Centos7.8静默安装11gRAC

rpm、安装包保存于百度网盘，提取码: cebv

参考文档：RAC的几种IP：https://cloud.tencent.com/developer/article/1578494

一、基本信息与配置

节点基本信息：

注：该编辑文档软件会把用户和密码首字母自动大写，其实为小写。

	节点一	节点二
主机名	ora1	ora2
操作系统	Centos7.8	Centos7.8
grid用户名/密码	grid	grid
Oracle用户名/密码	oracle	oracle
Oracle 版本	11g Enterprise Edition Release 11.2.0.4.0	11g Enterprise Edition Release 11.2.0.4.0
oracle用户SID	rac1	rac2
GI安装位置	/u01/app/grid/base	/u01/app/grid/base
数据库安装位置	/u01/app/oracle/base	/u01/app/oracle/base
公网IP	192.168.3.64/21	192.168.3.65/21
私网IP	192.168.122.2/24	192.168.122.3/24

需要的文件

```
# 安装包
p13390677_112040_Linux-x86-64_1of7.zip
p13390677_112040_Linux-x86-64_2of7.zip
p13390677_112040_Linux-x86-64_3of7.zip

# 补丁
p19404309_112040_Linux-x86-64.zip
p18370031_112040_Linux-x86-64.zip

# rpm
pdksh-5.2.14-37.el5_8.1.x86_64.rpm
compat-libstdc++-33-3.2.3-72.el7.x86_64.rpm
```

同时挂载本地系统镜像方便yum安装，本文档需要安装的依赖在本地系统镜像中足够安装。

用户配置

gird用户配置

1. 创建用户

```
groupadd oinstall
groupadd dba
groupadd oper
groupadd asmadmin
groupadd asmdba
groupadd asmoper

useradd -g oinstall -G asmadmin,asmdba,asmoper,dba grid
echo "grid" | passwd grid --stdin
```

2. 编辑Grid用户的 `.bash_profile`

注： ora1的grid用户的ORACLE_SID=+ASM1，ora2的grid用户的ORACLE_SID=+ASM2

```
export ORACLE_BASE=/u01/app/grid/base
export ORACLE_HOME=/u01/app/grid/home
export ORACLE_SID=+ASM1
export LD_LIBRARY_PATH=$ORACLE_HOME/lib:/lib:/usr/lib
export
CLASSPATH=$ORACLE_HOME/JRE:$ORACLE_HOME/jlib:$ORACLE_HOME/rd
bms/jlib

PATH=$PATH:$HOME/.local/bin:$HOME/bin:$ORACLE_HOME/bin
export PATH
```

3. 生效环境变量

```
. ~/.bash_profile
```

oracle 用户配置

1. 新建oracle用户

```
useradd -g oinstall -G oper,dba,asmdba -d /home/oracle
oracle
echo "oracle" | passwd oracle --stdin
```

2. 编辑oracle用户的`.bash_profile`

注：ora1的ORACLE_SID=rac1，ora2的ORACLE_SID=rac2

```
export ORACLE_SID=rac1
export ORACLE_BASE=/u01/app/oracle
export ORACLE_HOME=/u01/app/oracle/product/11.2.0/db_1

PATH=$PATH:$HOME/.local/bin:$HOME/bin:$ORACLE_HOME/bin
export PATH
```

文件夹设置

1. 双库创建相同的文件夹结构(root用户执行)

```
mkdir -p /u01/app/oracle/product/11.2.0/db_1
mkdir -p /u01/app/grid/base
mkdir -p /u01/app/grid/home
chown -R grid:oinstall /u01
chown -R oracle:oinstall /u01/app/oracle
```

2. 文件放置，zip包自行解压

   root家目录下的文件（双节点）

```
pdksh-5.2.14-37.el5_8.1.x86_64.rpm
compat-libstdc++-33-3.2.3-72.el7.x86_64.rpm
```

   grid家目录下的文件（仅节点一）

```
p13390677_112040_Linux-x86-64_3of7.zip
p19404309_112040_Linux-x86-64.zip
p18370031_112040_Linux-x86-64.zip
```

   oracle家目录下的文件（仅节点一）

```
p13390677_112040_Linux-x86-64_1of7.zip
p13390677_112040_Linux-x86-64_2of7.zip
```

系统配置

1. 修改每个节点的/etc/hosts

```
192.168.3.64 ora1
192.168.3.65 ora2

# 以下三个IP交给安装包进行配置，所以安装之前无需ping通以下IP
192.168.3.88 ora1-vip
192.168.3.89 ora2-vip
192.168.3.90 ora-scan
```

2. 关闭防火墙和SELinux

```
systemctl disable firewalld
systemctl stop firewalld
# 永久关闭SELINUX
sed -i 's/=enforcing/=disabled/g'  /etc/selinux/config
# 或临时关闭：setenforce 0
# 可选
reboot
```

内核参数

1. 修改内核参数文件/etc/sysctl.conf

```
cat << EOF > /etc/sysctl.conf
fs.aio-max-nr = 1048576
fs.file-max = 6815744
kernel.shmall = 16451328
kernel.shmmax = 33692319744
kernel.shmmni = 4096
kernel.sem = 250 32000 100 128
net.ipv4.ip_local_port_range = 9000 65500
net.core.rmem_default = 262144
net.core.rmem_max = 4194304
net.core.wmem_default = 262144
net.core.wmem_max = 1048576
EOF
```

