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| **Node Eviction / Rebootless restart - cssagent/cssmonitor**  **cssagent or cssmonitor aborted the node.**   * **cssagent or cssmonitor needs to receive heartbeats from CSSD on a regular basis.** * **If the length of time between heartbeats from CSSD is too long, cssagent or cssmonitor will abort the node.** | **cssagent\_CRS\_8011** crs alert log of ANY node contains "CRS-8011:reboot advisory message from host %s, component: cssagent" message, where %s is the name of rebooted node, with timestamp from the time of the incident **cssmonit\_CRS\_8011** crs alert log of ANY node contains "CRS-8011:reboot advisory message from host %s, component: cssmonit" message, where %s is the name of rebooted node, with timestamp from the time of the incident **DB Version**  **User-input Evicted Node Name**  **User-input Node Eviction Time** | Node Eviction / Rebootless restart - cssagent/cssmonitor[(See the next resolution)](https://support.oracle.com/epmos/faces/ui/gr/GrHome.jspx?domainId=NodeEviction&_adf.ctrl-state=17fz7hl362_119&_afrLoop=19555296150027#Bot0)  The files uploaded indicate that the cssagent or cssmonitor aborted the node because ocssd did not send a heartbeat to cssagent/cssmonitor within the expected time. The top cause is OS resource starvation causing ocssd heartbeat thread and/or cssagent to not get scheduled, even though these processes run with top priority. In most cases you will need to resolve the OS resource issue.  **Corrective Actions:**  1) Check for OS resource starvation or scheduler problem at the time of the reboot\*. It is not feasible to list all the possible causes, but top items to check for are:   * Check archived CPU stats (e.g. vmstat, top) for CPU load near 100% or run queue very high:   1. Check historical "top" data for processes using most CPU. If an Oracle clusterware process is using unusually high CPU, see point (2) below.   2. Check system CPU capacity.   3. Check historical "ps" data for unusual amount of processes (e.g. login storm, too many PQ slaves, etc). * Check archived memory and paging stats (eg. vmstat) for system out of memory and/or swap:   1. Check historical "top", "ps" data for processes using most memory.   2. Check if RSS of top memory consuming processes was increasing over time. * OS getting locked up in a driver or hardware: Check with sysadmin and/or OS support.   For detailed instructions on all of the above, please see[Document 1549496.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1549496.1).  \*NOTE: If OS statistics are collected with a sampling interval >30s, you may miss the problem. If Cluster Health Monitor (CHM) is available for your platform and version, this will automatically collect statistics appropriately. See [Document 1328466.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1328466.1). Otherwise, Oracle Support recommends to install OS Watcher ([Document 301137.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=301137.1)) and configure it to collect data every 30s or less.  2) Make sure that the latest Grid Infrastructure PSU is applied to get fixes for known issues with resource consumption which can lead to node eviction.   * See [Document 1549496.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1549496.1) for a list of the current known issues.   3) For AIX specifically:   * Apply fix for bug 13940331. Without this fix, OCSSD threads do not run in RT. For more information, see [Document 13940331.8](http://support.oracle.com/epmos/faces/DocumentDisplay?id=13940331.8). The patch can be downloaded from [Patch 13940331](https://updates.oracle.com/Orion/PatchDetails/process_form?patch_num=13940331).   + To choose the correct patch do the following:     1. Choose #OracleVersion# as the "Release"     2. Choose the appropriate platform from the "Platform" list.   NOTE: The database version and platform will not appear in the drop down menus when a patch is unavailable for that database version and platform.   * Apply all recommended fixes from [Document 1427855.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1427855.1).   For more information, see:   * [Document 1549496.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1549496.1): Oracle Grid Infrastructure: How to Troubleshoot cssagent/cssmonitor Evictions * [Document 1367153.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1367153.1): Top 5 Issues That Cause Node Reboots or Evictions or Unexpected Recycle of CRS (Issue #2) * [Document 1050693.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1050693.1): Troubleshooting 11.2 Clusterware Node Evictions (Reboots) |
