



Integrated Cloud Applications & Platform Services

Oracle Database 12c: Oracle Automatic Storage Management Administration

Activity Guide

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Course Practice Environment: Security Credentials

For operating system (Linux) usernames and passwords, see the following:

- If you are attending a classroom-based or live virtual class, ask your instructor or LVC producer for OS credential information.
- If you are using a self-study format, refer to the communication that you received from Oracle University for this course.

Operating System Credentials		
Practice Environment	Username	Password
DNS node	root	<i>Read the note above</i>
	oracle	
host01 ~ host05	root	oracle
	grid	oracle
	oracle	oracle

For product-specific credentials used in this course, see the following table:

Product-Specific Credentials		
Product/Application	Username	Password
Database (orcl)	SYS	oracle_4U
	SYSTEM	oracle_4U
Database (prod)	SYS	oracle_4U
	SYSTEM	oracle_4U
ASM Instance	SYS	oracle_4U
	ASMSNMP	Oracle_4U

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Practices for Lesson 1: ASM Overview

Practices for Lesson 1

There are no practices for this lesson.

Practices for Lesson 2: Administering ASM Instances

Practice 2-1: Administering ASM Instances

Overview

In this practice, you adjust initialization parameters in the SPFILE, and stop and start the ASM instances on local and remote nodes.

Disk groups are reconfigured occasionally to move older data to slower disks. Even though these operations occur at scheduled maintenance times in off-peak hours, the rebalance operations do not complete before regular operations resume. There is some performance impact to the regular operations. The setting for the `ASM_POWER_LIMIT` initialization parameter determines the speed of the rebalance operation. Determine the current setting and increase the speed by 2.

1. Open a terminal window to connect to `host01` as the `grid` user by using the `-X` option. Set the environment to use the `+ASM1` instance. Connect to the `+ASM1` instance as `SYS` with the `SYSASM` privilege. What is the setting for `ASM_POWER_LIMIT`?

```
[oracle@dns ~]$ ssh -X grid@host01
grid@host01's password:

[grid@host01 ~]$ . oraenv
ORACLE_SID = [grid] ? +ASM1
The Oracle base has been set to /u01/app/grid

[grid@host01 ~]$ sqlplus / as sysasm

SQL> show parameter ASM_POWER_LIMIT

NAME                           TYPE        VALUE
-----                         -----
asm_power_limit                integer     1

SQL>
```

2. This installation uses an SPFILE. Use the `ALTER SYSTEM` command to change the `ASM_POWER_LIMIT` for all nodes.

```
SQL> show parameter SPFILE

NAME                           TYPE        VALUE
-----                         -----
spfile                         string     +DATA/cluster01/ASMPARAMETERFI
                                LE/registry.253.959603671

SQL> ALTER SYSTEM set ASM_POWER_LIMIT=3 SCOPE=BOTH SID='*' ;
```

System altered.

```
SQL> show parameter ASM_POWER_LIMIT
```

NAME	TYPE	VALUE
asm_power_limit	integer	3

```
SQL>
```

3. You have decided that due to other maintenance operations, you want the +ASM1 instance to handle the bulk of the rebalance operation; so you set the `ASM_POWER_LIMIT` to 1 on instances +ASM2 and +ASM3, and to 5 on instance +ASM1. Exit SQL*Plus when you have finished.

```
SQL> ALTER SYSTEM set ASM_POWER_LIMIT=1 SCOPE=BOTH SID='+ASM2' ;
```

System altered.

```
SQL> ALTER SYSTEM set ASM_POWER_LIMIT=1 SCOPE=BOTH SID='+ASM3' ;
```

System altered.

```
SQL> ALTER SYSTEM set ASM_POWER_LIMIT=5 SCOPE=BOTH SID='+ASM1' ;
```

System altered.

```
SQL> column NAME format A16
```

```
SQL> column VALUE format A16
```

```
SQL> select inst_id, name, value from GV$PARAMETER
where name like 'asm_power_limit' order by 1;
```

INST_ID	NAME	VALUE
1	asm_power_limit	5
2	asm_power_limit	1
3	asm_power_limit	1

```
SQL> exit
```

```
[grid@host01 ~]$
```

4. Use `srvctl` to view which database instances are running on each host.

```
[grid@host01 ~]$ srvctl status database -db orcl
```

Instance orcl_1 is running on node host02

Instance orcl_2 is running on node host03

Instance orcl_3 is running on node host01

```
[grid@host01 ~]$
```

5. Use the `srvctl stop instance` command to stop the ASM instance on host01. What do you observe?

```
[grid@host01 ~]$ srvctl stop asm -n host01
PRCR-1014 : Failed to stop resource ora.asm
PRCR-1065 : Failed to stop resource ora.asm
CRS-2974: unable to act on resource 'ora.asm' on server 'host01'
because that would require stopping or relocating resource
'ora.DATA.dg' but the -force option was not specified

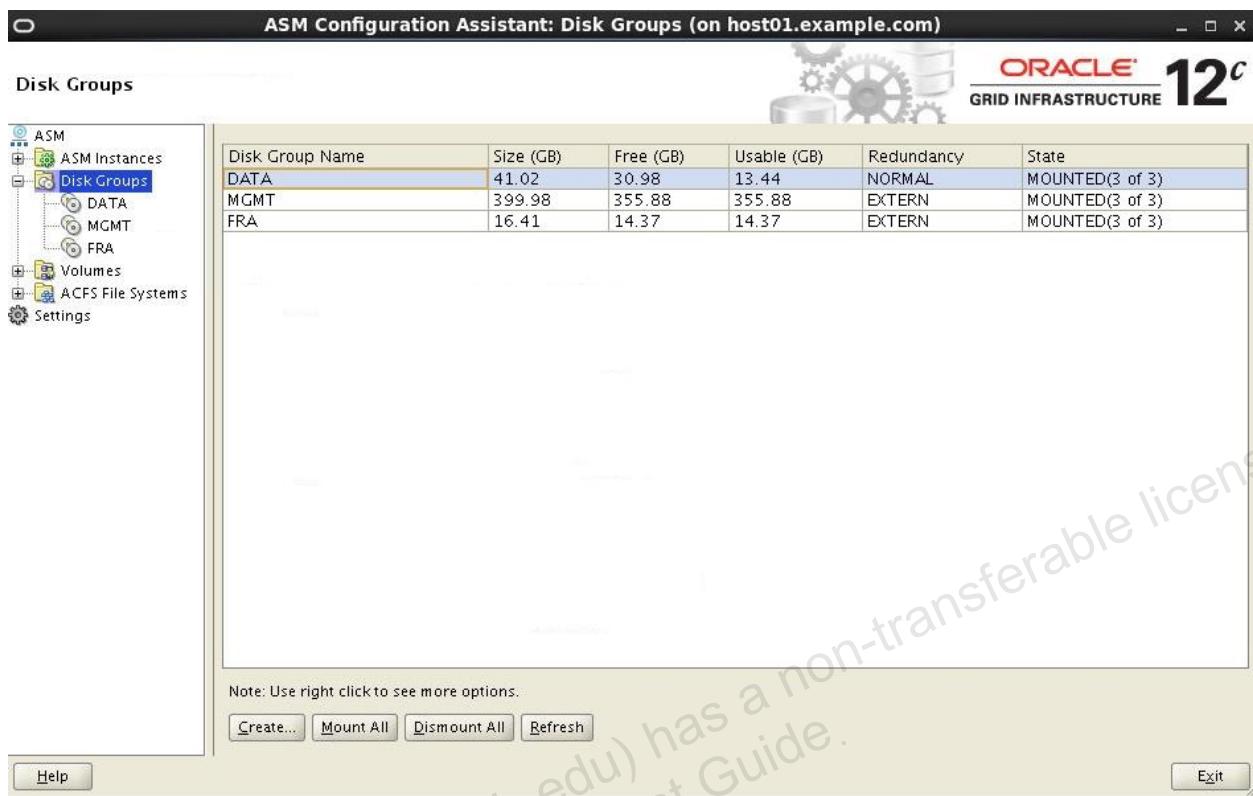
[grid@host01 ~]$
```

6. Execute `asmca` from the grid terminal window to examine the connected ASM clients.

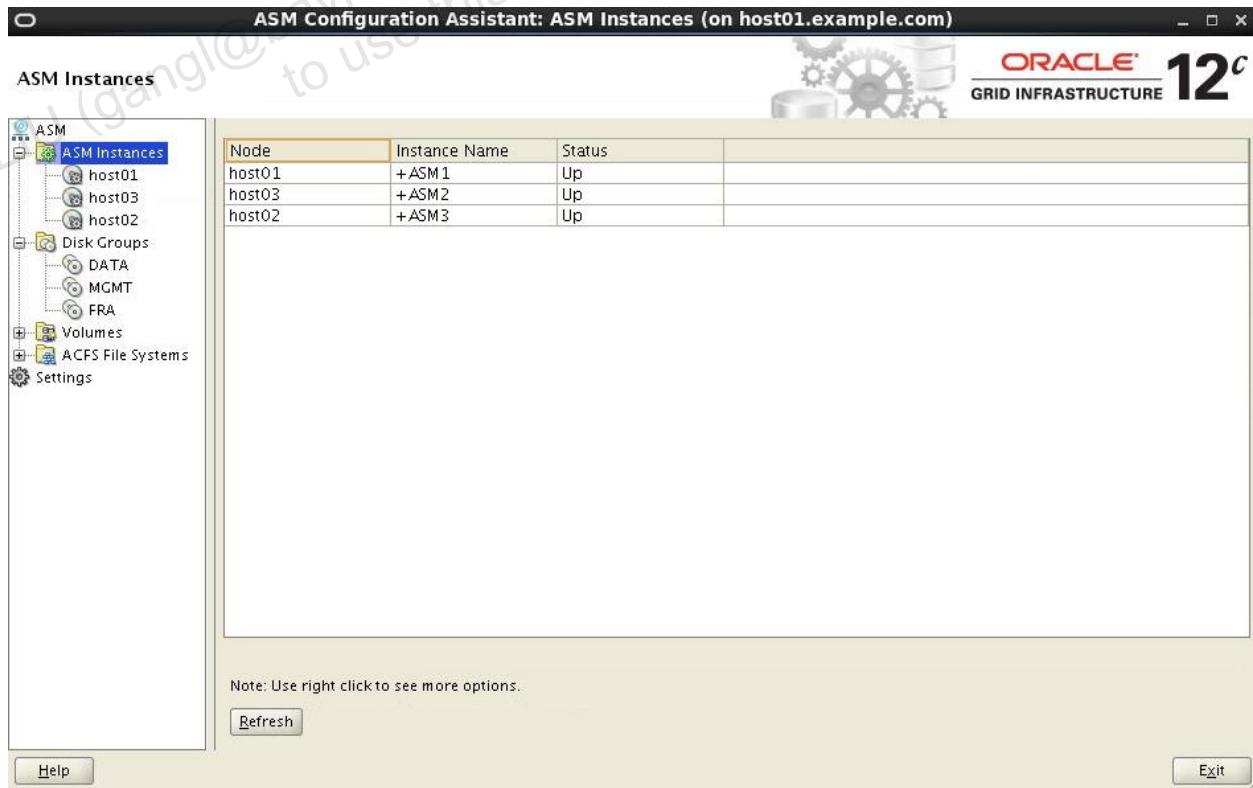
```
[grid@host01 ~]$ asmca
```



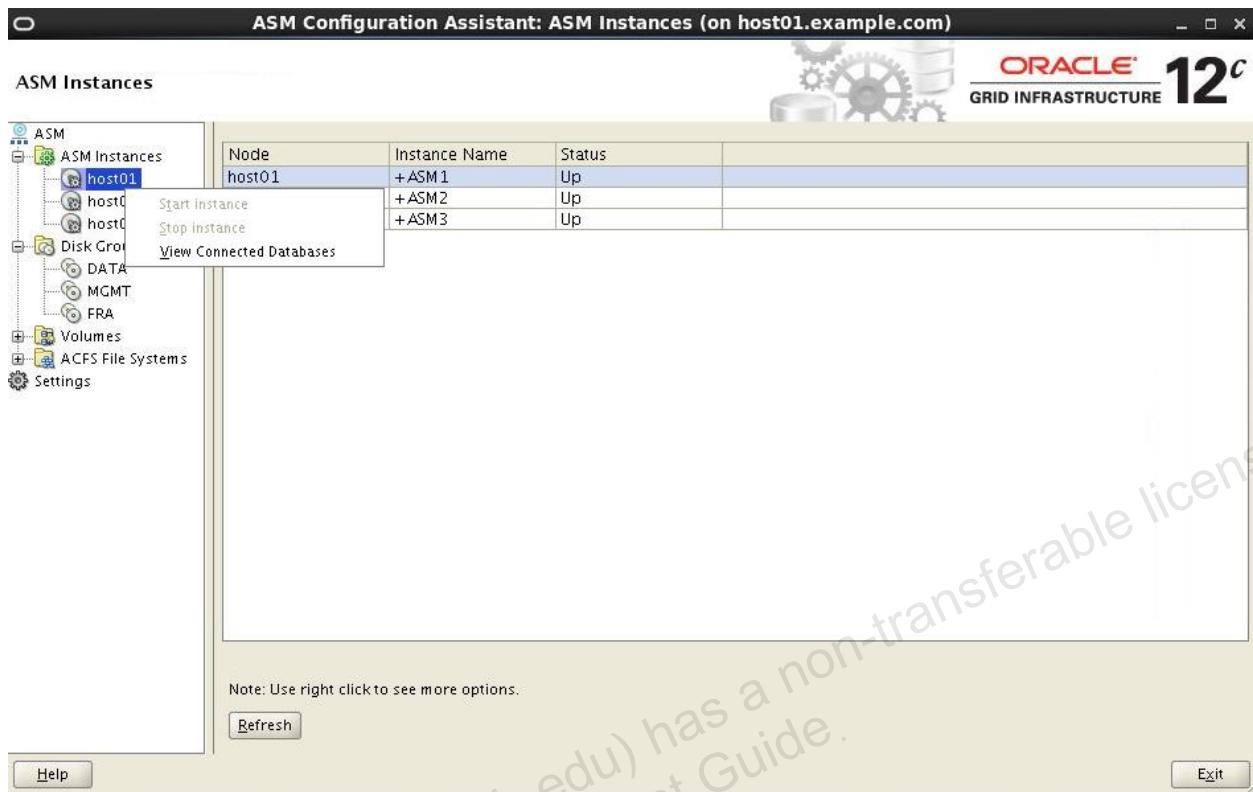
7. After the ASM Configuration Assistant appears, click on Disk Groups.



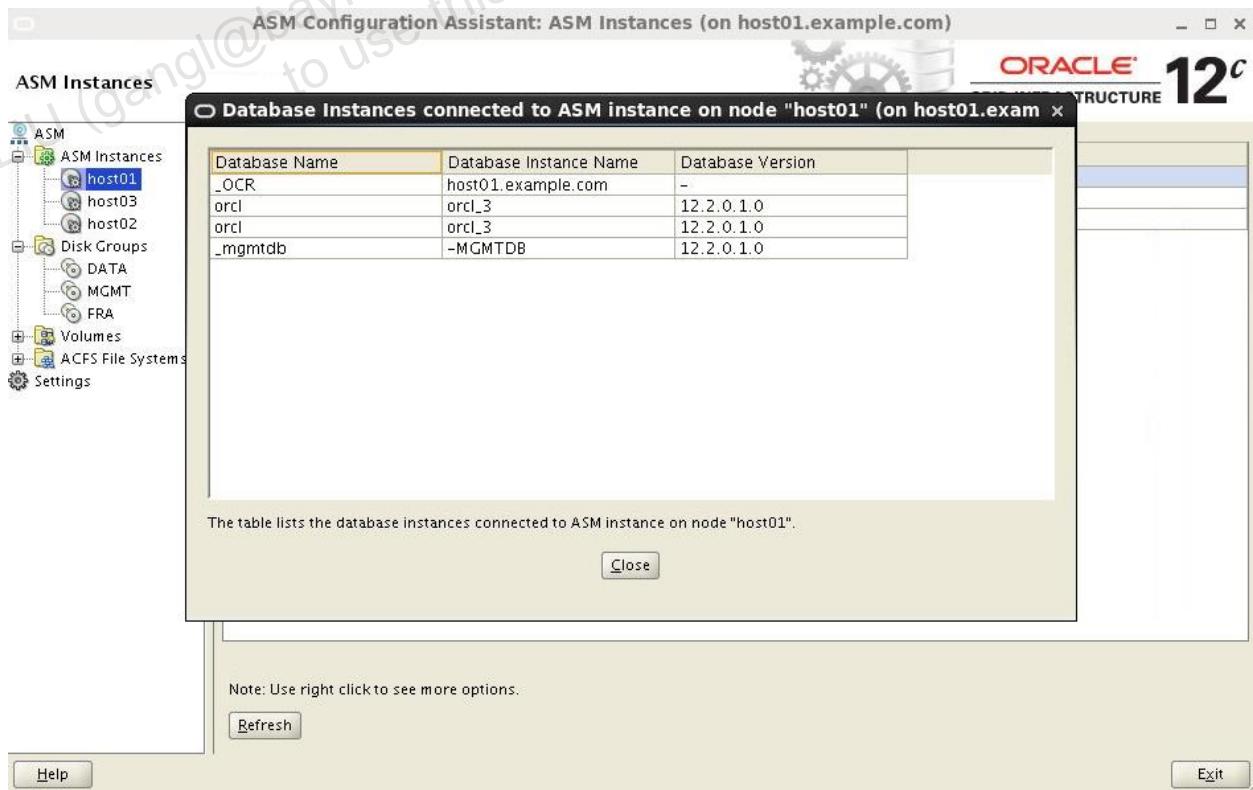
8. Click ASM Instances to review the current ASM instance locations.



9. Right-click host01 to choose the View Connected Databases menu.



10. Review the connected ASM clients. Click Close. Your output may vary.



11. Next, right-click host02 and select View Connected Databases. Repeat this for host03. You should see the orcl client connections in all three hosts. Click Close.

The screenshot shows two separate instances of the Oracle ASM Configuration Assistant running on host01.example.com. Both instances are titled "ASM Configuration Assistant: ASM Instances (on host01.example.com)".

The left instance is for host02 and displays the following table:

Database Name	Database Instance Name	Database Version
orcl	orcl_1	12.2.0.1.0
_OCR	host02.example.com	-
orcl	orcl_1	12.2.0.1.0

The right instance is for host03 and displays the following table:

Database Name	Database Instance Name	Database Version
orcl	orcl_2	12.2.0.1.0
_OCR	host03.example.com	-
orcl	orcl_2	12.2.0.1.0

In both tables, the first row (orcl) represents an Oracle Database instance, the second row (_OCR) represents the Oracle Cluster Registry, and the third row (orcl) represents another Oracle Database instance. All instances are running on host02 or host03 respectively, with version 12.2.0.1.0.

12. Exit ASMCA when you have finished.
13. Run the `asmcmd lsct` command to view the client connections for the DATA disk group that are connected to the ASM instance on host01, host02, and host03. Use your ASM instance name on each host (**See step 8**) to set the environment variables using the `oraenv` script.

```
[grid@host01 ~]$ asmcmd lsct data
DB_Name Status Software_Version Compatible_version Instance_Name Disk_Group
+ASM CONNECTED 12.2.0.1.0 12.2.0.1.0 +ASM1 DATA
_OCR CONNECTED - - host01.example.com DATA
orcl CONNECTED 12.2.0.1.0 12.2.0.0.0 orcl_3 DATA

[grid@host01 ~]$ ssh host02
[grid@host02 ~]$ . oraenv
ORACLE_SID = [grid] ? +ASM3
The Oracle base has been set to /u01/app/grid

[grid@host02 ~]$ asmcmd lsct data
DB_Name Status Software_Version Compatible_version Instance_Name Disk_Group
+ASM CONNECTED 12.2.0.1.0 12.2.0.1.0 +ASM3 DATA
_OCR CONNECTED - - host02.example.com DATA
orcl CONNECTED 12.2.0.1.0 12.2.0.0.0 orcl_1 DATA

[grid@host02 ~]$ ssh host03
[grid@host03 ~]$ . oraenv
ORACLE_SID = [grid] ? +ASM2
The Oracle base has been set to /u01/app/grid

[grid@host03 ~]$ asmcmd lsct data
DB_Name Status Software_Version Compatible_version Instance_Name Disk_Group
+ASM CONNECTED 12.2.0.1.0 12.2.0.1.0 +ASM2 DATA
_OCR CONNECTED - - host03.example.com DATA
orcl CONNECTED 12.2.0.1.0 12.2.0.0.0 orcl_2 DATA

[grid@host03 ~]$ exit
logout
Connection to host03 closed.
[grid@host02 ~]$ exit
logout
Connection to host02 closed.

[grid@host01 ~]$
```

14. Run the `srvctl status asm -detail` command to obtain the same information like step 13.

```
[grid@host01 ~]$ srvctl status asm -detail
ASM is running on host02,host03,host01
ASM is enabled.
ASM instance +ASM1 is running on node host01
Number of connected clients: 3
Client names: -MGMTDB:_mgmtdb:cluster01
    host01.example.com:_OCR:cluster01 orcl_3:orcl:cluster01
ASM instance +ASM2 is running on node host03
Number of connected clients: 2
Client names: host03.example.com:_OCR:cluster01
    orcl_2:orcl:cluster01
ASM instance +ASM3 is running on node host02
Number of connected clients: 2
Client names: host02.example.com:_OCR:cluster01
    orcl_1:orcl:cluster01

[grid@host01 ~]$
```

15. Close all the terminal windows that were opened for this practice.

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Practices for Lesson 3: Flex ASM

Practice 3-1: Client Database Failover with Flex ASM

Overview

In this practice, you crash an ASM instance and examine how the client database transparently fails over to another Flex ASM instance.

