

Installing and Creating Oracle Database 19c on OEL Linux 8.4 with ASM

Overview of Oracle Automatic Storage Management

In this tutorial, we will demonstrate the step by step procedure to install and create an Oracle database 19c on Oracle Enterprise Linux 8.4 with Automatic storage Management (ASM).

*Oracle ASM is a **volume manager** and a **file system** for Oracle database files that supports single-instance Oracle Database and Oracle Real Application Clusters (Oracle RAC) configurations.*

*Oracle ASM uses **disk groups** to store data files; an Oracle ASM disk group is a collection of disks that Oracle ASM manages as a unit. Within a disk group, Oracle ASM exposes a file system interface for Oracle database files. The content of files that are stored in a disk group is evenly distributed to eliminate hot spots and to provide uniform performance across the disks. The performance is comparable to the performance of raw devices.*

You can add or remove disks from a disk group while a database continues to access files from the disk group. When you add or remove disks from a disk group, Oracle ASM automatically redistributes the file contents and eliminates the need for downtime when redistributing the content.

Installation Architecture

VM Hosts
Ora19c.mydomain.com
OEL8.4 x86-64

Oracle Database Home

SID: MYDB

Oracle_Home:
/app/oracle/product/19.0.0/db_home

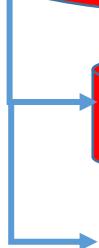
Oracle Clusterware (Oracle restart)

SID: +ASM

Grid_Home:
/app/oracle/product/19.0.0/grid_home

OCR (20 GB)

DATA Disk (20 GB)

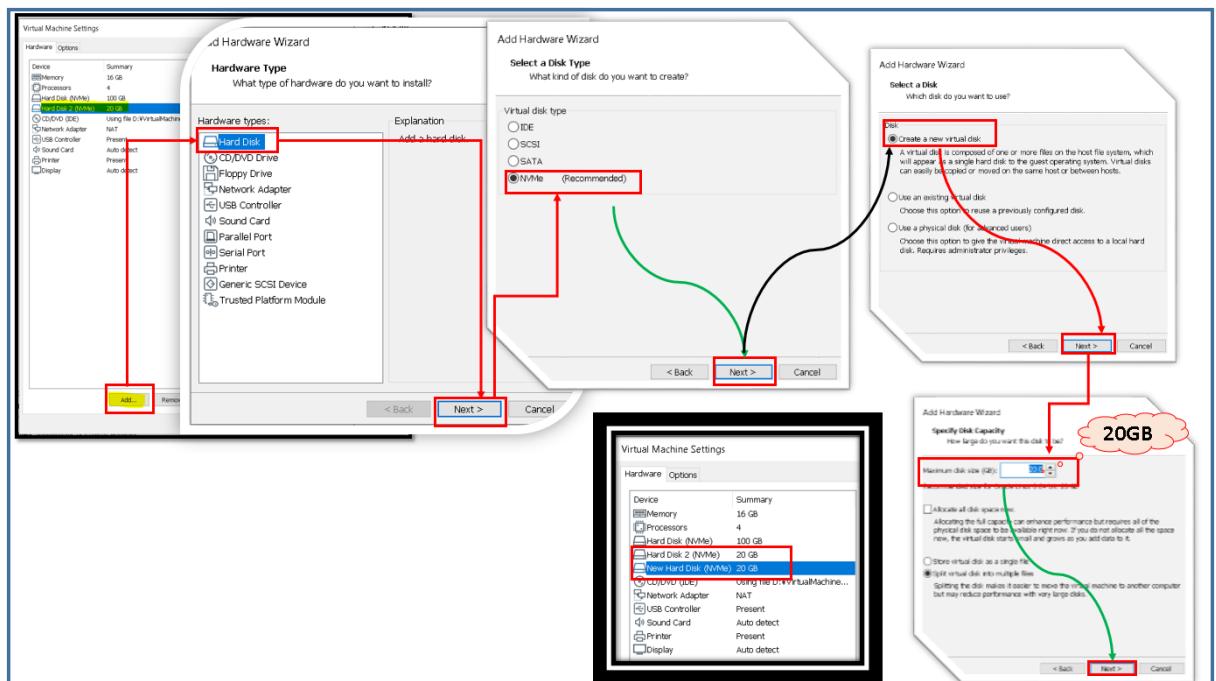


Installation Overview

1. Create Virtual Hard Disks (to be used by ASM)
2. OS Prerequisites setup
3. Oracle software installer and grid software installer download
4. Configure/Change Linux kernel parameter
5. Set up the environment variables for the OS Accounts: grid & oracle
6. Install ASM Packages and Create ASM disk volumes
7. Install additional packages required
8. Install Oracle Grid Infrastructure Software (Oracle Restart)
9. Create ASM Disk Groups
11. Install Oracle database software and create the sample database
12. Post Installation Validation

1. Create Virtual Hard Disks (to be used by ASM)

For creating OEL Linux you can check my video, I will give links in the description box. Now let's add two Virtual Hard Disk to your guest Linux machines.



2. OS Prerequisites setup

Required Resources.

- For testing purpose minimum 8GB memory should be fine (VM OS). For better performance it is better to have high spec.
- We will check the swap size. If you are running Oracle database on your environment, and having some performance issues because of memory, you may have to look at the swap space configured on your system.