| **Node Eviction / Rebootless restart - Member kill escalation**   1. **An asm or database instance hang and was evicted but did not abort, so the evicting instance issued a member kill request.** 2. **The clusterware could not kill all processes of the evicted instance in 30 seconds, so the clusterware decided to reboot the node or recycle clusterware to clean the hanging instance.** 3. **The clusterware aborted and rebooted the evicted node or the clusterware unexpectedly shutdown and recycled.**   **The clusterware will do what is needed to abort the evicted instance to avoid the entire database from hanging. When an instance is evicted, the entire database hangs until the evicted instance aborts.** | **DB Version**  **memberkill CRS-1663** CRS-1663:Member kill issued by PID **memberkill\_clssgmMbrKillSendEvent\_clssgmMbrKillEsc\_clssnmKillNode**  Ocssd.log on one of the SURVIVING nodes has the following messages around the time of the eviction  a. "clssgmMbrKillSendEvent: Missing answers or immediate escalation..."  b. "clssgmMbrKillEsc: Escalating node %n Member request..." (naming the restarted node)  c. "clssnmKillNode: node %n (%s) kill initiated" (targeting the restarted node)  The messages should be in this order and around the time of the eviction  **memberkill\_clssnmvDiskKillCheck**  Ocssd.log on the RESTARTED node shows:  "clssnmvDiskKillCheck: Aborting, evicted by node..." **memberkill\_CRS-1608**  Alert.log on the restarted node shows:  "CRS-1608:This node was evicted by..."  The messages should be around the time of the eviction  **User-input Evicted Node Name**  **User-input Node Eviction Time** | Node Eviction / Rebootless restart - Member kill escalation[(See the next resolution)](https://support.oracle.com/epmos/faces/ui/gr/GrHome.jspx?domainId=NodeEviction&_adf.ctrl-state=17fz7hl362_119&_afrLoop=19555296150027#Bot1)  When an evicted instance does not abort, the member kill request is sent to the ocssd.bin daemon of CRS of the node with the evicted instance. If the ocssd.bin daemon cannot abort the evicted instance in 30 seconds, the member kill request is escalated to the node kill request.  The result of the node kill request is that the node is rebooted unless CRS shuts down gracefully. See [Document 1549977.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1549977.1) which provides the sequence of events that can lead to the member kill request.  **Corrective Actions**  The most common causes of the member kill request escalation to the node kill request are:   1. On Unix/Linux, one or more processes for the instance are in a state that cannot be terminated using a "kill -9 " command. 2. On Unix/Linux, one or more Oracle database/asm processes that are killed do not get reaped by the OS and become a defunct or zombie process. 3. The load on the problem node is heavy, so either CPU is almost 100% used or memory starvation is causing heavy paging and swapping.   See [Document 1549977.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1549977.1) for more details on how to resolve these causes.  **Further consideration:**  The member kill request is issued because an evicted instance is not aborting, so an instance eviction is the starting event that led to the node eviction. Therefore, finding out the reason that an instance is evicted needs to be done separately.  Three known common causes for instance evictions are:   1. If there is a network problem that causes communication problem over the private interconnect, then the instance eviction will occur. 2. If the load on the server is heavy that results in CPU and memory starvation (heavy paging and swapping), then the instance will hang or perform very slowly, and this may cause an instance eviction. 3. If IO was slow, this will cause the instance to hang or perform very slowly and may lead to an instance eviction.   See [Document 1549135.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1549135.1) for more details about these causes.  For more information, see:   * [Document 1549977.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1549977.1) - Oracle Grid Infrastructure: How to Troubleshoot Node Reboots/Evictions or Abrupt Recycle of CRS due to the Escalation of a Member Kill Request to a Node Kill Request * [Document 1367153.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1367153.1) - Top 5 Issues That Cause Node Reboots or Evictions or Unexpected Recycle of CRS * [Document 1050693.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1050693.1) - Troubleshooting 11.2 Clusterware Node Evictions (Reboots) |
