

Practice

Creating Oracle Database with ASM

Practice Target

In this practice you will create an Oracle database 19c with ASM.

Practice Overview

In high level, in this practice, you will perform the following tasks:

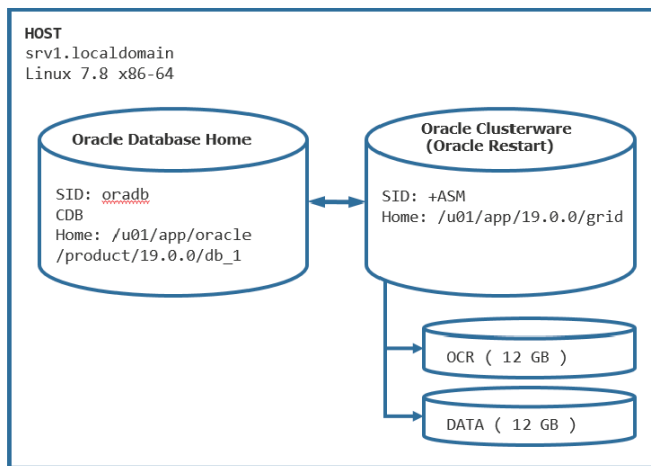
- Download Oracle Grid Infrastructure 19c software
- Create and configure an Oracle VirtualBox appliance
- Create virtual hardisks for ASM
- Setup the required environment variables for OS Accounts: grid and oracle
- Install the required ASM packages and create ASM disk volumes
- Change the required Kernel parameter values
- Install Oracle Grid Infrastructure software
- Create an ASM Disk Group
- Install Oracle database software and create an ASM-based database
- Check on Oracle Restart components and functionality
- Retrieve information about ASM
- Get started with `asmcmd`
- Create a tablespace in ASM

Note: In this practice, you will **not** use `srv1` machine that we used across the course practices. You will create a new vm (still its host name will be `srv1`) from the seed vm and use it for creating an ASM-based database.

Note: Because the machine will have two instances running in it, it requires more memory in it. You will configure the vm with a memory size 8G. This means the memory in your PC should be at least 12G.

Installation Architecture

In this practice, you will build a system the same as the following architecture diagram:



Downloading Oracle Grid Infrastructure 19c Software

1. Download Oracle Grid Infrastructure 19c (19.3) installation file for Linux x86-64 from this [link](#). It is a 2.8 GB file. Copy or move the file to the sharing folder.

Alternatively, download the installation file from Oracle website. Just make sure you download Oracle Grid Infrastructure 19.3 for Linux x86-64.

The file name is `LINUX.X64_193000_grid_home.zip`

2. We assume you already have Oracle database 19c (19.3) software installation files that you used to install Oracle database software in the other course practices so far. If not, download it from this [link](#). It is a 3G compressed file. Copy or move the file to the sharing folder.

The file name is `LINUX.X64_193000_db_home.zip`



Creating and Configuring an Oracle VirtualBox Appliance

In the following steps, you will create an Oracle VirtualBox Linux appliance by cloning the seed vm.

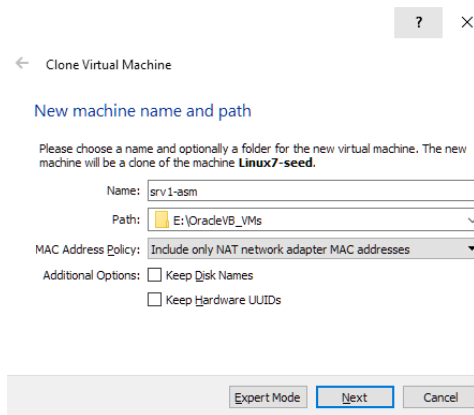
3. In Oracle VirtualBox, make sure that the vm "**Linux7-seed**" is added and turned off. If not, add it to Oracle VirtualBox Manager.

"**Linux7-seed**" is a vm that you imported into VirtualBox in the first course practice. In that practice, the Guest Additions were updated in that vm and its network was configured.

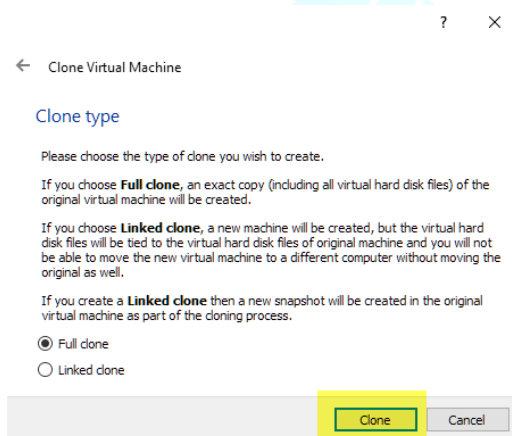
4. Right click on the vm and select Clone command (shortcut [Ctrl]+[o])

5. Change the **Name** to srv1-asm then click on **Next**.

Note: This is not the hostname.

