Managing & Troubleshooting Cluster - 360 degrees
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Over 20 years IT hands-on experience
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Technologist of the year, DBA 2011.
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A famous personality in the Oracle community once compared an Oracle DBA with a Pilot!!!
Any deployment (installation/upgrade) is a single shot
Foreword

Where as
Administration and Troubleshooting is never ending
What is covered

- What's new in 11gR2 Clusterware – Key new features at a glance
- Oracle 11gR2 Clusterware software stack
- Clusterware start-up sequence
- Cluster logs & directory tree structure
- Analyzing Cluster logs
- Cluster logs rotation/retention policy
- Troubleshooting Cluster start-up failures
- Debugging/Tracing Clusterware components
- Tools & Utilities – how to pick the right one
- References
- Q & A
Key new features at a glance

Oracle Grid Infrastructure

- Clusterware and ASM binaries are installed together in a single home directory: Grid Home (GI)
Key new features at a glance

- OCR can also be stored in ASM diskgroup
- Up to five (05) copies of OCR files

Status of Oracle Cluster Registry is as follows:

<table>
<thead>
<tr>
<th>Version</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total space (kbytes)</td>
<td>262120</td>
</tr>
<tr>
<td>Used space (kbytes)</td>
<td>9124</td>
</tr>
<tr>
<td>Available space (kbytes)</td>
<td>252996</td>
</tr>
<tr>
<td>ID</td>
<td>2095810919</td>
</tr>
<tr>
<td>Device/File Name</td>
<td>+DG_OCR_VOTE</td>
</tr>
</tbody>
</table>

Device/File integrity check succeeded
- Device/File not configured
- Device/File not configured
- Device/File not configured
- Device/File not configured

Cluster registry integrity check succeeded
Logical corruption check bypassed due to non-privileged user
Oracle Local Registry – OLR

- Independent OLR copy for each node
- Not shared between nodes
- Stores local node configuration details required by OHASD
- Configured upon installation/upgrade
- Facilitates the CRS startup process when OCR/VD stored in ASM
- ocrcheck -local
- Located under $GRID_HOME/cdata/hostname/hostname.olr
- $GRID_HOME/bin/ocrconfig -local -manualbakup/restore
Key new features at a glance

- Voting Disk (files) can also be stored in ASM diskgroup
- VD copies can’t resides in multiple ASM diskgroups
Key new features at a glance

Clusterized cluster-aware commands

- `crsctl start cluster --all` -- starts cluster on all nodes
- `crsctl stop cluster --all` -- stops cluster on all nodes
- `crsctl check cluster --all` -- verify cluster health on all nodes
Key new features at a glance

Complete redesign of Cluster daemon in 11gR2, ohasd introduction

Replaces RACG layer with Agents

New Services
- Grid Plug and Play (GPnP)
- Cluster Time Synchronization Service (CTSS)
- Grid Name Service

Cluster can be started in exclusive mode for maintenance purpose

./crsctl start res -t -init  ---- list all Clusterware daemon resources
Oracle 11gR2 Clusterware Software Stacks

1. Cluster Ready Services daemon (CRSD)

The upper stack
Oracle 11gR2 Clusterware Software Stack

1. Cluster Ready Services daemon (CRS)
2. Oracle High Availability Services daemon (OHASD)

The lower stack
Oracle 11gR2 Clusterware Software Stack

1. Cluster Ready Services daemon (CRS)
   - CRS
   - cssdagent
   - CTSS
   - ONS
   - orarootagent
   - CSS
   - ASM
   - EVM
   - oraagent

2. Oracle High Availability Services daemon (OHASD)

The upper stack
Oracle 11gR2 Clusterware Software Stack

1. Cluster Ready Services Stack (CRS)
   - CRS
   - cssdagent
   - CTSS
   - ONS
   - orarootagent
   - CSS
   - ASM
   - EVM
   - oraagent

2. Oracle High Availability Service Stack (OHASD)
   - appagent
   - GPNPD
   - mDNS
   - scriptagent
   - orarootagent
   - ologgerd
   - GIPC
   - oraagent
   - osymond

The lower stack
Oracle High Availability Services daemon (ohasd)