There is recommendation from Oracle in terms of how much space you should add.

If your RAM size is less than or equal to 2 GB, your swap size should be 1.5 times of the RAM. For example, if your RAM size is 2 GB, you should create swap space of 3GB

If you're RAM size is between 2 GB and 16 GB, your swap size should be the same size of the RAM. For example, if your RAM size is 4 GB, you should create swap space of 4GB

If your RAM size is more than 16 GB, your swap size should be 16 GB. For example, if your RAM size is 32 GB, it is enough if you create a swap space of 16GB.

- Your PC should have 100 GB free Hard Disk spaces available to your Guest OS.
- Set secure Linux to permissive by editing the "/etc/selinux/config" file, making sure the SELINUX flag is set as follows.
`vi /etc/selinux/config`
`SELINUX=disabled`
- If you have the Linux firewall enabled, you need to disable or configure it.
`firewall-cmd --state`
`systemctl stop firewalld`
`systemctl disable firewalld`

- Make sure your hostname is fully qualified domain name

```
hostnamectl
```

```
cat /etc/hosts
```

```
192.168.xxx.xxx ora19c.mydomain.com
```

3. Oracle software installer and grid software installer download

First of all let's download the oracle 19c software installer.

Go to the oracle site and download it. If you don't have oracle account you can create for free.

<https://www.oracle.com/database/technologies/oracle19c-linux-downloads.html>

4. Configure Linux kernel parameter required to install oracle software.

Automatic Setup for rpm file and kernel parameter.

If you plan to use the "oracle-database-preinstall-19c" package to perform all your prerequisite setup, run the following command.

```
dnf install -y oracle-database-preinstall-19c
```

Manual Setup

If you have not used the "oracle-database-preinstall-19c" package to perform all prerequisites, you will need to manually perform the following setup tasks.

Add the following lines to the "/etc/sysctl.conf" file, or in a file called "/etc/sysctl.d/99-oracle.conf".

```
fs.file-max = 6815744
kernel.sem = 250 32000 100 128
kernel.shmmni = 4096
kernel.shmall = 1073741824
kernel.shmmax = 4398046511104
kernel.panic_on_oops = 1
net.core.rmem_default = 262144
net.core.rmem_max = 4194304
net.core.wmem_default = 262144
net.core.wmem_max = 1048576
net.ipv4.conf.all.rp_filter = 2
net.ipv4.conf.default.rp_filter = 2
fs.aio-max-nr = 1048576
net.ipv4.ip_local_port_range = 9000 65500
```

Run one of the following commands to change the current kernel parameters, depending on which file you edited.

```
/sbin/sysctl -p
# Or
/sbin/sysctl -p /etc/sysctl.d/98-oracle.conf
Add the following lines to a file called "/etc/security/limits.d/oracle-database-preinstall-19c.conf" file.
vi /etc/security/limits.d/oracle-database-preinstall-19c.conf
```

```
oracle soft nofile 1024
oracle hard nofile 65536
oracle soft nproc 16384
oracle hard nproc 16384
oracle soft stack 10240
oracle hard stack 32768
oracle hard memlock 134217728
oracle soft memlock 134217728
```

5. Install additional packages required

The following packages are listed as required. Don't worry if some don't install. It won't prevent the installation.

```
dnf install -y bc
```

```
dnf install -y binutils
```

```
dnf install -y elfutils-libelf
```

```
dnf install -y elfutils-libelf-devel
```

```
dnf install -y fontconfig-devel
```

```
dnf install -y glibc
```

```
dnf install -y glibc-devel
```

```
dnf install -y ksh
```

```
dnf install -y libaio
```

```
dnf install -y libaio-devel
```

```
dnf install -y libXrender
```

```
dnf install -y libXrender-devel
```

```
dnf install -y libX11
```

```
dnf install -y libXau
```

```
dnf install -y libXi
```

```
dnf install -y librdmacm-devel
```

```
dnf install -y libstdc++
```

```
dnf install -y libstdc++-devel
```

```
dnf install -y libxcb
```

```
dnf install -y make
```

```
dnf install -y net-tools
```

```
dnf install -y nfs-utils
```

```
dnf install -y targetcli
```

```
dnf install -y smartmontools
```

```
dnf install -y sysstat
```

```
dnf install -y unixODBC
```

New for OL8

```
dnf install -y libnsl
```

```
dnf install -y libnsl.i686
```

```
dnf install -y libnsl2
```

6. Set up the environment variables for OS Accounts: grid & oracle

In the following steps, you will configure the OS variables for the software owner accounts. Oracle is the software owner of the database software and grid is the software owner of the Grid Clusterware software.