- Establish a terminal session connected to host01 by using the grid OS user. Configure the environment by using the oraenv script. Enter +ASM1 when you are prompted for an ORACLE_SID value.

```
[oracle@dns ~]$ ssh grid@host01
grid@host01's password:

[grid@host01 ~]$ . oraenv
ORACLE_SID = [grid] ? +ASM1
The Oracle base has been set to /u01/app/grid

[grid@host01 ~]$
```

- Change to the directory that contains the scripts associated with this practice and examine the contents of asm_clients.sql. This query shows the clients connected to all the Flex ASM instances in the cluster.

```
[grid@host01 ~]$ cd /stage/ASM/labs/less_03

[grid@host01 less_03]$ cat asm_clients.sql
col client_instance_name format a21
col host_name format a9
col status format a9

select distinct i.host_name, i.instance_name asm_instance_name,
c.instance_name client_instance_name, c.db_name, c.status
from gv$instance i, gv$asm_client c
where i.inst_id=c.inst_id;

exit

[grid@host01 less_03]$
```

3. Examine the clients connected to each of the Flex ASM instances. Take note of the connection mappings in your environment because they may differ. In particular, take note of the database instance and the ASM instance on host02. In the following example, the +ASM3 instance is running on host02 and the `orcl_1` database instance is connected to it. However, this may vary in your environment.

```
[grid@host01 less_03]$ sqlplus / as sysasm @asm_clients

HOST_NAME          ASM_IN CLIENT_INSTANCE_NAME DB_NAME   STATUS
-----
host01.example.com +ASM1   +ASM1                  +ASM      CONNECTED
host01.example.com +ASM1   -MGMTDB                _mgmtdb  CONNECTED
host01.example.com +ASM1   host01.example.com    _OCR     CONNECTED
host01.example.com +ASM1   orcl_3                 orcl     CONNECTED
host02.example.com +ASM3   +ASM3                  +ASM      CONNECTED
host02.example.com +ASM3   host02.example.com    _OCR     CONNECTED
host02.example.com +ASM3   orcl_1                orcl    CONNECTED
host03.example.com +ASM2   +ASM2                  +ASM      CONNECTED
host03.example.com +ASM2   host03.example.com    _OCR     CONNECTED
host03.example.com +ASM2   orcl_2                 orcl     CONNECTED

10 rows selected.

[grid@host01 less_03]$
```

4. Establish another terminal session as the oracle OS user by connecting to host02. Set the `oracle` environment by using the instance name identified in the previous steps.

```
[oracle@dns ~]$ ssh oracle@host02
oracle@host02's password:

[oracle@host02 ~]$ . oraenv
ORACLE_SID = [oracle] ? orcl_1
ORACLE_HOME = [/home/oracle] ?
/u01/app/oracle/product/12.2.0/dbhome_1
The Oracle base has been set to /u01/app/oracle

[oracle@host02 ~]$
```

5. Change to the directory that contains the scripts associated with this practice.

```
[oracle@host02 ~]$ cd /stage/ASM/labs/less_03
[oracle@host02 less_03]$
```

6. Connect to the RAC database instance as follows. Confirm that you are connected to the database instance, which is a client of +ASM3 (located on host02).

```
[oracle@host02 less_03]$ sqlplus system/<password>

SQL*Plus: Release 12.2.0.1.0 Production on Tue Nov 21 13:37:21
2017

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Connected to:
Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 -
64bit Production

SQL> select instance_name from v$instance;

INSTANCE_NAME
-----
orcl_1

SQL>
```

7. Start a workload by using the `workload.sql` script that is located in `/stage/ASM/labs/less_03`. The script executes a series of transactions that insert data, query data, and update data. **Do Not wait; proceed the next step.**

```
SQL> @workload

SQL> create table s(sn number);

Table created.

SQL> create table t(c number,d varchar2(20));

Table created.

SQL> create index it on t(c);

Index created.

SQL> insert into s values(1);

1 row created.

SQL> commit;
```

```

Commit complete.

SQL>
SQL> begin
 2   for i in 1..90000 loop
 3     insert into t values (i,'initial');
 4   end loop;
 5 end;
 6 /
...

```

- Back in your `grid` terminal session, abort the Flex ASM instance on `host02` (+ASM3).

```

[grid@host01 less_03]$ srvctl stop asm -node host02 -stopoption ABORT -force
[grid@host01 less_03]$

```

- Confirm that no ASM instance is running on `host02`.

```

[grid@host01 less_03]$ crsctl status resource ora.asm -t
-----
Name          Target  State       Server      State details
-----
Cluster Resources
-----
ora.asm
    1        ONLINE  ONLINE      host01      Started,STABLE
    2        ONLINE  ONLINE      host03      Started,STABLE
    3        OFFLINE OFFLINE
                                         Instance Shutdown,
                                         STABLE
-----
[grid@host01 less_03]$

```

- Back in your `oracle` terminal session, confirm that the workload is still running. This demonstrates how Flex ASM improves availability by transparently failing over client database instances if a Flex ASM instance fails. **Do Not wait; proceed the next step.**

```

...
SQL> declare
 2   v number;

```

```

3 begin
4   for i in 1..600000 loop
5     lock table s in exclusive mode;
6     select sn into v from s;
7     insert into t values(v,'orcl');
8     update s set sn=sn+1;
9   commit;
10  end loop;
11 end;
12 /
...

```

11. Return to your grid terminal session and re-examine the Flex ASM client connections by using the `asm_clients.sql` script. Notice that the `orcl_1` instance that was connected to +ASM3 has been relocated. In the following example, the instance that was previously connected to +ASM3 on is now connected to +ASM2 (on host03).

```
[grid@host01 less_03]$ sqlplus / as sysasm @asm_clients

SQL*Plus: Release 12.2.0.1.0 Production on Tue Nov 21 13:59:26
2017

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Connected to:
Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 -
64bit Production

HOST_NAME          ASM_IN CLIENT_INSTANCE_NAME DB_NAME STATUS
-----
host01.example.com +ASM1    +ASM1                  +ASM      CONNECTED
host01.example.com +ASM1    -MGMTDB                _mgmtdb  CONNECTED
host01.example.com +ASM1    host01.example.com  _OCR      CONNECTED
host01.example.com +ASM1    orcl_3                 orcl     CONNECTED
host03.example.com +ASM2    +ASM2                  +ASM      CONNECTED
host03.example.com +ASM2    host03.example.com  _OCR      CONNECTED
host03.example.com +ASM2    orcl_1                 orcl     CONNECTED
host03.example.com +ASM2    orcl_2                 orcl     CONNECTED

8 rows selected.

Disconnected from Oracle Database 12c Enterprise Edition Release
12.2.0.1.0 - 64bit Production

[grid@host01 less_03]$
```

12. Restart the Flex ASM instance that you stopped earlier in this practice.

```
[grid@host01 less_03]$ srvctl start asm -node host02

[grid@host01 less_03]$
```

13. Confirm that Flex ASM is again running on host02.

```
[grid@host01 less_03]$ srvctl status asm -detail
ASM is running on host02,host03,host01
ASM is enabled.
ASM instance +ASM1 is running on node host01
Number of connected clients: 3
Client names: -MGMTDB:_mgmtbdb:cluster01
host01.example.com:_OCR:cluster01 orcl_3:orcl:cluster01
ASM instance +ASM2 is running on node host03
Number of connected clients: 2
Client names: host03.example.com:_OCR:cluster01
orcl_2:orcl:cluster01
ASM instance +ASM3 is running on node host02
Number of connected clients: 2
Client names: host02.example.com:_OCR:cluster01
orcl_1:orcl:cluster01

[grid@host01 less_03]$
```

14. Re-examine the Flex ASM client connections. Notice that `orcl_1` is reconnected to the newly started Flex ASM instance `+ASM3`. This is because Flex ASM redistributes clients automatically when an ASM instance is added.

```
[grid@host01 less_03]$ sqlplus / as sysasm @asm_clients

SQL*Plus: Release 12.2.0.1.0 Production on Tue Nov 21 14:04:45
2017

Copyright (c) 1982, 2016, Oracle. All rights reserved.

Connected to:
Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 -
64bit Production

HOST_NAME          ASM_IN CLIENT_INSTANCE_NAME   DB_NAME   STATUS
-----
host01.example.com  +ASM1   +ASM1                  +ASM      CONNECTED
host01.example.com  +ASM1   -MGMTDB                _mgmtbdb CONNECTED
host01.example.com  +ASM1   host01.example.com     _OCR      CONNECTED
```

```
host01.example.com  +ASM1 orcl_3          orcl   CONNECTED
host02.example.com  +ASM3  +ASM3           +ASM    CONNECTED
host02.example.com  +ASM3  host02.example.com _OCR   CONNECTED
host02.example.com  +ASM3 orcl_1           orcl   CONNECTED
host03.example.com  +ASM2  +ASM2           +ASM    CONNECTED
host03.example.com  +ASM2  host03.example.com _OCR   CONNECTED
host03.example.com  +ASM2 orcl_2           orcl   CONNECTED

10 rows selected.

Disconnected from Oracle Database 12c Enterprise Edition Release
12.2.0.1.0 - 64bit Production

[grid@host01 less_03]$
```

Congratulations! You have exercised client database failover with Flex ASM.

15. Close all terminal windows opened for this practice.

Practices for Lesson 4: Administering ASM Diskgroups Part I

Practice 4-1: Administering ASM Disk Groups

Overview

In this practice, you change the configuration of a disk group and control the resulting rebalance operations. You determine the connected clients to the existing disk groups and perform disk group checks.

Because the `asmadmin` group has only one member, `grid`, open a terminal window and become the `grid` OS user for this practice.

1. Open a terminal session from your desktop to host01 as the grid user and use oraenv to set your environment. Use the asmcmd lsdg command to check the currently configured disk groups.

```
[oracle@dns ~]$ ssh grid@host01
grid@host01's password:

[grid@host01 ~]$ . oraenv
ORACLE_SID = [grid] ? +ASM1
The Oracle base has been set to /u01/app/grid

[grid@host01 ~]$ asmcmd lsdg

State      Type      Rebal   Sector  Logical_Sector  Block          AU
Total_MB   Free_MB  Req_mir_free_MB  Usable_file_MB
Offline_disks Voting_files  Name

MOUNTED    NORMAL    N            512           512    4096  4194304
42000      30884          4200          13342             0
Y DATA/

MOUNTED    EXTERN   N            512           512    4096  4194304
16800      14716          0           14716             0
N FRA/

MOUNTED    EXTERN   N            512           512    4096  4194304
409584     362832         0           362832            0
N MGMT/

[grid@host01 ~]$
```

2. Use the `asmcmd lsdsdk` command to view the disks that belong to the `DATA` disk group.

Note: -k option displays several columns of the V\$ASM_DISK view.

- Now drop DATA_0000. Use the chdg command with inline XML. Use a power level of 5. Note that the command is typed without a return, all on one line.

```
chdg '<chdg name="DATA" power="5"><drop><fg name="DATA_0000">
</fg><dsk name="DATA 0000"/></drop></chdg>'
```

[grid@host01 ~] \$ **asmcmd**

```
ASMCMD> chdg '<chdg name="DATA" power="5"><drop><fg  
name="DATA_0000"></fg><dsk name="DATA_0000"/></drop></chdg>'  
Diskgroup altered.  
  
ASMCMD> exit  
  
[grid@host01 ~]$
```

4. Next, you add another disk to the DATA disk group. Perform a disk check to verify the disk group metadata. Use the check disk group command `chkdg`.

```
[grid@host01 ~]$ asmcmd chkdg data  
Diskgroup altered.  
[grid@host01 ~]$
```

5. Add the dropped disk (`/dev/c1_DATA1_dsk13`) back to the DATA disk group and remove a disk (`DATA_0004: /dev/c1_DATA1_dsk11`), but the rebalance operation must wait until a quiet time, and then proceed as quickly as possible. As the `grid` user, use SQL*Plus to connect to the ASM instance on `host01` and perform the following operations:

```
[grid@host01 ~]$ sqlplus / as sysasm  
  
SQL*Plus: Release 12.2.0.1.0 Production on Tue Nov 21 15:37:18  
2017  
  
Copyright (c) 1982, 2016, Oracle. All rights reserved.  
  
Connected to:  
Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 -  
64bit Production  
  
SQL> ALTER DISKGROUP DATA ADD DISK '/dev/c1_DATA1_dsk13'  
REBALANCE POWER 0;  
  
Diskgroup altered.  
  
SQL> ALTER DISKGROUP DATA DROP DISK DATA_0004 REBALANCE POWER 0;  
Diskgroup altered.  
SQL>
```

6. Next, start the rebalance operations on the DATA disk group. Specify a power of 6. Query the V\$ASM_OPERATION view to monitor the rebalance. **Note:** You may not see the output of the query because the rebalance operation takes less than a minute.

```
SQL> alter diskgroup DATA rebalance power 6;

Diskgroup altered.

SQL> SELECT group_number, operation, state, power, est_minutes
  FROM v$asm_operation;

GROUP_NUMBER OPERA STAT          POWER EST_MINUTES
----- -----
        1 REBAL WAIT            6      0
        1 REBAL RUN             6      1
        1 REBAL DONE            6      0
        1 REBAL DONE            6      0

SQL> /

GROUP_NUMBER OPERA STAT          POWER EST_MINUTES
----- -----
        1 REBAL WAIT            6      0
        1 REBAL RUN             6      0
        1 REBAL DONE            6      0
        1 REBAL DONE            6      0

SQL> /

no rows selected

SQL> exit
[grid@host01 ~]$
```

7. Examine the disk I/O statistics by using the `asmcmd lsdsk --statistics` command.
The disks in the DATA and MGMT disk groups show the most activity.

<code>[grid@host01 ~]\$ asmcmd lsdsk --statistics</code>												
Reads	Write	Read_Errs	Write_Errs	Read_time	Write_Time	Bytes_Read	Bytes_Written	Voting_File	Path			
5026	126776	0	0	472.469286	224.222447	411902976	2320915456	N	/dev/c1_DATA1_dsk1			
9435	31818	0	0	436.834749	92.751034	481620480	670652416	N	/dev/c1_DATA1_dsk10			
351494	134504	0	0	568.388206	232.074763	6122650112	2399880704	N	/dev/c1_DATA1_dsk12			
672	1584	0	0	.549265	222.280885	10801152	1202911232	N	/dev/c1_DATA1_dsk13			
133930	131549	0	0	499.118526	282.682958	2824747008	1286961664	Y	/dev/c1_DATA1_dsk14			
5193	124839	0	0	459.231625	283.51138	483441152	1170079744	Y	/dev/c1_DATA1_dsk2			
467745	52166	0	0	630.4083	128.123281	7964913664	1017371648	Y	/dev/c1_DATA1_dsk3			
223947	46662	0	0	528.777473	110.974353	2732577280	909714432	N	/dev/c1_DATA1_dsk4			
364043	39581	0	0	695.827077	102.317774	6284477952	847249408	N	/dev/c1_DATA1_dsk5			
106724	111341	0	0	36.942283	182.89791	465057792	646351360	N	/dev/c1_DATA1_dsk6			
37207	118007	0	0	15.836118	188.798851	607488512	1824048640	N	/dev/c1_DATA1_dsk7			
21	28607	0	0	.314929	60.803161	2234368	370415104	N	/dev/c1_DATA1_dsk8			
34	24362	0	0	.358386	52.679068	465408	291095040	N	/dev/c1_DATA1_dsk9			
137858	201085	0	0	247.402663	788.413612	18857165312	5273890816	N	/dev/c1_MGMT_dsk1			
369893	230573	0	0	352.522606	543.01553	21371753472	6757088256	N	/dev/c1_MGMT_dsk10			
648029	149812	0	0	472.290552	522.012141	27781332992	5309677568	N	/dev/c1_MGMT_dsk11			
118312	105938	0	0	247.167705	406.999415	17758786048	4827290112	N	/dev/c1_MGMT_dsk12			
340543	122623	0	0	344.146808	552.093876	23595122176	5010157568	N	/dev/c1_MGMT_dsk13			
37447	38157	0	0	80.092993	121.137461	5856358400	1603792384	N	/dev/c1_MGMT_dsk14			
103383	116518	0	0	230.256918	396.692329	16831979520	4910233600	N	/dev/c1_MGMT_dsk2			
135564	109159	0	0	247.555066	402.100614	17773378560	4872443392	N	/dev/c1_MGMT_dsk3			
110746	114906	0	0	234.856541	473.06844	17851039744	4862623744	N	/dev/c1_MGMT_dsk4			
223702	109663	0	0	277.420187	388.147589	18346680320	4788509184	N	/dev/c1_MGMT_dsk5			
140036	116860	0	0	255.808626	382.060644	18954770432	5107488256	N	/dev/c1_MGMT_dsk6			
134619	117076	0	0	257.079231	449.729315	18848813056	4884122624	N	/dev/c1_MGMT_dsk7			
143848	118919	0	0	266.578281	503.871278	18403573760	5002567168	N	/dev/c1_MGMT_dsk8			
145812	113625	0	0	262.360102	437.453102	18111535104	4903334912	N	/dev/c1_MGMT_dsk9			

8. Examine the disk statistics bytes and time for the DATA disk group with the `asmcmd iostat -t -G DATA` command. **Note:** `-t` option shows time statistics.

<code>[grid@host01 ~]\$ asmcmd iostat -t -G DATA</code>					
Group_Name	Dsk_Name	Reads	Writes	Read_Time	Write_Time
DATA	DATA_0000	17256448	1204797440	.730677	222.485645
DATA	DATA_0001	483445248	1170509824	459.232601	283.654712
DATA	DATA_0002	2827192320	1289259520	499.185328	282.998244
DATA	DATA_0003	7973568512	1018039296	630.636542	128.290777
DATA	DATA_0005	411902976	2320915456	472.469286	224.222447
DATA	DATA_0006	6122650112	2401807872	568.388206	232.289046
DATA	DATA_0007	481817088	670668800	436.844486	92.752599
DATA	DATA_0008	2734674432	909829120	528.857606	110.982957
DATA	DATA_0009	6291424768	847462400	696.092863	102.343376

`[grid@host01 ~]$`

9. Run the following SQL*Plus commands to return the DATA (DATA_0004: /dev/c1_DATA1_dsk11) and DATA disk groups to the configuration at the beginning of the practice.

`[grid@host01 ~]$ sqlplus / as sysasm`

SQL*Plus: Release 12.2.0.1.0 Production on Tue Nov 21 15:58:35 2017

Copyright (c) 1982, 2016, Oracle. All rights reserved.

```
Connected to:  
Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 -  
64bit Production  
SQL> ALTER DISKGROUP DATA ADD DISK '/dev/c1_DATA1_dsk11'  
REBALANCE POWER 1024;  
  
Diskgroup altered.  
  
SQL> exit  
[grid@host01 ~]$
```

10. Close all the terminal windows that were opened for this practice.

Practice 4-2: Renaming the ASM Disk Groups

Overview

In this practice, you create a new disk group, and then rename the new disk group.

1. Open a terminal session to host01 as the grid user and use oraenv to set your environment. Use the asmcmd lsdg command to check the currently configured disk groups.

```
[oracle@dns ~]$ ssh -X grid@host01
grid@host01's password:

[grid@host01 ~]$ . oraenv
ORACLE_SID = [grid] ? +ASM1
The Oracle base has been set to /u01/app/grid

[grid@host01 ~]$ asmcmd lsdg
State      Type    Rebal   Sector  Logical_Sector Block          AU
Total_MB   Free_MB  Req_mir_free_MB  Usable_file_MB
Offline_disks Voting_files  Name
MOUNTED    NORMAL   N            512           512    4096  4194304
42000      30820          4200          13310          0
Y  DATA/
MOUNTED    EXTERN   N            512           512    4096  4194304
16800      14716          0           14716          0
N  FRA/
MOUNTED    EXTERN   N            512           512    4096  4194304
409584     361956          0           361956          0
N  MGMT/

[grid@host01 ~]$
```

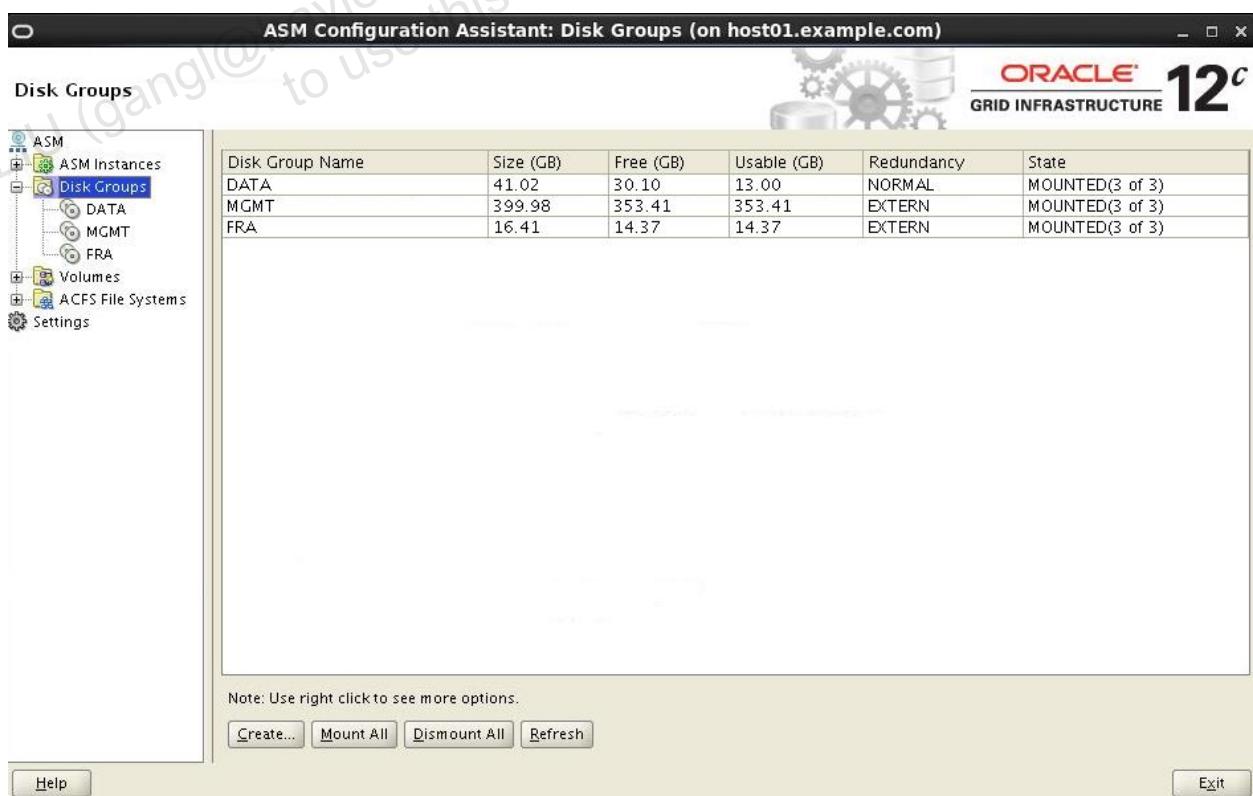
2. Start the ASM Configuration Assistant (asmca).

```
[grid@host01 ~]$ asmca
```

3. After the ASM Configuration Assistant appears, click on Disk Groups.



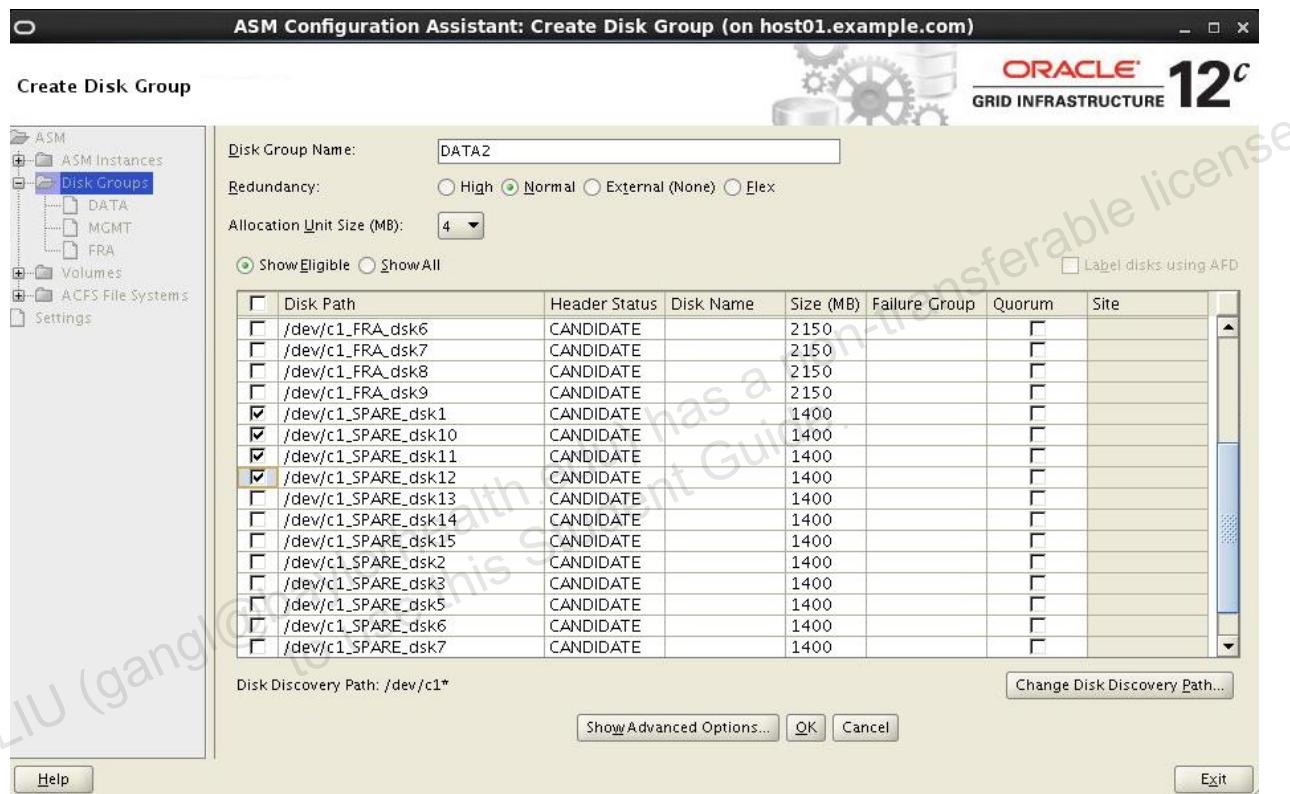
4. Click on Create.