**entry point**

/etc/inittab

**HPUX**

h1:3:*respawn*: /sbin/init.d/init.ohasd run >/dev/null 2>&1 < /dev/null

**Linux**

h1:3:*respawn*: /etc/init.d/init.ohasd run >/dev/null 2>&1 < /dev/null

**Oracle/RedHat Linux 6**

/etc/init, /etc/init.d/init.ohasd run
Clusterware Startup Sequence
Clusterware Startup Sequence

- **Level 0**
  - INIT
  - OHASD

- **Level 1**
  - cssdmonitor
  - OHASD oraagent

- **Level 2**
  - ASM
  - mDNSD
  - GIPCD
  - EVMD
  - GPNPD
  - CRSD
  - CTSSD
  - Diskmon
  - cssdagent
  - CSSD
Clusterware Startup Sequence
Clusterware Startup Sequence
Clusterware Startup Sequence

1. Oracle High Availability Service Daemon (ohasd)
2. Cluster Synchronization Service Daemon (cssd)
3. Event Manager Daemon (evmd)
4. Cluster Ready Service Daemon (crsd)

GPnP / OLR
Voting disk
OCR
Cluster logs & directory structure

GRID_HOME/log/host_name/

alert<hostname>.log

CRSD == crsd.log

CSSD == ocssd.log

OHASD == ohsad.log

EVMD == evmd.log

Operating System Logs
Cluster logs & directory structure

GRID_HOME/log/host_name/alterrac1.log

- Writes Clusterware stack all important alerts messages
- Posts Cluster stack start/stop messages
- Nodes eviction messages
- OLR events
- Voting and OCR disk related messages
- Active nodes list
- Preferably the first log file to review upon any cluster issues
Cluster logs & directory structure

GRID_HOME/log/host_name/alterrac1.log

[ohasd(10937)]CRS-1301:Oracle High Availability Service started on node rac1.
[cssd(19712)]CRS-1713:CSSD daemon is started in exclusive mode
[ohasd(19506)]CRS-2765:Resource 'ora.cssdmonitor' has failed on server 'rac1'

[cssd(19951)]CRS-1605:CSSD voting file is online: /dev/rdsk/c0t13d2; details in /u00/app/11.2.0/grid_1/log/rac1/cssd/ocssd.log.

[cssd(7945)]CRS-1714:Unable to discover any voting files, retrying discovery in 15 seconds; Details at (:CSSNM00070:) in /u00/app/11.2.0/grid/log/usdbt01/cssd/ocssd.log

[/u00/app/11.2.0/grid_1/bin/oraagent.bin(19914)]CRS-5815:Agent '/u00/app/11.2.0/grid_1/bin/oraagent_oracle' could not find any base type entry points for type 'ora.daemon.type'. Details at (:CRSAGF00108:) {0:9:2} in /u00/app/11.2.0/grid_1/log/usdbp01/agent/ohasd/oraagent_oracle/oraagent_oracle.log.

[cssd(19951)]CRS-1601:CSSD Reconfiguration complete. Active nodes are rac1,rac2.

[cssd(3726)]CRS-1625:Node rac2, number 2, was manually shut down

[cssd(3726)]CRS-1612:Network communication with node rac2 (2) missing for 50% of timeout interval. Removal of this node from cluster in 14.145 seconds
Cluster logs & directory structure

GRID_HOME/log/host_name/crsd.log

- Cluster Ready Services daemon (CRSD) maintains this log
- Any cluster resources Start/stop/failure occurrence are written
- Review the log when you have resources failures, unable to start etc

- 2013-04-05 02:05:05.379: [ CRSPE][46] {13:24208:51894} Resource ora.prddb.db has been updated in the PE data model:6000000004f82610
- 2013-04-05 02:08:15.371: [ CRSPE][46] {0:33:627} State change received from rac1 for ora.prddb.db
- 2013-04-05 02:08:22.698: [ CRSPE][46] {0:33:628} CRS-2672: Attempting to start 'ora.prddb.prddb_srv.svc' on 'rac1'
- 2013-04-23 17:32:46.340: [ OCRRAW][1]prpioini: all disks are not OCR/OLR formatted
Cluster logs & directory structure

