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# Oracle 19c RAC on Linux安装手册

# 说明

Starting with Oracle Grid Infrastructure 12c Release 1 (12.1), as part of an Oracle Flex

Cluster installation, Oracle ASM is configured within Oracle Grid Infrastructure to

provide storage services

Starting with Oracle Grid Infrastructure 19c (19.3), with Oracle Standalone

Clusters, you can again place OCR and voting disk files directly on shared file

systems.

Oracle Flex Clusters

Starting with Oracle Grid Infrastructure 12c Release 2 (12.2), Oracle Grid

Infrastructure cluster configurations are Oracle Flex Clusters deployments.

从12.2开始，集群分Standalone Cluster与Domain Service Cluster两种集群模式，

**Standalone Cluster：**

* 可以支持64个节点
* 每个节点都直接连接共享存储
* 各个节点共享存储都通过各自节点的ASM实例或者共享文件系统挂载。
* 本地控制GIMR
* 19c Standalone Cluster可选择是否配置GIMR
* 可以使用GNS配置vip与scan，也可以自己手工配置。

**Domain Services Cluster：**

* 一个或多个节点组成域服务集群（DSC）
* 一个或多个节点组成数据库成员集群（Database Member Cluster ）
* （可选）一个或多个节点组成应用成员节点（Application Member Cluster）
* 集中的网格基础架构管理存储库（为Oracle Cluster Domain中的每个集群提供MGMTDB）
* 跟踪文件分析器（TFA）服务，用于Oracle Clusterware和Oracle数据库的目标诊断数据收集
* 合并Oracle ASM存储管理服务
* 可选的快速家庭配置（RHP）服务，用于安装群集，以及配置，修补和升级Oracle Grid Infrastructure和Oracle Database家庭。 配置Oracle域服务群集时，还可以选择配置Rapid Home Provisioning Server。

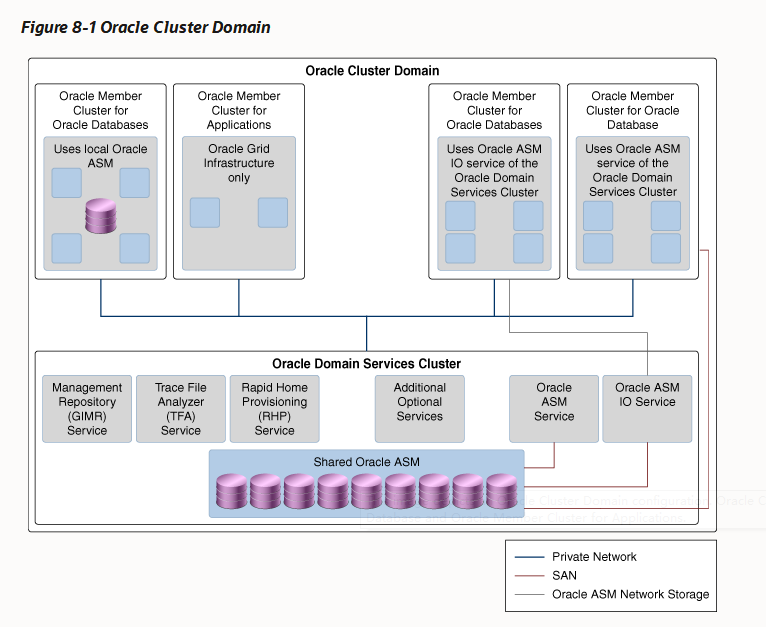
这些中心化的服务可以被cluster Domain 中的数据库成员集群利用（Datebase Member Cluster或Application Member Cluster）。

**Domain Service Cluster中的存储访问：**

DSC中的ASM能够提供中心化的存储管理服务，成员集群（Member Cluster）能够通过以下两种方式访问DSC上的分片式存储：

* 直接物理连接到分片存储进行访问
* 使用ASM IO Service 通过网络路径进行访问

单个Member Cluster中所有节点必须以相同的方式访问分片存储，一个Domain Service Cluster可以有多个Member Cluster，架构图如下：



