ***Checkpoint Completed***  A session is waiting for checkpoint to complete. This could happen for example during a close database or a local checkpoint. A Local Checkpoint is one that is initiated by the user (for example, performed by ALTER SYSTEM CHECKPOINT LOCAL statements).  Wait Time: 5 seconds  Parameters: None    ***Log File Switch (checkpoint incomplete)***  Waiting for a log switch because the session cannot wrap into the next log. Wrapping cannot be performed because the checkpoint for that log has not completed.  Wait Time: 1 second  Parameters: None  Oracle® Database Reference11g Release 2 (11.2)  Part Number E17110-04  [https://docs.oracle.com/cd/E18283\_01/server.112/e17110/waitevents003.htm](https://docs.oracle.com/cd/E18283_01/server.112/e17110/waitevents003.htm /o Oracle Documentation /t _blank)  [Note 1440522.1](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=1440522.1 \\o Note 1440522.1 \\t _blank) Database Open waits indefinitely on "parallel recovery coord wait for reply"    **Checkpoints and Instance Recovery**  IMG_268  Instance recovery uses checkpoints to determine which changes must be applied to the data files. The checkpoint position guarantees that every committed change with an SCN lower than the checkpoint SCN is saved to the data files.      IMG_269               Fig 2 Checkpoint Position in Online Redo Log    During instance recovery, the database must apply the changes that occur between the checkpoint position and the end of the redo thread. Some changes may already have been written to the data files. However, only changes with SCNs lower than the checkpoint position are guaranteed to be on disk.  Oracle® Database Concepts 11g Release 2 (11.2)  Part Number E25789-01  [http://docs.oracle.com/cd/E25054\_01/server.1111/e25789/startup.htm#CEGCHJGF](http://docs.oracle.com/cd/E25054_01/server.1111/e25789/startup.htm /l CEGCHJGF /o Oracle documentation /t _blank)    **Checkpoint Performance**  IMG_270  Frequent checkpoints will enable faster recovery, but can cause performance degradation. A Checkpoint might be a costly operation when the number of files are huge since it has to freeze the datafile headers during the process. There is a performance trade-off regarding frequency of checkpoints.  More frequent checkpoints enable faster database recovery after a crash. This is why some customer sites which have a very low tolerance for unscheduled system downtime will often choose this option. However, the performance degradation of frequent checkpoints may not justify this philosophy in many cases. Let's assume the database is up and running 95% of the time, and unavailable 5% of the time from frequent instance crashes or hardware failures requiring database recovery.  For most customer sites, it makes more sense to tune for the 95% case rather than the rare 5% downtime.   * Checkpoint occurs at every log switch. Hence frequent log switches will start the checkpoints and may degrade the performance. If a previous checkpoint is already in progress, the checkpoint forced by the log switch will override the current checkpoint. This necessitates well-sized redo logs to avoid unnecessary checkpoints as a result of frequent log switches. A good rule of thumb is to switch logs at most every twenty minutes. Having your log files too small can increase checkpoint activity and reduce performance. Oracle recommends the user to set all online log files to be the same size, and have at least two log groups per thread. * Set the value of FAST\_START\_MTTR\_TARGET to 3600. This enables Fast-Start checkpointing and the Fast-Start Fault Recovery feature, but minimizes its effect on run-time performance while avoiding the need for performance tuning of FAST\_START\_MTTR\_TARGET.   **Additional Resources**  IMG_271  [Note 472821.1](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=472821.1 \\o Note 472821.1 \\t _blank) Which Checkpoint Parameters To Set In Oracle10g?  [Note 265831.1](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=265831.1 \\o Note 265831.1 \\t _blank) Automatic Checkpoint Tuning in Oracle 10g  [Note 147468.1](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=147468.1 \\o Note 147468.1 \\t _blank) Checkpoint Tuning and Troubleshooting Guide  [Note 568049.1](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=568049.1 \\o Note 568049.1 \\t _blank) Incremental Checkpoint Up To RBA ,Current Log Tail at RBA  **Known Issues and Resolutions**  IMG_272  [Note 1265962.1](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=1265962.1 \\o Note 1265962.1 \\t _blank) Can Not Allocate Log  [Note 6794377.8](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=6794377.8 \\o Note 6794377.8 \\t _blank) Bug 6794377 - ORA-604 / ORA-1000 from CKPT process  [Note 28045.1](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=28045.1 \\o Note 28045.1 \\t _blank) ORA-600 [2103] "Timeout on 'Control file' or 'Checkpoint Progress' Enqueue"  [Note 7385253.8](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=7385253.8 \\o Note 7385253.8 \\t _blank) Bug 7385253 - Slow Truncate / DBWR uses high CPU / CKPT blocks on RO enqueue  [Note 156180.1](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=156180.1 \\o Note 156180.1 \\t _blank) 'ALTER SYSTEM CHECKPOINT' hang when using dbwr\_io\_slaves  [Note 187217.1](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=187217.1 \\o Note 187217.1 \\t _blank) RMAN Checkpoint Does Not Correspond to Checkpoint\_change# in V$database  [Note 259586.1](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=259586.1 \\o Note 259586.1 \\t _blank) LOG\_CHECKPOINT\_INTERVAL Ignored, CHECKPOINT Only Occurs When Log Switch Happens  [Note 461673.1](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=461673.1 \\o Note 461673.1 \\t _blank) Queries Waiting For Checkpoint To Finish And Showing Wait Event "Enq: TC – Contention"  [Note 5931789.8](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=5931789.8 \\o Note 5931789.8 \\t _blank) Bug 5931789 - Database hang possible as CKPT cannot get controlfile enqueue (CF)  Note 1326886.1 Database Instance Hang at Database Checkpoint With Block Change Tracking Enabled  [Note 6268371.8](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=6268371.8 \\o Note 6268371.8 \\t _blank) Bug 6268371 - ORA-12996 / ORA-12998 / corruption from ALTER TABLE DROP UNUSED COLUMNS CHECKPOINT  [Note 18674170.8](https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1490838.1&id=18674170.8 \\o Note 18674170.8 \\t _blank) Bug 18674170 - RMAN Restore for large archived log (>32GB) fails with ORA-19622 missing data |