RAC and ASM issues after Upgrade of Linux Kernel

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Problem Description

After upgrade of Linux Kernel Version 2.6.9-22.ELsmp to Version 2.6.9-55.0.2.ELsmp the following behavior was observed on the RAC Database server:

1) **CRS Failed to start**

   CRS issue was related to two different problems

   Emc Powerpath failed to start
   Solution: UNIX administrator reinstalled EMC Powerpath

   CRS raw devices dynamically changed its mapping
   Solution: DBA mapped CRS raw devices to the correct new names

2) **ASM Failed to start**

   ASM problem was caused by an incompatible driver with the new version
   workaround link ASMLib rpms to the old kernel using the oracleasm_debug_link ASM command
   (Usage is described on Metalink Note:462618.1)

   Solution: If available, replace the old ASMLib driver with the driver that matches the actual kernel.
**CRS related errors**

/ractst/app01/10gCRS/log/ractst1/client/clsc55.log:

Oracle Database 10g CRS Release 10.2.0.1.0 Production Copyright 1996, 2005 Oracle. All rights reserved.
2007-10-29 13:49:01.801: [ COMMCRS][2550872480]clsc_connect: (0x704290) no listener at (ADDRESS=(PROTOCOL=ipc)(KEY=ora_crsqs))

/ractst/app01/10gCRS/log/ractst1/crsd/crsd.log:

2007-10-26 20:24:56.260: [ CRSMAIN][2550872448]0Starting Threads
2007-10-26 20:24:56.261: [ CRSMAIN][1474455904]0Starting runCommandServer for (UI = 1, E2E = 0). 0
2007-10-26 20:24:56.261: [ CRSMAIN][1476557152]0Starting runCommandServer for (UI = 1, E2E = 0). 1
2007-10-26 20:25:40.569: [ CRSEVT][1493350752]OCAAMonitorHandler :: 0:Action Script for resource 'ora.ractst1.vip' stdout redirection failed for `/ractst/app01/10gCRS/crs/log/startfSYwVd.stdout` : No such file or directory

/racdbtst/app01/10gCRS/log/ractst1/evmd/evmd.log

2007-09-26 04:13:47.295: [ COMMCRS][2542511264]clscreceive: (0x6ecfe0) Connection not active
2007-09-27 14:35:17.321: [ COMMCRS][2542511264]clscsendx: (0x2a9822a820) Physical connection (0x2a98210420) not active

/ractst/app01/10gCRS/log/ractst1/racg/ora.ractst1.db.log

2007-10-26 20:24:49.841: [ COMMCRS][2549054720]clsc_connect: (0x5b7930) no listener at (ADDRESS=(PROTOCOL=ipc)(KEY=ora_crsqs))
CRS RAW DEVICES ISSUES

Service raw devices is down and cannot be started

# service rawdevices status  <<<< This command should return status

# service rawdevices start  <<<< Restart Fail

Assigning devices:

/dev/raw/votingdisk  -->  /dev/emcpowerwl
Cannot locate block device '/dev/emcpowerwl' (No such file or directory)

/dev/raw/ocr.dbf  -->  /dev/emcpowerw2
Cannot locate block device '/dev/emcpowerw2' (No such file or directory)

/dev/raw/spfile+ASM.ora  -->  /dev/emcpowerw3
Cannot locate block device '/dev/emcpowerw3' (No such file or directory)

EMC Powerpath devices not available

# fdisk -l | grep /dev/emcpower
Disk /dev/sdb doesn't contain a valid partition table
Disk /dev/sdp doesn't contain a valid partition table
Disk /dev/sdq doesn't contain a valid partition table
Disk /dev/sdag doesn't contain a valid partition table
Disk /dev/sdaw doesn't contain a valid partition table
Corrective actions

System Administrator reinstalled Powerpath

Still service rawdevices failed to start

Checked /etc/sysconfig/rawdevices

The mapping to the rawdevices changed:

Before we had:

```
# cat /etc/sysconfig/rawdevices
/dev/raw/votingdisk     /dev/emcpowerw1
/dev/raw/ocr.dbf        /dev/emcpowerw2
/dev/raw/spfile+ASM.ora /dev/emcpowerw3
```

Now emcpowerw1 is not configured:

```
# fdisk -l | grep /dev/emcpowerw
Disk /dev/sdb doesn't contain a valid partition table
Disk /dev/sdp doesn't contain a valid partition table
Disk /dev/sdq doesn't contain a valid partition table
Disk /dev/sdag doesn't contain a valid partition table
Disk /dev/sdaw doesn't contain a valid partition table
```