2. 生效内核参数

```
sysctl -p
```

3. 修改/etc/security/limits.conf

```
cat << EOF > /etc/security/limits.conf
oracle   soft   nproc    131072
oracle   hard   nproc    131072
oracle   soft   nofile   131072
oracle   hard   nofile   131072
oracle   soft   core     unlimited
oracle   hard   core     unlimited
oracle   soft   memlock  50000000
oracle   hard   memlock  50000000
grid soft nproc 2047
grid hard nproc 16384
grid soft nofile 1024
grid hard nofile 65536
EOF
```

4. 在/etc/pam.d/login下添加

```
session required pam_limits.so
```

这使得用户将加载PAM的pam_limits.so，设置用户登录的硬性设置

安装依赖

本地系统镜像中可直接安装(双节点执行)

```
yum install -y binutils-* libc* compat-libstdc++-* elfutils-libelf-* elfutils-libelf-* elfutils-libelf-devel-static-* gcc-* gcc-c++-* glibc-* glibc-common-* glibc-devel-* glibc-headers-* kernel-headers-* libaio-* libaio-devel-* libgcc-* libgomp-* libstdc++-* libstdc++-devel-* make-* sysstat-* compat-libcap* smartmontools
```

额外需要（双节点执行）

```
rpm -ivh compat-libstdc++-33-3.2.3-72.el7.x86_64.rpm
# 如果 pdksh 与 (已安装) ksh-20120801-142.el7.x86_64 冲突
# rpm -e ksh-20120801-142.el7.x86_64
rpm -ivh pdksh-5.2.14-37.el5_8.1.x86_64.rpm
```

推荐安装

```
yum install -y -q net-tools telnet unzip
```

安装cvuqdisk包（仅节点一）

```
# 进入安装文件夹
cd grid/
rpm -ivh rpm/cvuqdisk-1.0.9-1.rpm
```

二、配置共享磁盘

除iscsi服务端外，其他步骤**双节点执行**

参考：[iscsi安装参考文档]

配置iscsi服务端

1. 安装

   ```
   yum install -y target*
   ```

2. 启动并自启

   ```
   systemctl enable target
   systemctl start target
   ```

3. 将未格式化、未分区的硬盘进行分区通过`fdisk -l`检查到`/dev/sdb`是我们需要进行共享的磁盘，先将它分区,但不需要格式化

   ```
   [root@ora1 grid]# fdisk /dev/sdb
   ```

```
命令(输入 m 获取帮助)：n
Select (default p): p
分区号 (1-4, 默认 1)：1
起始 扇区 (2048-41943039, 默认为 2048)：2048
Last 扇区, +扇区 or +size{K,M,G} (2048-41943039, 默认为 41943039)：13981696

命令(输入 m 获取帮助)：n
Select (default p): p
分区号 (2-4, 默认 2)：2
起始 扇区 (13981697-41943039, 默认为 13983744)：13983744
Last 扇区, +扇区 or +size{K,M,G} (13983744-41943039, 默认为 41943039)：27962026

命令(输入 m 获取帮助)：n
Select (default p): p
分区号 (3,4, 默认 3)：3
起始 扇区 (13981697-41943039, 默认为 27963392)：27963392
Last 扇区, +扇区 or +size{K,M,G} (27963392-41943039, 默认为 41943039)：41943039

命令(输入 m 获取帮助)：w
The partition table has been altered!
Calling ioctl() to re-read partition table.
正在同步磁盘。
```

4. 查看分区

```
ora1 ~]# lsblk
NAME            MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda               8:0    0   50G  0 disk
├─sda1            8:1    0    1G  0 part /boot
└─sda2            8:2    0   49G  0 part
  ├─centos-root 253:0    0 45.1G  0 lvm  /
  └─centos-swap 253:1    0  3.9G  0 lvm  [SWAP]
sdb               8:16   0   20G  0 disk
├─sdb1            8:17   0    6G  0 part
├─sdb2            8:18   0    6G  0 part
└─sdb3            8:19   0    8G  0 part
sr0              11:0    1  4.5G  0 rom
loop0             7:0    0  4.5G  1 loop /mnt/iso
```

5. 进入子系统

```
[root@ora1 ~]# targetcli
```

6. 添加硬盘信息格式

```
/> /backstores/block create DB1 /dev/sdb1
/> /backstores/block create DB2 /dev/sdb2
/> /backstores/block create DB3 /dev/sdb3
```

7. 创建iscsi

```
格式：/iscsi create 格式.年份-月份.*.com.自定义名称
/> /iscsi create iqn.2021-06.30.com.oracle
```

8. 关联block和target

```
/> /iscsi/iqn.2021-06.30.com.oracle/tpg1/luns create
/backstores/block/DB1
/> /iscsi/iqn.2021-06.30.com.oracle/tpg1/luns create
/backstores/block/DB2
/> /iscsi/iqn.2021-06.30.com.oracle/tpg1/luns create
/backstores/block/DB3
```

9. 创建acl

```
/> /iscsi/iqn.2021-06.30.com.oracle/tpg1/acls create
iqn.2021-06.30.com.oracle:ora1
```

10. 退出

```
/> exit
Global pref auto_save_on_exit=true
Configuration saved to /etc/target/saveconfig.json
```