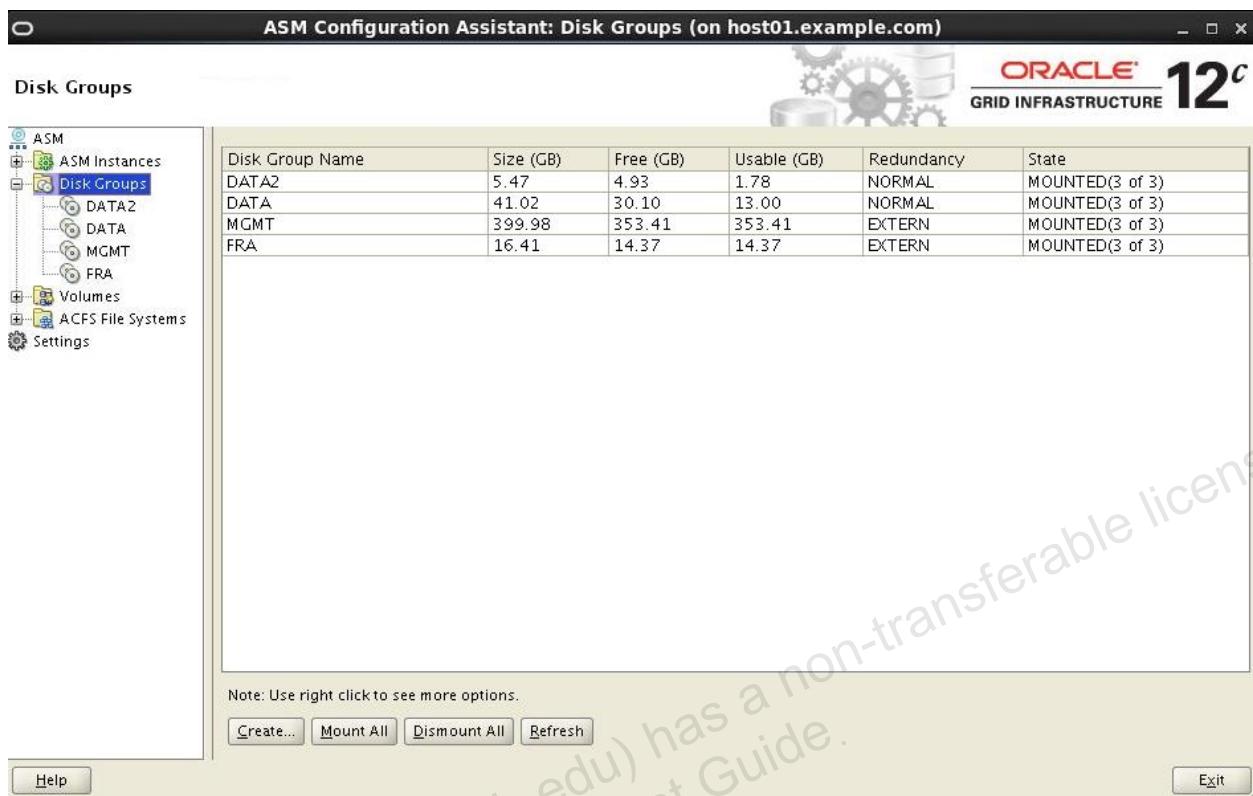
5. In the Create Disk Group window, enter DATA2 as the disk group name and select the following four candidate disks (`c1_SPARE_dsk`).

- `/dev/c1_SPARE_dsk1`
- `/dev/c1_SPARE_dsk10`
- `/dev/c1_SPARE_dsk11`
- `/dev/c1_SPARE_dsk12`

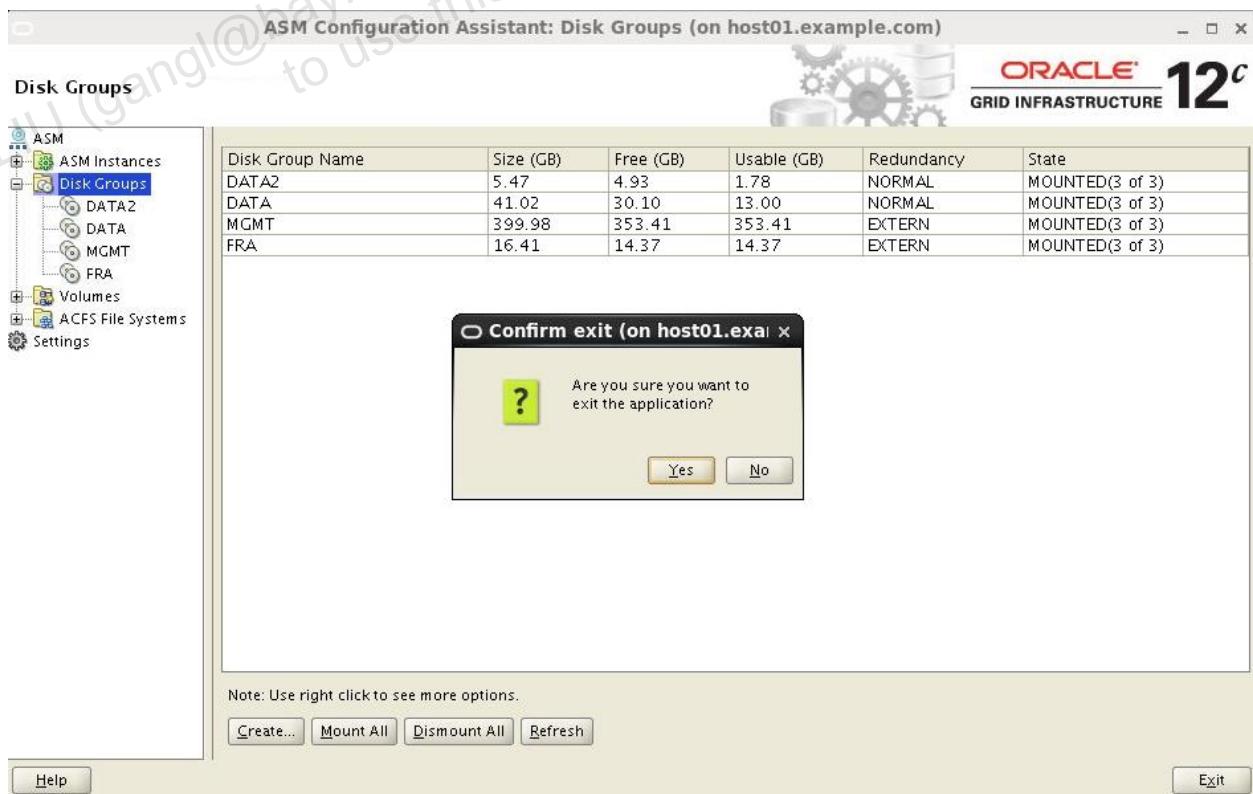
Make sure the Redundancy is **Normal** and The *Label disks using AFD* is **NOT** selected.
Then click OK to create the disk group.



6. Click Exit to quit the ASM Configuration Assistant.



7. Click Yes to confirm that you want to quit the ASM Configuration Assistant.



8. Use the asmcmd lsdg command again to check the currently configured disk groups.

```
[grid@host01 ~]$ asmcmd lsdg
State      Type      Rebal    Sector   Logical_Sector   Block          AU
Total_MB   Free_MB   Req_mir_free_MB  Usable_file_MB
Offline_disks Voting_files   Name
MOUNTED    NORMAL    N           512        512    4096  4194304
42000     30820          4200          13310          0
Y DATA/
MOUNTED    NORMAL    N           512        512    4096  4194304
5600       5048          1400          1824          0
N DATA2/
MOUNTED    EXTERN   N           512        512    4096  4194304
16800      14716          0           14716          0
N FRA/
MOUNTED    EXTERN   N           512        512    4096  4194304
409584    361892          0           361892          0
N MGMT/

[grid@host01 ~]$
```

9. Unmount the DATA2 disk group on all nodes.

```
[grid@host01 ~]$ srvctl stop diskgroup -diskgroup DATA2
[grid@host01 ~]$
```

10. Rename the DATA2 disk group to DG2 by using the renamedg command in two phases. Start the first phase as follows. Be sure to specify a file name for the config parameter.

```
[grid@host01 ~]$ renamedg phase=one dgname=DATA2 newdgname=DG2
confirm=true config=/tmp/renamedg verbose=true
asm_diskstring='/dev/c1*'

Parsing parameters..

Parameters in effect:

Old DG name      : DATA2
New DG name      : DG2
Phases           :
Phase 1
Discovery str    : /dev/c1*
Confirm          : TRUE
Clean            : TRUE
Raw only         : TRUE
```

```

renamedg operation: phase=one dgname=DATA2 newdgname=DG2
confirm=true config=/tmp/renamedg verbose=true
asm_diskstring=/dev/c1*
Executing phase 1
Discovering the group
Performing discovery with string:/dev/c1*
Identified disk UFS:/dev/c1_SPARE_dsk10 with disk number:1 and
timestamp (33058485 -1744051200)
Identified disk UFS:/dev/c1_SPARE_dsk12 with disk number:3 and
timestamp (33058485 -1744051200)
Identified disk UFS:/dev/c1_SPARE_dsk1 with disk number:0 and
timestamp (33058485 -1744051200)
Identified disk UFS:/dev/c1_SPARE_dsk11 with disk number:2 and
timestamp (33058485 -1744051200)
Checking for heartbeat...
Re-discovering the group
Performing discovery with string:/dev/c1*
Identified disk UFS:/dev/c1_SPARE_dsk10 with disk number:1 and
timestamp (33058485 -1744051200)
Identified disk UFS:/dev/c1_SPARE_dsk12 with disk number:3 and
timestamp (33058485 -1744051200)
Identified disk UFS:/dev/c1_SPARE_dsk1 with disk number:0 and
timestamp (33058485 -1744051200)
Identified disk UFS:/dev/c1_SPARE_dsk11 with disk number:2 and
timestamp (33058485 -1744051200)
Checking if the diskgroup is mounted or used by CSS
Checking disk number:1
Checking disk number:3
Checking disk number:0
Checking disk number:2
Generating configuration file..
Completed phase 1

[grid@host01 ~]$
```

11. Take a look at the contents of the /tmp/renamedg file that was created in phase one by the renamedg command.

```

[grid@host01 ~]$ cat /tmp/renamedg
/dev/c1_SPARE_dsk10 DATA2 DG2
/dev/c1_SPARE_dsk12 DATA2 DG2
/dev/c1_SPARE_dsk1 DATA2 DG2
/dev/c1_SPARE_dsk11 DATA2 DG2

[grid@host01 ~]$
```

12. Use renamedg to start phase two by using the same configuration file. You can leave out the `asm_diskstring` parameter.

```
[grid@host01 ~]$ renamedg phase=two dgname=DATA2 newdgname=DG2
confirm=true config=/tmp/renamedg verbose=true

Parsing parameters..

Parameters in effect:

Old DG name      : DATA2
New DG name      : DG2
Phases           :
    Phase 2
Discovery str     : (null)
Confirm          : TRUE
Clean            : TRUE
Raw only         : TRUE

renamedg operation: phase=two dgname=DATA2 newdgname=DG2
confirm=true config=/tmp/renamedg verbose=true
Executing phase 2
Looking for /dev/c1_SPARE_dsk10
Modifying the header
Looking for /dev/c1_SPARE_dsk12
Modifying the header
Looking for /dev/c1_SPARE_dsk1
Modifying the header
Looking for /dev/c1_SPARE_dsk11
Modifying the header
Completed phase 2

[grid@host01 ~]$
```

13. Use the asmcmd lsdg command to list mounted disk groups.

```
[grid@host01 ~]$ asmcmd lsdg
State      Type   Rebal  Sector  Logical_Sector  Block          AU
Total_MB   Free_MB  Req_mir_free_MB  Usable_file_MB
Offline_disks Voting_files  Name
MOUNTED    NORMAL   N              512             512    4096  4194304
42000      30820        4200          13310                0
Y  DATA/
MOUNTED    EXTERN   N              512             512    4096  4194304
16800      14716        0            14716                0
N  FRA/
```

MOUNTED	EXTERN	N	512	512	4096	4194304
409584	361892		0	361892		0
N MGMT/						

```
[grid@host01 ~]$
```

Note that the newly renamed DG2 disk group is not mounted.

- Mount the newly renamed disk group, DG2, on all nodes. What do you observe? Note that the `renamedg` command only renames the disk group. It does not create the disk group resource. Check the resources with the `crsctl` command.

```
[grid@host01 ~]$ srvctl start diskgroup -diskgroup DG2
PRCA-1000 : ASM Disk Group DG2 does not exist
PRCR-1001 : Resource ora.DG2.dg does not exist

[grid@host01 ~]$ crsctl stat res -t|more

-----
Name          Target  State       Server      State details
-----
Local Resources
-----
ora.ASMNET1LSNR.ASM.lsnr
    ONLINE  ONLINE   host01      STABLE
    ONLINE  ONLINE   host02      STABLE
    ONLINE  ONLINE   host03      STABLE
ora.DATA.dg
    ONLINE  ONLINE   host01      STABLE
    ONLINE  ONLINE   host02      STABLE
    ONLINE  ONLINE   host03      STABLE
ora.DATA2.dg
    OFFLINE OFFLINE  host01      STABLE
    OFFLINE OFFLINE  host02      STABLE
    OFFLINE OFFLINE  host03      STABLE
ora.FRA.dg
    ONLINE  ONLINE   host01      STABLE
    ONLINE  ONLINE   host02      STABLE
    ONLINE  ONLINE   host03      STABLE
ora.LISTENER.lsnr
...
[grid@host01 ~]$
```

15. Use `srvctl` to remove the old `DATA2` disk group resource.

```
[grid@host01 ~]$ srvctl remove diskgroup -diskgroup DATA2  
[grid@host01 ~]$
```

16. Use the `asmcmd` mount command to mount the disk group on the local node. Use `crsctl` to inspect the resources again. What do you see?

```
[grid@host01 ~]$ asmcmd mount DG2  
[grid@host01 ~]$ crsctl stat res ora.DG2.dg -t  
-----  
Name          Target  State        Server      State details  
-----  
Local Resources  
-----  
ora.DG2.dg  
    ONLINE  ONLINE   host01      STABLE  
    OFFLINE OFFLINE  host02      STABLE  
    OFFLINE OFFLINE  host03      STABLE  
-----  
[grid@host01 ~]$
```

Mounting the `DG2` disk group creates the renamed disk group resource. However, it is mounted only on the first (local) node.

17. Now you can use the `srvctl` command to mount the `DG2` disk group on all nodes.

```
[grid@host01 ~]$ srvctl start diskgroup -diskgroup DG2  
[grid@host01 ~]$ crsctl stat res ora.DG2.dg -t  
-----  
Name          Target  State        Server      State details  
-----  
Local Resources  
-----  
ora.DG2.dg  
    ONLINE  ONLINE   host01      STABLE  
    ONLINE  ONLINE   host02      STABLE  
    ONLINE  ONLINE   host03      STABLE  
-----  
[grid@host01 ~]$
```

18. Drop the DG2 disk group. **Note:** The **-r** option is to drop contents recursively and **-f** option is to force the operation. Only applicable if the disk group cannot be mounted.

```
[grid@host01 ~]$ srvctl stop diskgroup -diskgroup DG2
```

```
[grid@host01 ~]$ asmcmd dropdg -r -f DG2
```

```
[grid@host01 ~]$
```

19. Close all the terminals that were opened for this practice.

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Practices for Lesson 5: Administering ASM Disk Groups Part II

Practice 5-1: ASM Disk Group Space Management

Overview

In this practice, you investigate ASM disk group space management.

- **Case 1:** TEST ASM Disk Group with External redundancy
- **Case 2:** TEST2 ASM Disk Group with Normal redundancy and 6 Failure Groups
- **Case 3:** TEST3 ASM Disk Group with Normal redundancy and 3 Failure Groups
- **Case 4:** TEST4 ASM Disk Group with Normal redundancy and 2 Failure Groups
- **Case 5:** TEST5 ASM Disk Group with High redundancy and 6 Failure Groups
- **Case 6:** TEST6 ASM Disk Group with High redundancy and 3 Failure Groups

1. Open a terminal session to host01 as the grid user and use oraenv to set your environment. Use the asmcmd lsdg command to check the currently configured disk groups.

```
[oracle@dns ~]$ ssh -X grid@host01
grid@host01's password:

[grid@host01 ~]$ . oraenv
ORACLE_SID = [grid] ? +ASM1
The Oracle base has been set to /u01/app/grid

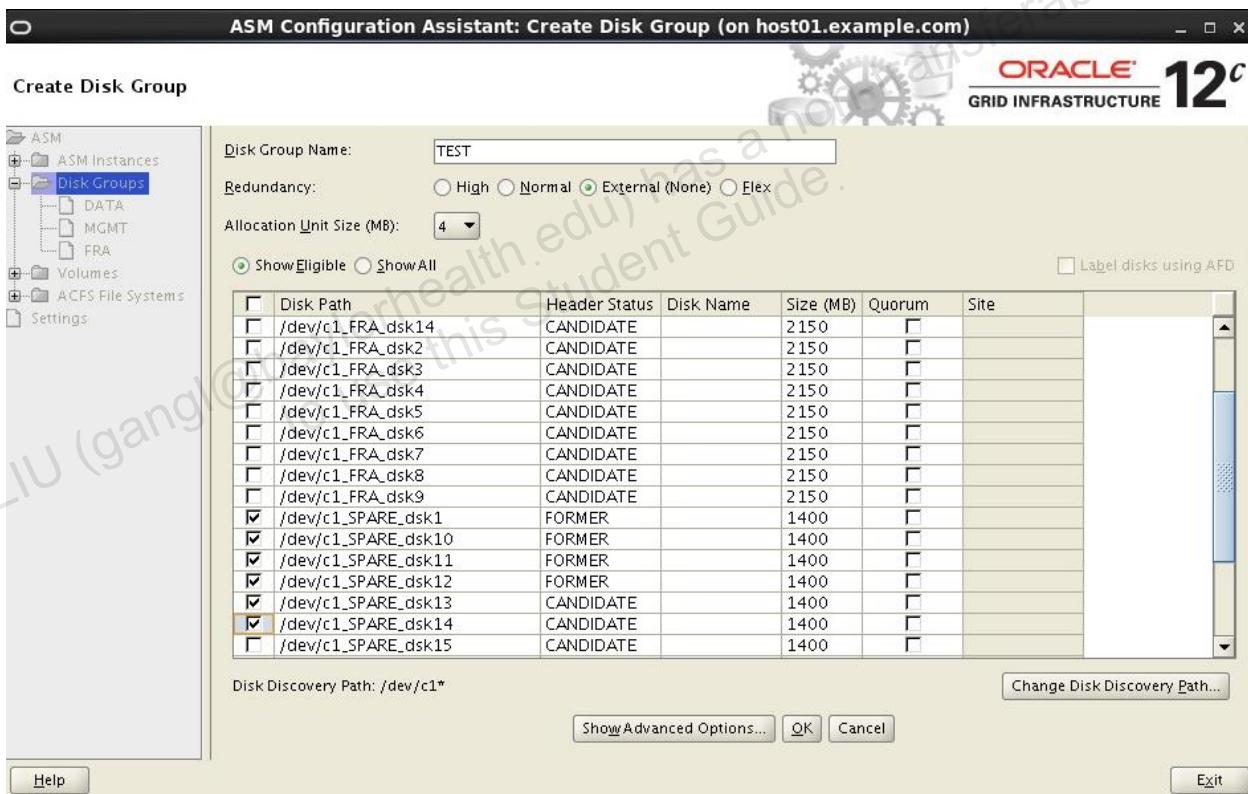
[grid@host01 ~]$ asmcmd lsdg
State      Type   Rebal  Sector  Logical_Sector  Block          AU
Total_MB   Free_MB  Req_mir_free_MB  Usable_file_MB  Offline_disks
Voting_files Name
MOUNTED    NORMAL  N            512                512    4096  4194304
42000     30644           4200              13222               0
Y  DATA/
MOUNTED    EXTERN  N            512                512    4096  4194304
16800     14716           0                14716               0
N  FRA/
MOUNTED    EXTERN  N            512                512    4096  4194304
409584    360504          0                360504              0
N  MGMT/
[grid@host01 ~]$
```

Case 1: TEST ASM Disk Group with EXTERNAL redundancy

2. Start ASMCA and create a disk group, called TEST, by using EXTERNAL redundancy, using the following six unused 1400 MB disks. Exit ASMCA when you have finished.