6. A) In terminal window, switch the user to oracle and open the .bash_profile and add the following environment variables. vi ~/.bash_profile

```
ORACLE_BASE=/app/oracle; export ORACLE_BASE

ORACLE_SID=MYDB; export ORACLE_SID

ORACLE_HOME=$ORACLE_BASE/product/19.0.0/db_home; export ORACLE_HOME

TNS_ADMIN=$ORACLE_HOME/network/admin; export TNS_ADMIN

PATH=$PATH:$HOME/.local/bin:$HOME/bin

PATH=${PATH}:/usr/bin:/bin:/usr/local/bin

PATH=.:${PATH}:$ORACLE_HOME/bin

export PATH

LD_LIBRARY_PATH=$ORACLE_HOME/lib

LD_LIBRARY_PATH=${LD_LIBRARY_PATH}:$ORACLE_HOME/oracm/lib

LD_LIBRARY_PATH=${LD_LIBRARY_PATH}:/lib:/usr/lib:/usr/local/lib

export LD_LIBRARY_PATH

CLASSPATH=$ORACLE_HOME/JRE

CLASSPATH=${CLASSPATH}:$ORACLE_HOME/jlib

CLASSPATH=${CLASSPATH}:$ORACLE_HOME/rdbms/jlib

CLASSPATH=${CLASSPATH}:$ORACLE_HOME/network/jlib

export CLASSPATH

export TEMP=/tmp

export TMPDIR=/tmp

umask 022
```

b) Switch current user back to `root` then run the following code to create required groups, `grid` user and modify the accounts.

#Create the new groups and users.

```
groupadd -g 54321 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

usermod -g oinstall -G
dba,oper,backupdba,dgdba,asmdba,asmoper,asmadmin,kmdba,racdba oracle

#Change password for oracle user
$ passwd oracle

useradd -g oinstall -G
dba,oper,backupdba,dgdba,asmdba,asmoper,asmadmin,kmdba,racdba grid

$ passwd grid
```

C) **Create Oracle Cluster ware and oracle home directories:**

```
mkdir -p /app/oracle/product/19.0.0/db_home
mkdir -p /app/grid/product/19.0.0/grid_home
chown -R grid:oinstall /app
chown -R oracle:oinstall /app/oracle
chmod -R 775 /app
```

d) In terminal window, switch the user to grid and open the .bash_profile and add the following environment variables.

```
$ vi ~/.bash_profile
```

```
ORACLE_SID=+ASM; export ORACLE_SID  
  
ORACLE_BASE=/app/grid; export ORACLE_BASE  
  
ORACLE_HOME=$ORACLE_BASE/product/19.0.0/grid_home; export ORACLE_HOME  
  
ORACLE_TERM=xterm; export ORACLE_TERM  
  
TNS_ADMIN=$ORACLE_HOME/network/admin; export TNS_ADMIN  
  
PATH=.:${JAVA_HOME}/bin:${PATH}:$HOME/bin:$ORACLE_HOME/bin  
  
PATH=${PATH}:/usr/bin:/bin:/usr/local/bin  
  
export PATH  
  
export TEMP=/tmp  
  
export TMPDIR=/tmp  
  
umask 022
```

7. Install ASM Packages

In the following steps, you will install ASM packages required to install grid software

7. A: Change the current user to root user.

Download and Install Oracle ASMLib package

```
cd /tmp
```

```
wget https://download.oracle.com/otn\_software/asmlib/oracleasmlib-2.0.17-1.el8.x86\_64.rpm
```

```
wget https://public-yum.oracle.com/repo/OracleLinux/OL8/addons/x86\_64/getPackage/oracleasm-support-2.1.12-1.el8.x86\_64.rpm
```

```
yum localinstall ./oracleasm-support-2.1.12-1.el8.x86_64.rpm ./oracleasmlib-2.0.17-1.el8.x86_64.rpm
```

the following command will take a few minutes to finish:

```
yum install kmod-oracleasm
```

7. B: Configure and load the ASM kernel module. Respond to the command as illustrated by the code in red color.

```
oracleasm configure -i
```

Configuring the Oracle ASM library driver.

This will configure the on-boot properties of the Oracle ASM library driver. The following questions will determine whether the driver is loaded on boot and what permissions it will have. The current values will be shown in brackets ('[]'). Hitting <ENTER> without typing an answer will keep that current value. Ctrl-C will abort.

Default user to own the driver interface []: **grid**

Default group to own the driver interface []: **oinstall**

Start Oracle ASM library driver on boot (y/n) [n]: **y**

Scan for Oracle ASM disks on boot (y/n) [y]: **y**

Writing Oracle ASM library driver configuration: done

7. C: Load the oracleasm kernel module:

```
/usr/sbin/oracleasm init
```

You can see list the disks as seen by the OS. You should see the disks created in the Vmware which we previously created.

You should see the disks created and attached to the Linux guest OS.

```
fdisk -l | grep "Disk /dev/nvm"
```

```
Disk /dev/nvme0n1: 100 GiB, 107374182400 bytes, 209715200 sectors  
Disk /dev/nvme0n2: 20 GiB, 21474836480 bytes, 41943040 sectors  
Disk /dev/nvme0n3: 20 GiB, 21474836480 bytes, 41943040 sectors
```

7. D: Now Use fdisk command to create partitions in the disk.

Do the following for the disks nvme0n2 and nvme0n3

```
fdisk <device file>  
fdisk /dev/nvme0n2
```

Then press: **n, p, 1, ENTER, ENTER, w** – to apply changes

Following are the output done on nvme0n2:

```
[root@ora19c]# fdisk /dev/nvme0n2
```

Welcome to fdisk (util-linux 2.32.1).

Changes will remain in memory only, until you decide to write them.

Be careful before using the write command.

Device does not contain a recognized partition table.

Created a new DOS disklabel with disk identifier 0x0a1c4425.