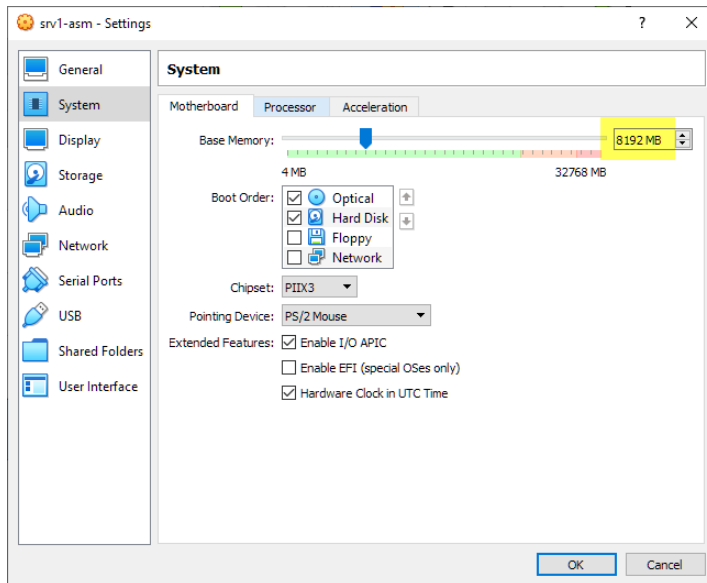


6. Click on Clone button.



7. After the cloning is finished, open the settings of the cloned mv

8. Change its allocated memory size to 8 GB, as follows:



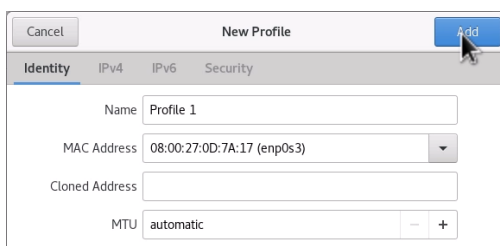
9. Click on OK button then start the vm
10. Login to the vm as `root`
11. Open the network settings of the VM. Obtain the IP address assigned to the VM. Make it a static IP address.

Click on **Applications** > **System Tools** > **Settings** > **Network** > under the **Wired** section click on the **Gear button** > highlight the IP address from the under the Details tab > right-click on the highlighted IP and select **Copy** command

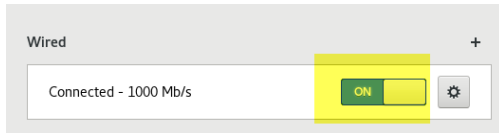
> click on **IPv4** tab > IPv4 Method to **Manual** > Paste the IP address into the **Address** field > set the **Netmask** to 255.255.255.0 > and the **Gateway** to 192.168.1.1

> click on **Apply** button

Note: Under the **Wired** section, you might not see any Network Profile configured. Simply, click on the **plus** button beside the "**Wired**" label, select the MAC address from the dropdown list, then click on **Add** button, as shown in the following screenshot:



12. Turn off the network adapter then turn it on again, then close the Settings window.



13. In the hosting PC, open the command prompt and ping the vm IP address to make sure it is seen by the PC.

14. In `srv1`, open a terminal window then open the `hosts` file with `vi` editor.

```
vi /etc/hosts
```

15. Insert into it the following line. Replace the `<ip address>` with the IP address of `srv1`

```
<ip address> srv1 srv1.localdomain
```

16. Ping `srv1` to make sure the changes take effect.

```
ping -c 3 srv1
```

17. Configure a connection to `srv1-asm` in Putty.

`srv1-asm` is the vm name in VirtualBox. `srv1` is its hostname.

Tip: In Putty, instead of creating a connection configuration for the vm from scratch, load the settings of `srv1`, change its configured IP address to match the IP address of the new vm, give the changed configuration the name "srv1-asm" and save it.

18. Open the connection and test it by connecting to `srv1` as `root`

19. If everything goes fine, shutdown the vm.

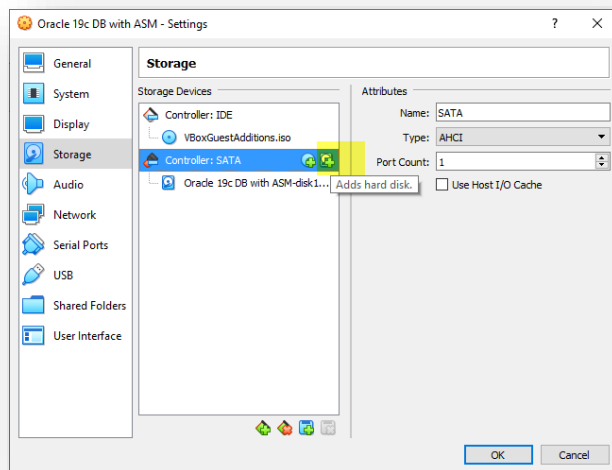
```
shutdown -h now
```

Creating Virtual Harddisks for ASM

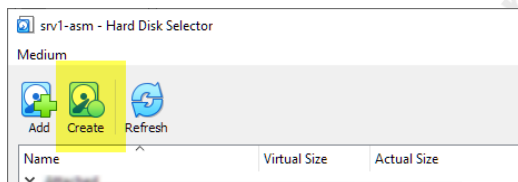
In OracleVirtualBox manager window, perform the following steps on `srv1` to create two ASM disks: OCRDISK1 (12 GB) and DATADISK1 (12GB)