GRID_HOME/log/host_name/o<cssd>.log

- Cluster Synchronization daemon (CSSD) maintains this log
- Busiest log file
- Records node inter-communication messages
- Heart beat missing and node eviction messages

2013-04-23 16:14:14.713: [CSSD][6](:CSSNM00070:)clssnmCompleteInitVFDiscovery: Voting file not found. Retrying discovery in 15 seconds

- 2013-04-17 11:33:23.286: [GIPCHALO][7] gipchaLowerProcessNode: bootstrap node considered dead because of idle connection time 60014 ms, node 60000000019645b0 { host 'rac2', haName 'CSS_crs', srcLuid 8c78ad11-53582d91, dstLuid 2f6e4604-5e451051 numInf 1, contigSeq 6712447, lastAck 6697196, lastValidAck 6712447, sendSeq [6697202 : 6697202], createTime 2417887052, sentRegister 1, localMonitor 1, flags 0x808 }

- 2013-04-20 15:13:18.953: [CSSD][54]clssnmSendingThread: sending status msg to all nodes
- 2013-04-20 15:13:18.954: [CSSD][54]clssnmSendingThread: sent 4 status msgs to all nodes

- 2013-04-12 17:35:55.351: [CSSD][49]clssnmvReadDskHeartbeat: Reading DHBs to get the latest info for node rac1, 17 LATSvalid 0 uniqueness 1348227938

- [cssd(7335)]CRS-1612:Network communication with node rac2 (02) missing for 50% of timeout interval. Removal of this node from cluster in 14.397 seconds
- [cssd(7335)]CRS-1611:Network communication with node rac2 (02) missing for 75% of timeout interval. Removal of this node from cluster in 7.317 seconds
- [cssd(7335)]CRS-1610:Network communication with node rac2 (02) missing for 90% of timeout interval. Removal of this node from cluster in
GRID_HOME/log/host_name/ohasd.log

- Oracle High Availability Service (OHASD) maintains this log
- High Availability service messages are written
- Review the log when you have issues whilst running root.sh/rootupgrd.sh
- If the service unable to start or becomes unhealthy due to OLR problems
- Loads default debugging levels

2013-04-17 11:32:47.125: [ default][1] Initializing OLR
2013-04-17 11:32:47.255: [ OCRRAW][1]proprioo: for disk 0 (/u00/app/12.1.0/grid_1/cdata/rac2.olr), id match (1), total id sets, need recover (0), my votes (0), total votes (0), commit_lsn (3118), lsn (3118)
2013-04-17 11:32:47.368: [ default][1] Loading debug levels...
2013-04-17 11:32:47.803: [ clsdmt][13]Creating PID [6401] file for home /u00/app/12.1.0/grid_1/host usdbp10 bin ohasd to /u00/app/12.1.0/grid_1/ohasd/init/
Cluster logs & directory structure

$GRID_HOME/log/<hostname>/

- alert_<hostname>.log
- /ohasd
  - ohasd.log
- /crsd
  - crsd.log
- /cssd
  - cssd.log
- /evmd
  - evmd.log
- /client
- /ctssd
  - Crssd.log
  - ctssd.log
- /diskmon
- /cvu
- /admin
- /agent
  - /ohasd
  - /crsd

ocrcheck.log, olsnodes.log, ocrdump.log etc
ctssd.01, 02.. 10
ora.DATABASE.log,
ctssd.01, 02.. 10

Presented by: Syed Jaffer Hussain
Operating System logs

HPUX - /var/adm/syslog/syslog.log

AIX - /bin/errpt –a

Linux - /var/log/messages

Windows - Refer .TXT log files under Application/System log using Windows Event Viewer

Solaris - /var/adm/messages
Managing Clusterware log files manually is not recommended...
Cluster logs rotation/retention policy

They are governed and managed automatically ......
• Most Clusterware log files follow the 10x10 rule as part of automatic rotation/retention policy and governed automatically.

• 10 copies of `cssd.log` files with 50M retained and rotated subsequently.

• `ohasd`, `evmd`, `crsd` etc logs also retain 10 copies with 10M size.