- /dev/c1_SPARE_dsk1
- /dev/c1_SPARE_dsk10
- /dev/c1_SPARE_dsk11
- /dev/c1_SPARE_dsk12
- /dev/c1_SPARE_dsk13
- /dev/c1_SPARE_dsk14

```
[grid@host01 ~]$ asmca
```



3. Use the `asmcmd lsdg` command to view the disk group space values for the TEST disk group. What is the total disk space in the disk group? How much is actually available?

```
[grid@host01 ~]$ asmcmd lsdg TEST
State      Type      Rebal     Sector    Logical_Sector   Block          AU
Total_MB   Free_MB   Req_mir_free_MB  Usable_file_MB Offline_disks
Voting_files  Name
```

```
MOUNTED   EXTERN   N          512          512    4096  4194304
8400      8164           0          8164          0
N  TEST/
```

```
[grid@host01 ~]$
```

- The TOTAL_MB column shows that the size of the disk group is 8400 MB.
- The available space, which is shown under the Usable_file_MB column, is actually 8164 MB. In this example, 236 MB is consumed by ASM metadata for the disk group.

4. Stop the TEST resource, and then drop the TEST disk group. Make sure that the disk group resource has been removed.

```
[grid@host01 ~]$ srvctl stop diskgroup -diskgroup TEST
```

```
[grid@host01 ~]$ asmcmd dropdg -r -f TEST
```

```
[grid@host01 ~]$ crsctl stat res ora.TEST.dg -t
```

```
CRS-2613: Could not find resource 'ora.TEST.dg'.
```

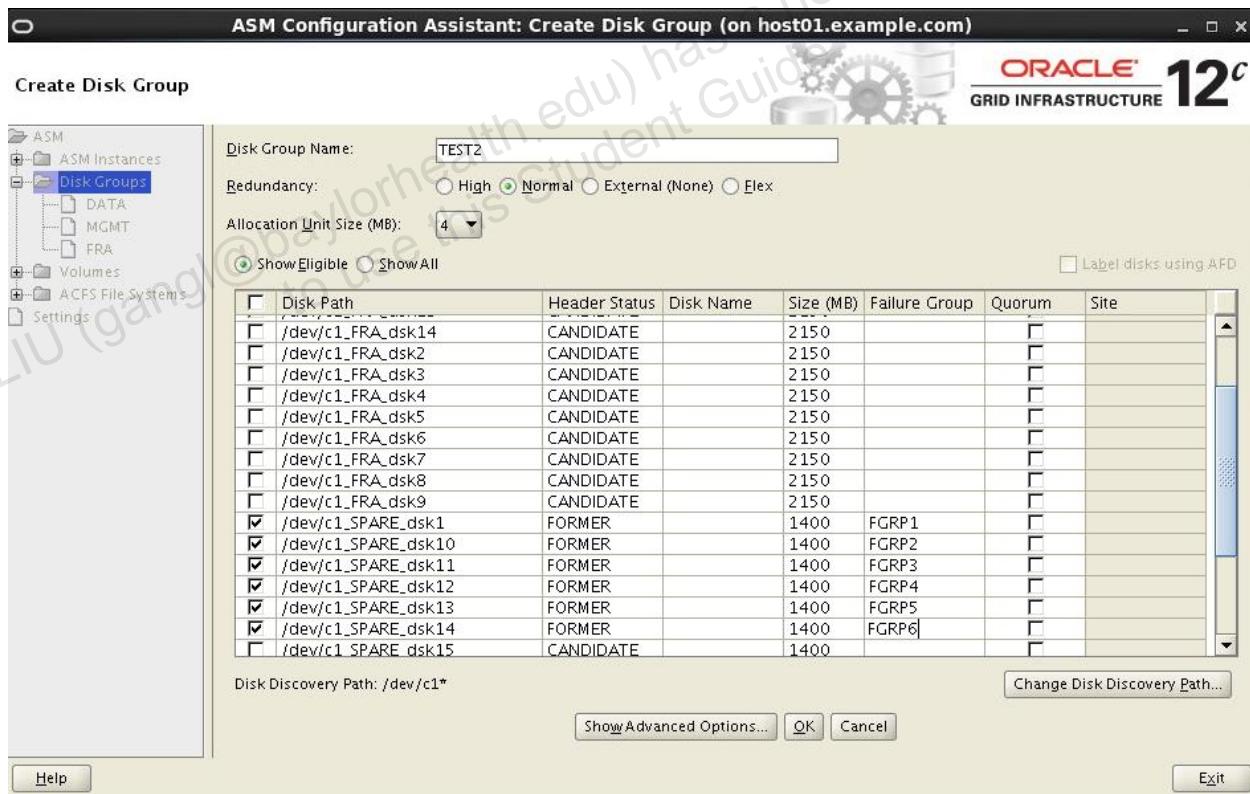
```
[grid@host01 ~]$
```

Case 2: TEST2 ASM Disk Group with NORMAL redundancy and 6 Failure Groups

5. Next, create a disk group called TEST2 by using NORMAL redundancy. Use the six 1400 MB disks that were used in step 2. (`c1_SPARE_dsk1`, `c1_SPARE_dsk10`, `c1_SPARE_dsk11`, `c1_SPARE_dsk12`, `c1_SPARE_dsk13`, and `c1_SPARE_dsk14`). Name the failure groups FGRP1, FGRP2, FGRP3, FGRP4, FGRP5, and FGRP6, respectively. Use ASMCA to create the disk group. Exit ASMCA when you have finished.

- `/dev/c1_SPARE_dsk1` (FGRP1)
- `/dev/c1_SPARE_dsk10` (FGRP2)
- `/dev/c1_SPARE_dsk11` (FGRP3)
- `/dev/c1_SPARE_dsk12` (FGRP4)
- `/dev/c1_SPARE_dsk13` (FGRP5)
- `/dev/c1_SPARE_dsk14` (FGRP6)

```
[grid@host01 ~]$ asmca
```



6. Use the asmcmd lsdg command to view space information for the TEST2 disk group.

```
[grid@host01 ~]$ asmcmd lsdg TEST2
State      Type    Rebal   Sector  Logical_Sector  Block      AU
Total_MB   Free_MB  Req_mir_free_MB  Usable_file_MB  Offline_disks
Voting_files Name
MOUNTED    NORMAL   N              512          512       4096     4194304
8400        7824           1400          3212          0
N  TEST2/
```

[grid@host01 ~]\$

- The TOTAL_MB column shows the sum of the total size of the member disks (8400 MB). Free_MB shows how much disk space is unused (7824 MB). Because of disk group redundancy, this is **not** the usable space that is available.
- The usable space in the NORMAL redundancy is shown under the Usable_file_MB column (3212 MB)
- Free_MB = Usable_file_MB x 2 (for Normal Redundancy) + Req_mir_free_MB (size of a single failure group)
- The value of Req_mir_free_MB (1400 MB) represents the amount of free space that is required for ASM to restore redundancy in the event of a failure.

7. In the previous step, you determined that Req_mir_free_MB is equal to 1400 MB. What is significant about this value?

```
[grid@host01 ~]$ sqlplus / as sysasm

SQL*Plus: Release 12.2.0.1.0 Production on Wed Nov 22 10:53:58 2017

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Connected to:
Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 - 64bit
Production

SQL> select failgroup,sum(total_mb) from v$asm_disk where failgroup
like 'FGRP%' group by failgroup;

FAILGROUP                      SUM(TOTAL_MB)
-----
FGRP1                           1400
FGRP2                           1400
FGRP3                           1400
FGRP4                           1400
```

```
FGRP5          1400
FGRP6          1400

6 rows selected.

SQL> exit

[grid@host01 ~]$
```

- From step 6, the value of `Req_mir_free_MB` is 1400 MB, which is the size of a single failure group (and a single disk in this example).

8. Open a terminal to host01 as the `oracle` user. Set the `oracle` environment by using `oraenv`.

```
[oracle@dns ~]$ ssh oracle@host01
oracle@host01's password:

[oracle@host01 ~]$ . oraenv
ORACLE_SID = [oracle] ? orcl
ORACLE_HOME = [/home/oracle] ?
/u01/app/oracle/product/12.2.0/dbhome_1
The Oracle base has been set to /u01/app/oracle

[oracle@host01 ~]$
```

9. Start SQL*Plus and add a tablespace called `TESTTB` with an 1600 MB data file in the `TEST2` disk group.

```
[oracle@host01 ~]$ sqlplus sys/<sys_password>@orcl as sysdba

SQL*Plus: Release 12.2.0.1.0 Production on Wed Nov 22 10:53:58 2017

Copyright (c) 1982, 2016, Oracle. All rights reserved.

Connected to:
Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 - 64bit
Production

SQL> create tablespace TESTTB datafile '+TEST2' size 1600m;

Tablespace created.

SQL>
```

10. Return to the `grid` terminal and use the `asmcmd lsdg` command to check space information for the `TEST2` disk group. How much usable space is left?

```
[grid@host01 ~]$ asmcmd lsdg TEST2
State      Type      Rebal      Sector      Logical_Sector      Block          AU
Total_MB   Free_MB   Req_mir_free_MB   Usable_file_MB   Offline_disks
Voting_files Name
MOUNTED    NORMAL    N              512             512     4096   4194304
8400       4592      1400           1596            0
N TEST2/

[grid@host01 ~]$
```

- The `Usable_file_MB` column shows that the available space has dropped to 1596 MB from 3212 MB.

11. Return to the `oracle` terminal and add another 1600 MB datafile to the `TESTTB` tablespace. What do you think will happen?

```
SQL> alter tablespace TESTTB add datafile '+TEST2' size 1600m;
Tablespace altered.
SQL>
```

- Even though `Usable_file_MB` is 1596 MB, you were able to create the 1600 MB datafile. ASM only monitors `Usable_file_MB` and does not stop users from exhausting the usable space.

12. Return to the `grid` terminal and use the `asmcmd lsdg` command to check space information for the `TEST2` disk group once again. What does it show?

```
[grid@host01 ~]$ asmcmd lsdg TEST2
State      Type      Rebal      Sector      Logical_Sector      Block          AU
Total_MB   Free_MB   Req_mir_free_MB   Usable_file_MB   Offline_disks
Voting_files Name
MOUNTED    NORMAL    N              512             512     4096   4194304
8400       1372      1400           -14              0
N TEST2/

[grid@host01 ~]$
```

- The `Usable_file_MB` column now shows a negative value, -14 MB. If a failure were to occur now, ASM would be unable to restore redundancy for the disk group. It is obviously important to monitor `Usable_file_MB` for normal (or high) redundancy disk groups.

13. When `Usable_file_MB` becomes negative, you should either free up adequate space or increase the size of the disk group. For this exercise, you drop the `TESTTB` tablespace in the `oracle` terminal, and then re-check by using `asmcmd lsdg` from the `grid` terminal.

```
SQL> drop tablespace TESTTB including contents and datafiles;
```

Tablespace dropped.

```
SQL> exit
```

```
[oracle@host01 ~]$
```

*****SWITCH TERMINAL WINDOWS*****

```
[grid@host01 ~]$ asmcmd lsdg TEST2
```

State	Type	Rebal	Sector	Logical_Sector	Block	AU
Total_MB	Free_MB	Req_mir_free_MB	Usable_file_MB		Offline_disks	
Voting_files	Name					
MOUNTED	NORMAL	N	512	512	4096	4194304
8400	7812		1400	3206		0
N	TEST2/					

```
[grid@host01 ~]$
```

- `Usable_file_MB` now shows that the available space has increased to 3206 MB.

14. Switch to the `oracle` terminal window and use `srvctl` to remove dependencies between the database resource and the `TEST2` disk group.

Switch back to the `grid` terminal and drop the `TEST2` disk group. Make sure that the `TEST2` resource has been removed.

```
[oracle@host01 ~]$ srvctl modify database -db orcl -diskgroup 'DATA,FRA'
```

*****SWITCH TERMINAL WINDOWS*****

```
[grid@host01 ~]$ srvctl stop diskgroup -diskgroup TEST2
```

```
[grid@host01 ~]$ asmcmd dropdg -r -f TEST2
```

```
[grid@host01 ~]$ crsctl stat res ora.TEST2.dg -t
```

CRS-2613: Could not find resource 'ora.TEST2.dg'.

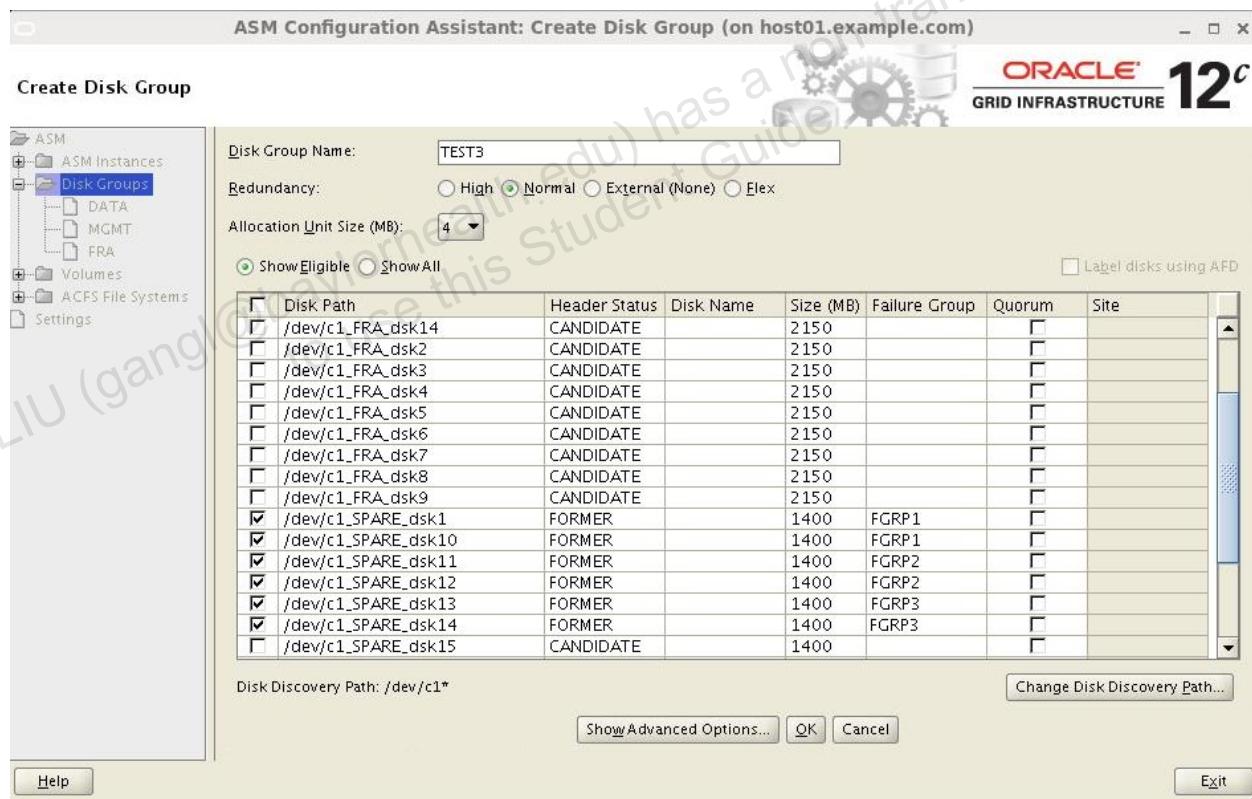
```
[grid@host01 ~]$
```

Case 3: TEST3 ASM Disk Group with NORMAL redundancy and 3 Failure Groups

15. Create a disk group with ASMCA, called TEST3, by using NORMAL redundancy and the same six disks that were used to create TEST2. This time, however, configure three failure groups (FGRP1, FGRP2, and FGRP3) with two disks each. Exit ASMCA when you have finished.

- /dev/c1_SPARE_dsk1 (FGRP1)
- /dev/c1_SPARE_dsk10 (FGRP1)
- /dev/c1_SPARE_dsk11 (FGRP2)
- /dev/c1_SPARE_dsk12 (FGRP2)
- /dev/c1_SPARE_dsk13 (FGRP3)
- /dev/c1_SPARE_dsk14 (FGRP3)

```
[grid@host01 ~]$ asmca
```



16. Next, take a look at the size of the failure groups in the new disk group by using the following query:

```
[grid@host01 ~]$ sqlplus / as sysasm

SQL> select failgroup,sum(total_mb) from v$asm_disk where failgroup
like 'FGRP%' group by failgroup;

FAILGROUP          SUM(TOTAL_MB)
-----
FGRP1              2800
FGRP2              2800
FGRP3              2800
SQL> exit
[grid@host01 ~]$
```

- All three failure groups are 2800 MB.

17. Use the asmcmd lsdg command to check space information for the TEST3 disk group once again. What does it show?

```
[grid@host01 ~]$ asmcmd lsdg TEST3
State      Type      Rebal    Sector   Logical_Sector   Block       AU
Total_MB   Free_MB   Req_mir_free_MB  Usable_file_MB  Offline_disks
Voting_files Name
MOUNTED    NORMAL    N           512           512     4096   4194304
8400        7824      2800          2512            0
N  TEST3/

[grid@host01 ~]$
```

- As expected, the Req_mir_free_MB value is 2800 MB, which is the same size as a failure group. Usable_file_MB for the disk group TEST3 is 2512 MB.
- Free_MB (7824 MB) = Usable_file_MB (2512 MB) x 2 (for Normal Redundancy) + Req_mir_free_MB (size of a single failure group, 2800 MB)

18. Drop the TEST3 disk group. Make sure that the TEST3 resource has been removed.

```
[grid@host01 ~]$ srvctl stop diskgroup -diskgroup TEST3

[grid@host01 ~]$ asmcmd dropdg -r -f TEST3

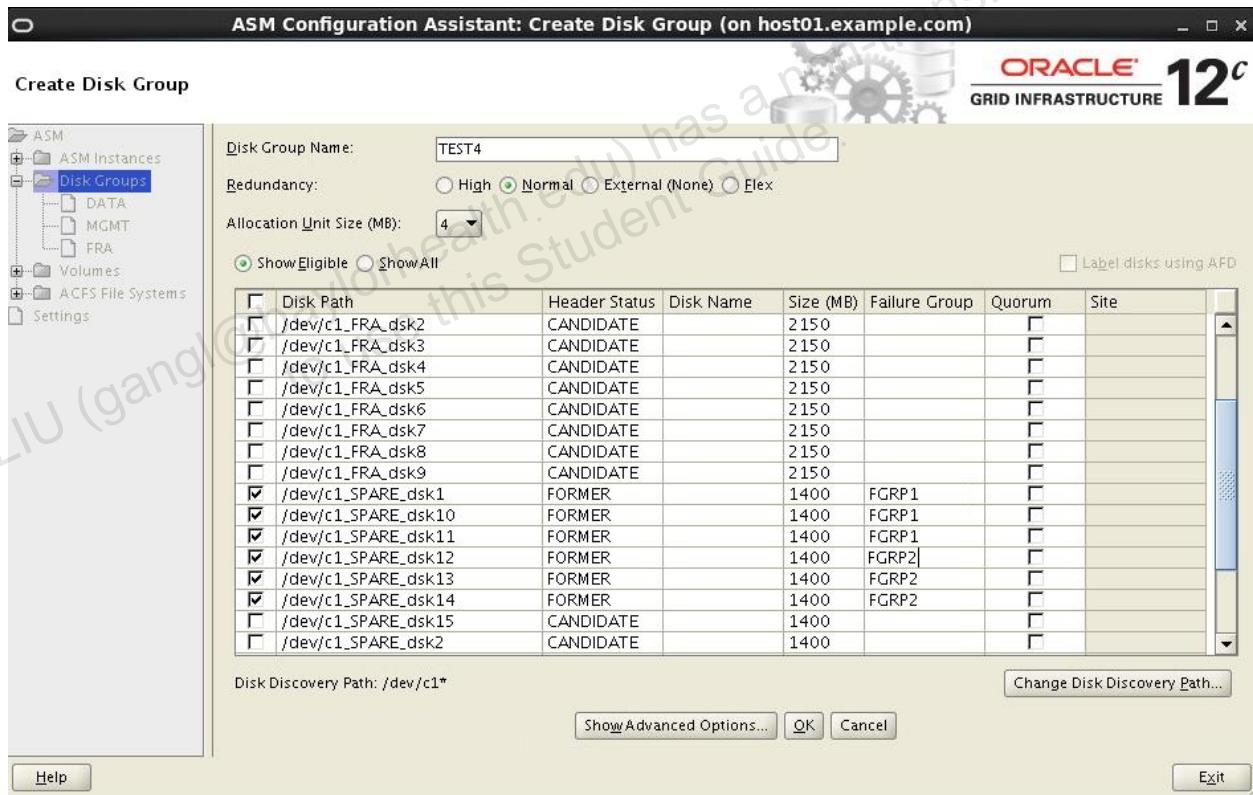
[grid@host01 ~]$ crsctl stat res ora.TEST3.dg -t
CRS-2613: Could not find resource 'ora.TEST3.dg'.
[grid@host01 ~]$
```

Case 4: TEST4 ASM Disk Group with NORMAL redundancy and 2 Failure Groups

19. Create a disk group with ASMCA, called TEST4, by using NORMAL redundancy and the same six disks that were used to create TEST3. This time, however, configure two failure groups (FGRP1 and FGRP2) with three disks each. Exit ASMCA when you have finished.

- /dev/c1_SPARE_dsk1 (FGRP1)
- /dev/c1_SPARE_dsk10 (FGRP1)
- /dev/c1_SPARE_dsk11 (FGRP1)
- /dev/c1_SPARE_dsk12 (FGRP2)
- /dev/c1_SPARE_dsk13 (FGRP2)
- /dev/c1_SPARE_dsk14 (FGRP2)

```
[grid@host01 ~]$ asmca
```



20. Again, take a look at the size of the failure groups in the new disk group by using the following query.

```
[grid@host01 ~]$ sqlplus / as sysasm

SQL> select failgroup,sum(total_mb) from v$asm_disk where failgroup
like 'FGRP%' group by failgroup;

FAILGROUP          SUM(TOTAL_MB)
-----
FGRP1              4200
FGRP2              4200
SQL> exit
[grid@host01 ~]$
```

- The two failure groups are 4200 MB.

21. Use the asmcmd lsdg command to check space information for the TEST4 disk group once again. What does it show now?

```
[grid@host01 ~]$ asmcmd lsdg TEST4
State      Type     Rebal   Sector   Logical_Sector Block       AU
Total_MB   Free_MB  Req_mir_free_MB Usable_file_MB Offline_disks
Voting_files Name
MOUNTED    NORMAL   N           512          512    4096  4194304
8400        7992      2800          2596            0
N  TEST4/
[grid@host01 ~]$
```

- Req_mir_free_MB now is only 2800 MB (the size of two disks) instead of the size of one failure group (4200 MB) as you might think. It appears that ASM anticipates the failure of only two disks and no longer anticipates the failure of a complete failure group.
- Why is that? ASM implements mirroring by storing the same data in different failure groups. A normal redundancy disk group requires at least two failure groups. How can ASM restore redundancy in a normal redundancy disk group when there is only one failure group left? In this case, this is not possible, so ASM anticipates the loss of only two disks.