# 1 OS环境检查

|  |  |  |
| --- | --- | --- |
| **项目** | **要求** | **检查命令** |
| **RAM** | 至少8G | # grep MemTotal /proc/meminfo |
| 运行级别 | 3 or 5 | # runlevel |
| Linux版本 | Oracle Linux 7.4 with the Unbreakable Enterprise Kernel 4:  4.1.12-112.16.7.el7uek.x86\_64 or later  Oracle Linux 7.4 with the Unbreakable Enterprise Kernel 5:  4.14.35-1818.1.6.el7uek.x86\_64 or later  Oracle Linux 7.4 with the Red Hat Compatible kernel:  3.10.0-693.5.2.0.1.el7.x86\_64 or later  • Red Hat Enterprise Linux 7.4: 3.10.0-693.5.2.0.1.el7.x86\_64  or later  • SUSE Linux Enterprise Server 12 SP3: 4.4.103-92.56-default  or later | # uname -mr  # cat /etc/redhat-release |
| /tmp | 至少1G | # du -h /tmp |
| swap | SWAP Between 4 GB and 16 GB: Equal to RAM  More than 16 GB: 16 GB，如果启用了Huge Page，则计算SWAP需要减去分配给HugePage的内存。 | # grep SwapTotal /proc/meminfo |
| /dev/shm | 检查/dev/shm挂载类型，以及权限。 | # df -h /dev/shm |
| 软件空间要求 | grid至少12G，Oracle至少10g空间，建议分配100g预留  19c开始GIMR在standalone安装时变为可选项。 | # df -h /u01 |

# 2 关闭THP，开启Hugepages

如果使用Oracle Linux，可以通过Preinstallation RPM配置操作系统，如果安装Oracle Domain Services Cluster，则需要配置GIMR，则需要考虑大页面会被GIMR的SGA使用1G，需要将此考虑到hugepages中，standalone则可以选择是否配置GIMR。

## 2.1 禁用透明大页面：

# 查看透明大页面是否开启

[root@db-oracle-node1 ~]# cat /sys/kernel/mm/transparent\_hugepage/enabled

[always] madvise never

# 查看透明大页面整理碎片功能是否开启，THP defragmentation

[root@db-oracle-node1 ~]# cat /sys/kernel/mm/transparent\_hugepage/defrag

[always] madvise never

将"transparent\_hugepage=never"内核参数追加到GRUB\_CMDLINE\_LINUX选项后：

# vi /etc/default/grub

GRUB\_CMDLINE\_LINUX="rd.lvm.lv=rhel/root rd.lvm.lv=rhel/swap ...

transparent\_hugepage=never"

备份/boot/grub2/grub.cfg，通过grub2-mkconfig -o命令重建/boot/grub2/grub.cfg文件：

On BIOS-based machines: ~]# grub2-mkconfig -o /boot/grub2/grub.cfg

On UEFI-based machines: ~]# grub2-mkconfig -o /boot/efi/EFI/redhat/grub.cfg

重启系统：

# shutdown -r now

验证参数设置是否正确：

# cat /proc/cmdline

注：如果还没有关闭THP，参考<http://blog.itpub.net/31439444/viewspace-2674001/>完成剩余步骤。

## 2.2 开启大页面：

# vim /etc/sysctl.conf

vm.nr\_hugepages = xxxx

# sysctl -p

vim /etc/security/limits.conf

oracle soft memlock xxxxxxxxxxx

oracle hard memlock xxxxxxxxxxx

# 3 安装软件包

## 3.1 Red Hat Enterprise Linux 7安装包

openssh

bc

binutils

compat-libcap1

compat-libstdc++

elfutils-libelf

elfutils-libelf-devel

fontconfig-devel

glibc

glibc-devel

ksh

libaio

libaio-devel

libX11

libXau

libXi

libXtst

libXrender

libXrender-devel

libgcc

librdmacm-devel

libstdc++

libstdc++-devel

libxcb

make

net-tools (for Oracle RAC and Oracle Clusterware)

nfs-utils (for Oracle ACFS)

python (for Oracle ACFS Remote)

python-configshell (for Oracle ACFS Remote)

python-rtslib (for Oracle ACFS Remote)

python-six (for Oracle ACFS Remote)

targetcli (for Oracle ACFS Remote)