Command (m for help): n

Partition type

- p primary (0 primary, 0 extended, 4 free)**
- e extended (container for logical partitions)**

Select (default p): p

Partition number (1-4, default 1): 1

First sector (2048-41943039, default 2048):

Last sector, +sectors or +size{K,M,G,T,P} (2048-41943039, default 41943039):

Created a new partition 1 of type 'Linux' and of size 20 GiB.

Command (m for help): w

The partition table has been altered.

Calling ioctl() to re-read partition table.

Syncing disks.

7. E: Verify that the partitions are created.

```
[root@ora19c /]# fdisk -l | grep "/dev/nvm"
Disk /dev/nvme0n1: 100 GiB, 107374182400 bytes, 209715200 sectors
/dev/nvme0n1p1 *      2048  2099199  2097152  1G 83 Linux
/dev/nvme0n1p2      2099200 209715199 207616000  99G 8e Linux LVM
Disk /dev/nvme0n2: 20 GiB, 21474836480 bytes, 41943040 sectors
/dev/nvme0n2p1      2048 41943039 41940992  20G 83 Linux
Disk /dev/nvme0n3: 20 GiB, 21474836480 bytes, 41943040 sectors
```

Similarly repeat the same above steps to create partitions for another Disk /dev/nvme0n3

7. F: Create the ASM disks

```
[root@ora19c /]# oracleasm createdisk OCRDISK1 /dev/nvme0n2p1
```

Writing disk header: done

Instantiating disk: done

```
[root@ora19c /]# oracleasm createdisk DATADISK1 /dev/nvme0n3p1
```

Writing disk header: done

Instantiating disk: done

```
[root@ora19c /]# oracleasm listdisks
```

DATADISK1

OCRDISK1

8. Install Oracle Grid Infrastructure Software (Oracle Restart)

In the following steps, you will install Oracle Grid Infrastructure software. The installation procedure automatically creates and starts the Clusterware services.

Copy the Oracle Grid Infrastructure software installation file to the temp folder.

You can download from Oracle site and find the file named as
"LINUX.X64_193000_grid_home.zip "

Extract the installation file into the Oracle Grid Infrastructure software home directory

```
su - grid
unzip /yourmediolocation /LINUX.X64_193000_grid_home.zip -d $ORACLE_HOME
```

Install the cvuqdisk as root

The package cvuqdisk must be installed before installing the Clusterware software

```
cd /app/grid/product/19.0.0/grid_home /cv/rpm/
CVUQDISK_GRP=oinstall; export CVUQDISK_GRP
rpm -iv cvuqdisk-1.0.10-1.rpm
```

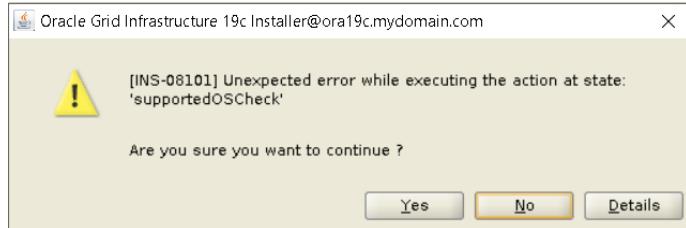
Now switch to grid user terminal and perform the following steps to avoid Supported OS check issue as below.

Fake Oracle Linux 7.

Under /app/grid/product/19.0.0/grid_home edit below

```
vi cv/admin/cvu_config
```

```
export CV_ASSUME_DISTID=OEL8.4
```