20. Open the settings of `srv1`

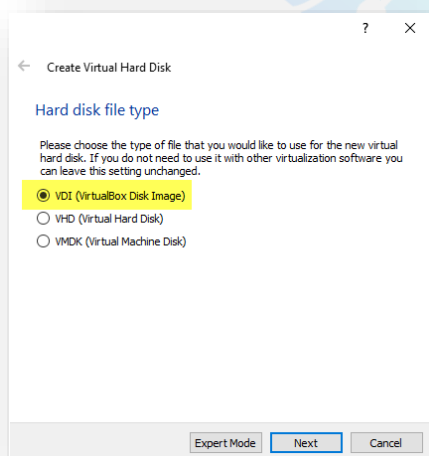
21. Click on Storage then Add "hard disk" button



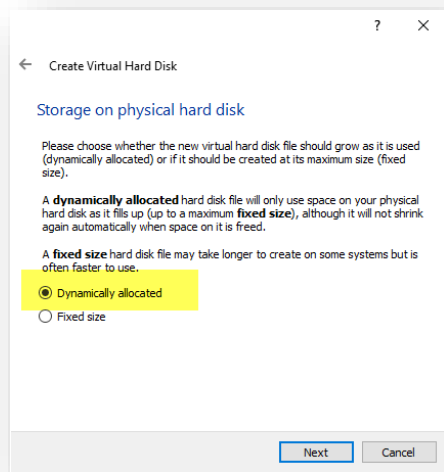
22. Click on **Create** button as follows:



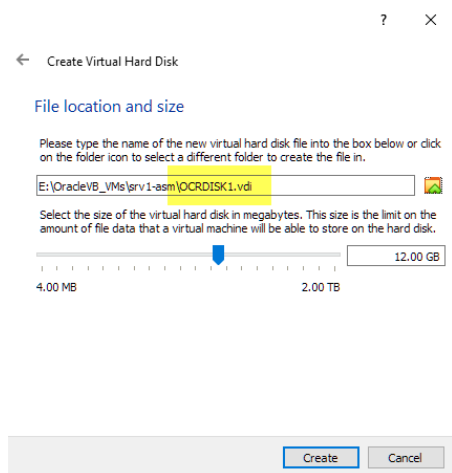
23. Select VDI option



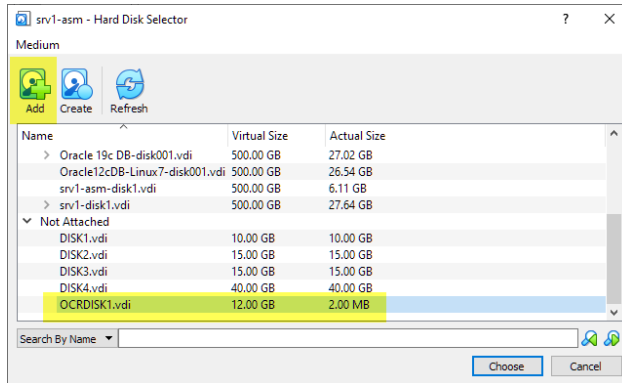
24. Select Dynamically allocated



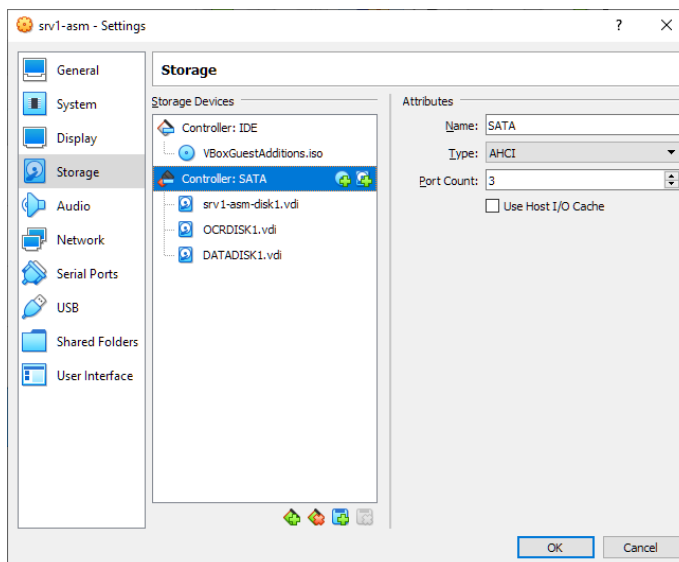
25. Set the OCR disk file name and its size.



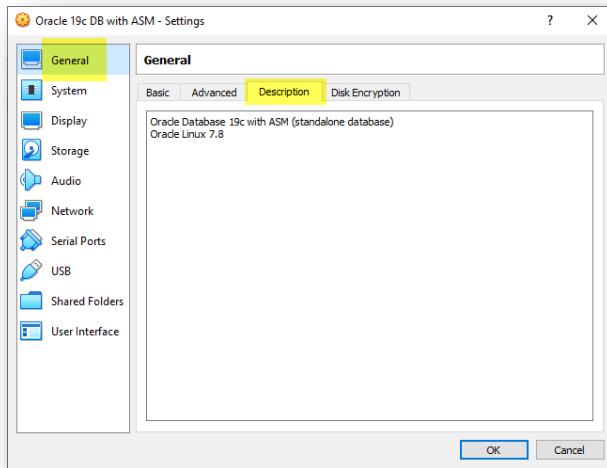
26. Select the `OCRDISK1.vdi` and click on Add button to attach the disk to the vm.



27. Perform the same steps again to create the DATA disk, of size 12G. You should end up with having two disks as follows:



28. Optionally, set a description for the appliance, then click on **OK** button



29. Start the vm and connect to it via Putty as `root`



Setting up Environment Variables for OS Accounts: `grid` and `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 Infrastructure software.