22. Drop the TEST4 disk group. Make sure that the TEST4 resource has been removed.

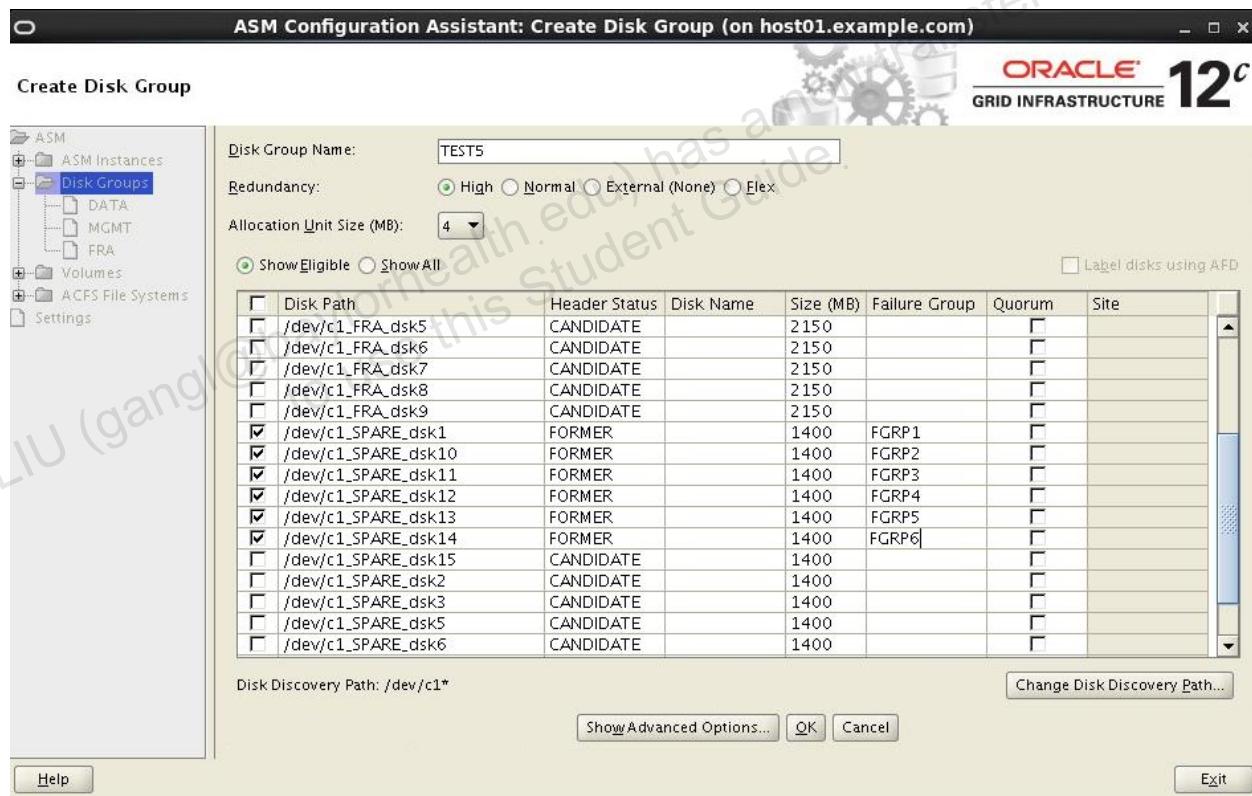
```
[grid@host01 ~]$ srvctl stop diskgroup -diskgroup TEST4
[grid@host01 ~]$ asmcmd dropdg -r -f TEST4
[grid@host01 ~]$ crsctl stat res ora.TEST4.dg -t
CRS-2613: Could not find resource 'ora.TEST4.dg'.
[grid@host01 ~]$
```

Case 5: TEST5 ASM Disk Group with HIGH redundancy and 6 Failure Groups

23. Next, you investigate space management in high redundancy disk groups. Create a disk group with ASMCA, called TEST5, by using HIGH redundancy and the same six disks that were used to create TEST4. Configure six failure groups (FGRP1, FGRP2, FGRP3, FGRP4, FGRP5, and FGRP6) with one disk each. Exit ASMCA when you have finished.

- /dev/c1_SPARE_dsk1 (FGRP1)
- /dev/c1_SPARE_dsk10 (FGRP2)
- /dev/c1_SPARE_dsk11 (FGRP3)
- /dev/c1_SPARE_dsk12 (FGRP4)
- /dev/c1_SPARE_dsk13 (FGRP5)
- /dev/c1_SPARE_dsk14 (FGRP6)

```
[grid@host01 ~]$ asmca
```



24. Next, take a look at the size of the failure groups in the new disk group by using the following query:

```
[grid@host01 ~]$ sqlplus / as sysasm

SQL> select failgroup,sum(total_mb) from v$asm_disk where failgroup
like 'FGRP%' group by failgroup;

FAILGROUP          SUM(TOTAL_MB)
-----
FGRP1              1400
FGRP2              1400
FGRP3              1400
FGRP4              1400
FGRP5              1400
FGRP6              1400

6 rows selected.

SQL> exit
[grid@host01 ~]$
```

- All six failure groups are 1400 MB.

25. How do you suppose that the required free and usable disk space in our HIGH redundancy disk group will compare to a NORMAL redundancy disk group with the same number of disks and disk groups? Use the asmcmd lsdg command to check space information for the TEST5 disk group. Compare these values with those returned in step 6 for the normal redundancy disk group.

```
[grid@host01 ~]$ asmcmd lsdg TEST5
State      Type   Rebal  Sector  Logical_Sector  Block          AU
Total_MB   Free_MB  Req_mir_free_MB  Usable_file_MB  Offline_disks
Voting_files Name
MOUNTED    HIGH    N            512           512    4096  4194304
8400        7824          2800           1674                  0
N  TEST5/
```



```
[grid@host01 ~]$
```

- Note that Req_mir_free_MB is now 2800 MB (compared to 1400 MB in the normal redundancy disk group), which is the size of two failure groups. High redundancy disk groups can lose two failure groups before data availability is adversely affected.
- Free_MB = Usable_file_MB x 3 (for High Redundancy) + Req_mir_free_MB (size of two failure groups)

26. Stop the TEST5 disk group resource and drop the disk group. Make sure that the TEST5 resource has been removed.

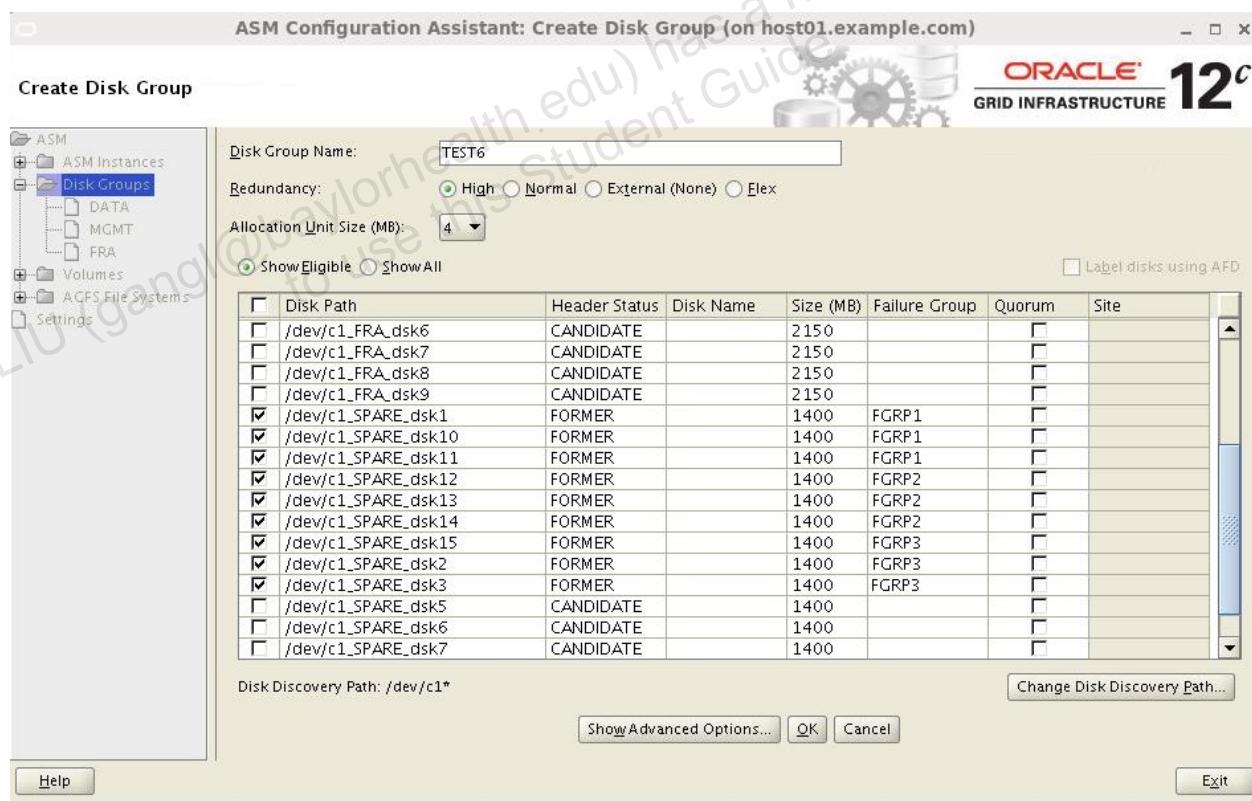
```
[grid@host01 ~]$ srvctl stop diskgroup -diskgroup TEST5
[grid@host01 ~]$ asmcmd dropdg -r -f TEST5
[grid@host01 ~]$ crsctl stat res ora.TEST5.dg -t
CRS-2613: Could not find resource 'ora.TEST5.dg'.
[grid@host01 ~]$
```

Case 6: TEST6 ASM Disk Group with HIGH redundancy and 3 Failure Groups

27. Finally, create a disk group with ASMCA, called TEST6, by using HIGH redundancy and the following all nine of the 1400 MB disks. Configure three failure groups (FGRP1, FGRP2, and FGRP3) with three disks each. Exit ASMCA when you have finished.

- /dev/c1_SPARE_dsk1 (FGRP1)
- /dev/c1_SPARE_dsk10 (FGRP1)
- /dev/c1_SPARE_dsk11 (FGRP1)
- /dev/c1_SPARE_dsk12 (FGRP2)
- /dev/c1_SPARE_dsk13 (FGRP2)
- /dev/c1_SPARE_dsk14 (FGRP2)
- /dev/c1_SPARE_dsk15 (FGRP3)
- /dev/c1_SPARE_dsk2 (FGRP3)
- /dev/c1_SPARE_dsk3 (FGRP3)

```
[grid@host01 ~] $ asmca
```



28. Next, take a look at the size of the failure groups in the new disk group by using the following query:

```
[grid@host01 ~]$ sqlplus / as sysasm

SQL> select failgroup,sum(total_mb) from v$asm_disk where failgroup
like 'FGRP%' group by failgroup;

FAILGROUP          SUM(TOTAL_MB)
-----
FGRP1              4200
FGRP2              4200
FGRP3              4200

SQL> exit
[grid@host01 ~]$
```

- All three failure groups are 4200 MB.

29. Use the asmcmd lsdg command to check space information for the TEST6 disk group.

```
[grid@host01 ~]$ asmcmd lsdg TEST6
State      Type   Rebal  Sector  Logical_Sector  Block       AU
Total_MB   Free_MB  Req_mir_free_MB  Usable_file_MB  Offline_disks
Voting_files Name
MOUNTED    HIGH   N           512           512     4096   4194304
12600      11988          4200          2596           0
N  TEST6/
[grid@host01 ~]$
```

- Note that `Req_mir_free_MB` is now 4200 MB, which is the size of a single failure group. The reason for this is similar as that for a normal redundancy disk group with two failure groups. But this is a high redundancy disk group with only three failure groups. If one or two failure groups are lost, ASM cannot restore redundancy because that would require at least three working failure groups. So, ASM anticipates the loss of a single failure group.

30. Close all the terminals that were opened for this practice.

Practice 5-2: Miscellaneous Administration Activities

Overview

In this practice, you perform various disk group administration and monitoring activities.

1. Open a terminal session to host01 as the grid user and use oraenv to set your environment. Make sure that the TEST6 disk group is mounted by all three ASM instances.

```
[oracle@dns ~]$ ssh -X grid@host01
grid@host01's password:

[grid@host01 ~]$ . oraenv
ORACLE_SID = [grid] ? +ASM1
The Oracle base has been set to /u01/app/grid

[grid@host01 ~]$ crsctl stat res ora.TEST6.dg -t
-----
Name          Target     State        Server      State details
-----
Local Resources
-----
ora.TEST6.dg
      ONLINE    ONLINE    host01      STABLE
      ONLINE    ONLINE    host02      STABLE
      ONLINE    ONLINE    host03      STABLE
-----
[grid@host01 ~]$
```

2. Use srvctl to dismount the TEST6 disk group. Confirm that the disk group is dismounted on all three nodes.

```
[grid@host01 ~]$ srvctl stop diskgroup -diskgroup TEST6
[grid@host01 ~]$ 

[grid@host01 ~]$ crsctl stat res ora.TEST6.dg -t
-----
Name          Target     State        Server      State details
-----
Local Resources
-----
ora.TEST6.dg
      OFFLINE   OFFLINE    host01      STABLE
      OFFLINE   OFFLINE    host02      STABLE
      OFFLINE   OFFLINE    host03      STABLE
-----
[grid@host01 ~]$
```

3. Use `srvctl` to start the `TEST6` disk group resource. Confirm that the disk group resource is started on all three nodes.

```
[grid@host01 ~]$ srvctl start diskgroup -diskgroup TEST6
```

```
[grid@host01 ~]$ crsctl stat res ora.TEST6.dg -t
```

Name	Target	State	Server	State details
<hr/>				
Local Resources				
ora.TEST6.dg	ONLINE	ONLINE	host01	STABLE
	ONLINE	ONLINE	host02	STABLE

[grid@host01 ~] \$

4. List the disks in the TEST6 disk group by using the `asmcmd lsdsk` command. Attempt to take the TEST6 0000 disk offline. What do you observe?

```
[grid@host01 ~]$ asmcmd lsdsk -G TEST6 -k
```

- It appears that the COMPATIBLE.RDBMS value for the TEST6 disk group is lower than 11.1.0.0.0.

5. Determine the current COMPATIBLE.RDBMS value for the TEST6 disk group. Change it to 12.2.0.0.0. Confirm the change.

```
[grid@host01 ~]$ asmcmd lsattr -G TEST6 -l compatible.rdbms
Name          Value
compatible.rdbms 10.1.0.0.0

[grid@host01 ~]$ asmcmd setattr -G TEST6 compatible.rdbms
12.2.0.0.0

[grid@host01 ~]$ asmcmd lsattr -G TEST6 -l compatible.rdbms
Name          Value
compatible.rdbms 12.2.0.0.0

[grid@host01 ~]$
```

6. Now, take the TEST6_0000 disk offline. Look at the operations in steps 4 and 5 that were logged in alert_plusASM1.log (look near the end of the file). Check DISK_REPAIR_TIME for TEST6. What will happen to the TEST6_0000 disk if no other action is taken?

```
[grid@host01 ~]$ asmcmd offline -G TEST6 -D TEST6_0000

Diskgroup altered.

[grid@host01 ~]$ tail -50
/u01/app/grid/diag/asm/+asm/+ASM1/trace/alert_plusASM1.log

NOTE: Instance updated compatible.rdbms to 10.1.0.0.0 for grp 3
(TEST6).
2017-11-22T15:16:41.915486+00:00
NOTE: Instance updated compatible.rdbms to 10.1.0.0.0 for grp 3
(TEST6).
2017-11-22T15:16:41.940814+00:00
SUCCESS: diskgroup TEST6 was mounted
2017-11-22T15:16:41.982311+00:00
SUCCESS: ALTER DISKGROUP TEST6 MOUNT /* asm agent *//*
{1:54507:21611} */
2017-11-22T15:19:41.083828+00:00
SQL> /* ASMCMD */ALTER DISKGROUP TEST6 OFFLINE DISK TEST6_0000
2017-11-22T15:19:41.091076+00:00
ORA-15032: not all alterations performed
ORA-15283: ASM operation requires compatible.rdbms of 11.1.0.0.0 or
higher

2017-11-22T15:19:41.091693+00:00
ERROR: /* ASMCMD */ALTER DISKGROUP TEST6 OFFLINE DISK TEST6_0000
2017-11-22T15:20:37.889647+00:00
SQL> /* ASMCMD */ALTER DISKGROUP TEST6 SET ATTRIBUTE
'compatible.rdbms' = '12.2.0.0.0'
2017-11-22T15:20:42.756823+00:00
NOTE: Advancing RDBMS compatibility to 12.2.0.0.0 for grp 3
2017-11-22T15:20:42.766129+00:00
GMON querying group 3 at 186 for pid 55, osid 29802
2017-11-22T15:20:42.776669+00:00
SUCCESS: Advanced compatible.rdbms to 12.2.0.0.0 for grp 3
2017-11-22T15:20:42.779113+00:00
NOTE: Instance updated compatible.rdbms to 12.2.0.0.0 for grp 3
(TEST6).
2017-11-22T15:20:42.800596+00:00
SUCCESS: /* ASMCMD */ALTER DISKGROUP TEST6 SET ATTRIBUTE
'compatible.rdbms' = '12.2.0.0.0'
```

```

2017-11-22T15:21:18.080285+00:00
SQL> /* ASMCMD */ALTER DISKGROUP TEST6 OFFLINE  DISK TEST6_0000
2017-11-22T15:21:18.080819+00:00
NOTE: DRTimer CD Create:  for disk group 3 disks:
  0
NOTE: process _user29802_asml (29802) initiating offline of disk
0.4042311184 (TEST6_0000) with mask 0x7e in group 3 (TEST6) without
client assisting
NOTE: initiating PST update: grp 3 (TEST6), dsk = 0/0xf0f0c610,
mask = 0x6a, op = clear mandatory
2017-11-22T15:21:18.090031+00:00
GMON updating disk modes for group 3 at 195 for pid 55, osid 29802
NOTE: group TEST6: updated PST location: disks 0003 0006 0001
2017-11-22T15:21:18.111887+00:00
NOTE: PST update grp = 3 completed successfully
NOTE: initiating PST update: grp 3 (TEST6), dsk = 0/0xf0f0c610,
mask = 0x7e, op = clear mandatory
2017-11-22T15:21:18.112779+00:00
GMON updating disk modes for group 3 at 196 for pid 55, osid 29802
2017-11-22T15:21:18.126471+00:00
NOTE: cache closing disk 0 of grp 3: TEST6_0000
2017-11-22T15:21:18.149080+00:00
NOTE: PST update grp = 3 completed successfully
NOTE: DRTimer CD Destroy: for diskgroup 3
2017-11-22T15:21:18.151730+00:00
SUCCESS: /* ASMCMD */ALTER DISKGROUP TEST6 OFFLINE  DISK TEST6_0000

[grid@host01 ~]$ asmcmd lsattr -G TEST6 -l disk_repair_time
Name          Value
disk_repair_time 3.6h

[grid@host01 ~]

```

- If the TEST6_0000 disk is not brought back online in 12960 seconds (3.6 hours), it will be dropped. 3.6 hours is the default unless a different time is specified when the disk is taken offline.

7. List the disks in TEST6. What is the status of the TEST6_0000 disk? Bring the TEST6_0000 disk back online.

```

[grid@host01 ~]$ asmcmd lsdisk -G TEST6 -k
Total_MB  Free_MB  OS_MB  Name          Failgroup  Site_Name
Site_GUID
Site_Status  Failgroup_Type  Library  Label  Failgroup_Label  Site
_Label  UDID  Product  Redund  Path

```

1400	1332	0	TEST6_0000	FGRP1	
00000000000000000000					000000000000
			REGULAR	System	
UNKNOWN					
1400	1328	1400	TEST6_0001	FGRP1	
00000000000000000000					000000000000
			REGULAR	System	
UNKNOWN /dev/c1_SPARE_dsk10					
1400	1336	1400	TEST6_0002	FGRP1	
00000000000000000000					000000000000
			REGULAR	System	
UNKNOWN /dev/c1_SPARE_dsk11					
1400	1332	1400	TEST6_0003	FGRP2	
00000000000000000000					000000000000
			REGULAR	System	
UNKNOWN /dev/c1_SPARE_dsk12					
1400	1340	1400	TEST6_0004	FGRP2	
00000000000000000000					000000000000
			REGULAR	System	
UNKNOWN /dev/c1_SPARE_dsk13					
1400	1324	1400	TEST6_0005	FGRP2	
00000000000000000000					000000000000
			REGULAR	System	
UNKNOWN /dev/c1_SPARE_dsk14					
1400	1332	1400	TEST6_0006	FGRP3	
00000000000000000000					000000000000
			REGULAR	System	
UNKNOWN /dev/c1_SPARE_dsk15					
1400	1332	1400	TEST6_0007	FGRP3	
00000000000000000000					000000000000
			REGULAR	System	
UNKNOWN /dev/c1_SPARE_dsk2					
1400	1332	1400	TEST6_0008	FGRP3	
00000000000000000000					000000000000
			REGULAR	System	
UNKNOWN /dev/c1_SPARE_dsk3					
[grid@host01 ~]\$					

- The TEST6_0000 disk has been taken offline; so although it shows up in the disk listing, there is no path to the underlying device and no space is displayed in the OS_MB column. The disk status will remain the same until the DISK_REPAIR_TIME value is exceeded when the disk is dropped.