| **Node Eviction / Rebootless restart - Missed network heartbeat**   1. **The evicted node was aborted by clusterware.** 2. **Clusterware logs on one or more of the surviving nodes show missed heartbeat messages and &quot;clssnmEvict: Evicting node&quot;.** 3. **The missed heartbeat messages and eviction message on the surviving node are from a time BEFORE the evicted node shut down at the OS level.** | **DB Version**  **nhb\_clssnmEvict**  The following message is present in the ocssd log of one or more of the OTHER, NOT evicted nodes, around the time of the restart:  "clssnmEvict: Evicting node %n, %s"  where the %n and %s are the hostname and node number of the evicted node. **nhb\_clssnmPollingThread**  The following message is present in the ocssd log of one or more of the OTHER, NOT evicted nodes, around the time of the restart:  "clssnmPollingThread: node %s (%n) at ... eviction in..."  where the %n and %s are the hostname and node number of the evicted node. **nhb\_CRS\_1607**  The following message is present in the clusterware alert log (alert.log) of one or more of the OTHER, NOT evicted nodes, around the time of the restart:  "CRS-1607:Node %s is being evicted in cluster incarnation %n"  where the above messages refer to the name of the evicted node  **nhb\_CRS\_1610**  The following message is present in the clusterware alert log (alert.log) of one or more of the OTHER, NOT evicted nodes, around the time of the restart:  "CRS-1610:Network communication with node %s missing for %n of timeout interval. Removal of this node from cluster in % seconds"  where the above messages refer to the name of the evicted node  **User-input Evicted Node Name**  **User-input Node Eviction Time** | Node Eviction / Rebootless restart - Missed network heartbeat[(See the next resolution)](https://support.oracle.com/epmos/faces/ui/gr/GrHome.jspx?domainId=NodeEviction&_adf.ctrl-state=17fz7hl362_119&_afrLoop=19555296150027#Bot2)  The files uploaded indicate that the eviction occurred due to missed network heartbeats. However, other causes could exist which cannot be determined based on the files uploaded. Further investigation will have to be performed manually. Please check whether the missed heartbeat and node eviction messages in the log files of the surviving nodes start BEFORE the time the node stopped at the OS level. If not, then these messages are a symptom, not the cause, and you should refer to the following note to identify the cause:  [Document 1050693.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1050693.1): Troubleshooting 11.2 Clusterware Node Evictions (Reboots)  Otherwise, the cause of the eviction is missed network heartbeats (NHB). The most common cause of missed NHB is network problems communicating over the private interconnect.  Refer to the following note to check private interconnect network:  [Document 1534949.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1534949.1): Oracle Grid Infrastructure: How to Troubleshoot Missed Network Heartbeat Evictions |
| **Node Eviction / Rebootless restart - Missed network heartbeat - split brain**   1. **The ocssd log shows that a node aborted to avoid &quot;split brain&quot; due to missed network heartbeat.** 2. **Missed network heartbeat (NHB) eviction occurred because the ocssd of the surviving node lost contact with the evicted node over the interconnect.** 3. **One or more nodes were unable to communicate over the interconnect** 4. **One node aborted itself to avoid &quot;split brain&quot; when communication over the interconnect was compromised** | **Cohort Nodes**  clssnmCheckDskInfo: My cohort: XX  clssnmCheckDskInfo: Surviving cohort: XX  **DB Version**  **splitbrain\_clssnmCheckDskInfo**  The following message is present in the ocssd log of the evicted node:  clssnmCheckDskInfo: Aborting local node to avoid splitbrain. **User-input Evicted Node Name**  **User-input Node Eviction Time** | Node Eviction / Rebootless restart - Missed network heartbeat - split brain[(See the next resolution)](https://support.oracle.com/epmos/faces/ui/gr/GrHome.jspx?domainId=NodeEviction&_adf.ctrl-state=17fz7hl362_119&_afrLoop=19555296150027#Bot3)  The files uploaded indicate that a Split-Brain node eviction occurred.  In this case, node(s) #My\_Cohort\_Nodes# aborted itself to avoid "split brain" when communication over the interconnect with node(s) #My\_Surviving\_Nodes# was compromised.  Missed network heartbeat (NHB) evictions happen when ocssd of the surviving node loses contact with the evicted node over the interconnect. The nodes must be able to communicate over the interconnect to avoid a "split brain" situation. In this case, one node aborted itself to avoid "split brain" when communication over the interconnect was compromised. For more information see [Document 1546004.