Checking rawdevice configuration on the node that is working:
Correct rawdevice mapping

Check using these values on upgraded node

```bash
# fdisk -l | grep "\s+1\s+49\s+150350\s+83\s+Linux"
/dev/emcpowero1  1    49   150350   83  Linux
# fdisk -l | grep "\s+50\s+98\s+150381\s+83\s+Linux"
/dev/emcpowero2  50   98   150381   83  Linux
# fdisk -l | grep "\s+99\s+147\s+150381\s+83\s+Linux"
/dev/emcpowero3  99  147   150381   83  Linux
```

The new mapping is:

<table>
<thead>
<tr>
<th>On node with old kernel</th>
<th>On node with new kernel</th>
</tr>
</thead>
<tbody>
<tr>
<td># cat /etc/sysconfig/rawdevices</td>
<td># cat /etc/sysconfig/rawdevices</td>
</tr>
<tr>
<td>/dev/raw/votingdisk /dev/emcpoweru1</td>
<td>/dev/raw/votingdisk /dev/emcpoweru1</td>
</tr>
<tr>
<td>/dev/raw/ocr.dbf /dev/emcpoweru2</td>
<td>/dev/raw/ocr.dbf /dev/emcpoweru2</td>
</tr>
</tbody>
</table>
Start service rawdevices

Once updated `/etc/sysconfig/rawdevices`, service rawdevices start successfully

```
[root@ractst1 scripts]# service rawdevices start
Assigning devices:
/dev/raw/votingdisk --> /dev/emcpowero1
/dev/raw/raw1: bound to major 120, minor 225
/dev/raw/ocr.dbf --> /dev/emcpowero2
/dev/raw/raw2: bound to major 120, minor 226
/dev/raw/spfile+ASM.ora --> /dev/emcpowero3
/dev/raw/raw3: bound to major 120, minor 227
done
```
ASMLib Issue Alternative Solutions

ASMLib issue can be solved by installing new driver or linking to the old kernel

1) If there is an ASMLib driver for the new kernel version, install the new version and remove the old one. This is the best option.
2) If there is no ASMLib driver for the new kernel version, ASMLib can be linked to use the old kernel, this solution is based on oracleasm_debug_link usage Note:462618.1

1) Upgrade ASMLib driver procedure

Stop all CRS components on server

> srvctl stop instance -d racdbtst -i racdbtst1
> srvctl stop asm -n vmractest1
> srvctl stop nodeapps -n vmractest1

Check that all RAC components on current node are stopped.

> chkcrs | grep OFF
ora.racdbtst.ortspair.racdbtst1.srv ONLINE OFFLINE
ora.racdbtst.racdbtst1.inst OFFLINE OFFLINE
ora.racdbtst.ractest1.racdbtst1.srv ONLINE OFFLINE
ora.vmractest1.ASM1.asm OFFLINE OFFLINE
As root install the new driver

```
-rw-r--r-- 1 oracle dba  89591 Oct 29 16:19 oracleasm-2.6.9-55.0.2.ELsmp-2.0.3-1.x86_64.rpm
# rpm -Uvh oracleasm-2.6.9-55.0.2.ELsmp-2.0.3-1.x86_64.rpm
Preparing...  ################################################################# [100%]
  1: oracleasm-2.6.9-55.0.2.ELsmp ################################################################# [100%]

# rpm -qa | grep oracleasm
oracleasmlib-2.0.2-1
oracleasm-2.6.9-22.ELsmp-2.0.2-1
oracleasm-support-2.0.3-1
oracleasm-2.6.9-55.0.2.ELsmp

# /etc/init.d/oracleasm start
Loading module "oracleasm": [ OK ]
Mounting ASMLib driver filesystem: [ OK ]
Scanning system for ASM disks: [ OK ]
[root@vmractest1 oracle]# /etc/init.d/oracleasm listdisks
VOL1
VOL10
VOL11
VOL12
VOL13
VOL2
VOL3
```
Remove the old ASM driver

# rpm -e oracleasm-2.6.9-22.ELsmp-2.0.2-1

# rpm -qa | grep oracleasm
oracleasmlib-2.0.2-1
oracleasm-support-2.0.3-1
oracleasm-2.6.9-55.0.2.ELsmp

Check ASM Status

# /etc/init.d/oracleasm status
Checking if ASM is loaded: [ OK ]
Checking if /dev/oracleasm is mounted: [ OK ]

Start all RAC components

> srvctl start nodeapps -n vmractest1
> srvctl start asm -n vmractest1
> srvctl start instance -d racdbtst -i racdbtst1
Check all RAC components