8. Bring the TEST6_0000 disk back online. Verify the operation by using the `asmcmd lsdsk` command.

9. Next, take a look at the value for FAILGROUP_REPAIR_TIME. What is the current value? Change the value of FAILGROUP_REPAIR_TIME to two minutes and take the FGRP1 failure group offline. Look at the offline operation logged in alert_+ASM1.log (again, look near the end of the file). Verify that the drop timeout value is two minutes.

```
[grid@host01 ~]$ asmcmd lsattr -G TEST6 -l failgroup_repair_time
Name           Value
failgroup_repair_time 24.0h

[grid@host01 ~]$ asmcmd setattr -G TEST6 failgroup_repair_time 2m

[grid@host01 ~]$ asmcmd offline -G TEST6 -F FGRP1
Diskgroup altered.

[grid@host01 ~]$ tail -50
/u01/app/grid/diag/asm/+asm/+ASM1/trace/alert_+ASM1.log

NOTE: stopping process ARB0
NOTE: Starting expel slave for group 3/0xe6d03086 (TEST6)
2017-11-22T15:28:48.793257+00:00
NOTE: GroupBlock outside rolling migration privileged region
NOTE: requesting all-instance membership refresh for group=3
2017-11-22T15:28:48.836900+00:00
SUCCESS: rebalance completed for group 3/0xe6d03086 (TEST6)
NOTE: membership refresh pending for group 3/0xe6d03086 (TEST6)
2017-11-22T15:28:48.857008+00:00
GMON querying group 3 at 214 for pid 25, osid 6620
2017-11-22T15:28:48.861516+00:00
SUCCESS: refreshed membership for 3/0xe6d03086 (TEST6)
2017-11-22T15:28:50.556408+00:00
NOTE: Attempting voting file refresh on diskgroup TEST6
NOTE: Refresh completed on diskgroup TEST6. No voting file found.
2017-11-22T15:30:35.410083+00:00
SQL> /* ASMCMD */ALTER DISKGROUP TEST6 SET ATTRIBUTE
'failgroup_repair_time' = '2m'
2017-11-22T15:30:35.415310+00:00
SUCCESS: /* ASMCMD */ALTER DISKGROUP TEST6 SET ATTRIBUTE
'failgroup_repair_time' = '2m'
2017-11-22T15:30:47.606474+00:00
SQL> /* ASMCMD */ALTER DISKGROUP TEST6 OFFLINE DISKS IN  FAILGROUP
FGRP1
2017-11-22T15:30:47.609009+00:00
NOTE: DRTimer CD Create:  for disk group 3 disks:
```

```

NOTE: process _user29802_asml (29802) initiating offline of disk
0.4042311184 (TEST6_0000) with mask 0x7e in group 3 (TEST6) without
client assisting
NOTE: process _user29802_asml (29802) initiating offline of disk
1.4042311189 (TEST6_0001) with mask 0x7e in group 3 (TEST6) without
client assisting
NOTE: process _user29802_asml (29802) initiating offline of disk
2.4042311183 (TEST6_0002) with mask 0x7e in group 3 (TEST6) without
client assisting
NOTE: initiating PST update: grp 3 (TEST6), dsk = 0/0xf0f0c610,
mask = 0x6a, op = clear mandatory
NOTE: initiating PST update: grp 3 (TEST6), dsk = 1/0xf0f0c615,
mask = 0x6a, op = clear mandatory
NOTE: initiating PST update: grp 3 (TEST6), dsk = 2/0xf0f0c60f,
mask = 0x6a, op = clear mandatory
2017-11-22T15:30:47.616165+00:00
GMON updating disk modes for group 3 at 223 for pid 55, osid 29802
2017-11-22T15:30:47.629729+00:00
NOTE: PST update grp = 3 completed successfully
NOTE: initiating PST update: grp 3 (TEST6), dsk = 0/0xf0f0c610,
mask = 0x7e, op = clear mandatory
NOTE: initiating PST update: grp 3 (TEST6), dsk = 1/0xf0f0c615,
mask = 0x7e, op = clear mandatory
NOTE: initiating PST update: grp 3 (TEST6), dsk = 2/0xf0f0c60f,
mask = 0x7e, op = clear mandatory
2017-11-22T15:30:47.630416+00:00
GMON updating disk modes for group 3 at 224 for pid 55, osid 29802
2017-11-22T15:30:47.643924+00:00
NOTE: cache closing disk 0 of grp 3: TEST6_0000
2017-11-22T15:30:47.645104+00:00
NOTE: cache closing disk 1 of grp 3: TEST6_0001
2017-11-22T15:30:47.645845+00:00
NOTE: cache closing disk 2 of grp 3: TEST6_0002
2017-11-22T15:30:47.655117+00:00
NOTE: PST update grp = 3 completed successfully
NOTE: DRTimer CD Destroy: for diskgroup 3
2017-11-22T15:30:47.656655+00:00
SUCCESS: /* ASMCMD */ALTER DISKGROUP TEST6 OFFLINE DISKS IN
FAILGROUP FGRP1

```

[grid@host01 ~]\$

- The drop timeout is 120 seconds (2 minutes).

10. Wait for two minutes. List the disks that belong to the TEST6 disk group and verify that the FGRP1 failure group disks have been dropped. Is it possible to bring the failure group FGRP1 back online?

[grid@host01 ~]\$ **asmcmd lsdsk -G TEST6 -k**

Total_MB	Free_MB	OS_MB	Name	Failgroup	Site_Name
Site_GUID				Site_Status	Failgroup_Type
Library	Label	Failgroup_Label	Site_Label	UDID	Product
Path					Redund
1400	1324	0	DROPPED_0000_TEST6	FGRP1	
00				REGULAR	
System					UNKNOWN
1400	1332	0	DROPPED_0001_TEST6	FGRP1	
00				REGULAR	
System					UNKNOWN
1400	1328	0	DROPPED_0002_TEST6	FGRP1	
00				REGULAR	
System					UNKNOWN
1400	1328	1400	TEST6_0003	FGRP2	
00				REGULAR	
System					UNKNOWN
/dev/c1_SPARE_dsk12					
1400	1328	1400	TEST6_0004	FGRP2	
00				REGULAR	
System					UNKNOWN
/dev/c1_SPARE_dsk13					
1400	1328	1400	TEST6_0005	FGRP2	
00				REGULAR	
System					UNKNOWN
/dev/c1_SPARE_dsk14					
1400	1328	1400	TEST6_0006	FGRP3	
00				REGULAR	
System					UNKNOWN
/dev/c1_SPARE_dsk15					
1400	1328	1400	TEST6_0007	FGRP3	
00				REGULAR	
System					UNKNOWN
/dev/c1_SPARE_dsk2					
1400	1328	1400	TEST6_0008	FGRP3	
00				REGULAR	
System					UNKNOWN
/dev/c1_SPARE_dsk3					
[grid@host01 ~]\$ asmcmd online -G TEST6 -F FGRP1					
ORA-15032: not all alterations performed					
ORA-15281: not all specified disks were brought ONLINE					
ORA-15284: ASM terminated ALTER DISKGROUP ONLINE (DBD ERROR: OCISStmtExecute)					
[grid@host01 ~]\$					

- Because the DISKGROUP_REPAIR_TIME value of two minutes has been exceeded, the failure group disks have been dropped. It is not possible to bring the failure group online at this point.

11. Add the disks /dev/c1_SPARE_dsk1, /dev/c1_SPARE_dsk10, and /dev/c1_SPARE_dsk11 back to the TEST6 disk group. Name the failure group FGRP1. Verify that the disks have been successfully added.

12. Use `srvctl` to stop the `TEST6` disk group resource. Drop the `TEST6` disk group. Make sure that the `TEST6` resource has been removed.

```
[grid@host01 ~]$ srvctl stop diskgroup -diskgroup TEST6  
  
[grid@host01 ~]$ asmcmd dropdg -r -f TEST6  
  
[grid@host01 ~]$ crsctl stat res ora.TEST6.dg -t  
CRS-2613: Could not find resource 'ora.TEST6.dg'.  
  
[grid@host01 ~]$
```

13. Close all the terminal windows that were opened for this practice.

Practices for Lesson 6: Flex ASM Disk Group

Practice 6-1: Flex Disk Groups

Overview

In this practice, you will work with flex disk groups, file groups, and quota groups.

1. Open a terminal window on your dns node and ssh to host01 as the grid user. Set the environment using oraenv.

```
[oracle@dns ~]$ ssh -X grid@host01
grid@host01's password:

[grid@host01 ~]$ . oraenv
ORACLE_SID = [grid] ? +ASM1
The Oracle base has been set to /u01/app/grid

[grid@host01 ~]$
```

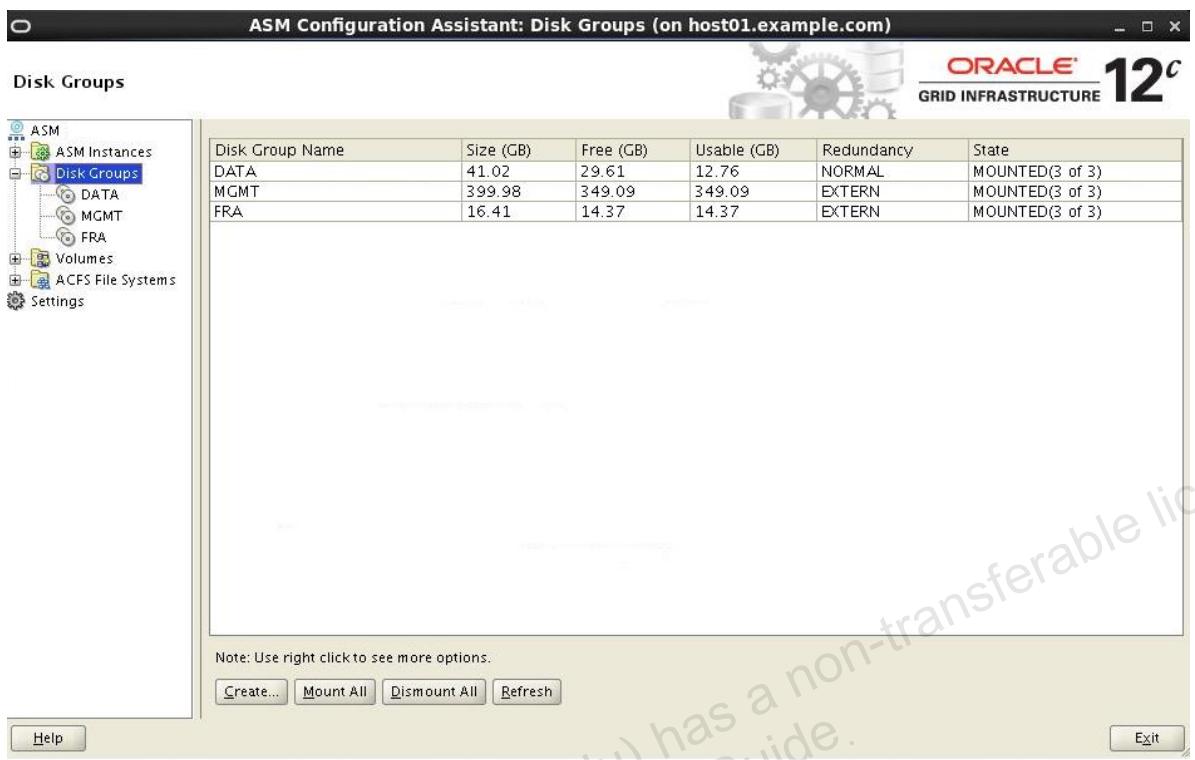
2. You will use ASMCA to create a new flex disk group.

```
[grid@host01 ~]$ asmca
```

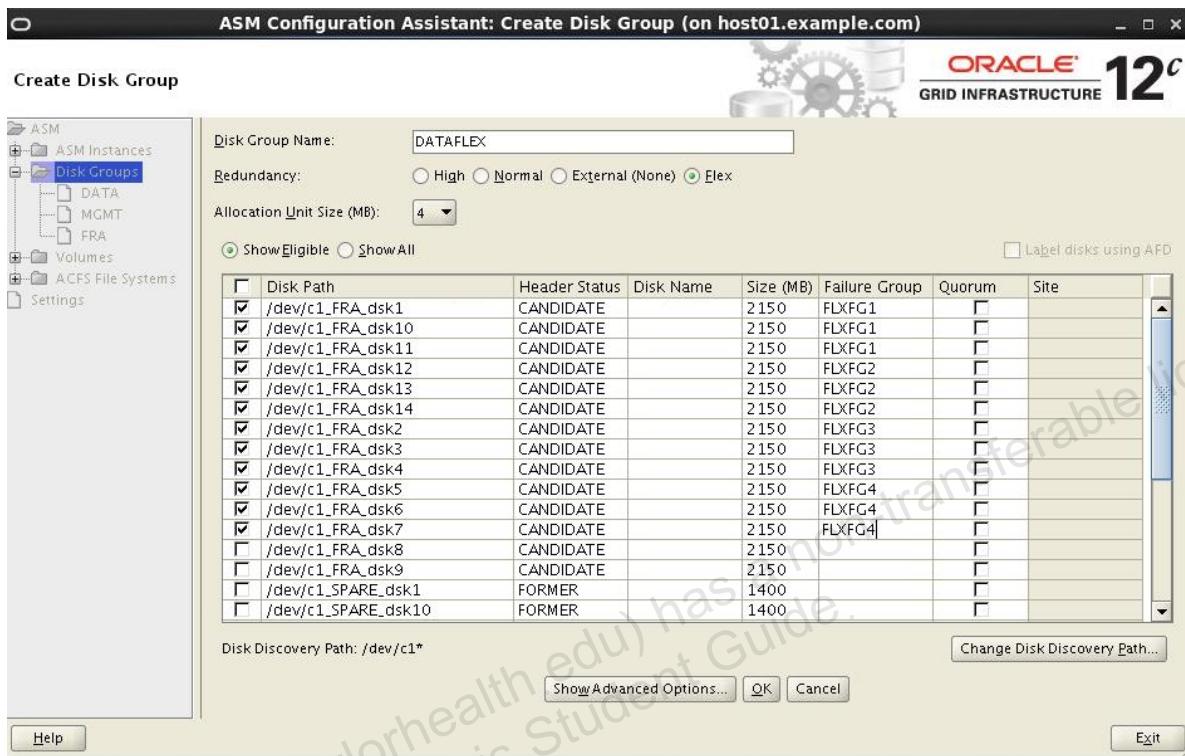
3. Click on Disk Groups.



4. Click on Create.



5. Name the disk group **DATAFLEX** and click the Flex radio button. Choose the first 12 **c1_FRA_DSKn** disks as shown below. You will create four failure groups (**FLXFG1**, **FLXFG2**, **FLXFG3**, and **FLXFG4**). Assign three disks per failure group as shown below. Click OK.



6. Open a second window to **host01** as the **grid** user, set the environment and use **asmcmd** **mkqg** command to create two quota groups, one called **pdb1_qg** with a quota of **10G** and another one called **pdb2_qg** with a quota of **8G**. List the new quota groups with the **asmcmd lsqg** command.

```
[oracle@dns ~]$ ssh -X grid@host01
grid@host01's password:

[grid@host01 ~]$ . oraenv
ORACLE_SID = [grid] ? +ASM1
The Oracle base has been set to /u01/app/grid

[grid@host01 ~]$ asmcmd mkqg -G DATAFLEX pdb1_qg quota 10G
Diskgroup altered.

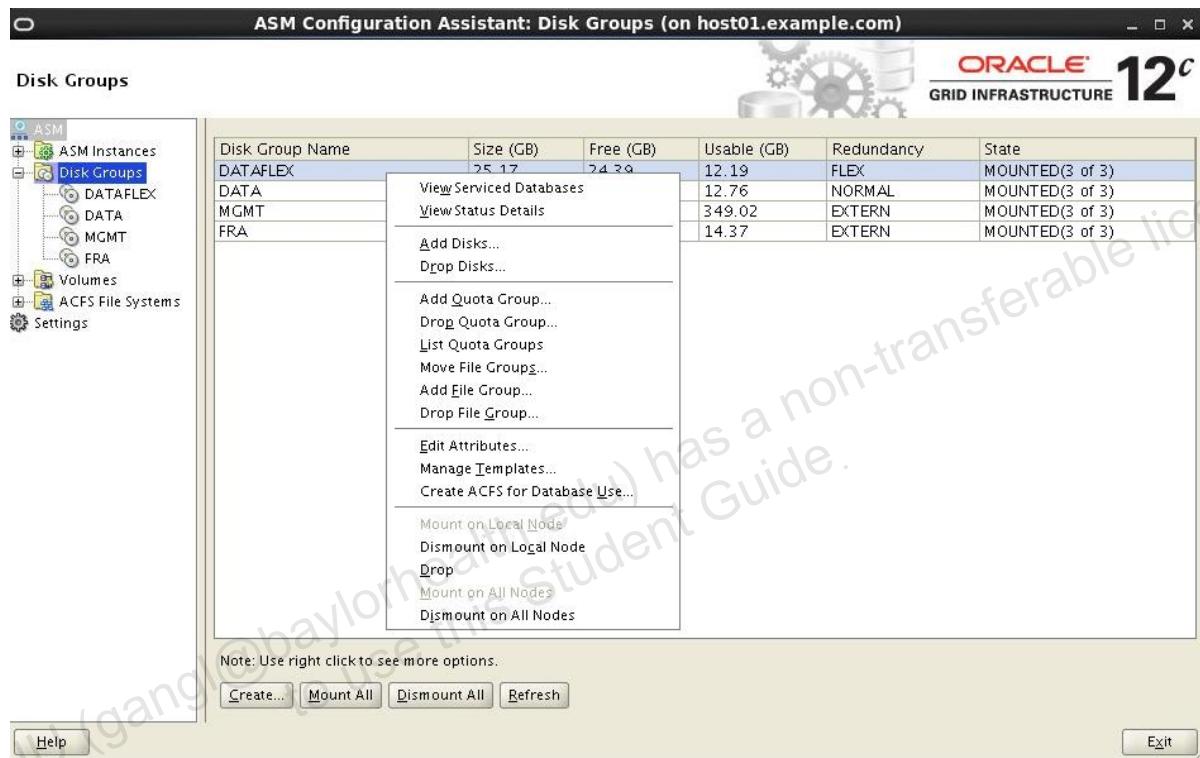
[grid@host01 ~]$ asmcmd mkqg -G DATAFLEX pdb2_qg quota 8G
Diskgroup altered.

[grid@host01 ~]$ asmcmd lsqg
Group_Num Quotagroup_Num Quotagroup_Name Incarnation Used_Quota_MB Quota_Limit_MB
```

2	1	GENERIC	1	0	0
2	2	PDB1_QG	1	0	10240
2	3	PDB2_QG	1	0	8192

```
[grid@host01 ~]$
```

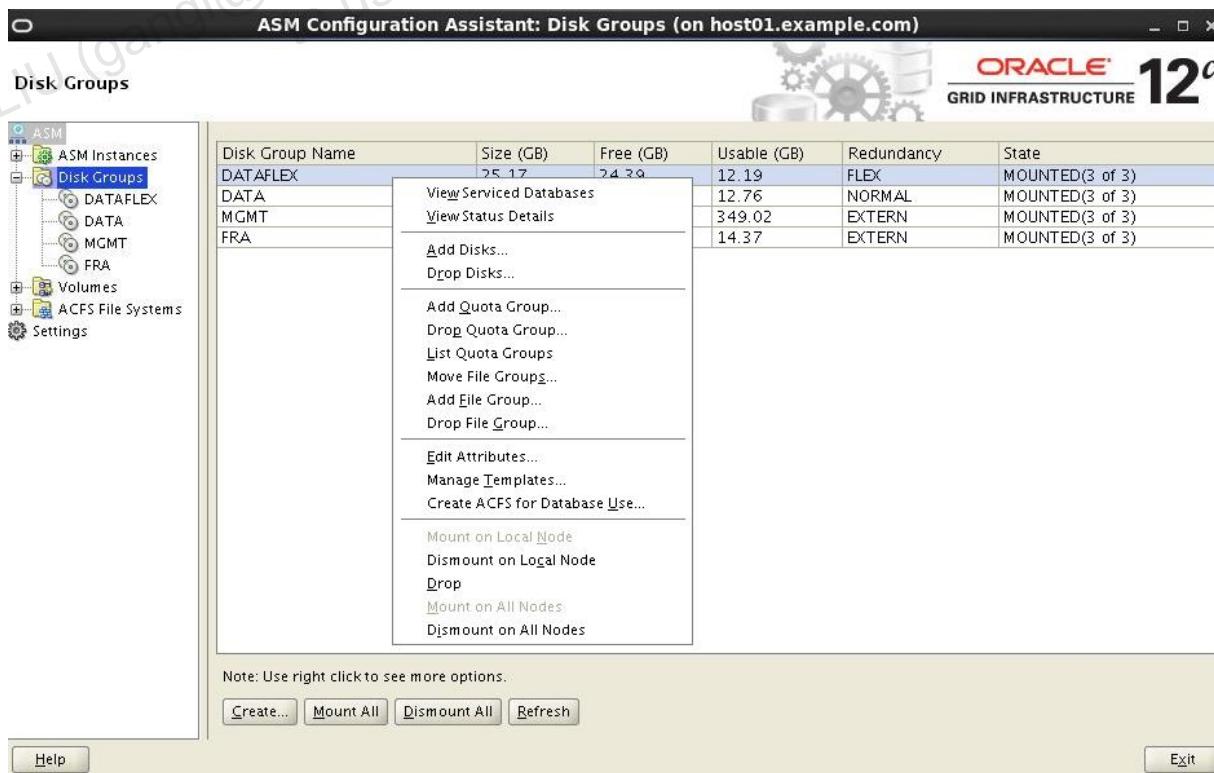
7. Return to ASMCA, right-click on DATAFLEX and select **Add File Group** from the drop down menu.



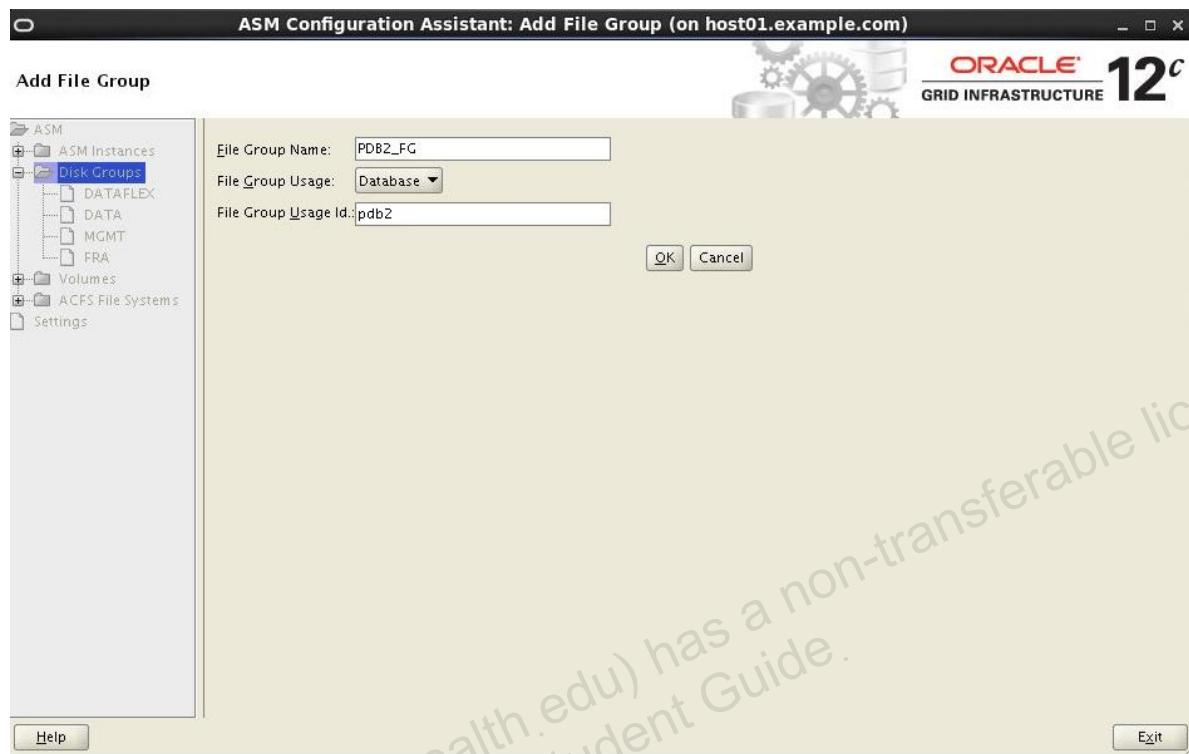
8. On the Add File Group page, enter PDB1_FG in the File Group Name field, select Database for File Group Usage, and enter PDB1 (**upper case**) in the File Group Usage Id field. Click OK.