30. In the Putty session, switch current user to `oracle` and make a backup copy of the current bash profile file:

Note: If you are working in a system where `oracle` user is not there, you need to create `oracle` user and `oinstall` and `dba` groups. `oinstall` is the login group for `oracle`.

```
su - oracle
mv ~/.bash_profile ~/.bash_profile_bkp
```

31. Open the `.bash_profile` file with the `vi` editor

```
vi ~/.bash_profile
```

32. Add the following lines to it.

```
# .bash_profile

# OS User: oracle
# Application: Oracle Database Software Owner
if [ -f ~/.bashrc ]; then
. ~/.bashrc
fi

ORACLE_BASE=/u01/app/oracle; export ORACLE_BASE
ORACLE_SID=oradb; export ORACLE_SID
ORACLE_HOME=$ORACLE_BASE/product/19.0.0/db_1; export ORACLE_HOME

NLS_DATE_FORMAT="DD-MON-YYYY HH24:MI:SS"; export NLS_DATE_FORMAT
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
export EDITOR=vi
umask 022
```

- 33.** Switch the current user back to `root` then run the following code to create required groups, `grid` user and modify the accounts as follows. Enter the password for `grid` user when you are prompted to do so.

```
exit

groupadd asmadmin
groupadd asmdba
usermod -a -G asmdba oracle
useradd -u 54323 -g oinstall -G asmadmin,asmdba grid
passwd grid
```

- 34.** Add `oracle` and `grid` accounts to `vboxsf` group.

The `vboxsf` group was created by VirtualBox Guest Additions and it allows its members to access the shared folder (staging folder) in the hosting machine.

```
usermod -a -G vboxsf oracle
usermod -a -G vboxsf grid
```

- 35.** Create Oracle Database and Clusterware base and home directories:

Oracle Clusterware is the core software for Oracle Grid Infrastructure.

```
mkdir -p /u01/app/oracle/product/19.0.0/db_1
mkdir -p /u01/app/grid
mkdir -p /u01/app/19.0.0/grid
chown -R grid:oinstall /u01
chown -R oracle:oinstall /u01/app/oracle
chmod -R 775 /u01
```

- 36.** Switch to `grid` user and modify its bash profile as follows:

```
su - grid
mv ~/.bash_profile ~/.bash_profile_bkp
vi ~/.bash_profile
```

```
# .bash_profile
# Get the aliases and functions
if [ -f ~/.bashrc ]; then
. ~/.bashrc
fi
ORACLE_SID=+ASM; export ORACLE_SID
ORACLE_BASE=/u01/app/grid; export ORACLE_BASE
# the home must not be under the ORACLE_BASE
ORACLE_HOME=/u01/app/19.0.0/grid; 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
```

Installing ASM Packages and Creating ASM Disk Volumes

In the following steps, you will install ASM packages then create ASM disk volumes.

37. Exit from the current user so that the current user becomes the `root`

```
exit
```

38. Install Oracle ASMLib package

```
yum install oracleasm-support

# the following command will take a few minutes to finish:
yum install kmod-oracleasm
```

39. 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
```

40. Load the `oracleasm` kernel module:

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

41. List the disks as seen by the OS. You should see the disks created in the VirtualBox and attached to the appliance.

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

42. Use `fdisk` to create partitions in the disk.

Do the following for the disks `sdb` and `sdc`

```
fdisk <device file>
then press: n, p, 1, ENTER, ENTER, w - to apply changes
```

Following is the output done on `sdb`:

```
[root@srv1 ~]# fdisk /dev/sdb
Device contains neither a valid DOS partition table, nor Sun, SGI or OSF disklabel
Building a new DOS disklabel with disk identifier 0xd2973f79.
Changes will remain in memory only, until you decide to write them.
```

```
After that, of course, the previous content won't be recoverable.

Warning: invalid flag 0x0000 of partition table 4 will be corrected by w(rite)

WARNING: DOS-compatible mode is deprecated. It's strongly recommended to
        switch off the mode (command 'c') and change display units to
        sectors (command 'u').

Command (m for help): n
Command action
  e   extended
  p   primary partition (1-4)
p
Partition number (1-4): 1
First cylinder (1-261, default 1):
Using default value 1
Last cylinder, +cylinders or +size{K,M,G} (1-261, default 261):
Using default value 261

Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.
Syncing disks.
```

43. Verify that the partitions are created.

```
fdisk -l | grep "/dev/s"
```

44. Create the ASM disks

```
oracleasm createdisk OCRDISK1 /dev/sdb1
oracleasm createdisk DATADISK1 /dev/sdc1
oracleasm listdisks
```

Changing the Required Kernel Parameter Values

In the following step, you will change the kernel parameter values to the values recommended by Oracle.

45. Create the following file then add the code that follows to it.

```
vi /etc/sysctl.d/97-oracle-database-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
```

46. Apply the current values of the kernel parameters:

```
/sbin/sysctl --system
```

47. Run the following code to install further packages required by Oracle software.