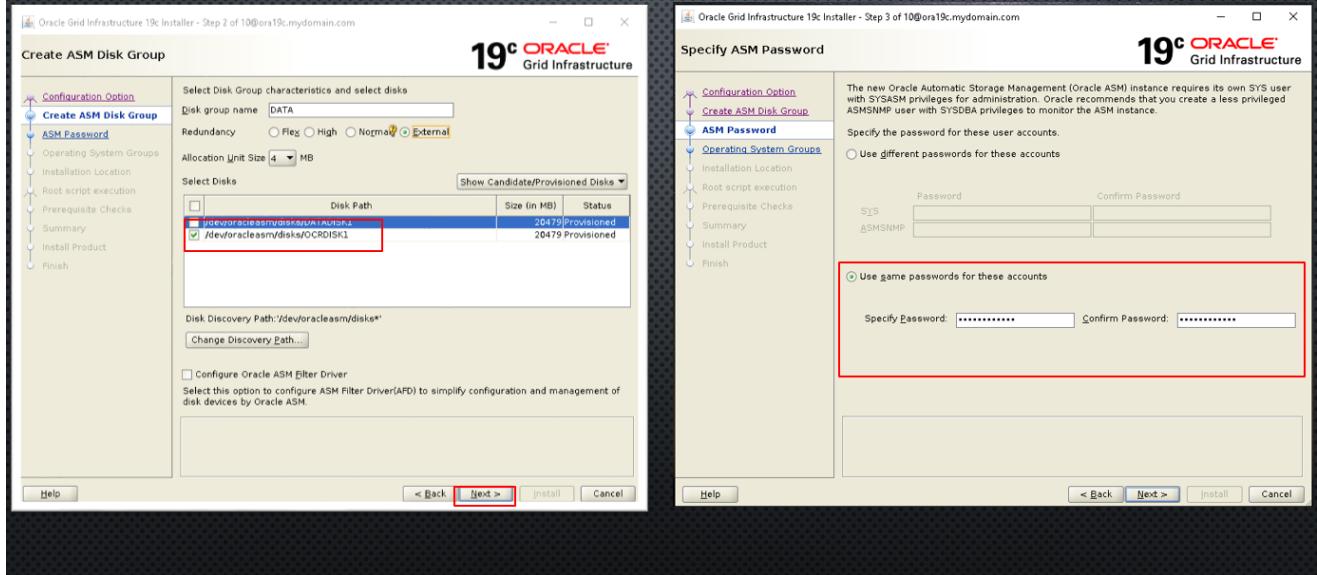


8. Install Oracle Grid Infrastructure Software (Oracle Restart)

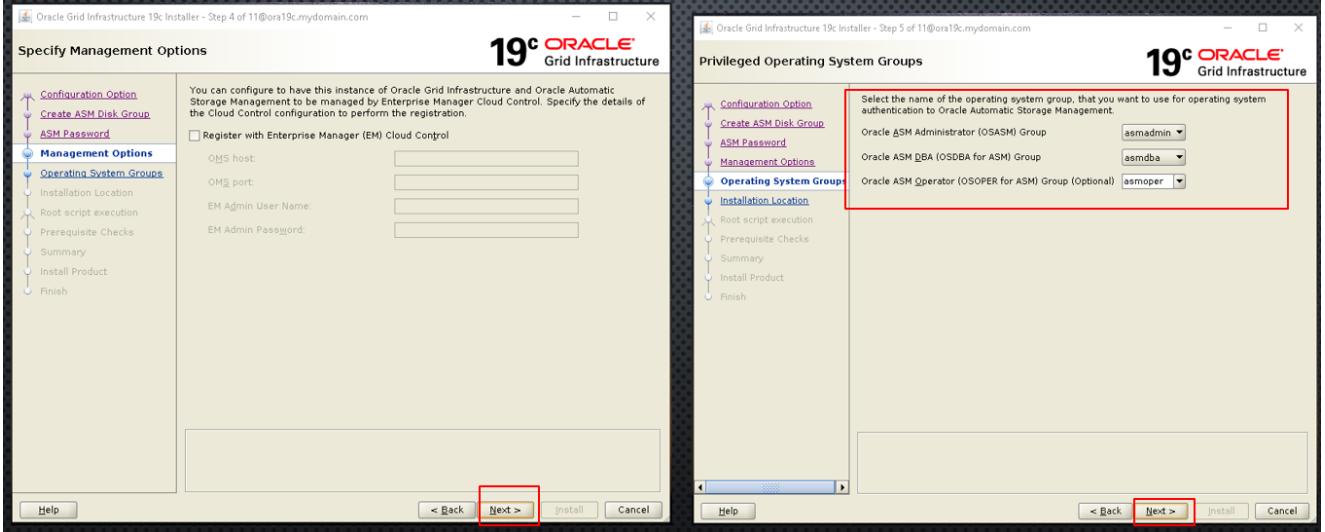
Open a terminal window, change the current directory to the Grid Infrastructure software home directory and run the gridSetup.sh script.

```
cd $ORACLE_HOME  
./gridSetup.sh
```

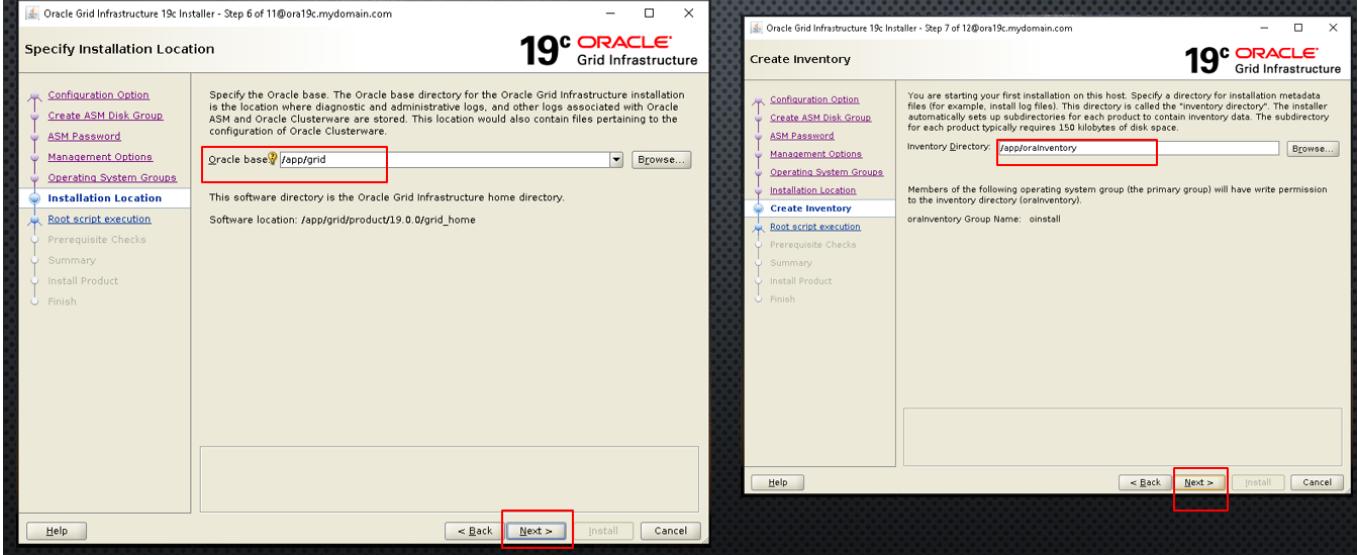
8. Install Oracle Grid Infrastructure Software (Oracle Restart)