11. 重启服务

```
systemctl restart target
```

注：此时会有端口开放

```
[root@ora1 ~]# netstat -tunlp |grep 3260
tcp        0      0 0.0.0.0:3260            0.0.0.0:*
          LISTEN      -
```

配置iscsi客户端

1. 安装

```
yum install -y iscsi*
```

2. 开机自启

```
systemctl enable iscsid
```

3. 发现target

注：有输出才是被发现，-p 后面的参数是iscsi服务端的ip

```
[root@ora1 ~]# iscsiadm -m discovery -t st -p 192.168.3.64
192.168.3.64:3260,1 iqn.2021-06.30.com.oracle
```

4. 修改/etc/iscsi/initiatorname.iscsi

```
InitiatorName=iqn.2021-06.30.com.oracle:ora1
```

5. 重启服务

```
systemctl restart iscsid
```

6. 登录

   注：需要发现后，才能登陆

```
iscsiadm -m node -T iqn.2021-06.30.com.oracle -p
192.168.3.64 -l
```

   如果在主机A格式化了共享盘，在B上其实有了，但可能需要重新登录后，才能在`lsblk`中看见，不登录也可以直接用格式化的磁盘

7. 检查,其中sdc,sdd,sde就是我们共享盘啦

```
[root@ora1 ~]# lsblk
NAME            MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda               8:0    0   50G  0 disk
├─sda1            8:1    0    1G  0 part /boot
└─sda2            8:2    0   49G  0 part
  ├─centos-root 253:0    0 45.1G  0 lvm  /
  └─centos-swap 253:1    0  3.9G  0 lvm  [SWAP]
sdb               8:16   0   20G  0 disk
├─sdb1            8:17   0    6G  0 part
├─sdb2            8:18   0    6G  0 part
└─sdb3            8:19   0    8G  0 part
sdc               8:32   0    6G  0 disk
sdd               8:48   0    8G  0 disk
sde               8:64   0    6G  0 disk
sr0              11:0    1  4.5G  0 rom
loop0             7:0    0  4.5G  1 loop /mnt/iso
```

8. 在节点一分区（），并在节点二重新登录

节点一：

```
[root@ora1 ~]# fdisk /dev/sdc

命令(输入 m 获取帮助)：n
Partition type:p
分区号 (1-4, 默认 1)：1
起始 扇区 (2048-13978965, 默认为 2048)：2048
Last 扇区, +扇区 or +size{K,M,G} (2048-13978965, 默认为 13978965)：13978965
命令(输入 m 获取帮助)：w
The partition table has been altered!
正在同步磁盘。

[root@ora1 ~]# fdisk /dev/sdd
命令(输入 m 获取帮助)：n
Partition type:
   p   primary (0 primary, 0 extended, 4 free)
   e   extended
Select (default p):
起始 扇区 (2048-13980330, 默认为 2048)：
Last 扇区, +扇区 or +size{K,M,G} (2048-13980330, 默认为 13980330)：
命令(输入 m 获取帮助)：w
The partition table has been altered!
正在同步磁盘。

[root@ora1 ~]# fdisk /dev/sde
命令(输入 m 获取帮助)：n
Partition type:
分区号 (1-4, 默认 1)：1
起始 扇区 (2048-13979647, 默认为 2048)：2048
Last 扇区, +扇区 or +size{K,M,G} (2048-13979647, 默认为 13979647)：13979647
命令(输入 m 获取帮助)：w
The partition table has been altered!
正在同步磁盘。
```

节点二：

```
# 注销
[root@ora2 ~]# iscsiadm -m node -T iqn.2021-06.30.com.oracle -p 192.168.3.64 -u
Logging out of session [sid: 6, target: iqn.2021-06.30.com.oracle, portal: 192.168.3.64,3260]
Logout of [sid: 6, target: iqn.2021-06.30.com.oracle, portal: 192.168.3.64,3260] successful.
# 重新登录
[root@ora2 ~]# iscsiadm -m node -T iqn.2021-06.30.com.oracle -p 192.168.3.64 -l
Logging in to [iface: default, target: iqn.2021-06.30.com.oracle, portal: 192.168.3.64,3260] (multiple)
Login to [iface: default, target: iqn.2021-06.30.com.oracle, portal: 192.168.3.64,3260] successful.
# 可以看到磁盘被分区了
[root@ora1 ~]# lsblk
NAME            MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda               8:0    0   50G  0 disk
├─sda1            8:1    0    1G  0 part /boot
└─sda2            8:2    0   49G  0 part
  ├─centos-root 253:0    0 45.1G  0 lvm  /
  └─centos-swap 253:1    0  3.9G  0 lvm  [SWAP]
sdb               8:16   0   20G  0 disk
├─sdb1            8:17   0    6G  0 part
├─sdb2            8:18   0    6G  0 part
└─sdb3            8:19   0    8G  0 part
sdc               8:32   0    6G  0 disk
└─sdc1            8:33   0    6G  0 part
sdd               8:48   0    8G  0 disk
└─sdd1            8:49   0    8G  0 part
sde               8:64   0    6G  0 disk
└─sde1            8:65   0    6G  0 part
sr0              11:0    1  4.5G  0 rom
loop0             7:0    0  4.5G  1 loop /mnt/iso
```