<table>
<thead>
<tr>
<th>HA Resource</th>
<th>Target</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>ora.racdbtst.db</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.racdbtst.orts1.cs</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.racdbtst.orts1.racdbtst1.srv</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.racdbtst.orts2.cs</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.racdbtst.orts2.racdbtst2.srv</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.racdbtst.ortspair.cs</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.racdbtst.ortspair.racdbtst1.srv</td>
<td>ONLINE</td>
<td>ONLINE on vmractest1</td>
</tr>
<tr>
<td>ora.racdbtst.ortspair.racdbtst2.srv</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.racdbtst.racdbtst1.inst</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.racdbtst.racdbtst2.inst</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.racdbtst.ractest1.cs</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.racdbtst.ractest1.racdbtst1.srv</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.racdbtst.ractest2.cs</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.racdbtst.ractest2.racdbtst2.srv</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.racdbtst.ractest3.cs</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.racdbtst.ractest3.racdbtst2.srv</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.vmractest1.ASM1.asm</td>
<td>ONLINE</td>
<td>ONLINE on vmractest1</td>
</tr>
<tr>
<td>ora.vmractest1.LISTENER_VMRACTEST1.lsnr</td>
<td>ONLINE</td>
<td>ONLINE on vmractest1</td>
</tr>
<tr>
<td>ora.vmractest1.gsd</td>
<td>ONLINE</td>
<td>ONLINE on vmractest1</td>
</tr>
<tr>
<td>ora.vmractest1.ons</td>
<td>ONLINE</td>
<td>ONLINE on vmractest1</td>
</tr>
<tr>
<td>ora.vmractest1.vip</td>
<td>ONLINE</td>
<td>ONLINE on vmractest1</td>
</tr>
<tr>
<td>ora.vmractest2.ASM2.asm</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.vmractest2.LISTENER_VMRACTEST2.lsnr</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.vmractest2.gsd</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.vmractest2.ons</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
<tr>
<td>ora.vmractest2.vip</td>
<td>ONLINE</td>
<td>ONLINE on vmractest2</td>
</tr>
</tbody>
</table>
2) Implementation of workaround for ASMLib driver mismatch with Linux Kernel

If there is no ASMLib available for this kernel version you can try to implement this workaround, it will work if the driver is only slightly different.

Relink ASMLib to the old kernel

Syntax is oracleasm_debug_link <old kernel> <new kernel>

```bash
# /usr/lib/oracleasm/oracleasm_debug_link 2.6.9-22.ELsmp 2.6.9-55.0.2.ELsmp

# /etc/init.d/oracleasm start
Loading module "oracleasm": [ OK ]
Mounting ASMLib driver filesystem: [ OK ]
Scanning system for ASM disks: [ OK ]

[root@ractst1 scripts]# /etc/init.d/oracleasm listdisks
VOL1
VOL10
VOL11
VOL12
VOL13
VOL2
VOL3
VOL4
VOL5
VOL6
VOL7
```
At this point, since OCR, Voting and ASM Spfile were made available, CRS started, and brought up nodeapps and ASM. ASM was not ready so the instance was not able to mount the diskgroups.

**Restart ASM after the relink**

```
> srvctl stop asm -n ractst1
> srvctl start asm -n ractst1
> asmcmd lsdg
```

```
<table>
<thead>
<tr>
<th>State</th>
<th>Type</th>
<th>Rebal</th>
<th>Unbal</th>
<th>Sector</th>
<th>Block</th>
<th>AU</th>
<th>Total_MB</th>
<th>Free_MB</th>
<th>Req_mir_free_MB</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOUNTED</td>
<td>EXTERN</td>
<td>N</td>
<td>N</td>
<td>512</td>
<td>4096</td>
<td>1048576</td>
<td>118683</td>
<td>116634</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>116634</td>
<td>0</td>
<td>BACKDG/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MOUNTED</td>
<td>EXTERN</td>
<td>N</td>
<td>N</td>
<td>512</td>
<td>4096</td>
<td>1048576</td>
<td>1305507</td>
<td>264311</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>264311</td>
<td>0</td>
<td>DATADG/</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

Now both ASM diskgroups are mounted and instance #1 can be restarted