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1546004.1) (Oracle Grid Infrastructure: Understanding Split-Brain Node Eviction).  **Corrective Actions:**  The most common (but not exclusive) cause of missed NHB is network problems communicating over the private interconnect.  Network communications between node(s) #My\_Cohort\_Nodes# and node(s) #My\_Surviving\_Nodes# need to be checked, as well as any other factors which could cause loss of communication between #My\_Cohort\_Nodes# and #My\_Surviving\_Nodes# .  1. Check OS and network statistics from the evicted node(s) #My\_Cohort\_Nodes# , and network statistics from the surviving node(s) #My\_Surviving\_Nodes#, from the time of the eviction 2. Validate the interconnect network setup. 3. Check that the OS network settings are correct by running the RAC check tool. 4. Check communication over the private network between node(s) #My\_Cohort\_Nodes# and node(s) #My\_Surviving\_Nodes#. 5. Check for platform specific issues. 6. Check for known issues which can cause NHB node eviction.  Details for each of these steps can be found in [Document 1534949.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1534949.1) (Oracle Grid Infrastructure: How to Troubleshoot Missed Network Heartbeat Evictions). |
| **Node Eviction / Rebootless restart - Voting disks unavailable**   1. **The evicted node was aborted by clusterware on that node.** 2. **An insufficient number of voting files were available.**   **The clusterware must be able to access a minimum number of the voting files, otherwise it will abort.** | **DB Version**  **User-input Evicted Node Name**  **User-input Node Eviction Time**  **votingdisk\_clssnmvDiskCheck**  Following message is in ocssd.log of restarted node around the time of the restart:  clssnmvDiskCheck: Aborting, %n of %n configured voting disks available, need %n  **votingdisk\_CRS-1606**  Following message is in alert.log of restarted node around the time of the restart:  CRS-1606:The number of voting files available, %n, is less than the minimum number of voting files required, %n, resulting in CSSD termination to ensure data integrity... | Node Eviction / Rebootless restart - Voting disks unavailable[(See the next resolution)](https://support.oracle.com/epmos/faces/ui/gr/GrHome.jspx?domainId=NodeEviction&_adf.ctrl-state=17fz7hl362_119&_afrLoop=19555296150027#Bot4)  The files uploaded indicate that the clusterware on node #node\_entered\_by\_customer# aborted because an insufficient number of voting files were available.  Oracle Clusterware determines the minimum number of accessible voting disks as follows:   * If you have 5 voting disks configured, a node must be able to access at least 3 of them at any time. * If you have 3 voting disks configured, a node must be able to access at least 2 of them at any time. * If you have 1 voting disk configured, a node must be able to access that single disk at any time.   If the voting disks are stored in an ASM diskgroup, the number of voting files depends on the redundancy of the diskgroup:   * A high redundancy diskgroup stores 5 voting files * A normal redundancy diskgroup stores 3 voting files * An external redundancy diskgroup stores only 1 voting file   The two most common causes for this issue are:   1. Interruption of the storage connection to voting disk 2. Bug 13869978, which can occur if only one voting disk is in use and the Grid Infrastructure version is less than 11.2.0.3.4.   **Corrective Actions**  1) First, check whether all of the voting files are currently accessible.   * To list all voting files: Use the command "crsctl query css votedisk" on a node where the clusterware is up. * Check that each node can access the devices underlying each voting file.   + Detailed instructions can be found in[Document 1549428.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1549428.1).   If any voting files or underlying devices are not currently accessible from any node, work with your storage administrator and/or system administrator to resolve the accessibility issue at the storage and/or OS level.  2) If you only have one voting disk, make sure that the fix for bug 13869978 is applied. This issue is fixed in 11.2.0.3.4 Grid Infrastructure PSU and above .   * To check for this patch, run "$GRID\_HOME/OPatch/opatch lsinventory -oh $GRID\_HOME | grep 13869978" * This bug only applies when there is ONLY ONE voting disk in use, and Grid Infrastructure version is LESS THAN 11.2.0.3.4.   To determine if a patch is available go to[Patch 13869978](https://updates.oracle.com/Orion/PatchDetails/process_form?patch_num=13869978) and do the following:  1. Choose #OracleVersion# as the "Release"  2. Choose the appropriate platform in the "Platform" list.  