```
yum install ksh
yum install libaio-devel.x86_64
```

48. Reboot the vm

```
reboot
```

Installing Oracle Grid Infrastructure Software

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

Note: When Oracle Grid Infrastructure is configured with a non-RAC database, the configuration is called **Oracle Restart**.

49. Make sure the Oracle Grid Infrastructure software installation file (LINUX.X64_193000_grid_home.zip) is copied to the staging folder.

50. As `grid`, extract the installation file into the Oracle Grid Infrastructure software home directory

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

51. Install the `cvuqdisk` in `srv1` as `root`

The package `cvuqdisk` is shipped with Oracle Grid software files and must be installed before installing the Clusterware software.

```
# exit to return back to the root shell:
exit

cd /u01/app/19.0.0/grid/cv/rpm/
CVUQDISK_GRP=oinstall; export CVUQDISK_GRP
rpm -iv cvuqdisk-1.0.10-1.rpm
```

52. Login to the VirtualBox window of `srv1` as `grid`.

53. 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
```

54. Respond to the Installer windows as follows:

Window	Action
Configuration Option	Select the following option: "Configure Oracle Grid Infrastructure for a Standalone Server (Oracle Restart)"
Create ASM Disk Group	1. Click on Change Discovery Path button 2. Enter the Discovery Path as follows: <code>/dev/oracleasm/disks/*</code>

	<p>3. Fill in the fields as follows:</p> <p>Disk Group Name: OCRDISK Redundancy: External Select Disks: OCRDISK1</p> <p>This disk group will be used by Clusterware for OCR repository</p>
ASM Password	<p>Select the option "Use the same password for these accounts"</p> <p>Enter the password ABcd##1234</p>
Management Option	<p>Make sure the Checkbox is unselected</p>
Operating System Groups	<p>Make sure the following are the selected values:</p> <p>OSASM: asmadmin OSDBA: asmdba</p>
Installation Location	<p>Oracle Base and Oracle Grid Home should automatically point to the values of their corresponding variables.</p> <p>Note: Observe the grid home is not under the Oracle grid base home.</p>
Create Inventory	<p>It should automatically point to <code>/u01/app/oraInventory</code></p>
Root Script Execution	<p>Mark the checkbox "Automatically run configuration scripts" and enter the root password</p>
Prerequisite Checks	<p>All the Prerequisite Checks should pass except the memory. It complains the available memory is 7.5. We can ignore this warning.</p> <p>Select Ignore All checkbox then click on Next button.</p> <p>Click Yes on the confirmation dialog box.</p> <p>Note: If you see other warnings, you have to resolve them before you proceed.</p>
Install Product	<p>When the installation reaches to nearly 11%, it will display a confirmation message. Click on Yes button.</p>
	<p>Wait till the installation is finished.</p>
	<p>click on Close button</p>

55. After the installation is finished, you can check CRS services status:

```
crsctl status resource -t
```

Creating ASM Disk Groups

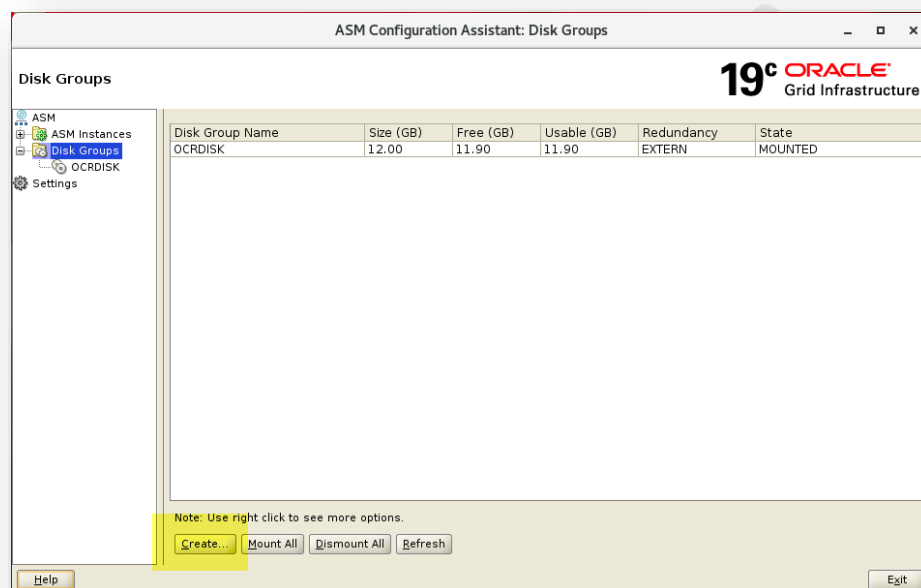
In the following steps, you will create the disk group that will be used by Oracle database to store its datafiles.