smartmontools

sysstat

## 3.2 其他软件包

可以选择是否安装附加驱动与软件包，可以配置：PAM、OCFS2，ODBC、LDAP

# 4 内核参数

## 4.1 使用Preinstall RPM配置内核参数

如果是Oracle Linux, or Red Hat Enterprise Linux

可以使用preinstall rpm配置os：

# cd /etc/yum.repos.d/

# wget <http://yum.oracle.com/public-yum-ol7.repo>

# yum repolist

# yum install oracle-database-preinstall-19c

也可以手工下载preinstall rpm安装包：

http://yum.oracle.com/repo/OracleLinux/OL6/latest/x86\_64//

<http://yum.oracle.com/repo/OracleLinux/OL7/latest/x86_64>

preinstall做以下工作：

* 创建oracle用户，创建oraInventory(oinstall)以及OSDBA(dba)组。
* 设置sysctl.conf，调整Oracle建议的系统启动参数、驱动参数
* 设置hard以及soft用户资源限制。
* 设置其他与系统内核版本相关的建议参数。
* 设置numa=off

## 4.2 手工配置参数

如果不使用preinstall rpm配置内核参数，也可以手工配置kernel parameter：

# vi /etc/sysctl.d/97-oracledatabase-

sysctl.conf

fs.aio-max-nr = 1048576

fs.file-max = 6815744

kernel.shmall = 2097152

kernel.shmmax = 4294967295

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

改变当前系统值：

# /sbin/sysctl –system

# /sbin/sysctl -a

设置网络端口范围：

$ cat /proc/sys/net/ipv4/ip\_local\_port\_range

# echo 9000 65500 > /proc/sys/net/ipv4/ip\_local\_port\_range

# /etc/rc.d/init.d/network restart

## 4.2 CVU(optional)

如果不使用Oracle Preinstallation RPM，可以使用Cluster Verification Utility,按照下面步骤安装CVU：

* Locate the cvuqdisk RPM package, which is located in the directory

Grid\_home/cv/rpm. Where Grid\_home is the Oracle Grid Infrastructure home

directory.

* Copy the cvuqdisk package to each node on the cluster. You should ensure that

each node is running the same version of Linux.

* Log in as root.
* Use the following command to find if you have an existing version of the cvuqdisk

package:

# rpm -qi cvuqdisk

* If you have an existing version of cvuqdisk, then enter the following command to

deinstall the existing version:

# rpm -e cvuqdisk

* Set the environment variable CVUQDISK\_GRP to point to the group that owns

cvuqdisk, typically oinstall. For example:

# CVUQDISK\_GRP=oinstall; export CVUQDISK\_GRP

* In the directory where you have saved the cvuqdisk RPM, use the command rpm

-iv package to install the cvuqdisk package. For example:

# rpm -iv cvuqdisk-1.0.10-1.rpm

* 运行安装验证

$ ./runcluvfy.sh stage -pre crsinst -fixup -n node1,node2,node3

# 5 网络配置

网络配置说明：

（1）要么全部ipv4，要么全部ipv6，GNS可以生成ipv6地址

（2）VIP，Starting with Oracle Grid Infrastructure 18c, using VIP is optional for Oracle

Clusterware deployments. You can specify VIPs for all or none of the cluster

nodes. However, specifying VIPs for selected cluster nodes is not supported.

（3）Private：安装过程可以配置四个interface private IP做为HAIP（高可用IP），如果配置了超过四个interface，则超过四个的部分自动做为冗余，private可以不使用bond网卡绑定，集群可以自动高可用。

（4）Public/VIP名称：可以使用字母数字以及“-”连接符，不允许使用“\_“下划线

（5）Public/VIP/SCAN VIP 需要在同一个子网段。

（6）Public需要固定配置在各个节点网卡，VIP、Private IP、SCAN都可以交给GNS来配置，除了SCAN需要三个固定IP以外，其他都需要一个固定IP，可以不固定在网卡，但是要固定解析。