配置多路径

参考文档：

深入分析Multipath

Oracle rac搭建使用Multipath

1. 安装软件

```
yum install device-mapper* -y
```

2. 启用模块

```
 modprobe dm-multipath
 modprobe dm-round-robin
```

3. 查看是否启用

```
[root@ora1 ~]# lsmod | grep ^dm_m[uo]
dm_multipath           27792  1 dm_round_robin
dm_mod                124501  9
dm_multipath,dm_log,dm_mirror
```

4. 生成Multipath而配置文件

```
 mpathconf --enable --find_multipaths y --with_module y --
with_multipathd y
```

5. 添加共享磁盘的wwid

```
# 将添加到/etc/multipath/wwid
[root@ora2 multipath]# multipath -a /dev/sdb
wwid '3600140579f3599c229346da8e86734e4' added
[root@ora2 multipath]# multipath -a /dev/sdc
wwid '36001405faacac4444884193b7de477e6' added
[root@ora2 multipath]# multipath -a /dev/sdd
wwid '36001405c8e49d885e6843d9bdc448d26' added
```

6. 修改/etc/multipath.conf配置文件

[多路径配置文件详解]

```
defaults {
        user_friendly_names yes
        # 启用多路径策略
        path_grouping_policy multibus
        find_multipaths yes
        path_selector "round-robin 0"
        failback manual
        rr_weight priorities
        no_path_retry 5
}

# 将本地磁盘排除
blacklist {
       devnode "^sd[ab]"
       devnode "sr0"
}
multipaths {
       multipath {
              # 根据multipath -a /dev/命令输出的wwid
              # 或根据/lib/udev/scsi_id -g -u /dev/sdb 中每个磁盘的WWID来对应
              wwid 3600140579f3599c229346da8e86734e4
              alias RAC-OCRVOTE
       }
       multipath {
              wwid 36001405faacac4444884193b7de477e6
              alias RAC-FRA
       }
       multipath {
              wwid 36001405c8e49d885e6843d9bdc448d26
              alias RAC-DATA
       }
}
```

7. 重启服务

```
systemctl restart multipathd
```

8. 检查

此时查看`multipath -v3 | grep "not in wwids file, skipping sdd"`，没有报错。

查看

```
[root@ora1 ~]# ll /dev/mapper/
总用量 0
lrwxrwxrwx 1 root root       7 7月   4 13:13 centos-root -> ../dm-0
lrwxrwxrwx 1 root root       7 7月   4 13:13 centos-swap -> ../dm-1
crw------- 1 root root 10, 236 7月   4 13:13 control
lrwxrwxrwx 1 root root       7 7月   4 13:32 RAC-DATA -> ../dm-4
lrwxrwxrwx 1 root root       7 7月   4 13:32 RAC-DATA1 -> ../dm-7
lrwxrwxrwx 1 root root       7 7月   4 13:32 RAC-FRA -> ../dm-2
lrwxrwxrwx 1 root root       7 7月   4 13:32 RAC-FRA1 -> ../dm-5
lrwxrwxrwx 1 root root       7 7月   4 13:32 RAC-OCRVOTE -> ../dm-3
lrwxrwxrwx 1 root root       7 7月   4 13:32 RAC-OCRVOTE1 -> ../dm-6
```

查看

```
[root@ora1 ~]# multipathd show paths
hcil     dev dev_t pri dm_st  chk_st dev_st  next_check
3:0:0:2 sdd 8:48  1   active ready  running ..... 1/20
3:0:0:0 sdc 8:32  1   active ready  running ..... 1/20
3:0:0:1 sde 8:64  1   active ready  running ..... 1/20
```

到此multipath 配置完成！

配置udev

参考文档：udev简介及配置

通过UDEV配置，能够让Oracle对磁盘名进行持久化并改变磁盘访问权限为grid:asmadmin。这样在ASM的配置过程中能够看到磁盘。今后增加磁盘也不会改变原有的磁盘名称。该步骤可使用ASMLIB

1. 根据共享盘查看dm_uuid

```
 [root@ora1 ~]# for i in RAC-OCRVOTE1 RAC-DATA1 RAC-FRA1; do
 printf "%s %s\n" "$i" "$(udevadm info --query=all --
name=/dev/mapper/$i |grep -i -o dm_uuid.*)";
 done

RAC-OCRVOTE1 DM_UUID=part1-mpath-
3600140579f3599c229346da8e86734e4
RAC-DATA1 DM_UUID=part1-mpath-
36001405c8e49d885e6843d9bdc448d26
RAC-FRA1 DM_UUID=part1-mpath-
36001405faacac4444884193b7de477e6
```

2. 添加udev规则

   编辑/etc/udev/rules.d/99-oracle-asmdevices.rules

   ENV{DM_UUID}==""依次为上诉查找的结果，SYMLINK（该名称作为/dev/.....）依次为**asm-ocrvote**，**asm-data**，**asm-fra**

```
# 模板
# KERNEL=="dm-*",SYMLINK+="",ENV{DM_UUID}=="",OWNER="grid",GROUP="asmadmin",MODE="0660"
KERNEL=="dm-*",ENV{DM_UUID}=="part1-mpath-3600140579f3599c229346da8e86734e4",SYMLINK+="asm-ocrvote",OWNER="grid",GROUP="asmadmin",MODE="0660"
KERNEL=="dm-*",ENV{DM_UUID}=="part1-mpath-36001405c8e49d885e6843d9bdc448d26",SYMLINK+="asm-data",OWNER="grid",GROUP="asmadmin",MODE="0660"
KERNEL=="dm-*",ENV{DM_UUID}=="part1-mpath-36001405faacac4444884193b7de477e6",SYMLINK+="asm-fra",OWNER="grid",GROUP="asmadmin",MODE="0660"
```