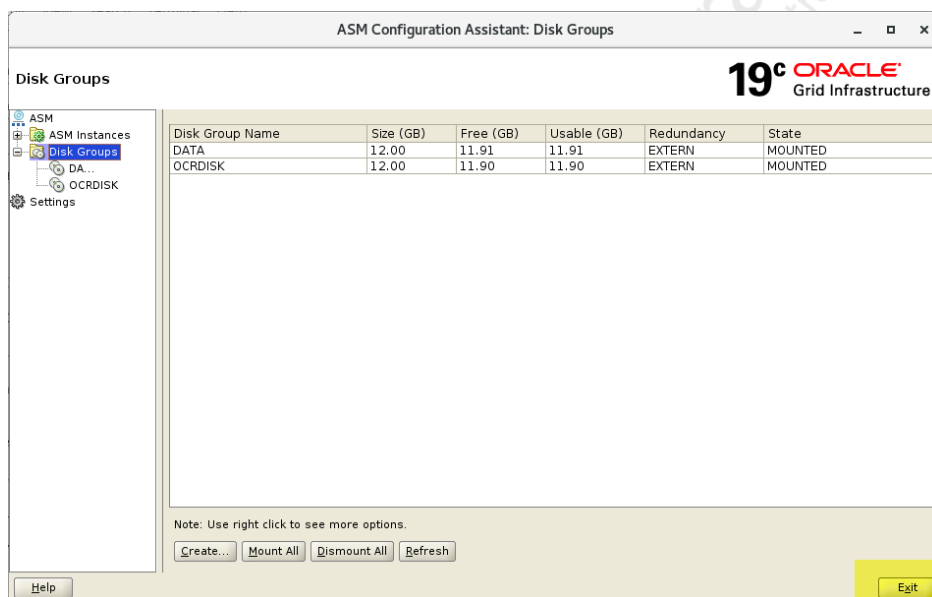
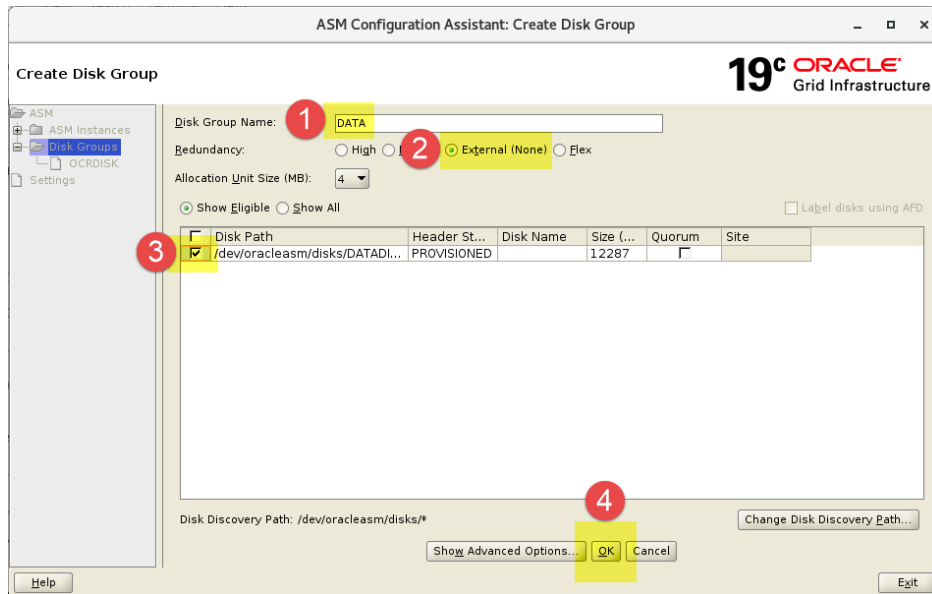
Note: In real life scenario, we might create more than one disk group. For example, one for the data files and one for the FRA.

56. In the VirtualBox window, initiate ASM Configuration Assistant

```
asmca
```

57. Create the disk group `DATADISK` by responding to the Assistant as follows:





58. Click on **Yes** when you see the confirmation message to close the window.

Installing Oracle Database Software and Creating an ASM-based Database

In the following steps, you will install Oracle database software in `srv1` and then use `dbca` to create an ASM-based database.

59. Make sure a copy of the Oracle database software installation file (`LINUX.X64_193000_db_home.zip`) is there in the staging folder.

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

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

61. Logout from the VirtualBox window and login to it again as `oracle`

62. In Oracle VirtualBox, create a snapshot for the vm. This snapshot will be used to restore vm in case the database installation fails for any reason.

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

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

64. Respond to the Installer windows as follows:

Window	Action
Configuration Option	Select the option: "Setup software only"
Database Installation Options	Select the option: "Single instance database installation"
Database Edition	Select the option: "Enterprise Edition"
Installation Location	Keep the default value
Operating System Groups	Select the OS groups as follows: <div> <div>Database Administrator (OSDBA) group:</div> <div>Database Operator (OSOPER) group (Optional):</div> <div>Database Backup and Recovery (OSBACKUPDBA) group:</div> <div>Data Guard administrative (OSDGDBA) group:</div> <div>Encryption Key Management administrative (OSKMDBA) group:</div> <div>Real Application Cluster administrative (OSRACDBA) group:</div> <div> <div>dba</div> <div></div> <div>dba</div> <div>dba</div> <div>dba</div> <div>asmdba</div> </div> </div>

Root Script Execution	Mark the checkbox "Automatically run configuration scripts" and enter the root password
Prerequisite Checks	All the Prerequisite Checks should pass.
Summary	Click on Install button
Install Product	When the installation reaches to nearly 63%, it will display a confirmation message. Click on Yes button.
Finish	click on Close button

65. Run the `dbca` and respond to the utility windows as follows:

Database Operation	Create a database
Creation Mode	Advance Configuration
Deployment Type	Custom Database
Database Identification	Global Database Name: oradb.localdomain Oracle SID: oradb Pluggable Database Name: pdb1
Storage Option	Select the option: "Use following for the database storage attributes" Make sure the "Database files storage type" is automatically set to "ASM" and "Database files location" is set to "+DATA/{DB_UNIQUE_NAME}"
Fast Recovery Option	Mark the option "Specify Fast Recovery Area" click on "Browse" button and select "DATA" disk group. Fast Recovery Size: 5000 MB. You will be prompted for the message [DBT-06801], click on "Yes" button Note: In real life scenario, you should set the FRA to a size large enough to accommodate its contents.
Network Configuration	Click on "Next" button. Note: You do not see a Listener in the list because the running Listener is owned by <code>grid</code> . The database will still be registered in the running Listener.
Database Options	Deselect all the options except the Oracle JVM . We keep the OJVM option because it is included in most installations.