## 5.1 固定配置

只通过DNS解析SCAN，Public/Private/VIP均通过手工配置固定IP，安装时手工指定设置。

## 5.2 GNS + 固定配置

/etc/hosts

192.168.204.11 pub19-node1.rac.libai

192.168.204.12 pub19-node2.rac.libai

#private ip

40.40.40.41 priv19-node1.rac.libai

40.40.40.42 priv19-node2.rac.libai

#vip

192.168.204.21 vip19-node1.rac.libai

192.168.204.22 vip19-node2.rac.libai

#scan-vip

#192.168.204.33 scan19-vip.rac.libai

#192.168.204.34 scan19-vip.rac.libai

#192.168.204.35 scan19-vip.rac.libai

#gns-vip

192.168.204.10 gns19-vip.rac.libai

DNS配置：

**[root@19c-node2 limits.d]# yum install -y bind chroot**

**[root@19c-node2 limits.d]# vi /etc/named.conf**

options {

directory "/var/named";

dump-file "/var/named/data/cache\_dump.db";

statistics-file "/var/named/data/named\_stats.txt";

memstatistics-file "/var/named/data/named\_mem\_stats.txt";

allow-query { any; }; # any可以为一个指定网段，允许该网段查询DNS服务器。

recursion yes;

allow-transfer { none; };

};

zone "." IN {

type hint;

file "named.ca";

};

zone "rac.libai" IN { # 正解域 centos.libai

type master;

file "named.rac.libai";

};

zone "204.168.192.in-addr.arpa" IN { # 反解域 204.168.192.in-addr.arpa

type master;

file "named.192.168.204";

};

zone "40.40.40.in-addr.arpa" IN { # 反解域 204.168.192.in-addr.arpa

type master;

file "named.40.40.40";

};

/\* 编辑vip pub正解析域

[root@pub19-node2 ~]# vi /var/named/named.rac.libai

$TTL 600

@ IN SOA rac.libai. admin.rac.libai. (

0 ; serial number

1D ; refresh

1H ; retry

1W ; expire

3H ) ; minimum

@ IN NS master

master IN A 192.168.204.12

scan19.vip.rac.libai. IN A 192.168.204.162

scan19.vip.rac.libai. IN A 192.168.204.163

scan19.vip.rac.libai. IN A 192.168.204.164

priv19-node1.rac.libai. IN A 40.40.40.41

priv19-node2.rac.libai. IN A 40.40.40.42

vip19-node1.rac.libai. IN A 192.168.204.21

vip19-node2.rac.libai. IN A 192.168.204.22

pub19-node1.rac.libai. IN A 192.168.204.11

pub19-node2.rac.libai. IN A 192.168.204.12

vip.rac.libai. IN NS gns.rac.libai.

gns.rac.libai. IN A 192.168.204.10

# 最后两行表示：子域vip.rac.libai的解析服务器为gns.rac.libai，gns.rac.libai的服务器地址为192.168.204.10

这是配置gns的关键。

# 在gridSetup.sh配置SCAN的页面，scan的域名scan19.vip.rac.libai必须包含交给gns管理的子域即scan19.vip.rac.libai需要包含vip.rac.libai

# gridSetup.sh配置gns的IP地址即192.168.204.10，subdomain即vip.rac.libai

# 如果配合DHCP，则可以完成vip，private，scan都使用gns分配IP。

来自：<http://blog.sina.com.cn/s/blog_701a48e70102w6gv.html>

**[root@19c-node2 named]# vi named.192.168.204**

$TTL 600

@ IN SOA rac.libai. admin.rac.libai. (

10 ; serial

3H ; refresh

15M ; retry

1W ; expire

1D ) ; minimum

@ IN NS master.rac.libai.

12 IN PTR master.rac.libai.

33 IN PTR scan19-vip.rac.libai.

34 IN PTR scan19-vip.rac.libai.

35 IN PTR scan19-vip.rac.libai.

21 IN PTR vip19-node1.rac.libai.

22 IN PTR vip19-node2.rac.libai.

11 IN PTR pub19-node1.rac.libai.

12 IN PTR pub19-node2.rac.libai.

10 IN PTR gns.rac.libai.

**[root@19c-node2 named]# vi named.40.40.40**

$TTL 600

@ IN SOA rac.libai. admin.rac.libai. (

10 ; serial

3H ; refresh

15M ; retry

1W ; expire

1D ) ; minimum

@ IN NS master.rac.libai.