3. 双节点添加完规则后,重启udev服务

```
udevadm control --reload-rules
udevadm trigger --type=devices --action=change
```

4. 测试文件是否生效

   在查看`ll /dev/mapper/`时，能够发现`RAC-FRA1 -> ../dm-5`，`RAC-OCRVOTE1 -> ../dm-6`，`RAC-DATA1 -> ../dm-7`，针对dm-5、dm-6、dm-7进行查看。

```
udevadm test /sys/block/dm-5
```

   查看权限分配是否正确

```
[root@ora1 rules.d]# ll /dev/dm-5
brw-rw---- 1 grid asmadmin 253, 5 7月   4 14:06 /dev/dm-5
```

三、安装Grid Infrastructure

标题无特殊特殊说明的步骤，均使用grid用户执行

grid用户互信

配置RAC的节点互信，在主节点执行一次即可

```
sshsetup/sshUserSetup.sh -hosts "ora1 ora2" -user grid -advanced -noPromptPassphrase
```

注：验证互信的方式：`ssh 主机名 date`，能免密执行

配置GI

1. 执行检查

   ```
   ./runcluvfy.sh stage -pre crsinst -n ora1,ora2 -fixup -verbose
   ```

2. 修改response/grid_install.rsp

   注：主节点修改该文件即可，其他节点将被复制安装文件

   ```
   oracle.install.responseFileVersion=/oracle/install/rspfmt_crsinstall_response_schema_v11_2_0
   # 主机名
   ORACLE_HOSTNAME=ora1
   # INVENTORY 目录
   INVENTORY_LOCATION=/u01/app/grid/oraInventory
   SELECTED_LANGUAGES=en
   oracle.install.option=CRS_CONFIG
   # ORACLE_HOME:不能在ORACLE_BASE之下且不相同
   ORACLE_BASE=/u01/app/grid/base
   ORACLE_HOME=/u01/app/grid/home
   oracle.install.asm.OSDBA=asmdba
   oracle.install.asm.OSOPER=asmoper
   oracle.install.asm.OSASM=asmadmin
   # scanName:scan ip
   oracle.install.crs.config.gpnp.scanName=ora-scan
   oracle.install.crs.config.gpnp.scanPort=1521
   # cluster Name:集群名
   ```

```
oracle.install.crs.config.clusterName=rac
oracle.install.crs.config.gpnp.configureGNS=false
oracle.install.crs.config.gpnp.gnsSubDomain=
oracle.install.crs.config.gpnp.gnsVIPAddress=
oracle.install.crs.config.autoConfigureClusterNodeVIP=false
# cluster node:前者公网，后者VIP
oracle.install.crs.config.clusterNodes=ora1:ora1-vip,ora2:ora2-vip
# networkInterfaceList:填写网关,前者公网，后者私网，均为真实网卡，填写该IP的网段号，接口3是未被使用
oracle.install.crs.config.networkInterfaceList=eth0:192.168.0.0:1,eth5:192.168.122.0:2
oracle.install.crs.config.storageOption=ASM_STORAGE
oracle.install.crs.config.sharedFileSystemStorage.diskDriveMapping=
oracle.install.crs.config.sharedFileSystemStorage.votingDiskLocations=
oracle.install.crs.config.sharedFileSystemStorage.votingDiskRedundancy=NORMAL
oracle.install.crs.config.sharedFileSystemStorage.ocrLocations=
oracle.install.crs.config.sharedFileSystemStorage.ocrRedundancy=NORMAL
oracle.install.crs.config.useIPMI=false
oracle.install.crs.config.ipmi.bmcUsername=
oracle.install.crs.config.ipmi.bmcPassword=
oracle.install.asm.SYSASMPassword=Oracle123
# 表决盘
oracle.install.asm.diskGroup.name=OCRVOTE
# NORMAL模式需要指定三块，EXTERNAL模式只需要制定一块盘
# 剩下2块盘，留作创建磁盘组
oracle.install.asm.diskGroup.redundancy=EXTERNAL
oracle.install.asm.diskGroup.AUSize=1
# 指定表决盘盘路径,根据ll /dev/RAC-ORAVOTE指向的路径
oracle.install.asm.diskGroup.disks=/dev/dm-7
# 发现其他asm磁盘
oracle.install.asm.diskGroup.diskDiscoveryString=/dev/dm-*
# password
```

```
oracle.install.asm.monitorPassword=Oracle123
oracle.install.crs.upgrade.clusterNodes=
oracle.install.asm.upgradeASM=false
oracle.installer.autoupdates.option=SKIP_UPDATES
oracle.installer.autoupdates.downloadUpdatesLoc=
AUTOUPDATES_MYORACLESUPPORT_USERNAME=
AUTOUPDATES_MYORACLESUPPORT_PASSWORD=
PROXY_HOST=
PROXY_PORT=0
PROXY_USER=
PROXY_PWD=
PROXY_REALM=
```