• The policy doesn’t applies to the `alterHOSTNAME.log` file.

```
-rw-r--r-- 1 root  root  10530020 Apr 12 02:36 ohasd.110
-rw-r--r-- 1 root  root  10549711 Apr 12 19:13 ohasd.109
-rw-r--r-- 1 root  root  10549193 Apr 13 11:36 ohasd.108
-rw-r--r-- 1 root  root  10510419 Apr 14 04:36 ohasd.107
-rw-r--r-- 1 root  root  10549404 Apr 14 21:23 ohasd.106
-rw-r--r-- 1 root  root  10549633 Apr 15 14:06 ohasd.105
-rw-r--r-- 1 root  root  10549264 Apr 15 06:48 ohasd.104
-rw-r--r-- 1 root  root  10549344 Apr 15 23:33 ohasd.103
-rw-r--r-- 1 root  sys   025 Apr 17 11:32 chashour.log
-rw-r--r-- 1 root  root  10546668 Apr 17 21:20 ohasd.102
-rw-r--r-- 1 root  root  10560037 Apr 19 10:27 ohasd.101
-rw-r--r-- 1 root  root  10549044 Apr 20 15:43 ohasd.log
```

```
-rw-r--r-- 1 oracle  oinstall  52820882 Apr 13 03:28 cssd.110
-rw-r--r-- 1 oracle  oinstall  52803086 Apr 14 03:34 cssd.109
-rw-r--r-- 1 oracle  oinstall  52802579 Apr 15 03:49 cssd.108
-rw-r--r-- 1 oracle  oinstall  52813632 Apr 16 03:28 cssd.107
-rw-r--r-- 1 oracle  oinstall  52740711 Apr 17 02:50 cssd.106
-rw-r--r-- 1 oracle  oinstall  198 Apr 17 11:33 cssdout.log
-rw-r--r-- 1 oracle  oinstall  52603148 Apr 17 23:24 cssd.105
-rw-r--r-- 1 oracle  oinstall  52827491 Apr 18 10:22 cssd.104
-rw-r--r-- 1 oracle  oinstall  52840232 Apr 19 03:11 cssd.103
-rw-r--r-- 1 oracle  oinstall  52840296 Apr 19 13:25 cssd.102
-rw-r--r-- 1 oracle  oinstall  52833941 Apr 20 05:44 cssd.101
-rw-r--r-- 1 oracle  oinstall  17593108 Apr 20 15:53 cssd.log
```
$GRID_HOME/bin/crsctl check crs

CRS-4638: Oracle High Availability Services is online
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
$GRID_HOME/bin/crsctl check crs
$GRID_HOME/bin/crsctl check cluster

CRS-4639: Could not contact Oracle High Availability Services

CRS-4124: Oracle High Availability Services startup failed
CRS-4000: Command Check failed, or completed with errors
OR
CRS-4535: Cannot communicate with Cluster Ready Services
CRS-4530: Communications failure contacting Cluster Synchronization Services daemon
CRS-4534: Cannot communicate with Event Manager
Troubleshooting Cluster start-up failures

Oracle High Availability Service (ohasd) start-up failures – common causes
CRS-4639: Could not contact Oracle High Availability Services
CRS-4124: Oracle High Availability Services startup failed
CRS-4000: Command Check failed, or completed with errors

1. Verify whether the cluster auto start-up is configured or not?
   • crsctl config has
   • /var/opt/oracle/scls_scr/hostname/root or
     /etc/oracle/scls_scr/hostname/root
   • Verify OS run level
   • Check whether ohasd daemon process is up or not: ps -ef |grep ohasd

2. Verify ohasd auto-start pointer in the /etc/init and /etc/inittab files?
   • h1:3:respawn:/sbin/init.d/init.ohasd run >/dev/null 2>&1 </dev/null

3. Verify the OLR availability, corruption and accessibility on the local node
   • Review the ohasd.log file for more details

4. Verify whether the ohasd agents are up or not – for unhealthy cluster
   • ps -ef |grep oraagent|orarootagent|cssdagent|cssdmonitor
   • Review the ohasd.log file

5. Verify Grid Infrastructure location permission
   • Compare with a good node location
Troubleshooting Cluster start-up failures

Oracle High Availability Service (ohasd) start-up failures – troubleshooting common causes

1. Enable Cluster auto start-up
   • `crsctl enable has|crs`
   • `crsctl start crs/cluster`

2. Put the following line in the respective OS files
   • `h1:3:respawn:/sbin/init.d/init.ohasd run >/dev/null 2>&1 </dev/null`