```
> srvctl start database -d ractst1
> srvctl start service -d ractst1

> chkcrs
```

```
<table>
<thead>
<tr>
<th>HA Resource</th>
<th>Target</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>ora.ractst1.ASM1.asm</td>
<td>ONLINE</td>
<td>ONLINE on ractst1</td>
</tr>
<tr>
<td>ora.ractst1.gsd</td>
<td>ONLINE</td>
<td>ONLINE on ractst1</td>
</tr>
<tr>
<td>ora.ractst1.LISTENER_RACTST1.lsnr</td>
<td>ONLINE</td>
<td>ONLINE on ractst1</td>
</tr>
<tr>
<td>ora.ractst1.ons</td>
<td>ONLINE</td>
<td>ONLINE on ractst1</td>
</tr>
<tr>
<td>ora.ractst1.vip</td>
<td>ONLINE</td>
<td>ONLINE on ractst1</td>
</tr>
</tbody>
</table>
```
<table>
<thead>
<tr>
<th>Resource</th>
<th>Status</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>ora.ractst2.ASM2.asm</td>
<td>ONLINE</td>
<td>ONLINE on ractst2</td>
</tr>
<tr>
<td>ora.ractst2.gsd</td>
<td>ONLINE</td>
<td>ONLINE on ractst2</td>
</tr>
<tr>
<td>ora.ractst2.LISTENER_RACTST2.lsnr</td>
<td>ONLINE</td>
<td>ONLINE on ractst2</td>
</tr>
<tr>
<td>ora.ractst2.ons</td>
<td>ONLINE</td>
<td>ONLINE on ractst2</td>
</tr>
<tr>
<td>ora.ractst2.vip</td>
<td>ONLINE</td>
<td>ONLINE on ractst2</td>
</tr>
<tr>
<td>ora.ractst1.db</td>
<td>ONLINE</td>
<td>ONLINE on ractst2</td>
</tr>
<tr>
<td>ora.ractst1.racltst.cs</td>
<td>ONLINE</td>
<td>ONLINE on ractst2</td>
</tr>
<tr>
<td>ora.ractst1.racltst.ractst11.srv</td>
<td>ONLINE</td>
<td>ONLINE on ractst1</td>
</tr>
<tr>
<td>ora.ractst1.racltst.ractst12.srv</td>
<td>ONLINE</td>
<td>ONLINE on ractst2</td>
</tr>
<tr>
<td>ora.ractst1.ractst11.inst</td>
<td>ONLINE</td>
<td>ONLINE on ractst1</td>
</tr>
<tr>
<td>ora.ractst1.ractst12.inst</td>
<td>ONLINE</td>
<td>ONLINE on ractst2</td>
</tr>
</tbody>
</table>
Checklist after Linux Kernel Upgrade on a RAC Database Server

**Pre-upgrade steps**

- Download ASMLib driver that match the new kernel version from [http://www.oracle.com/technology/software/tech/linux/asmlib](http://www.oracle.com/technology/software/tech/linux/asmlib)
- ftp the ASMLib driver to the servers that will be upgraded

**Upgrade steps**

1) Bring down all RAC components (DBA)

   a. srvctl stop instance –d <dbname> -I <instance_name>
   b. srvctl stop asm –n <nodename>
   c. srvctl stop nodeapps –n <nodename>
2) Install new kernel, reboot (SYSADMIN)

3) Reinstall EMC Powerpath (SYSADMIN)

4) Check that service rawdevices start (SYSADMIN)

   # service rawdevices start

   a. If service rawdevices do not start review the mapping of ocr, voting disk, and asmpfile

   # cat /etc/sysconfig/rawdevices
   #fdisk –l | grep dev/emcpower

   look for a device that contains 3 partitions similar to this:
   
   Disk /dev/emcpowero: 3194 MB, 3194880000 bytes
   /dev/emcpowero1 1 49 150350 83 Linux
   /dev/emcpowero2 50 98 150381 83 Linux
   /dev/emcpowero3 99 147 150381 83 Linux

   Correct /etc/sysconfig/rawdevices to match the pattern as taken on the second node, use the minor and major
   numbers to match the identities:
### On node with old kernel

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code># cat /etc/sysconfig/rawdevices</code></td>
<td>Show raw devices configuration</td>
</tr>
<tr>
<td><code>/dev/raw/votingdisk /dev/emcpoweru1</code></td>
<td>Raw device configurations</td>
</tr>
<tr>
<td><code>/dev/raw/ocr.dbf /dev/emcpoweru2</code></td>
<td>Raw device configurations</td>
</tr>
<tr>
<td><code>/dev/raw/spfile+ASM.ora /dev/emcpoweru3</code></td>