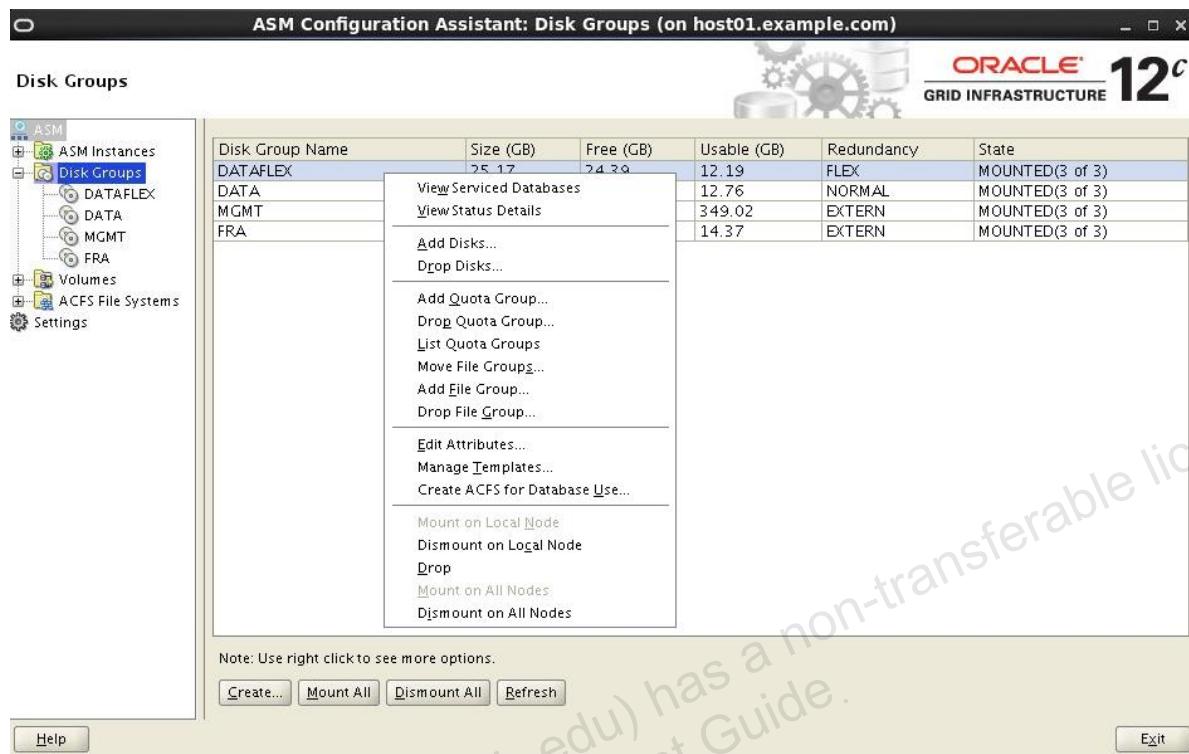
9. Again, right-click on DATAFLEX and select **Add File Group** from the drop down menu.



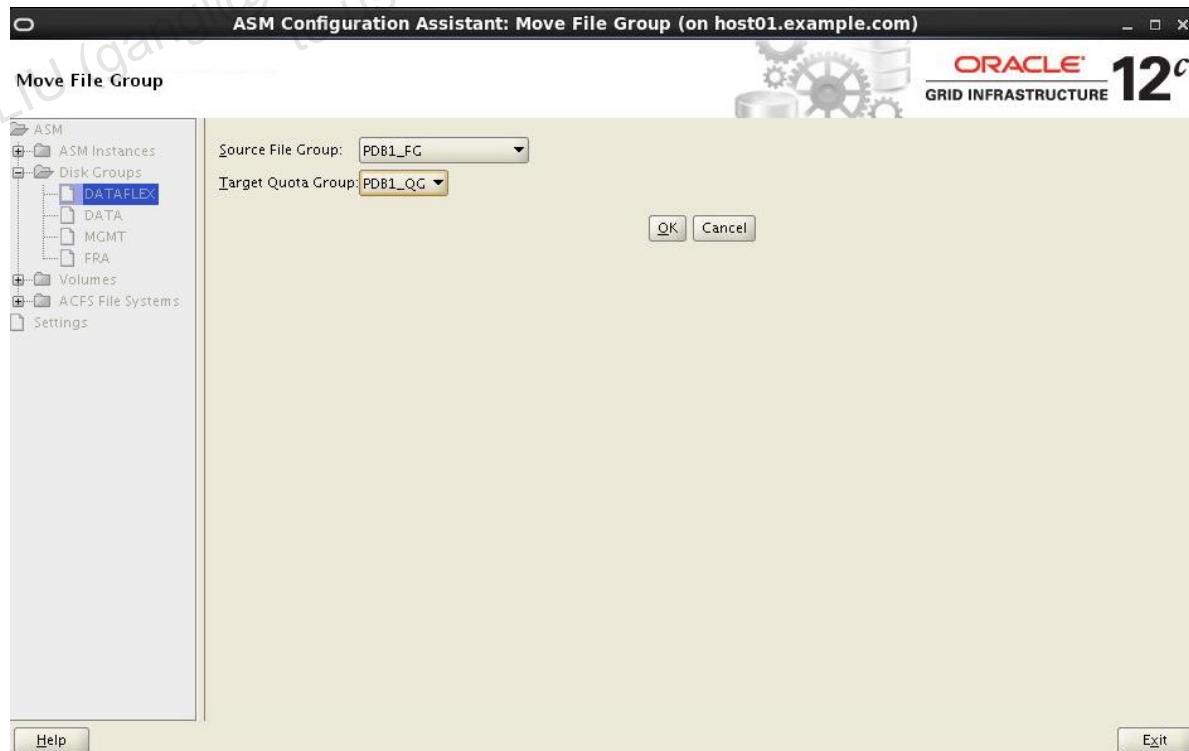
10. On the Add File Group page, enter PDB2_FG in the File Group Name field, select Database for File Group Usage, and enter pdb2 (**lower case**) in the File Group Usage Id field. Click OK.



11. Next, you will move the file groups into quota groups. Right-click on DATAFLEX and select **Move File Groups**.



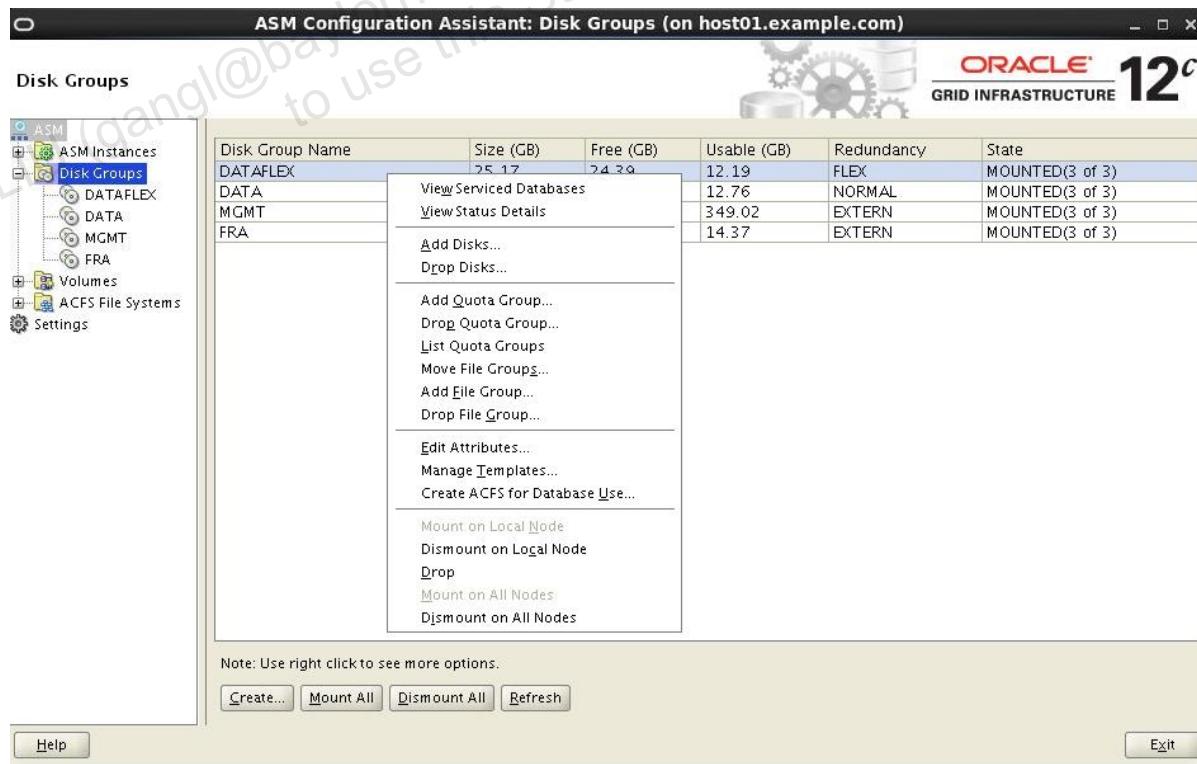
12. Select PDB1_FG from the Source File Group pull down menu. Select PDB1_QG from the Target Quota Group pull down menu. Click OK.



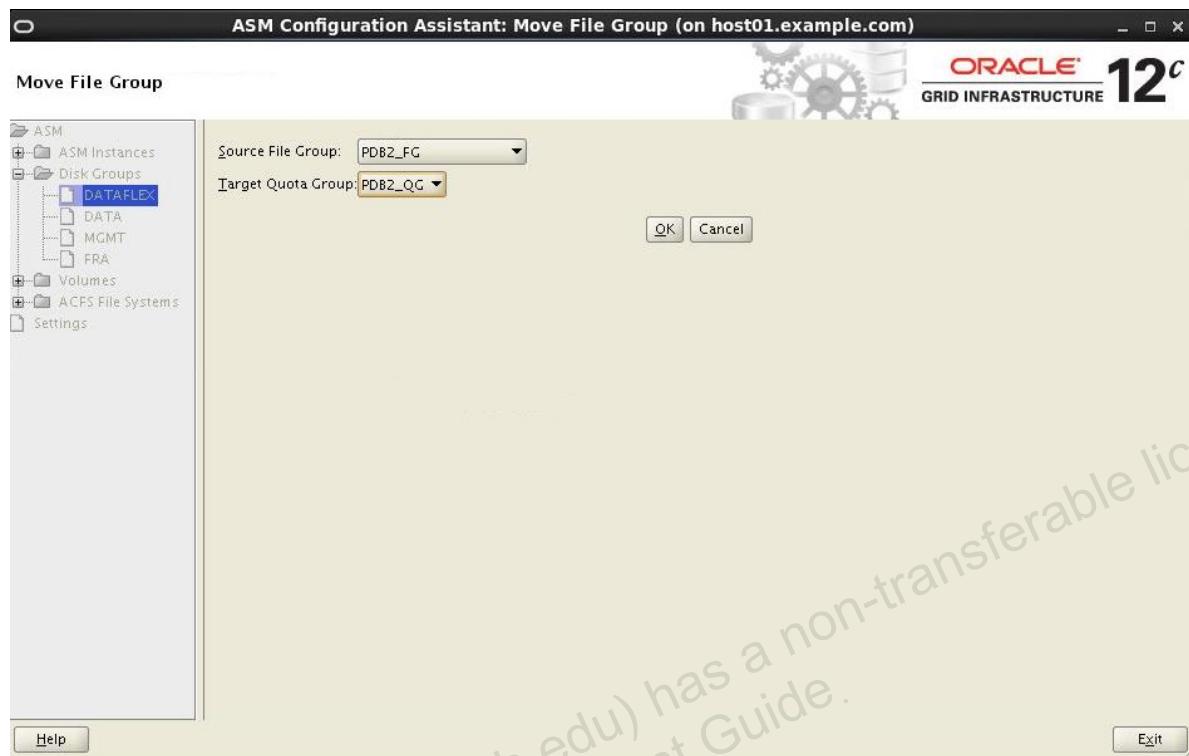
13. Click Yes on the dialog box to move the file group.



14. Again, right-click on DATAFLEX and select Move File Groups.



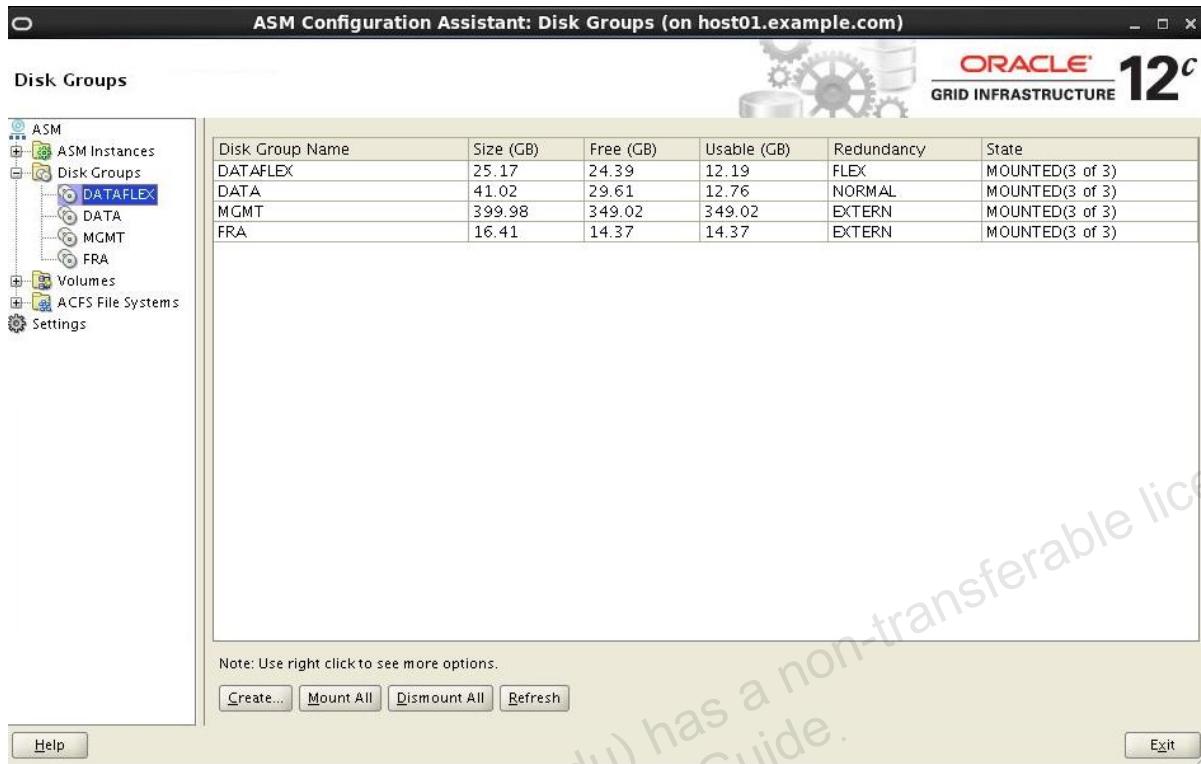
15. Select PDB2_FG from the Source File Group pull down menu. Select PDB2_QG from the Target Quota Group pull down menu. Click OK.



16. Click Yes on the dialog box to move the file group.



17. Click Exit to dismiss ASMCA.



18. From the grid terminal window, execute the `asmcmd lsfg` command to list file group details.

```
[grid@host01 ~]$ asmcmd lsfg
File Group          Disk Group   Quota Group  Used Quota MB  Client Name  Client
Type
DEFAULT_FILEGROUP  DATAFLEX     GENERIC      0
PDB1_FG            DATAFLEX     PDB1_QG    0          PDB1        DATABASE
PDB2_FG            DATAFLEX     PDB2_QG    0          pdb2       DATABASE

[grid@host01 ~]$
```

19. Start SQL*Plus. You will modify some file group properties for `PDB1_FG` and `PDB2_FG` as shown below.

```
[grid@host01 ~]$ sqlplus / as sysasm

SQL*Plus: Release 12.2.0.1.0 Production on Tue Jun 13 17:25:50 2017

Copyright (c) 1982, 2016, Oracle. All rights reserved.

Connected to:
Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 - 64bit
Production
```

```

SQL> ALTER DISKGROUP dataflex MODIFY FILEGROUP PDB1_FG SET
  'controlfile.redundancy' = 'HIGH';

Diskgroup altered.

SQL> ALTER DISKGROUP dataflex MODIFY FILEGROUP PDB1_FG SET
  'datafile.redundancy' = 'MIRROR';

Diskgroup altered.

SQL> ALTER DISKGROUP dataflex MODIFY FILEGROUP PDB1_FG SET
  'power_limit' = '50';

Diskgroup altered.

SQL> ALTER DISKGROUP dataflex MODIFY FILEGROUP PDB2_FG SET
  'priority' = 'highest';

Diskgroup altered.

SQL> ALTER DISKGROUP dataflex MODIFY FILEGROUP PDB2_FG SET
  'power_limit' = '40';

Diskgroup altered.

SQL> exit
Disconnected from Oracle Database 12c Enterprise Edition Release
12.2.0.1.0 - 64bit Production
[grid@host01 ~]$

```

20. Run `asmcmd lsfg` as shown below and check that the filegroup properties were successfully updated for both `PDB1_FG` and `PDB2_FG`.

File Group	Disk Group	Property	Value	File Type
PDB1_FG	DATAFLEX	PRIORITY	MEDIUM	
PDB1_FG	DATAFLEX	STRIPING	COARSE	CONTAINER
PDB1_FG	DATAFLEX	REDUNDANCY	HIGH	CONTROLFILE
PDB1_FG	DATAFLEX	STRIPING	FINE	CONTROLFILE
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	DATAFILE
PDB1_FG	DATAFLEX	STRIPING	COARSE	DATAFILE
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	ONLINELOG

PDB1_FG	DATAFLEX	STRIPING	COARSE	ONLINELOG
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	ARCHIVELOG
PDB1_FG	DATAFLEX	STRIPING	COARSE	ARCHIVELOG
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	TEMPFILE
PDB1_FG	DATAFLEX	STRIPING	COARSE	TEMPFILE
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	BACKUPSET
PDB1_FG	DATAFLEX	STRIPING	COARSE	BACKUPSET
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	PARAMETERFILE
PDB1_FG	DATAFLEX	STRIPING	COARSE	PARAMETERFILE
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	DATAGUARDCONFIG
PDB1_FG	DATAFLEX	STRIPING	COARSE	DATAGUARDCONFIG
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	CHANGETRACKING
PDB1_FG	DATAFLEX	STRIPING	COARSE	CHANGETRACKING
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	FLASHBACK
PDB1_FG	DATAFLEX	STRIPING	COARSE	FLASHBACK
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	DUMPSET
PDB1_FG	DATAFLEX	STRIPING	COARSE	DUMPSET
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	AUTOBACKUP
PDB1_FG	DATAFLEX	STRIPING	COARSE	AUTOBACKUP
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	VOTINGFILE
PDB1_FG	DATAFLEX	STRIPING	COARSE	VOTINGFILE
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	OCRFILE
PDB1_FG	DATAFLEX	STRIPING	COARSE	OCRFILE
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	ASMVOL
PDB1_FG	DATAFLEX	STRIPING	COARSE	ASMVOL
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	ASMVDRL
PDB1_FG	DATAFLEX	STRIPING	COARSE	ASMVDRL
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	OCRBACKUP
PDB1_FG	DATAFLEX	STRIPING	COARSE	OCRBACKUP
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	FLASHFILE
PDB1_FG	DATAFLEX	STRIPING	COARSE	FLASHFILE
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	XTRANSPORT BACKUPSET
PDB1_FG	DATAFLEX	STRIPING	COARSE	XTRANSPORT BACKUPSET
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	AUDIT_SPILLFILES
PDB1_FG	DATAFLEX	STRIPING	COARSE	AUDIT_SPILLFILES
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	INCR XTRANSPORT BACKUPSET
PDB1_FG	DATAFLEX	STRIPING	COARSE	INCR XTRANSPORT BACKUPSET
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	KEY_STORE
PDB1_FG	DATAFLEX	STRIPING	COARSE	KEY_STORE
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	AUTologin_KEY_STORE
PDB1_FG	DATAFLEX	STRIPING	COARSE	AUTologin_KEY_STORE
PDB1_FG	DATAFLEX	REDUNDANCY	MIRROR	CONTAINER
PDB1_FG	DATAFLEX	POWER_LIMIT	50	

[grid@host01 ~]\$ asmcmd lsfg -G DATAFLEX --filegroup PDB2_FG				
File Group	Disk Group	Property	Value	File Type
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	PARAMETERFILE
PDB2_FG	DATAFLEX	STRIPING	COARSE	PARAMETERFILE
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	DATAGUARDCONFIG
PDB2_FG	DATAFLEX	STRIPING	COARSE	DATAGUARDCONFIG
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	CHANGETRACKING
PDB2_FG	DATAFLEX	STRIPING	COARSE	CHANGETRACKING
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	FLASHBACK
PDB2_FG	DATAFLEX	STRIPING	COARSE	FLASHBACK
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	DUMPSET
PDB2_FG	DATAFLEX	STRIPING	COARSE	DUMPSET
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	AUTOBACKUP
PDB2_FG	DATAFLEX	STRIPING	COARSE	AUTOBACKUP
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	VOTINGFILE
PDB2_FG	DATAFLEX	STRIPING	COARSE	VOTINGFILE
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	OCRFILE
PDB2_FG	DATAFLEX	STRIPING	COARSE	OCRFILE
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	ASMVOL
PDB2_FG	DATAFLEX	STRIPING	COARSE	ASMVOL
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	ASMVDR
PDB2_FG	DATAFLEX	STRIPING	COARSE	ASMVDR
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	OCRBACKUP
PDB2_FG	DATAFLEX	STRIPING	COARSE	OCRBACKUP
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	FLASHFILE
PDB2_FG	DATAFLEX	STRIPING	COARSE	FLASHFILE
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	XTRANSPORT BACKUPSET
PDB2_FG	DATAFLEX	STRIPING	COARSE	XTRANSPORT BACKUPSET
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	AUDIT_SPILLFILES
PDB2_FG	DATAFLEX	STRIPING	COARSE	AUDIT_SPILLFILES
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	INCR XTRANSPORT
PDB2_FG	DATAFLEX	STRIPING	COARSE	INCR XTRANSPORT
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	KEY_STORE
PDB2_FG	DATAFLEX	STRIPING	COARSE	KEY_STORE
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	AUTologin_KEY_STORE
PDB2_FG	DATAFLEX	STRIPING	COARSE	AUTologin_KEY_STORE
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	CONTAINER
PDB2_FG	DATAFLEX	STRIPING	COARSE	CONTAINER
PDB2_FG	DATAFLEX	PRIORITY	HIGHEST	
PDB2_FG	DATAFLEX	POWER_LIMIT	40	
PDB2_FG	DATAFLEX	REDUNDANCY	HIGH	CONTROLFILE
PDB2_FG	DATAFLEX	STRIPING	FINE	CONTROLFILE