3. Restore or set permissions on the OLR
   • Restore from the recent OLR backup, if the file is corrupted
   • Reset appropriate permission on the local node for the file

4. Verify whether the ohasd agents are up or not – for unhealthy cluster status
   • Set permission if needed
   • If binaries are corrupted, restore them from a latest backup

5. Reset permissions or restore from the recent backups

6. Additionally, remove/rename the files from the `/var/tmp/.oracle`, `/usr/tmp/.oracle` or `/tmp/.oracle` locations
Cluster Synchronization Service (cssd) start-up failures – common causes

CRS-4530: Communications failure contacting Cluster Synchronization Services daemon:

1. Verify the following:
   - GPnP profile accessibility
   - Voting disk files accessibility
   - Check the underlying network (private network) for any connectivity issues

2. Verify whether the daemon status on the OS
   - `ps -ef |grep ocssd.bin`
Cluster Synchronization Service (cssd) start-up failures – troubleshooting common causes

1. Review the ocssd.log file to diagnose the issue:
   - Review the ocssd.log file if the daemon is able to access the GPnP profile
   - Run, crsctl query css votedisk to verify whether the voting disk files are accessible
   - If Voting disk permissions are lost, reset them
   - Resolve underlying network issues for any heart-beat issues and bring up the interconnect resource:
     ./crsctl start res ora.cluster_interconnect.haip -init

2. Start the process manually
   - Try to start the daemon process manually if it is not up or unhealthy:
     ./crsctl start res ora.cssd -init
Cluster Ready Service (crsd) start-up failures – common causes

CRS-4535: Cannot communicate with Cluster Ready Services:

1. Verify the following:
   - Oracle Cluster Registry (OCR) accessibility
     ./ocrcheck
   - Look for any Grid Home ownership and permission changes
   - Check for the OCR mirror copy issues
   - Verify and validate underlying network (private network)

2. Verify whether the daemon status on the OS
   - ps -ef |grep crsd.bin
   - crsctl stat res -t -init, look for ora.crsd status

3. Verify crsd agents
   - ps -ef |grep oraagent|orarootagent
Cluster Ready Service (crsd) start-up failures – troubleshooting common causes

1. Take the following action:
   • Review the crsd.log file
   • Take appropriate steps to resolve ownership, privilege issues on the OCR files.
   • Compare with the a good node, and restore the directory
   • ./ocrcheck
   • Verify and validate underlying network (private network)

2. Verify whether the daemon status on the OS
   • Restart the process manually
     ./crsctl start res ora.crsd -init

3. Verify the following:
   • ./crsstat -t

4. Ensure sufficient free space available under the $GRID_HOME to avoid cluster unhealthy issues.
Troubleshooting other clusterware process

```
crsctl stat res -t -init
```

<table>
<thead>
<tr>
<th>Name</th>
<th>Target State</th>
<th>Server</th>
<th>State details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster Resources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ora.asm</td>
<td>1 ONLINE</td>
<td>rac1</td>
<td>Started,STABLE</td>
</tr>
<tr>
<td>ora.cluster_interconnect.haip</td>
<td>1 ONLINE OFFLINE</td>
<td>rac1</td>
<td>STABLE</td>
</tr>
<tr>
<td>ora.crsd</td>
<td>1 ONLINE OFFLINE</td>
<td>rac1</td>
<td>STABLE</td>
</tr>
<tr>
<td>ora.cssd</td>
<td>1 ONLINE OFFLINE</td>
<td>rac1</td>
<td>STABLE</td>
</tr>
<tr>
<td>ora.cssdmonitor</td>
<td>1 ONLINE UNKNOWN</td>
<td>rac1</td>
<td>STABLE</td>
</tr>
<tr>
<td>ora.ctssd</td>
<td>1 ONLINE</td>
<td>rac1</td>
<td>ACTIVE:0,STABLE</td>
</tr>
<tr>
<td>ora.diskmon</td>
<td>1 OFFLINE OFFLINE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ora.drivers.acfs</td>
<td>1 ONLINE</td>
<td>rac1</td>
<td>STABLE</td>
</tr>
<tr>
<td>ora.evmd</td>
<td>1 ONLINE</td>
<td>rac1</td>
<td>STABLE</td>
</tr>
<tr>
<td>ora.gipcd</td>
<td>1 ONLINE</td>
<td>rac1</td>
<td>STABLE</td>
</tr>
<tr>
<td>ora.gpnpd</td>
<td>1 ONLINE</td>
<td>rac1</td>
<td>STABLE</td>
</tr>
<tr>
<td>ora.mdnsd</td>
<td>1 ONLINE</td>
<td>rac1</td>
<td>STABLE</td>
</tr>
<tr>
<td>ora.storage</td>
<td>1 ONLINE</td>
<td>rac1</td>
<td>STABLE</td>
</tr>
</tbody>
</table>
Troubleshooting Cluster start-up failures