Configuration Options	Keep everything in its default values.
Management Options	Make sure the checkbox is not marked.
User Credential	Select the option " Use the same administrative password for all accounts " Set the password to ABcd##1234
Creation Option	click on " Next " button You will be prompted for the message [DBT-06801], click on " Yes " button
Summary	click on Finish button
Finish	click on Close button

66. If there is no one, open a Putty session to the vm as `oracle`
67. After the installation and database creation are finished, verify the database is up and running by logging to it as `sys`

```
sqlplus / as sysdba
exit
```

68. Using `srvctl` utility, check the status of the database (can be run as `grid` as well)

```
srvctl status database -d $ORACLE_SID
```

69. Check if a connection entry to `oradb` is added to the `tnsnames.ora` file

The `tnsnames.ora` file was not even created.

```
ls $TNS_ADMIN/tnsnames.ora
```

70. Add a connection descriptor to `PDB1` in the `tnsnames.ora` file:

```
cat > $TNS_ADMIN/tnsnames.ora << EOF
PDB1 =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = srv1)(PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = pdb1.localdomain)
    )
  )
EOF
```

- 71.** Make a testing connection to PDB1 name:

```
sqlplus system/ABcd##1234@pdb1
```

- 72.** Exit from SQL*Plus and from oracle session.

```
quit  
exit
```

You finished creating an Oracle database with Oracle Restart. In the next sections, you will explore this system.



Ahmed Baraka
Oracle Database Administrator

Checking on Oracle Restart Components and Functionality

In this section of the practice, you will explore the ASM components and examine its auto-restart functionality.

73. Change the current user to grid

`grid` is the owner of the Grid Infrastructure. We normally login as `grid` to manage the Oracle Restart components and configuration.

```
su - grid
```

74. Check the status of the Oracle High Availability Services

Oracle Restart makes use of the Oracle High Availability Services (HAS) to start and stop the configured components. If the HAS services are not running, Oracle Restart (including the ASM instance) will not work.

HAS services can be stopped/started using the command `crsctl stop | start has`

```
# verify the crsctl command is running from the grid home1
which crsctl
# check the HAS status:
crsctl check has
```

75. Verify that autostart the HAS is enabled.

```
crsctl config has
```

76. Check the status of the resources in the Oracle Restart stack

```
crsctl stat res -t
```

77. Check the status of the Oracle Local Registry (OLR)

OLR is used by Grid to save its configuration information.

```
ocrcheck -local
```

78. Display the help information of using `srvctl` utility

```
srvctl -help
```

79. Display the configuration parameters of the database.

```
srvctl config database -d oradb
```

80. Run the following commands to stop and then start up the database.

Because the database is registered in the Clusterware, `grid` is able to start, stop, and configure the database resource.

```
srvctl stop database -d oradb -o immediate
srvctl status database -d oradb
srvctl start database -d oradb
srvctl status database -d oradb
```


Any resource registered in the Clusterware can be managed by the Clusterware. Let's try managing the Listener.

- 81.** Issue the following statements to shutdown the Listener and start it up again.

```
srvctl stop listener
srvctl status listener
srvctl start listener
srvctl status listener
```

One of the advantages of using Oracle Restart is that it has the functionality to check on the running processes from Grid and database homes and automatically restart them if they unexpectedly go down. Let's test this functionality.

- 82.** Exit from `grid` session so that the current session becomes `root`

- 83.** Retrieve the process ID of the `pmon` process of the database instance.

```
ps -ef|grep ora_pmon
```

- 84.** Kill the process.

Substitute the `pid` with the PID of `pmon` process retrieved by the preceding command.

```
kill -9 <pid>
```

- 85.** Keep running the following command a few times to check if the process is respawned.

The process must be respawning by the Clusterware.

```
ps -ef | grep ora_pmon
```

- 86.** As `oracle`, check the status of the database.

If you run the command quickly enough, you might see the database is not running due to the process failure. Wait for a few seconds then check its status again. Oracle Restart should manage to recover the database from the process failure automatically and without our intervention.

```
su - oracle
srvctl status database -d $ORACLE_SID
```

Let's examine the Oracle Clusterware diagnostic files.

- 87.** Examine the directory structure of the directory `$ORACLE_BASE/diag/crs/srv1/crs`

The Clusterware diagnostic files and alertlog file are saved in the directory `$ORACLE_BASE/diag/crs/<hostname>/crs`. This directory is called **ADR Directory** (ADR stands for Automatic Diagnostic Repository).

```
cd /u01/app/grid/diag/crs/srv1/crs/
ls
```

88. Check the alert log file of the Clusterware.

The alert log file contains logging data that could be useful in troubleshooting scenarios.

The alert log is also written as an XML file in the alert subdirectory of the ADR home.

```
cd trace  
cat alert.log
```



Ahmed Baraka
Oracle Database Administrator

Retrieving Information about ASM

In this section of the practice, you will obtain information about the ASM instance.