42 In PTR 19cpriv-node2.rac.libai.

**[root@19c-node2 named]# systemctl restart named**

[root@19c-node1 software]# yum install -y dhcp

[root@19c-node1 software]# vi /etc/dhcp/dhcpd.conf

# see /usr/share/doc/dhcp\*/dhcpd.conf.example

# see dhcpd.conf(5) man page

#

ddns-update-styleinterim;

ignoreclient-updates;

subnet 192.168.204.0 netmask 255.255.255.0 {

option routers 192.168.204.1;

option subnet-mask 255.255.255.0;

option nis-domain "rac.libai";

option domain-name "rac.libai";

option domain-name-servers 192.168.204.12;

option time-offset -18000; # Eastern Standard Time

range dynamic-bootp 192.168.204.21 192.168.204.26;

default-lease-time 21600;

max-lease-time 43200;

}

[root@19c-node2 ~]# systemctl enable dhcpd

[root@19c-node2 ~]# systemctl restart dhcpd

[root@19c-node2 ~]# systemctl status dhcpd

/\* 查看租约文件

/var/lib/dhcp/dhcpd.leases

/\* 为enp0s10重新获取dhcp地址

# dhclient -d enp0s10

/\* 释放租约

# dhclient -r enp0s10

# 6 其他配置

## 6.1 操作系统杂项配置

（1）cluster名称：

大小写不敏感，必须字母数字，必须包含-连接符，不能包含\_下划线，最长15个字符，安装后，只能通过重装GI修改集群名称。

（2）/etc/hosts

#public Ip

192.168.204.11 pub19-node1.rac.libai

192.168.204.12 pub19-node2.rac.libai

#private ip

40.40.40.41 priv19-node1.rac.libai

40.40.40.42 priv19-node2.rac.libai

#vip

192.168.204.21 vip19-node1.rac.libai

192.168.204.22 vip19-node2.rac.libai

#scan-vip

#192.168.204.33 scan19.vip.rac.libai

#192.168.204.34 scan19.vip.rac.libai

#192.168.204.35 scan19.vip.rac.libai

#gns-vip

192.168.204.10 gns.rac.libai

（3）操作系统主机名

hostnamectl set-hostname pub19-node1.rac.libai –static

hostnamectl set-hostname pub19-node2.rac.libai --static

## 6.2 时钟同步

保证所有节点使用NTP或者CTSS同步时间。

安装之前，保证各个节点时钟相同，如果使用CTSS，可以通过下面步骤关闭linux 7自带NTP：

By default, the NTP service available on Oracle Linux 7 and Red Hat

Linux 7 is chronyd.

Deactivating the chronyd Service

To deactivate the chronyd service, you must stop the existing chronyd service, and

disable it from the initialization sequences.

Complete this step on Oracle Linux 7 and Red Hat Linux 7:

1. Run the following commands as the root user:

# systemctl stop chronyd

# systemctl disable chronyd

Confirming Oracle Cluster Time Synchronization Service After Installation

To confirm that ctssd is active after installation, enter the following command as the

Grid installation owner:

$ crsctl check ctss

## 6.3 NAS存储附加配置

如果使用NAS，为了Oracle Clusterware更好的容忍NAS设备以及NAS挂载的网络失败，建议开启Name Service Cache Daemon (nscd)。

# chkconfig --list nscd

# chkconfig --level 35 nscd on

# service nscd start

# service nscd restart

systemctl --all |grep nscd

## 6.4 I/O Scheduler

For best performance for Oracle ASM, Oracle recommends that you use the Deadline

I/O Scheduler.

# cat /sys/block/${ASM\_DISK}/queue/scheduler

noop [deadline] cfq

If the default disk I/O scheduler is not Deadline, then set it using a rules file:

**1.** Using a text editor, create a UDEV rules file for the Oracle ASM devices:

# vi /etc/udev/rules.d/60-oracle-schedulers.rules

**2.** Add the following line to the rules file and save it:

ACTION=="add|change", KERNEL=="sd[a-z]", ATTR{queue/rotational}=="0",

ATTR{queue/scheduler}="deadline"

**3.** On clustered systems, copy the rules file to all other nodes on the cluster. For

example:

$ scp 60-oracle-schedulers.rules root@node2:/etc/udev/rules.d/

**4.** Load the rules file and restart the UDEV service. For example:

Oracle Linux and Red Hat Enterprise Linux

# udevadm control --reload-rules

**5.** Verify that the disk I/O scheduler is set as Deadline.

# cat /sys/block/${ASM\_DISK}/queue/scheduler

noop [deadline] cfq

## 6.5 SSH超时限制

为了防止某些情况下ssh失败，设置超时限制为ulimit：

/etc/ssh/sshd\_config on all cluster nodes:

# vi /etc/ssh/sshd\_config

LoginGraceTime 0

## 6.3 用户组目录配置

判断是否有inventory以及组是否之前存在：

# more /etc/oraInst.loc

$ grep oinstall /etc/group

创建inventory目录，不要指定到oracle base目录下，防止发生安装过程中权限改变导致安装错误。

所有节点user以及group的id必须相同。

# groupadd -g 54421 oinstall

# groupadd -g 54322 dba

# groupadd -g 54323 oper

# groupadd -g 54324 backupdba

# groupadd -g 54325 dgdba

# groupadd -g 54326 kmdba

# groupadd -g 54327 asmdba

# groupadd -g 54328 asmoper

# groupadd -g 54329 asmadmin

# groupadd -g 54330 racdba

# /usr/sbin/useradd -u 54321 -g oinstall -G dba,asmdba,backupdba,dgdba,kmdba,oper,racdba oracle

# useradd -u 54322 -g oinstall -G asmadmin,asmdba,racdba grid

# id oracle

# id grid

# passwd oracle

# passwd grid

**建议使用OFA目录结构,保证Oracle home目录路径只包含ASCII码字符。**

GRID standalone可以将grid安装在oracle database软件的ORACLE\_BASE目录下，其他不可以。

# mkdir -p /u01/app/19.0.0/grid

# mkdir -p /u01/app/grid

# mkdir -p /u01/app/oracle/product/19.0.0/dbhome\_1/

# chown -R grid:oinstall /u01

# chown oracle:oinstall /u01/app/oracle

# chmod -R 775 /u01/

**grid .bash\_profile:**

# su – grid

$ vi ~/.bash\_profile

umask 022

export ORACLE\_BASE=/u01/app/grid

export ORACLE\_HOME=/u01/app/19.0.0/grid

export PATH=$PATH:$ORACLE\_HOME/bin

export NLS\_DATE\_FORMAT=’yyyy-mm-dd hh24:mi:ss’

export NLS\_LANG=AMERICAN.AMERICA\_AL32UTF8

export LD\_LIBRARY\_PATH=$LD\_LIBRARY\_PATH:$ORACLE\_HOME/lib

$ . ./.bash\_profile

**oracle .bash\_profile:**

# su – oracle

$ vi ~/.bash\_profile

umask 022

export ORACLE\_BASE=/u01/app/oracle

export ORACLE\_HOME=$ORACLE\_BASE/product/19.0.0/dbhome\_1

export PATH=$PATH:$ORACLE\_HOME/bin

export NLS\_DATE\_FORMAT=’yyyy-mm-dd hh24:mi:ss’