<td>Raw device configurations</td>
</tr>
<tr>
<td>`# fdisk -l</td>
<td>grep /dev/emcpoweru`</td>
</tr>
<tr>
<td><code>/dev/emcpoweru1 1 49 150350 83 Linux</code></td>
<td>FDisk details for raw device 1</td>
</tr>
<tr>
<td><code>/dev/emcpoweru2 50 98 150381 83 Linux</code></td>
<td>FDisk details for raw device 2</td>
</tr>
<tr>
<td><code>/dev/emcpoweru3 99 147 150381 83 Linux</code></td>
<td>FDisk details for raw device 3</td>
</tr>
</tbody>
</table>

### On node with new kernel

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code># cat /etc/sysconfig/rawdevices</code></td>
<td>Show raw devices configuration</td>
</tr>
<tr>
<td><code>/dev/raw/votingdisk /dev/emcpowero1</code></td>
<td>Raw device configurations</td>
</tr>
<tr>
<td><code>/dev/raw/ocr.dbf /dev/emcpowero2</code></td>
<td>Raw device configurations</td>
</tr>
<tr>
<td><code>/dev/raw/spfile+ASM.ora /dev/emcpowero3</code></td>
<td>Raw device configurations</td>
</tr>
<tr>
<td>`# fdisk -l</td>
<td>grep /dev/eemcpowero`</td>
</tr>
<tr>
<td><code>/dev/emcpowero1 1 49 150350 83 Linux</code></td>
<td>FDisk details for raw device 1</td>
</tr>
<tr>
<td><code>/dev/emcpowero2 50 98 150381 83 Linux</code></td>
<td>FDisk details for raw device 2</td>
</tr>
<tr>
<td><code>/dev/emcpowero3 99 147 150381 83 Linux</code></td>
<td>FDisk details for raw device 3</td>
</tr>
</tbody>
</table>

b. If service rawdevices start proceed to point 5

### 5) Replace ASMLib with the appropriate Driver, connected as root (SYSADMIN)

a. stop ASMLib
   i. `/etc/init.d/oracleasm stop`  

b. install the new rpm (downloaded and moved to the server on the pre-upgrade steps)  
   i. `rpm –Uvh <rpm device driver>`

e. start ASMLib, **wait patiently until scan disk finish**  
   i. `/etc/init.d/oracleasm start`
6) Check if CRS started (DBA)

   a. As oracle execute chkcrs

      i. If CRS is up, stop ASM
         1. srvctl stop asm –n <nodename>

      ii. if CRS is down start it as root, wait about 5 minutes for CRS components to start (SYSADMIN)
         1. /etc/init.d/init.crs start
         2. as user oracle check CRS components status with chkcrs
         3. If some components do not come up start them manually
Annex

Chkcrs script

Chkcrs script is a formatted version of the command crs_stat and is available from Metalink Note 259301.1

----- script start here -------
#!/usr/bin/ksh
#
# Sample 10g CRS resource status query script
#
# Description:
#   - Returns formatted version of crs_stat -t, in tabular
#   format, with the complete rsc names and filtering keywords
#   - The argument, $RSC_KEY, is optional and if passed to the script, will
#     limit the output to HA resources whose names match $RSC_KEY.
# Requirements:
#   - $ORA_CRS_HOME should be set in your environment

RSC_KEY=$1
QSTAT=-u
AWK=/usr/xpg4/bin/awk    # if not available use /usr/bin/awk

# Table header:echo ""
$AWK \
  'BEGIN {printf "%-45s %-10s %-18s\n", "HA Resource", "Target", "State";
     printf "%-45s %-10s %-18s\n", "---------", "-----", "-----";}'
# Table body:
$ORA_CRS_HOME/bin/crs_stat $QSTAT | $AWK \  
'BEGIN { FS="="; state = 0; } 
$1~/NAME/ && $2~/RSC_KEY~/ {appname = $2; state=1}; 
state == 0 {next;} 
$1~/TARGET/ && state == 1 {apptarget = $2; state=2;} 
$1~/STATE/ && state == 2 {appstate = $2; state=3;} 
state == 3 {printf "%-45s %-10s %-18s\n", appname, apptarget, appstate; state=0;}'

----- script end here -----