3. 进入安装文件夹，并执行下列命令，开始静默安装（约十分钟）

```
./runInstaller -ignorePrereq -silent -force -responseFile `pwd`/response/grid_install.rsp  -showprogress
```

注：图形化安装窗口异常的问题解决命令：`./runInstaller -jreLoc /etc/alternatives/jre_1.8.0`

注：通过`echo $?`是否返回`0`来判断安装成功，一般出现`CAUSE:`就是失败了

执行root.sh前的补丁p18370031

该脚本针对**CentOS7**的服务

没有补丁的解决方案

不打补丁时，执行root.sh将提示**Adding Clusterware entries to inittab**

1. 编写启动脚本

```
cat << EOF > /usr/lib/systemd/system/ohasd.service
[Unit]
Description=Oracle High Availability Services
After=syslog.target
[Service]
ExecStart=/etc/init.d/init.ohasd run >/dev/null 2>&1
Type=simple
Restart=always
[Install]
WantedBy=multi-user.target
EOF
```

2. 修改服务

```
chmod 755 /usr/lib/systemd/system/ohasd.service
systemctl daemon-reload
systemctl enable ohasd.service
```

3. 在运行root.sh时，`/etc/init.d/`目录出现`inint.ohasd`时启动服务

```
systemctl start ohasd.service
```

有补丁的解决方案

打补丁后，执行root.sh将提示**Adding Clusterware entries to oracle-ohasd.service**

注：节点一打补丁后，根据可以选择是否在其他节点上执行

1. 进入补丁目录

```
cd 18370031/
```

2. 安装补丁

   安装过程中

```
/u01/app/grid/home/OPatch/opatch apply
```

3. 检查安装历史记录

```
/u01/app/grid/home/OPatch/opatch lshistory
```

执行脚本（root用户执行）

1. 以root用户执行

   注：第一个节点执行完俩条命令后，再去二个节点执行，务必双节点执行。否则安装数据库找不到没有执行root.sh的主机

   注，出错时多检查日志，执行完毕后可`ehco $?`查看返回值，0则正确

```
/u01/app/grid/oraInventory/orainstRoot.sh
# 约十分钟
/u01/app/grid/home/root.sh
```

   完美执行脚本Root.sh 日志如下，仅供参考

```
Creating /etc/oratab file...
Entries will be added to the /etc/oratab file as needed by
Database Configuration Assistant when a database is created
Finished running generic part of root script.
Now product-specific root actions will be performed.
Using configuration parameter file:
/u01/app/grid/home/crs/install/crsconfig_params
Creating trace directory
User ignored Prerequisites during installation
Installing Trace File Analyzer
OLR initialization - successful
  root wallet
  root wallet cert
  root cert export
  peer wallet
  profile reader wallet
  pa wallet
  peer wallet keys
  pa wallet keys
```

```
  peer cert request
  pa cert request
  peer cert
  pa cert
  peer root cert TP
  profile reader root cert TP
  pa root cert TP
  peer pa cert TP
  pa peer cert TP
  profile reader pa cert TP
  profile reader peer cert TP
  peer user cert
  pa user cert
Adding Clusterware entries to oracle-ohasd.service
CRS-2672: Attempting to start 'ora.mdnsd' on 'ora1'
CRS-2676: Start of 'ora.mdnsd' on 'ora1' succeeded
CRS-2672: Attempting to start 'ora.gpnpd' on 'ora1'
CRS-2676: Start of 'ora.gpnpd' on 'ora1' succeeded
CRS-2672: Attempting to start 'ora.cssdmonitor' on 'ora1'
CRS-2672: Attempting to start 'ora.gipcd' on 'ora1'
CRS-2676: Start of 'ora.cssdmonitor' on 'ora1' succeeded
CRS-2676: Start of 'ora.gipcd' on 'ora1' succeeded
CRS-2672: Attempting to start 'ora.cssd' on 'ora1'
CRS-2672: Attempting to start 'ora.diskmon' on 'ora1'
CRS-2676: Start of 'ora.diskmon' on 'ora1' succeeded
CRS-2676: Start of 'ora.cssd' on 'ora1' succeeded

已成功创建并启动 ASM。

已成功创建磁盘组OCRVOTE。

clscfg: -install mode specified
Successfully accumulated necessary OCR keys.
Creating OCR keys for user 'root', privgrp 'root'..
Operation successful.
CRS-4256: Updating the profile
Successful addition of voting disk
214e1a35dd694f02bf891fa4259699f3.
```

```
Successfully replaced voting disk group with +OCRVOTE.
CRS-4256: Updating the profile
CRS-4266: Voting file(s) successfully replaced
##  STATE    File Universal Id                File Name
Disk group
--  -----    -----------------                ---------
------
 1. ONLINE   214e1a35dd694f02bf891fa4259699f3 (/dev/dm-7)
[OCRVOTE]
Located 1 voting disk(s).
CRS-2672: Attempting to start 'ora.asm' on 'ora1'
CRS-2676: Start of 'ora.asm' on 'ora1' succeeded
CRS-2672: Attempting to start 'ora.OCRVOTE.dg' on 'ora1'
CRS-2676: Start of 'ora.OCRVOTE.dg' on 'ora1' succeeded
软件包准备中...
cvuqdisk-1.0.9-1.x86_64
Configure Oracle Grid Infrastructure for a Cluster ...
succeeded
```