Troubleshooting other clusterware process

./crsctl start res ora.cluster_interconnect.haip -init

./crsctl start res ora.cssd -init

The following output will be displayed at your screen:

CRS-2679: Attempting to clean 'ora.cssdmonitor' on 'rac1'
CRS-2681: Clean of 'ora.cssdmonitor' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.cssdmonitor' on 'rac1'
CRS-2676: Start of 'ora.cssdmonitor' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.cssd' on 'rac1'
CRS-2676: Start of 'ora.cssd' on 'rac1' succeeded
CRS-2672: Attempting to start 'ora.cluster_interconnect.haip' on 'rac1'
CRS-2672: Attempting to start 'ora.crsd' on 'rac1'
CRS-2676: Start of 'ora.cluster_interconnect.haip' on 'rac1' succeeded
CRS-2676: Start of 'ora.crsd' on 'rac1' succeeded
Debugging/Tracing Cluster components

- Flexibility to modify the default tracing/logging levels for any Clusterware main and sub-processes
- Range from 1 – 5, 0 value disables the tracing level
  - `ohasd.log` file also writes the default trace levels message when Oracle High Availability service daemon starts up on the local node
- `crsctl get log {css|crs|evm} ALL` – lists existing trace levels for the modules
- `crsctl lsmodule` – list the module details
- `crsctl lsmodule {css|crs|evm}`
Default trace levels:

```
./crsctl get log css all
```

Get CSSD Module: BCCM   Log Level: 2
Get CSSD Module: CLSF    Log Level: 0
Get CSSD Module: CLSINET Log Level: 0
Get CSSD Module: CSSD    Log Level: 2
Get CSSD Module: GIPCBCCM Log Level: 2
Get CSSD Module: GIPCCM  Log Level: 2
Get CSSD Module: GIPCNGM Log Level: 2
Get CSSD Module: GIPCNM  Log Level: 2
Get CSSD Module: GPNP    Log Level: 1
Get CSSD Module: OLR     Log Level: 0
Get CSSD Module: SKGFD   Log Level: 0

Default modules:

```
./crsctl lsmodules
 Usage:
     crsctl lsmodules
     {mdns|gpn|css|crf|crs|ctss|evm|gipc}
     where
     mdns  multicast Domain Name Server
     gpn   Grid Plug-n-Play Service
     css   Cluster Synchronization Services
     crf   Cluster Health Monitor
     crs   Cluster Ready Services
     ctss  Cluster Time Synchronization Service
     evm   EventManager
     gipc  Grid Interprocess Communications
```
The following enable various tracing levels:

```
./crsctl set log crs crsmain=3
./crsctl set log crs crsmain=3,crsevt=4

./crsctl set log crs all=5
./crsctl set log res ora.prddb.db:5
```

The following examples explains how to set tracing levels on the OS:

```
export ORA_CRSDEBUG_ALL=1 --sets debugging level 1 to all modules
export ORA_CRSDEDEBUG_CRS=2 --sets debugging level 2 to CRS module
```
Debugging/Tracing Cluster components

The following disable tracing:

```
./crsctl set log crs crsmain=0
./crsctl set log res ora.prddb.db:0
./crsctl set log res ora.crs:0 -init
```

The following examples explains how to set tracing levels on the OS:

```
export ORA_CRSDEBUG_ALL=1  --sets debugging level 1 to all modules
export ORA_CRSDDDEBUG_CRS=2  --sets debugging level 2 to CRS module
```
Tools & Utilities - how to pick the right one
Diagcollection.pl:

- Located under $GRID_HOME/bin location

- Is a tool that gathers required Clusterware diagnostic information in a bunch of trace files from various resources: CRS logs, trace & core files, OCR data etc.