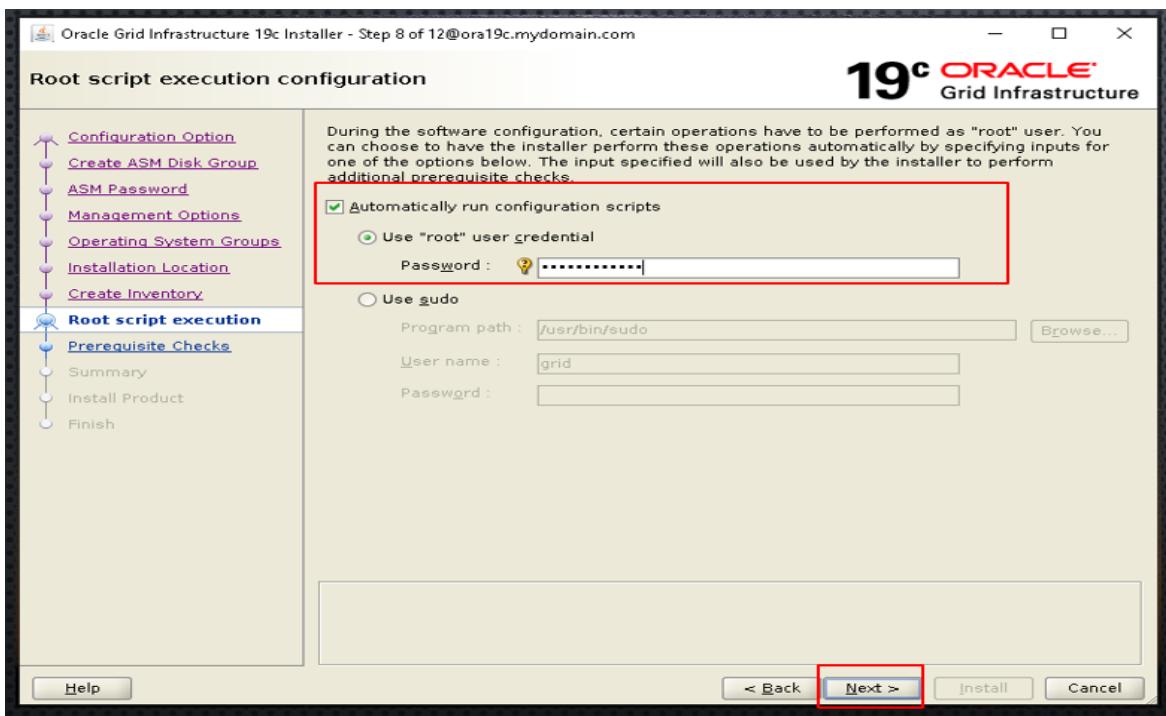


8. Install Oracle Grid Infrastructure Software (Oracle Restart)



8. Install Oracle Grid Infrastructure Software (Oracle Restart)





8. Install Oracle Grid Infrastructure Software (Oracle Restart)

Prerequisite Checks

Verification Result: All minimum requirements are satisfied. You may proceed with the installation.

Checks	Status	Fixable
Available Physical Memory	Succeeded	
Swap Size	Succeeded	
Free Space	Succeeded	
User Existence	Succeeded	
User Existence: grid	Succeeded	
Group Existence	Succeeded	
Group Existence: asmadmin	Succeeded	
Group Existence: manager	Succeeded	
Group Existence: asmbda	Succeeded	
Group Existence: oinstall	Succeeded	
Group Membership	Succeeded	
Group Membership: asmbda	Succeeded	
Group Membership: asmadmin	Succeeded	
Group Membership: oinstall(Primary)	Succeeded	
Group Membership: asmoper	Succeeded	
Root User	Succeeded	
Users With Same UID: 0	Succeeded	
Current Group ID	Succeeded	
Root user consistency	Succeeded	
Package cvqudisk-1.0.10-1	Succeeded	

This is a prerequisite condition to test whether the system has at least 8GB (8388608 KB) of total physical memory. ([more details](#))
Expected Value : 8GB (8388608 KB)
Actual Value : 15.6296GB (1.6388852E7KB)