2. 在主节点以grid用户执行

```
/u01/app/grid/home/cfgtoollogs/configToolAllCommands
RESPONSE_FILE=<response_file>
```

注：response_file请使用绝对路径

注：plug-in Automatic Storage Management Configuration Assistan失败关系不大($?返回3)

注：如果不执行该语句，安装数据库时会提示没有安装GI，因此务必执行。

四、安装并创建数据库

安装oracle软件(oracle用户执行)

1. oracle用户互信

```
# 进入安装目录
cd database
sshsetup/sshUserSetup.sh -hosts "ora1 ora2" -user oracle -advanced -noPromptPassphrase
```

注：互信检查方式为：`ssh 主机名 date`,能免密执行

2. 资源文件操作

   备份资源文件

```
cp response/db_install.rsp response/db_install.rsp.save
```

   修改response/db_install.rsp

```
oracle.install.responseFileVersion=/oracle/install/rspfmt_dbinstall_response_schema_v11_2_0
oracle.install.option=INSTALL_DB_SWONLY
# hostname
ORACLE_HOSTNAME=ora1
UNIX_GROUP_NAME=oinstall
INVENTORY_LOCATION=/u01/app/oracle/Inventory
SELECTED_LANGUAGES=en
# ORACLE_HOME
ORACLE_HOME=/u01/app/oracle/product/11.2.0/db_1
ORACLE_BASE=/u01/app/oracle
oracle.install.db.InstallEdition=EE
oracle.install.db.EEOptionsSelection=false
oracle.install.db.optionalComponents=oracle.rdbms.partitioning:11.2.0.4.0,oracle.oraolap:11.2.0.4.0,oracle.rdbms.dm:11.2.0.4.0,oracle.rdbms.dv:11.2.0.4.0,o
oracle.install.db.DBA_GROUP=dba
oracle.install.db.OPER_GROUP=dba
# node
oracle.install.db.CLUSTER_NODES=ora1,ora2
oracle.install.db.isRACOneInstall=false
oracle.install.db.racOneServiceName=
oracle.install.db.config.starterdb.type=GENERAL_PURPOSE
```

```
# globalDBName
oracle.install.db.config.starterdb.globalDBName=racdb
oracle.install.db.config.starterdb.SID=rac
oracle.install.db.config.starterdb.characterSet=AL32UTF8
oracle.install.db.config.starterdb.memoryOption=false
oracle.install.db.config.starterdb.memoryLimit=
oracle.install.db.config.starterdb.installExampleSchemas=false
oracle.install.db.config.starterdb.enableSecuritySettings=false
oracle.install.db.config.starterdb.password.ALL=Oracle#123
oracle.install.db.config.starterdb.password.SYS=
oracle.install.db.config.starterdb.password.SYSTEM=
oracle.install.db.config.starterdb.password.SYSMAN=
oracle.install.db.config.starterdb.password.DBSNMP=
oracle.install.db.config.starterdb.control=DB_CONTROL
oracle.install.db.config.starterdb.gridcontrol.gridControlServiceURL=
oracle.install.db.config.starterdb.automatedBackup.enable=false
oracle.install.db.config.starterdb.automatedBackup.osuid=
oracle.install.db.config.starterdb.automatedBackup.ospwd=
oracle.install.db.config.starterdb.storageType=
oracle.install.db.config.starterdb.fileSystemStorage.dataLocation=
oracle.install.db.config.starterdb.fileSystemStorage.recoveryLocation=
oracle.install.db.config.asm.diskGroup=
oracle.install.db.config.asm.ASMSNMPPassword=Oracle#123
MYORACLESUPPORT_USERNAME=
MYORACLESUPPORT_PASSWORD=
SECURITY_UPDATES_VIA_MYORACLESUPPORT=false
DECLINE_SECURITY_UPDATES=true
PROXY_HOST=
PROXY_PORT=
PROXY_USER=
PROXY_PWD=
PROXY_REALM=
```

```
53 COLLECTOR_SUPPORTHUB_URL=
54 oracle.installer.autoupdates.option=SKIP_UPDATES
55 oracle.installer.autoupdates.downloadUpdatesLoc=
56 AUTOUPDATES_MYORACLESUPPORT_USERNAME=
57 AUTOUPDATES_MYORACLESUPPORT_PASSWORD=
```

3. 节点1执行进行安装

```
./runInstaller -ignorePrereq -silent -force -responseFile `pwd`/response/db_install.rsp -showProgress
```

注：每个节点需要有相同文件结构(已实施)

注：其他远程节点会自动复制，远程节点的$ORACLE_HOME大约有4.2G，可查看进度（大约十五分钟）

注：安装之间再检查下oracle用户是否属于dba组，否则安装失败，会提示`CAUSE: The installation user account must be a member of all groups required for installation.`

注：不要输出`.....94% Done`和`Setup files successful.`作为安装结束的标志，多等一会。。每个节点的文件大小基本相同，刚出这两条日志时，节点二还没达到4.2G的大小

4. 使用root用户执行root.sh脚本

```
/u01/app/oracle/product/11.2.0/db_1/root.sh
```

创建磁盘组(grid用户)