- Can collect diagnostic information at different layers and homes: Cluster, Oracle RDBMS, Core, Oracle Base etc

- All the information will be then zipped into a few zip files

- Duration required to gather the information is directly proportional to the levels used

- Upload these files to My Oracle Support for issue investigation
Examples:
./diagcollection.sh --collect --chmos

./diagcollection.sh --collect --chmos --incidenttime <timeperiod> --incidentduration 05:00 (five hours report)

Alternative, you can use the following:

./oclumon dumpnodeview -allnodes -v -last "04:59:59" >/tmp/output.txt
./oclumon dumpnodeview -allnodes -v -s "2013-04-24 09:00" -e "2013-04-24 03:15:00"

Output files

crsData_rac1_20121204_1103.tar.gz
ocrData_rac1_20121204_1103.tar.gz
coreData_rac1_20121204_1103.tar.gz
osData_rac1_20121204_1103.tar.gz
Tools & Utilities - Cluster Health Monitor (CHM)

- Is a tool designed, developed to detect and analyze OS, Cluster resources failures etc.
- Formerly known as Instantaneous Problem Detector for OS(IPD/OS).
- Pre 11gR2 versions, you need to download the tool from OTN.
- With 11gR2, it is the integral part of the software and integrated closely with GI.
- ora.crf CHM resource introduced | crsctl stat res –t -init
- Not available on some platforms.
- Can be used on RAC and non-RAC environments.
- Collects OS real-time (every second, 5 sec from 11203) statistics: memory, swap, I/O, network etc
- Stores real-time monitoring metrics in the CHM repository.
- Historical data can be used to diagnose: node eviction, instance hang, server perf. etc
- Contains two services:
  
  **System Monitoring Service** (osysmond)
  - runs on every node, monitor and collect OS metrics and send data to
  **OloggeredCluster Logger Service** (ologgered)
  - Stores the information received from the nodes in the repository
  - Runs in one node as master service and standby service on other nodes

- CHM vs OSWatcher:
  CHM takes less CPU, and less overhead on the node, OSWatcher doesn’t run When the server CPU is heavily used
• Consumes less than %5 CPU/core, minimal overhead on the server
• Takes 1GB space by default across all nodes.
• Apprx. 0.5GB data per day.
• Data can be kept for 3 days.
• `./oclumon manage -get repsize`
• `oclumon` – a command-line tool, used to manage CHM repository
• Stores in a management repository database with 12c.
• Is a tool captures OS performance metrics and stores in the statistical data in a file
  • vmstat, netstat, top, tracerouts, ps, iostat etc
• Available on MOS.
• On RAC, need to configure, schedule on individual nodes
• Supports most UNIX/LINUX platforms.
• ./startoswbb.sh  (default interval/retention, 30 sec/48 hrs)
• ./startoswbb.sh 60 10  (60 seconds interval, 10 hrs data retention)
• ./stoposwbb.sh
• Review the dat file in the /archive directory
• Is a OS top-like utility on Linux Platforms
• Provides nearly real-time database monitoring capabilities for a RAC and Non-RAC dbs for 11.2.0.3 or higher.
• A very light weight utility, consumes 0.20% memory and <1% CPU.
• Download the oratop.zip from MOS, set chmod 755.
• Db init parameters: `statistics_level = TYPICAL, timed_statistics = TRUE` must be set
• Need to input username/password, connects as system user when no credentials provides.
• Set the following on the OS
  ```
  $ ORACLE_UNQNAME=<dbname>
  $ ORACLE_SID=<instance_name1>
  $ ORACLE_HOME=<db_home>
  $ export LD_LIBRARY_PATH=$ORACLE_HOME/lib
  $ export PATH=$ORACLE_HOME/bin:$PATH
  ```
• Download the oratop.zip from MOS, set chmod 755
• Needs a TNS to the source database
• Need privileges on, `v_$SESSION, v_$SYSTMETIC, v_$INSTANCE, v_$PROCESS, V_$SYSTEM_EVENT` etc
Live window: lists 5 TOP wait events, top Oracle sessions of i/o, memory, db load, provides database blocking details. Press q/Q or Control+C to abort.

```
./oratop -i 5 / as sysdba - interval every 5 seconds
./oratop -i 5 username/password@tns_alias
```
• A RAC configuration auditing utility that audits various important configuration settings: Cluster, ASM, Grid Infrastructure etc

• Audits, OS Kernal parameters/Packages, 11.2.0.3 upgrade readiness etc

• Download the raccheck.zip from MOS, chmod to 755.