Summary

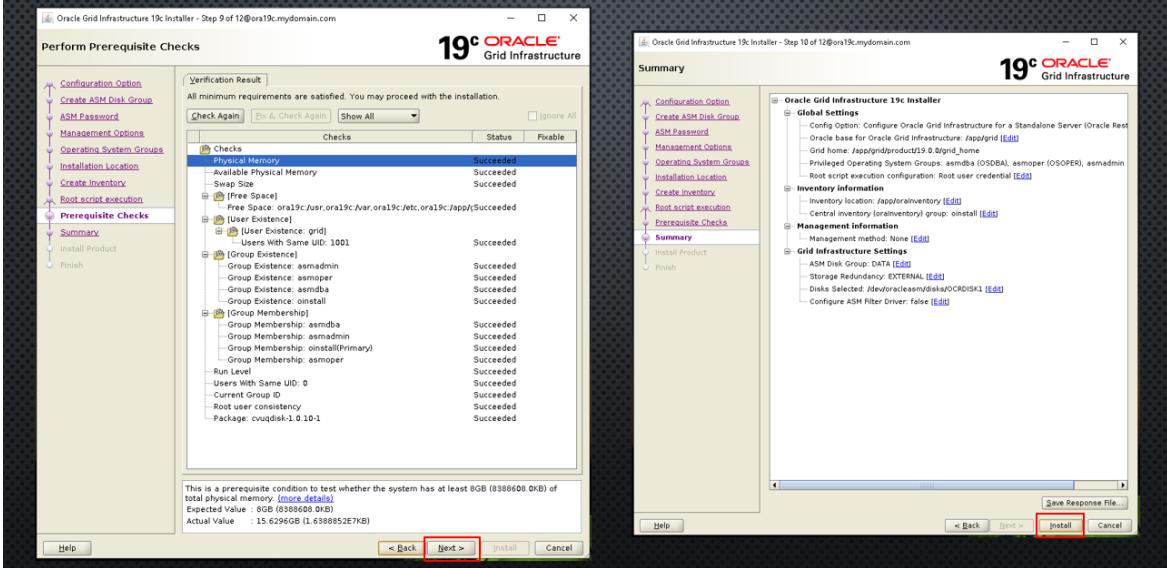
- Configuration Option
- Create ASM Disk Group
- ASM Password
- Management Options
- Operating System Groups
- Installation Location
- Create Inventory
- Root script execution
- Prerequisite Checks
- Summary
- Install Product
- Finish

Oracle Grid Infrastructure 19c Installer

- Global Settings
 - Config Option: Configure Oracle Grid Infrastructure for a Standalone Server (Oracle Restart)
 - Oracle base for Oracle Grid Infrastructure: /appgrid
 - Grid home: /appgrid/product/19.0.0/grid_home
 - Privileged Operating System Groups: asmbda (OSDBA), asmoper (OSOPER), asmadmin
 - Root script execution configuration: Root user credential
- Inventory Information
 - Inventory location: /app/oralnventory
 - Central inventory (orainventory) group: oinstall
- Management Information
 - Management method: None
- Grid Infrastructure Settings
 - Storage Redundancy: EXTERNAL
 - Disks Selected: /dev/oracleasm/disks/OCRDISK1
 - Configure ASM Filter Driver: false

Install

8. Install Oracle Grid Infrastructure Software (Oracle Restart)



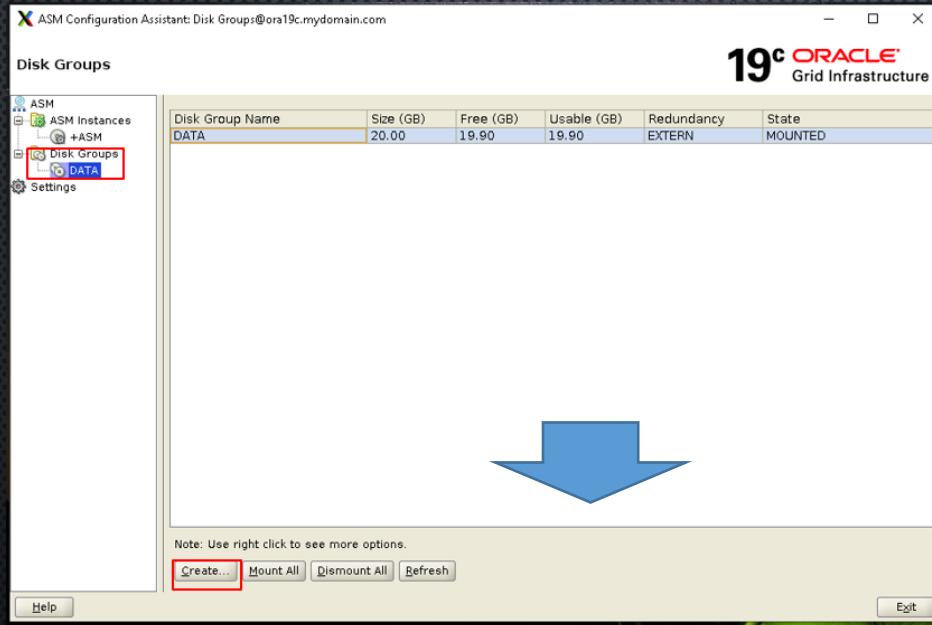
8. Install Oracle Grid Infrastructure Software (Oracle Restart)