export NLS\_LANG=AMERICAN.AMERICA\_AL32UTF8

export LD\_LIBRARY\_PATH=$LD\_LIBRARY\_PATH:$ORACLE\_HOME/lib

$ . ./.bash\_profile

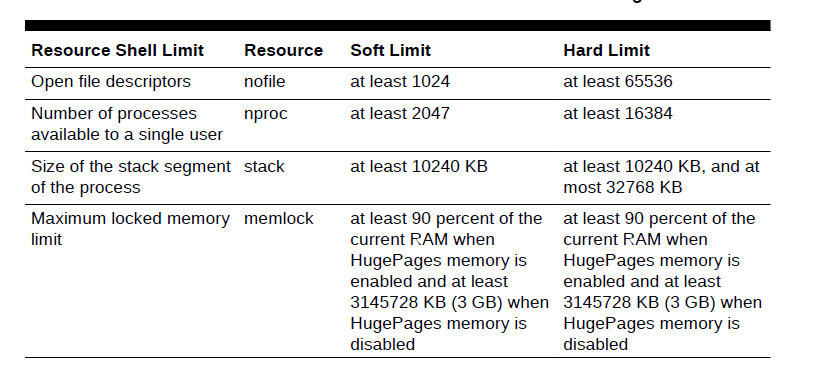
## 6.6 图形界面配置

$ xhost + hostname

$ export DISPLAY=local\_host:0.0

## 6.7 limits.conf

preinstall rpm包只配置oracle用户，安装GI，复制oracle设置，改为grid用户：



以下oracle grid用户都需要检查：

file descriptor：

$ ulimit -Sn

$ ulimit -Hn

number of processes：

$ ulimit -Su

$ ulimit -Hu

stack：

$ ulimit -Ss

$ ulimit -Hs

## 6.8关闭X11 Forward

为了确保不会因为X11转发导致安装失败，oracle grid用户家目录下.ssh:

$ ~/.ssh/config

Host \*

ForwardX11 no

## 6.9 Direct NFS

如果使用DNFS，则可以参考文档配置DNFS。

## 6.10 Oracle Member Cluster

如果要创建Oracle Member Cluster，则需要在Oracle Domain Services Cluster上创建Member Cluster Manifest File，参照官方文档Oracle Grid Infrastructure Grid Infrastructure Installation and Upgrade Guide下面章节：

Creating Member Cluster Manifest File for Oracle Member Clusters

## 6.11 手工配置ASM磁盘，UDEV

/\* 获取磁盘UUID

# /usr/lib/udev/scsi\_id -g -u /dev/sdb

/\* 编写UDEV规则文件

# vi /etc/udev/rules.d/99-oracle-asmdevices.rules

KERNEL=="sd\*", ENV{DEVTYPE}=="disk",SUBSYSTEM=="block",PROGRAM=="/usr/lib/udev/scsi\_id -g -u -d $devnode",RESULT=="1ATA\_VBOX\_HARDDISK\_VB9c33adf6-29245311",RUN+="/bin/sh -c 'mknod /dev/asmocr1 b $major $minor;chown grid:asmadmin /dev/asmocr1;chmod 0660 /dev/asmocr1'"

KERNEL=="sd\*", ENV{DEVTYPE}=="disk",SUBSYSTEM=="block",PROGRAM=="/usr/lib/udev/scsi\_id -g -u -d $devnode",RESULT=="1ATA\_VBOX\_HARDDISK\_VBb008c422-c636d509",RUN+="/bin/sh -c 'mknod /dev/asmdata1 b $major $minor;chown grid:asmadmin /dev/asmdata1;chmod 0660 /dev/asmdata1'"

KERNEL=="sd\*", ENV{DEVTYPE}=="disk",SUBSYSTEM=="block",PROGRAM=="/usr/lib/udev/scsi\_id -g -u -d $devnode",RESULT=="1ATA\_VBOX\_HARDDISK\_VB7d37c0f6-8f45f264",RUN+="/bin/sh -c 'mknod /dev/asmfra1 b $major $minor;chown grid:asmadmin /dev/asmfra1;chmod 0660 /dev/asmfra1'"