• Ability to compare between two outputs.

• All the recommendations/output written to a HTML file.

• The output include overall health check rating – out of 100, bug fixes, patch recommendations etc.

• Upload the .zip file if MOS ask to do so.
Examples:

./raccheck - follow the interactive steps
./raccheck -u -o pre|post
./raccheck -h
./raccheck -s

./raccheck -diff report1 report2

Usage: ./raccheck [-abvhpmsuSo:c:rt:]
- a All (Perform best practice check and recommended patch check)
- b Best Practice check only. No recommended patch check
- h Show usage
- v Show version
- p Patch check only
- m exclude checks for Maximum Availability Architecture
- u Run raccheck to check pre-upgrade or post-upgrade best
practices.-o pre or -o post is mandatory with -u option like ./raccheck -u -o pre
- f Run Offline.Checks will be performed on data already
- o Argument to an option. if -o is followed by
  v,V,Verbose,VERBOSE or Verbose, it will print checks which
  pass on the screen
  if -o option is not specified, it will print only failures on
  screen. for eg: raccheck -a -o v -r
  To include High availability best practices also in regular
  healthcheck eg ./raccheckck -r(not applicable for exachk) -c
  Pass specific module or component to check
  best practice
for. By default it will check for components indentified fr
• HANGANALYZE helps detecting the cause of database hang

• Advised to run the HANGANLYZE when a database suffers from hang, performance degradation, latching issues etc

• Available since 8.1.6, provides cluster-wide analysis from 9i

Examples:

SQL> sqlplus " / as sysdba"
SQL> oradebug setmypid
SQL> oradebug unlimit
SQL> oradebug setinst all
SQL> oradebug -g def hanganlyze 3
   -- wait 90 seconds
SQL> oradebug -g def hanganlyze 3
SQL> oradebug tracefile_name
SQL> exit
HANGANLYZE Level:

10   Dump all processes
5    Level 4 + Dump all processes involved in wait chains (NLEAF state)
4    Level 3 + Dump leaf nodes (blockers) in wait chains (LEAF, LEAF_NW, IGN_DMP state)
3    Level 2 + Dump only processes thought to be in a hang (IN_HANG state)
     -- recommended
1-2  Only HANGANALYZE output, no process dump at all
Review the trace file:

HANG ANALYZE (section)

CYCLES
list process dependencies for deadlock/hung state

BLOCKER OF MANY SESSIONS:
When a session block too many session, you will have this section, when a session block 10 or more sessions

STATE OF NODES | OPEN CHAINS | OTHER CHAINS
Dumping system state

When a database is in a complete hung state and you can’t connect to the database as / as sysdba, when memory leaks are suspected, use the following:

sqlplus – prelim / as sysdba

SQL> oradebug setmypid
SQL> oradebug unlimit;
SQL> oradebug – g all dump systemstate 10|266
Wait for 60 seconds
SQL> oradebug -g all dump systemstate 10|266

Review/upload the trace file to MOS
References

- RACcheck - RAC Configuration Audit Tool [ID 1268927.1]
- Troubleshoot Grid Infrastructure Startup Issues [ID 1050908.1]
- Oracle Clusterware CRSD OCSSD EVMD Log Rotation Policy [ID 557204.1]
- CRS Diagnostic Data Gathering: A Summary of Common tools and their Usage [ID 783456.1]
- Remote Diagnostic Agent (RDA) 4 - Getting Started [ID 314422.1]
- Data Gathering for Troubleshooting Oracle Clusterware (CRS or GI) And Real Application Cluster (RAC) Issues [ID 289690.1]
A big thank you all for listening ...

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