- Check CRS services status:
- su - grid**
- crsctl status resource -t**

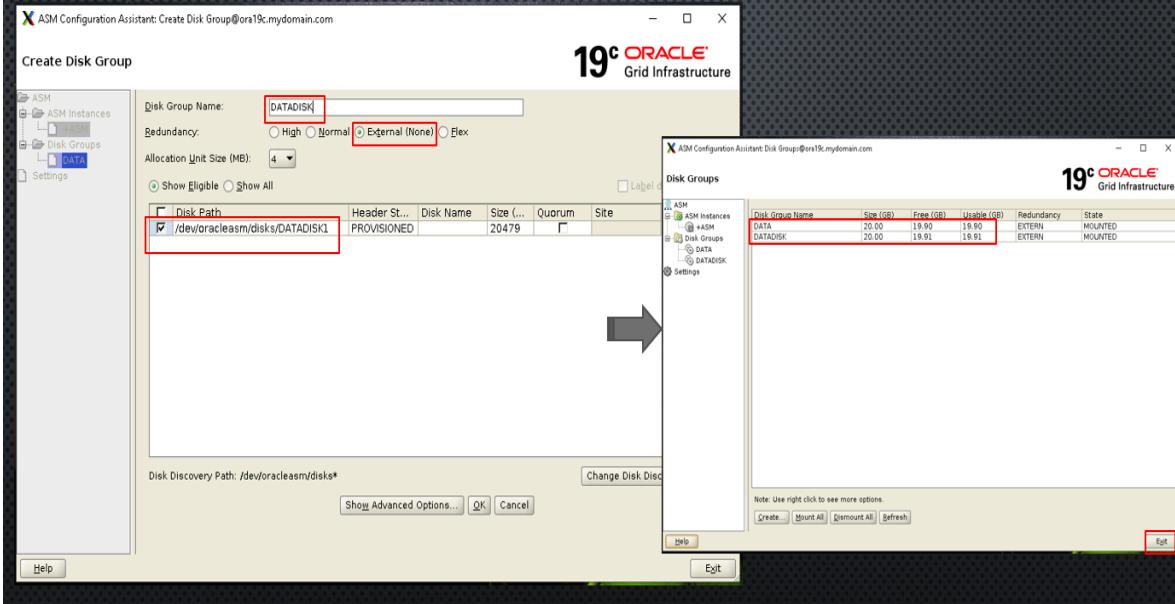
```
[grid@ora19c grid_home]$ crsctl status resource -t
Name        Target  State       Server      State details
Local Resources
-----
ora.DATA.dg    ONLINE  ONLINE    ora19c      STABLE
ora.LISTENER.lsnr  ONLINE  ONLINE    ora19c      STABLE
ora.asm        ONLINE  ONLINE    ora19c      Started,STABLE
ora.ons        OFFLINE OFFLINE   ora19c      STABLE
Cluster Resources
-----
ora.cssd      1      ONLINE  ONLINE    ora19c      STABLE
ora.diskmon   1      OFFLINE OFFLINE   ora19c      STABLE
ora.evmd      1      ONLINE  ONLINE    ora19c      STABLE
[grid@ora19c grid_home]$
```

9. Create ASM Disk Groups

To initiate ASM Configuration assistant run the following command by grid user.
asmca



9. Create ASM Disk Groups



11. Install Oracle Database software

11. Install Oracle database software and create the sample database

Copy the Oracle database software installation file to the staging folder.

At the time of this writing, the installation file name downloaded from Oracle site is
LINUX.X64_193000_db_home.zip

In the MobaXtrem session, change the current user to `oracle` then extract the installation file into the Oracle database software home directory

```
su - oracle
unzip /yourmedialocation/LINUX.X64_193000_db_home.zip -d $ORACLE_HOME
```

- ❖ Edit Fake Oracle Linux release to correct one.
Under /app/oracle/product/19.0.0/dbhome_1 edit below
`vi cv/admin/cvu_config`
Export CV_ASSUME_DISTID=OEL8.3

Open a terminal window, change the current directory to the Oracle database home directory and run the `runInstaller` script.

```
cd $ORACLE_HOME
./runInstaller
```

Please find the below cheat sheet for Configuration field.

11. Install Oracle database software and create the sample database

Configuration Field	Action
Management Options	Make sure the checkbox is not marked.
Recovery Option	Mark the checkbox Enable Recovery . Make sure ASM is selected
ASM Diskgroup	Select DATADISK
Schema Password	Set passwords for the accounts
Operating System Groups	Go with all default.
Root Script Execution	Click on next
Prerequisite Checks	All the Prerequisite Checks should pass.
Summary	Click on Install button
Install Product	Install
Finish	click on Close button

11. Install Oracle database software and create the sample database

Configuration Field	Action
Configuration Option	Create and Configure a single instance database
System Class	Server Class
Database Edition	Enterprise Edition
Installation Location	Keep the default value
Configuration Type	General Purpose
Database Identifiers	Global Database Name: MYDB Oracle SID: MYDB Pluggable Database Name: pdb1
Configuration Options	Do not mark the AMM checkbox Memory: 5120 MB Character set: Use Unicode (AL32UTF8) Sample Schemas: (optional) Mark the checkbox "Install sample schema in the database"
Database Storage	Make sure ASM is selected

12. Post Installation Validation

#modify database profile for password limit

By default the passwords will be expired after 180 days.

You can change it by the following SQL command.

\$ sqlplus / as sysdba

SQL> ALTER PROFILE DEFAULT LIMIT

PASSWORD_LIFE_TIME UNLIMITED;

#to check instance status

SQL> select instance_name,status from v\$instance;

#End

**Note: Please correct if you find any mistake in
documentation.**