/\* 拷贝UDEV规则文件到集群其他节点

# scp 99-oracle-asmdevices.rules root@node2:/etc/udev/rules.d/99-oracleasmdevices.

rules

/\* reload udev配置，测试

/sbin/udevadm trigger --type=devices --action=change

/sbin/udevadm control --reload

/sbin/udevadm test /sys/block/sdb

# 7 gridSetup.sh

$ su root

# export ORACLE\_HOME=/u01/app/19.0.0/grid

**Use Oracle ASM command line tool (ASMCMD) to provision the disk devices**

**for use with Oracle ASM Filter Driver.**

[root@19c-node1 grid]# asmcmd afd\_label DATA1 /dev/sdb --init

[root@19c-node1 grid]# asmcmd afd\_label DATA2 /dev/sdc --init

[root@19c-node1 grid]# asmcmd afd\_label DATA3 /dev/sdd --init

[root@19c-node1 grid]# asmcmd afd\_lslbl /dev/sdb

[root@19c-node1 grid]# asmcmd afd\_lslbl /dev/sdc

[root@19c-node1 grid]# asmcmd afd\_lslbl /dev/sdd

## 7.1 gridSerup.sh

$ unzip LINUX.X64\_193000\_grid\_home.zip -d /u01/app/19.0.0/grid/

$ /u01/app/19.0.0/grid/gridSetup.sh

**遇到问题：**

图形界面进行到创建OCR ASM磁盘组时，无法发现ASM磁盘，检查UDEV，UDEV配置正确，检查cfgtoollogs日志发现如下报错：

[root@19c-node1 ~]# su – grid

[grid@19c-node1 ~]$ cd $ORACLE\_HOME/cfgtoollogs/out/GridSetupActions2020-03-09\_01-02-16PM

[grid@19c-node1 ~]$ vi gridSetupActions2020-03-09\_01-02-16PM.log

INFO: [Mar 9, 2020 1:15:03 PM] Executing [/u01/app/19.0.0/grid/bin/kfod.bin, nohdr=true, verbose=true, disks=all, op=disks, shallow=true, asm\_diskstring='/dev/asm\*']

INFO: [Mar 9, 2020 1:15:03 PM] Starting Output Reader Threads for process /u01/app/19.0.0/grid/bin/kfod.bin

INFO: [Mar 9, 2020 1:15:03 PM] Parsing Error 49802 initializing ADR

INFO: [Mar 9, 2020 1:15:03 PM] Parsing ERROR!!! could not initialize the diag context

grid ORACLE\_HOME/cfgtoollogs/out/GridSetupActions2020-03-09\_01-02-16PM

发现ASM磁盘路径报错：

INFO: [Mar 9, 2020 1:15:03 PM] Executing [/u01/app/19.0.0/grid/bin/kfod.bin, nohdr=true, verbose=true, disks=all, status=true, op=disks, asm\_diskstring='/dev/asm\*']

INFO: [Mar 9, 2020 1:15:03 PM] Starting Output Reader Threads for process /u01/app/19.0.0/grid/bin/kfod.bin

INFO: [Mar 9, 2020 1:15:03 PM] Parsing Error 49802 initializing ADR

INFO: [Mar 9, 2020 1:15:03 PM] Parsing ERROR!!! could not initialize the diag context

**解决：**

将报错前命令单独拿出来执行

/u01/app/19.0.0/grid/bin/kfod.bin nohdr=true, verbose=true, disks=all, status=true, op=disks, asm\_diskstring='/dev/asm\*'

发现报错NLS DATA错误，很明显，跟.bash\_profile环境配置文件设置的NLS相关变量有关，注释掉相关NLS\_LANG变量，生效，再次执行，一切正常。

[root@pub19-node1 ~]# /u01/app/oraInventory/orainstRoot.sh

[root@pub19-node2 ~]# /u01/app/oraInventory/orainstRoot.sh

[root@pub19-node1 ~]# /u01/app/19.0.0/grid/root.sh

[root@pub19-node2 ~]# /u01/app/19.0.0/grid/root.sh

## 7.2 runInstaller&dbca

[oracle@pub19-node1 dbhome\_1]$ unzip LINUX.X64\_193000\_db\_home.zip -d /u01/app/oracle/product/19.0.0/dbhome\_1/

[oracle@pub19-node1 dbhome\_1]$ ./runInstaller

[oracle@pub19-node1 dbhome\_1]$ dbca

**遇到问题：**

CRS-5017: The resource action "ora.czhl.db start" encountered the following error:

ORA-12547: TNS:lost contact

. For details refer to "(:CLSN00107:)" in "/u01/app/grid/diag/crs/pub19-node2/crs/trace/crsd\_oraagent\_oracle.trc".

**解决：**

节点2 ORACLE\_HOME目录有两层权限不正确，修改权限之后，手工启动数据库正常。

[root@pub19-node2 oracle]# chown oracle:oinstall product/

[root@pub19-node2 product]# chown oracle:oinstall 19.0.0

[root@pub19-node2 19.0.0]# chown oracle:oinstall dbhome\_1/

[grid@pub19-node2 ~]$ srvctl start instance -node pub19-node2.rac.libai

starting database instances on nodes "pub19-node2.rac.libai" ...

started resources "ora.czhl.db" on node "pub19-node2"