NOTE: The database version and platform will not appear in the drop down menus when a patch is unavailable for that database version and platform.  3) If voting files are all currently accessible, and the patch for bug 13869978 has been applied (if using 1 voting disk), then check for any interruption to the communication with the voting disks at the time of the incident.   1. Check OS, SAN, and storage logs for any errors from the time of the incident. 2. If no errors are found in the logs, check archived IO statistics from the time of the incident. If the physical disk on which the voting file is located was very busy, this can result in no response from the storage for long enough that the clusterware marks the voting file unavailable.    * For instructions on how to check archived IO statistics, see [Document 1549428.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1549428.1).   For more information, see:   * [Document 1549428.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1549428.1) - Oracle Grid Infrastructure: How to Troubleshoot Voting Disk Evictions * [Document 1367153.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1367153.1) - Top 5 Issues That Cause Node Reboots or Evictions or Unexpected Recycle of CRS * [Document 1050693.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1050693.1) - Troubleshooting 11.2 Clusterware Node Evictions (Reboots) |
| **Unable to automatically identify the cause of the node eviction**  **The troubleshooting tool was unable to automatically identify the cause of the node eviction from the files uploaded.** | **User-input Evicted Node Name**  **User-input Node Eviction Time** | Unable to automatically identify the cause of the node eviction  The RAC Node Eviction tool was unable to automatically identify the cause of a node eviction of node #node\_entered\_by\_customer# at #time\_entered\_by\_customer# due to one of the following reasons:  1. A node eviction did not occurr within a 1/2 hour window to either side of #time\_entered\_by\_customer# which was enterend in Step 1 of the tool.  Verify the time of the node eviction and rerun the tool if the time of eviction is different than #time\_entered\_by\_customer#.  2. A node eviction did occur within a 1/2 hour window to either side of #time\_entered\_by\_customer#, but the cause of the node eviction could not be automatically identified using the files uploaded.  **Corrective Actions**  1) A common cause of node evictions is missed network heartbeats (NHB) due to problems communicating over the private interconnect. Please check network communications between #node\_entered\_by\_customer# and the other nodes, following the steps in[Document 1534949.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1534949.1): Oracle Grid Infrastructure: How to Troubleshoot Missed Network Heartbeat Evictions.  2) If no problems found in step 1, please follow the steps in [Document 1050693.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1050693.1): Troubleshooting 11.2 Clusterware Node Evictions (Reboots).  3) If still unable to identify the cause of the node eviction, or unsure what actions to take next, please open a SR with Oracle Support by clicking the "Open SR" button below and provide the following additional information:   * OS statistics:   + If Cluster Health Monitor (CHM) is included in your release and platform (see[Document 1328466.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1328466.1)), run "diagcollection.sh --collect --chmos" to collect CHM data.   + If OS Watcher (OSW) is installed (see [Document 301137.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=301137.1)), please tar & gzip the archived OSW data from the hour in which the node eviction occurred, from all nodes.   NOTE: Currently this troubleshooting tool only accepts crsData\* files. However, future releases of this troubleshooting tool may accept output from the Trace File Analyzer (TFA) tool, which simplifies data collection considerably (see [Document 1513912.1](http://support.oracle.com/epmos/faces/DocumentDisplay?id=1513912.1)). Please consider using TFA for ease of data collection for issues which are not covered by this troubleshooting tool. If TFA is installed, then you only need run a single command from one of the nodes in the cluster to collect all the data that is relevant to a problem. Example commands:  tfactl diagcollect -all -from "Apr/29/2013 3:00:00" -to "Apr/29/2013 9:00:00"  tfactl diagcollect -all -since 6h  tfactl diagcollect -for "Apr/29/2013 4:29:30" |