89. Change the current user to `grid` then check the status of the ASM instance.

```
su - grid
srvctl status asm -verbose
```

90. Check out the instance name.

The ASM instance always equals to "+ASM"

```
echo $ORACLE_SID
```

91. Login to the ASM instance using SQL*Plus

```
sqlplus / as sysasm
```

92. List the disk groups discovered in ASM.

```
col NAME for a15
SELECT NAME, STATE, TOTAL_MB, FREE_MB FROM V$ASM_DISKGROUP;
```

93. List the disks discovered by the ASM.

```
SELECT GROUP_NUMBER, NAME, MOUNT_STATUS, STATE, REDUNDANCY, TOTAL_MB, FREE_MB
FROM V$ASM_DISK;
```

94. List the files saved in ASM.

```
col TYPE for a15
SELECT GROUP_NUMBER, FILE_NUMBER, BYTES, TYPE, STRIPED
FROM V$ASM_FILE;
```

95. List the database instances connected to the ASM.

```
col INSTANCE_NAME for a8
col SOFTWARE_VERSION for a15
SELECT INSTANCE_NAME, DB_NAME, STATUS, SOFTWARE_VERSION
FROM V$ASM_CLIENT ;
```

96. Retrieve the SPFILE filename

The `SPFILE` of the ASM is saved in the `OCRDISK` disk group.

```
show parameter SPFILE
```

97. Convert the SPFILE into PFILE and display its contents.

```
CREATE PFILE='/tmp/asmpfile.ora' FROM SPFILE;
host cat /tmp/asmpfile.ora
```

Getting Started with asmcmd

In this section of the practice, you will get familiar with using `asmcmd` to explore the ASM contents.

98. Exit from SQL*Plus

```
exit
```

99. List the ASM disk groups in non-interactive mode.

By passing a command to the `asmcmd` utility in the command line, the utility runs the command, sends its output to the standard output, and then exit.

```
asmcmd lsdg
```

100. Invoke the `asmcmd` utility in an interactive mode.

101. In this mode, we submit the command to the `asmcmd` command prompt interface.

```
asmcd
```

102. Issue the help command to see list of the supported commands

```
help
```

103. Display help detail on using `ls` command

```
help ls
ls -?
```

104. Issue the following commands to a navigate the directories and files.

Observe the directory names passed to the command are case-insensitive, whereas the commands themselves are case-sensitive. Observe the database file types stored in ASM.

The full name of a file or a directory always starts with a disk group name, which in turn starts with a plus '+' sign.

```
ls
cd DATA
pwd
du
```

105. List the discovered disk groups and disks.

```
lsdg
lsdsk
```

106. Go to any directory and copy any file to /tmp

cp command allows us to get a file out of the ASM disks to the file system accessible by the OS.

```
cp <file> /tmp
```



Ahmed Baraka
Oracle Database Administrator

Creating Tablespaces in ASM

In this section of the practice, you will examine create a tablespace in ASM.

107. Exit from `asmcmd` then change the current user to `oracle`

```
quit
exit
su - oracle
```

108. Invoke SQL*Plus and login to the database as `sys`. Start `PDB1`.

```
sqlplus / as sysdba
ALTER PLUGGABLE DATABASE PDB1 OPEN;
```

109. Verify the OMF is enabled.

By default, the database creates the tablespace datafiles in the `DATA` disk group.

```
show parameter db_create_file_dest
```

110. Create a tablespace in `PDB1` without specifying the datafile.

```
ALTER SESSION SET CONTAINER = PDB1;
show parameter DB_CREATE_FILE_DEST
CREATE TABLESPACE mytbs;
```

111. Retrieve the datafile created for the tablespace.

```
SELECT FILE_NAME
FROM DBA_DATA_FILES
WHERE TABLESPACE_NAME='MYTBS';
```

112. Exit from SQL*Plus and invoke RMAN with connecting `PDB1` as target database

```
exit
rman target sys/ABcd##1234@pdb1
```

113. Make a copy of the MYTBS datafile to the sharing folder.

RMAN allows use to take copy of the database datafiles from ASM to the normal file system.

```
ALTER TABLESPACE MYTBS OFFLINE;
BACKUP AS COPY TABLESPACE MYTBS FORMAT '/media/sf_staging/mytbs.bak';
ALTER TABLESPACE MYTBS ONLINE;
```

114. Exit from RMAN

```
exit
```

115. Shutdown `srv1` and delete the snapshot taken for it.

Caution: Do not delete this vm. You will still use it for a the next practice.



Summary

- To configure Oracle Restart, we must install Oracle Grid Infrastructure in the system
- When is connected to an ASM instance, an Oracle database can save a variety of data types in the ASM disk groups, like data files, control files, online redo log files, parameter file, backup files and others.
- When an Oracle database process is abnormally turned down, Oracle restart automatically respawns the process. This feature provides more high availability than when working without ASM.
- We can obtain information about the ASM disk group and disks using SQL statements and asmcmd utility commands.
- When OMF points to an ASM disk group, by default, the data files of the newly create tablespaces are automatically saved into the OMF disk group. The full path of the datafile is automatically defined.
- Normal OS commands cannot directly access the files saved in the ASM. We can make copies of the ASM files to the traditional file systems using asmcmd. For database files, we can use SQL, asmcmd, or RMAN.



Ahmed Baraka
Oracle Database Administrator