1. 以grid用户进入SQLPLUS，其中ORALCE_SID=+ASM1

```
sqlplus / as sysasm
```

2. 查看当前磁盘组

```
 SQL> select group_number,name,state,total_mb,free_mb from
v$asm_diskgroup;
GROUP_NUMBER NAME                                               STATE
       TOTAL_MB    FREE_MB
------------ ------------------------------ ----------- ----
------ ----------
             1 OCRVOTE                                       MOUNTED
             6140         5744
```

3. 创建磁盘组

```
SQL> CREATE DISKGROUP DATA external REDUNDANCY disk
'/dev/dm-6' ATTRIBUTE
'au_size'='1M','compatible.asm'='11.2';
Diskgroup created.

SQL> CREATE DISKGROUP FRA external REDUNDANCY disk '/dev/dm-
5' ATTRIBUTE 'au_size'='1M','compatible.asm'='11.2';
 Diskgroup created.
```

4. 再次查看当前磁盘组

```
SQL> select group_number,name,state,total_mb,free_mb from
v$asm_diskgroup;

GROUP_NUMBER NAME                                               STATE
       TOTAL_MB    FREE_MB
------------ ------------------------------ ----------- ----
------ ----------
             1 OCRVOTE                                       MOUNTED
             6140         5744
             2 DATA                                           MOUNTED
             6140         6088
             3 FRA                                           MOUNTED
             8187         8135
```

注：另一节点上也可看到创建的磁盘组

安装数据库（oracle用户）

1. 备份资源文件

```
cd $ORACLE_HOME
cp assistants/dbca/dbca.rsp !#:1.save
```

2. 修改$ORACLE_HOME/assistants/dbca/dbca.rsp

```
[CREATEDATABASE]
GDBNAME = "racdb"
templateName=General_Purpose.dbc
# 该文件SID指定的是前缀
# 所以oracle的用户的ORACLE_SID应该是rac1与rac2
SID = "rac"
NODELIST="ora1,ora2"
SYSPASSWORD = "password"
SYSTEMPASSWORD = "password"
SYSMANPASSWORD = "password"
DBSNMPPASSWORD = "password"
DATAFILEDESTINATION ="+DATA"
RECOVERYAREADESTINATION="+DATA"
STORAGETYPE="ASM"
CHARACTERSET = "AL32UTF"
NATIONALCHARACTERSET= "UTF8"
DISKGROUPNAME=DATA
OBFUSCATEDPASSWORDS=FALSE
SAMPLESCHEMA=FALSE
```

3. 使用dbca安装数据库

```
dbca -silent -createDatabase -responseFile
`pwd`/assistants/dbca/dbca.rsp
```

注：如果$?不是0，可以去/u01/app/oracle/cfgtoollogs/dbca查看日志

注：当节点一执行后，可在节点二的oracle用户（ORALCE_SID=rac2）实时查看新建的数据库

五、结束

到此安装结束！下面是部分命令

- 检查RAC状态

```
[grid@ora1 ~]$ crs_stat -t
Name           Type           Target    State     Host
------------------------------------------------------------
ora.DATA.dg    ora....up.type ONLINE    ONLINE    ora1
ora....ER.lsnr ora....er.type ONLINE    ONLINE    ora1
ora....N1.lsnr ora....er.type ONLINE    ONLINE    ora2
ora....N2.lsnr ora....er.type ONLINE    ONLINE    ora1
ora....N3.lsnr ora....er.type ONLINE    ONLINE    ora1
ora.asm        ora.asm.type   ONLINE    ONLINE    ora1
ora.cvu        ora.cvu.type   ONLINE    ONLINE    ora1
ora.gsd        ora.gsd.type   OFFLINE   OFFLINE
ora....network ora....rk.type ONLINE    ONLINE    ora1
ora.oc4j       ora.oc4j.type  ONLINE    ONLINE    ora1
ora.ons        ora.ons.type   ONLINE    ONLINE    ora1
ora....SM1.asm application    ONLINE    ONLINE    ora1
ora....A1.lsnr application    ONLINE    ONLINE    ora1
```

```
ora.ora1.gsd   application    OFFLINE   OFFLINE
ora.ora1.ons   application    ONLINE    ONLINE    ora1
ora.ora1.vip   ora....t1.type ONLINE    ONLINE    ora1
ora....SM2.asm application    ONLINE    ONLINE    ora2
ora....A2.lsnr application    ONLINE    ONLINE    ora2
ora.ora2.gsd   application    OFFLINE   OFFLINE
ora.ora2.ons   application    ONLINE    ONLINE    ora2
ora.ora2.vip   ora....t1.type ONLINE    ONLINE    ora2
ora.scan1.vip  ora....ip.type ONLINE    ONLINE    ora2
ora.scan2.vip  ora....ip.type ONLINE    ONLINE    ora1
ora.scan3.vip  ora....ip.type ONLINE    ONLINE    ora1

[grid@ora1 ~]$ 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
```

注：gsd结尾项状态为OFFLINE是正常

注：启动/关闭集群需要root权限，可以把grid用户变量复制到root用户的.bash_profile下

- 用root用户直接关闭并启动集群

```
# 关得快
[root@ora1 ~]# crsctl stop cluster -all
# 启动慢
[root@ora1 ~]# crsctl start cluster -all
```