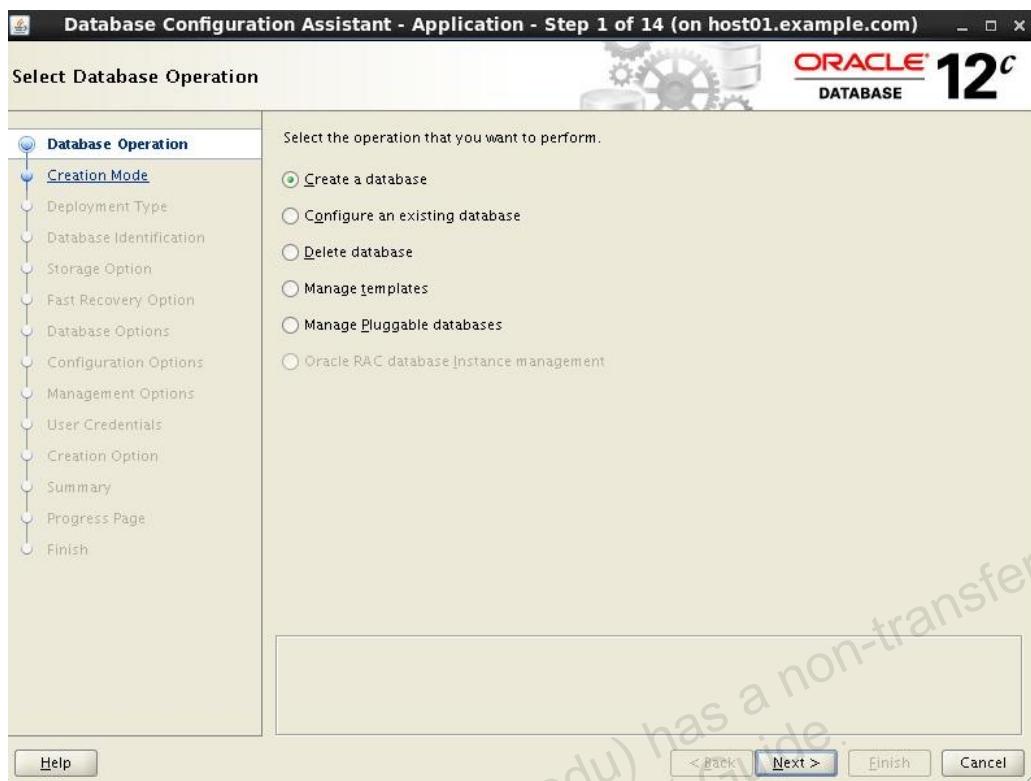
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	DATAFILE
PDB2_FG	DATAFLEX	STRIPING	COARSE	DATAFILE
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	ONLINELOG
PDB2_FG	DATAFLEX	STRIPING	COARSE	ONLINELOG
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	ARCHIVELOG
PDB2_FG	DATAFLEX	STRIPING	COARSE	ARCHIVELOG
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	TEMPFILE
PDB2_FG	DATAFLEX	STRIPING	COARSE	TEMPFILE
PDB2_FG	DATAFLEX	REDUNDANCY	MIRROR	BACKUPSET
PDB2_FG	DATAFLEX	STRIPING	COARSE	BACKUPSET

```
[grid@host01 ~]$
```

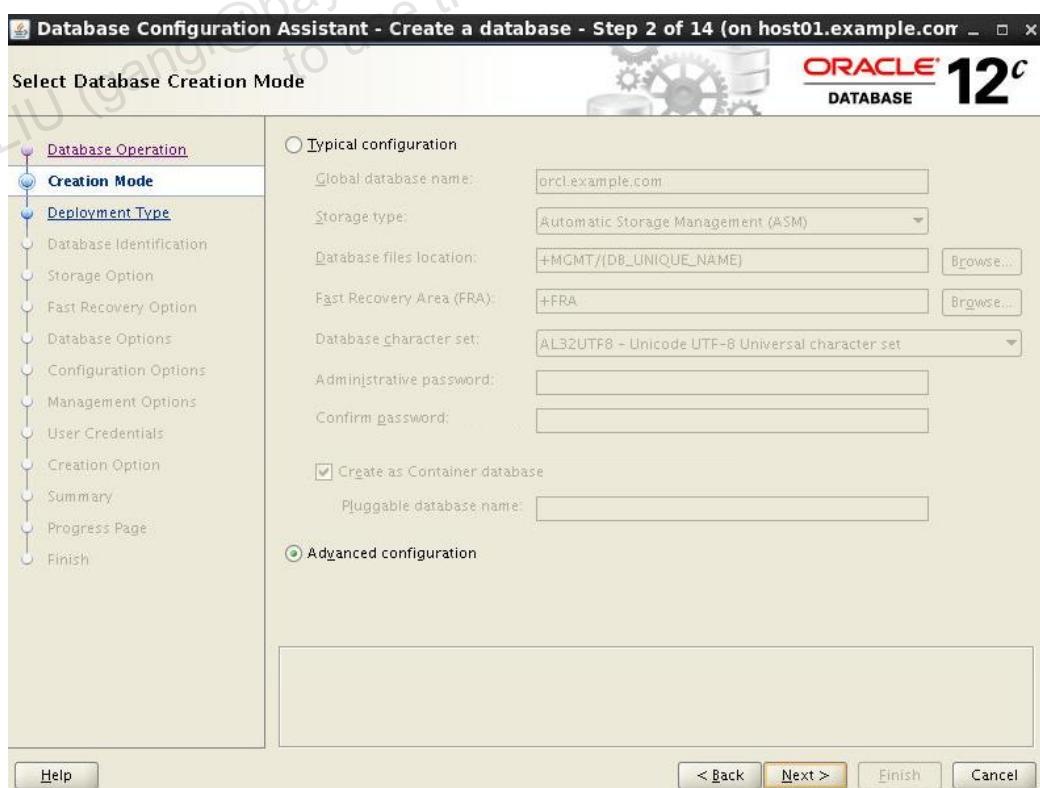
21. Next, you will create a container database with two PDBs. Open a terminal to host01 as the oracle user. Change working directory to /u01/app/oracle/product/12.2.0/dbhome_1/bin and start dbca.

```
[oracle@dns ~]$ ssh -X oracle@host01  
oracle@host03's password:  
  
[oracle@host03 ~]$ cd /u01/app/oracle/product/12.2.0/dbhome_1/bin  
  
[oracle@host03 bin]$ ./dbca
```

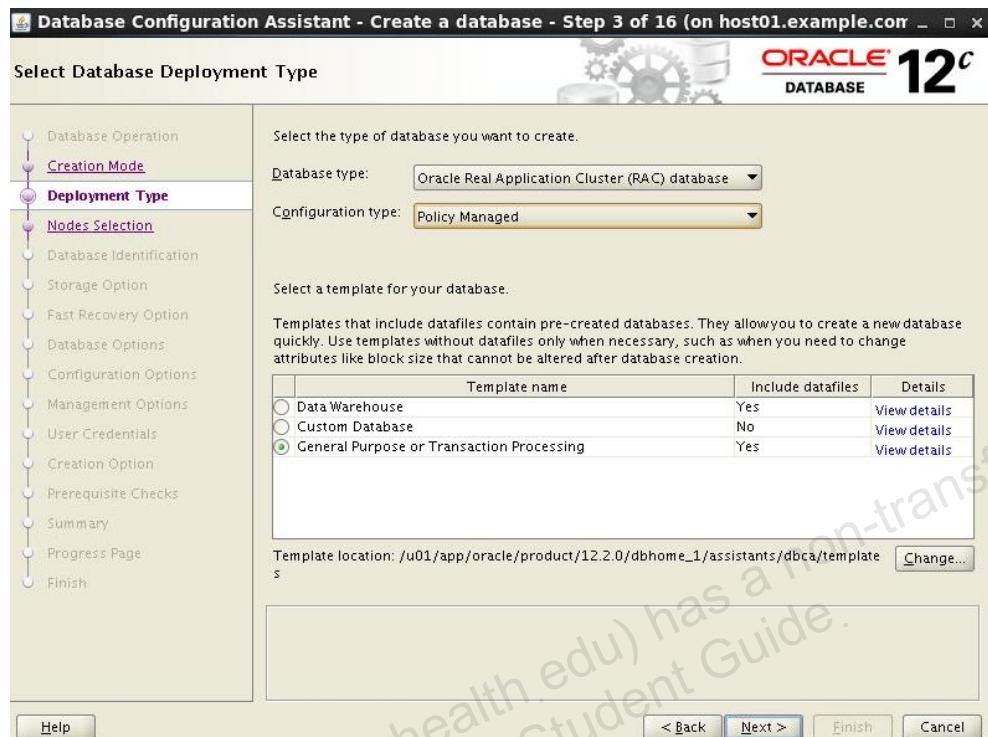
22. On the “Select Database Operation” page, select Create a database and click Next.



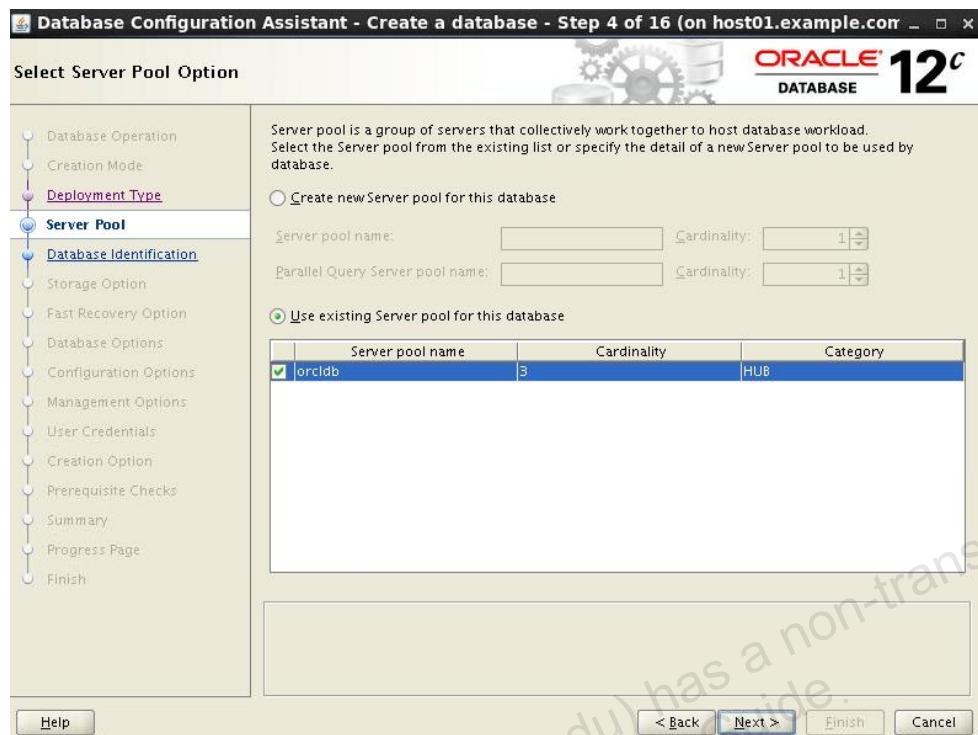
23. On the “Select database Creation Mode” page, select “Advanced configuration” and click Next.



24. On the “Select Database Deployment Type” page, select “Oracle Real Application Cluster (RAC) database” from the Database type pull-down list and “Policy Managed” from the Configuration type pull-down list. Select the “General Purpose or Transaction Processing” template and click Next.



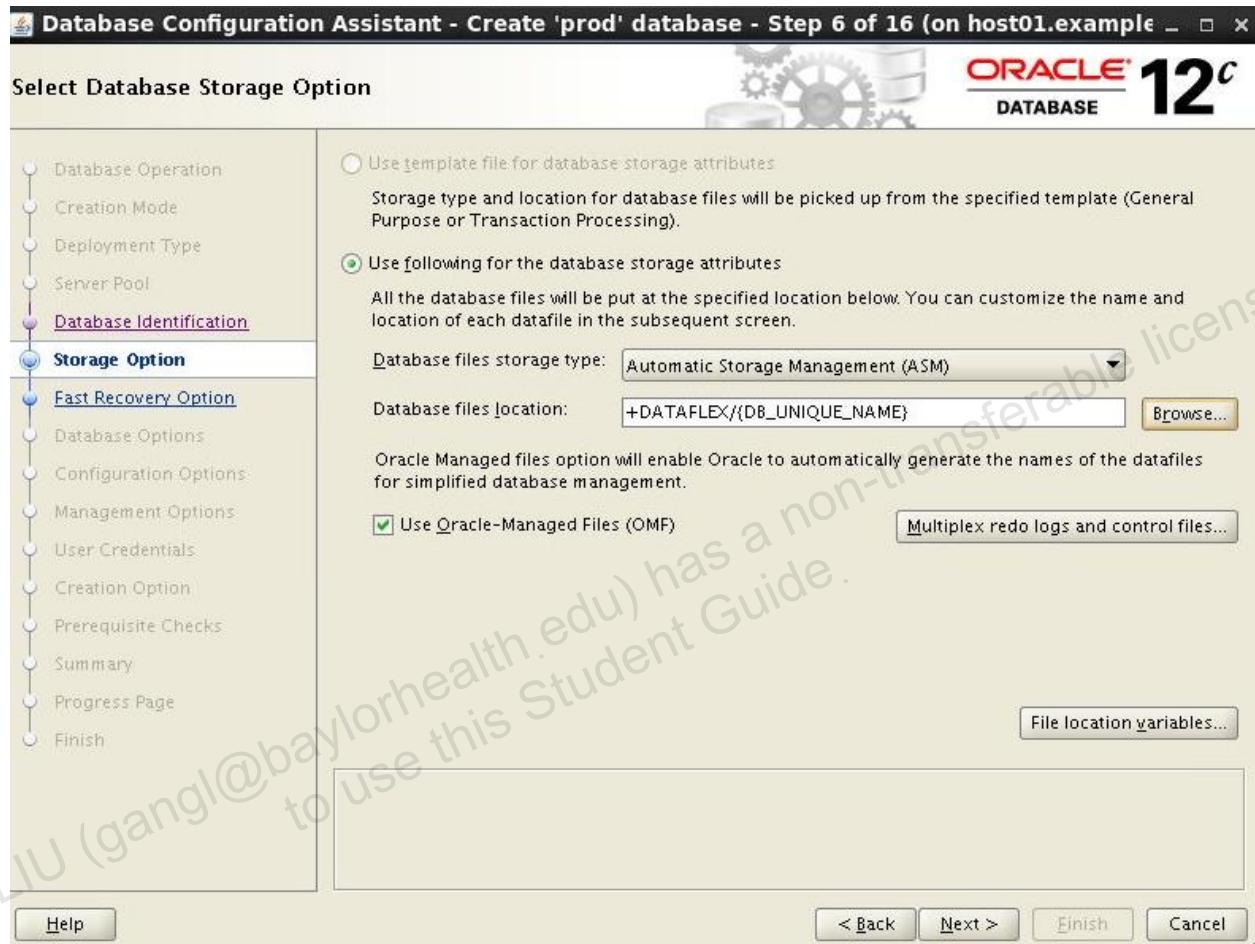
25. On the Server Pool Option page, select `orcldb` in the Use existing Server pool for this database option. Click Next.



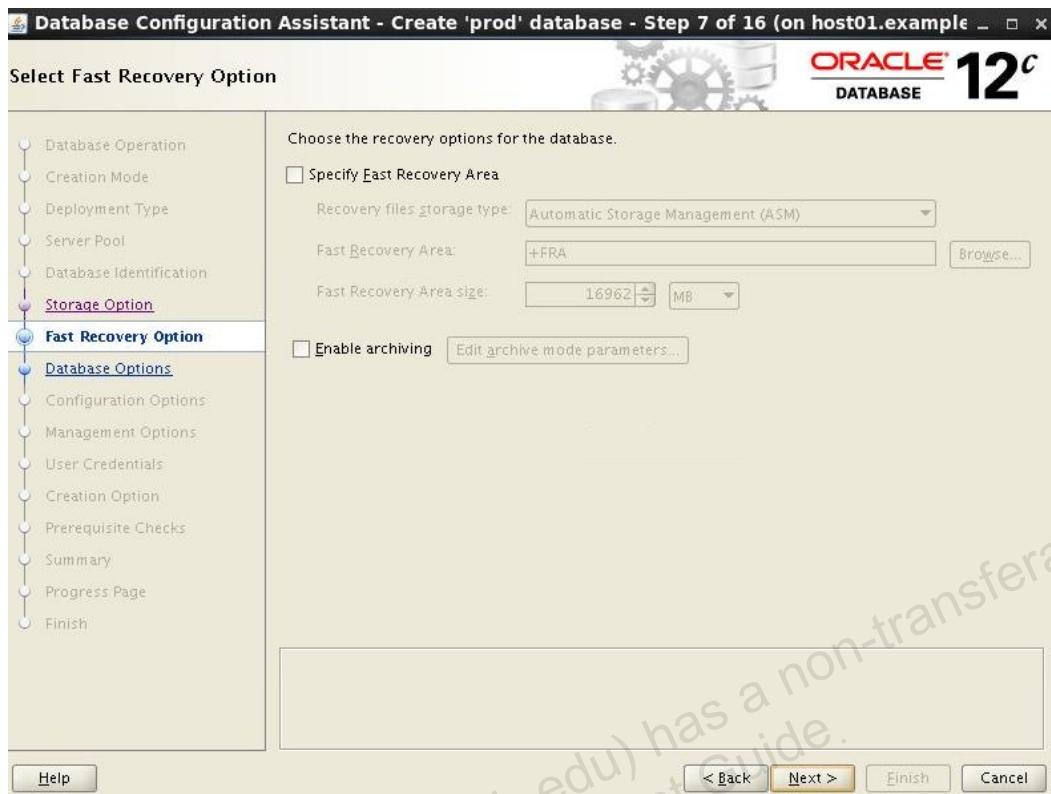
26. Ensure the Global database name is `prod`. Make sure the Create as Container database check box is checked. Make sure the “Use Local Undo tablespace for PDBs” checkbox is selected. The “Create a Container database with one or more PDBs” radio button should be selected and the Number of PDBs should be 2. Make sure the PDB name prefix is `PDB` (**upper case**). Click Next to continue.



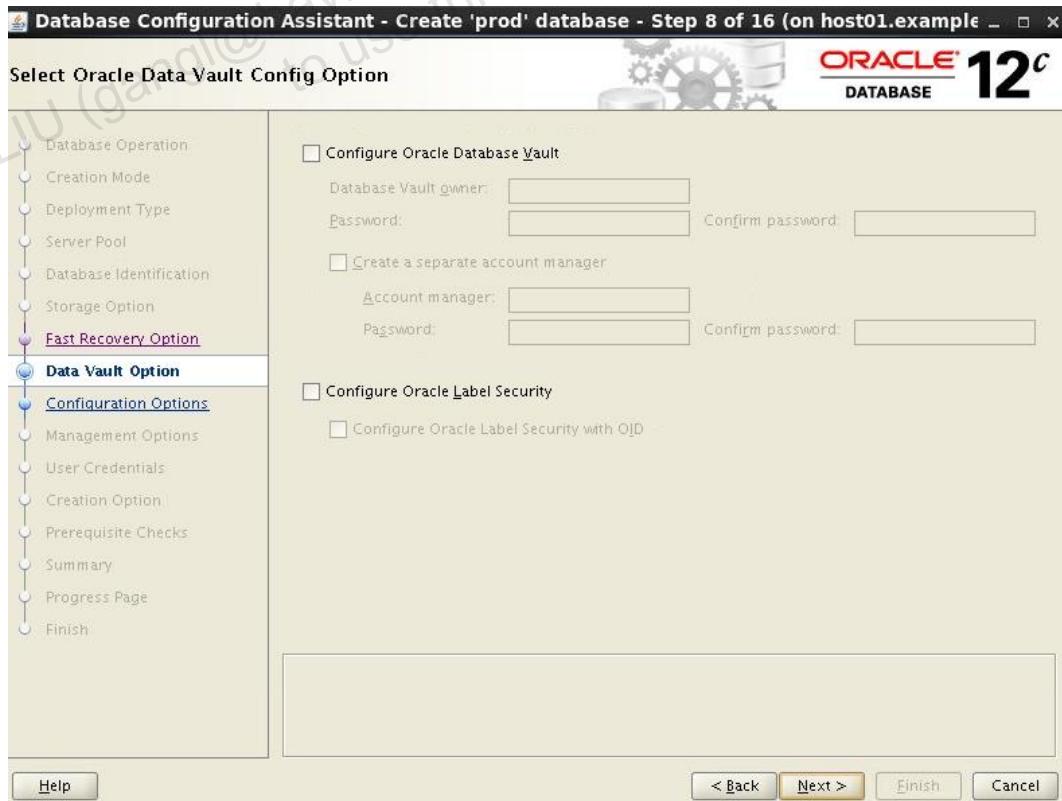
27. On the Select Database Storage page, click the “Use following for the database storage attributes” radio button. Make sure “Automatic Storage Management” is selected from the Database files storage type pull down list and the Database files location is **+DATAFLEX/{DB_UNIQUE_NAME}**. Make sure the “Use Oracle-Managed Files” check box is selected and click Next.



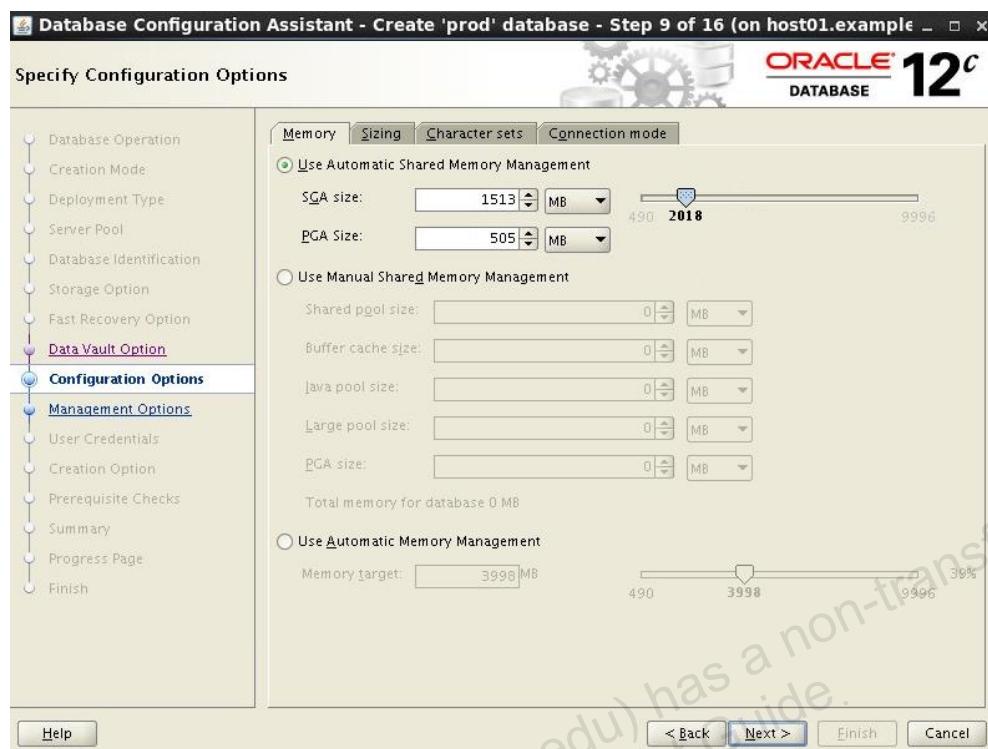
28. On the Select Fast Recovery Option page, click Next to continue.



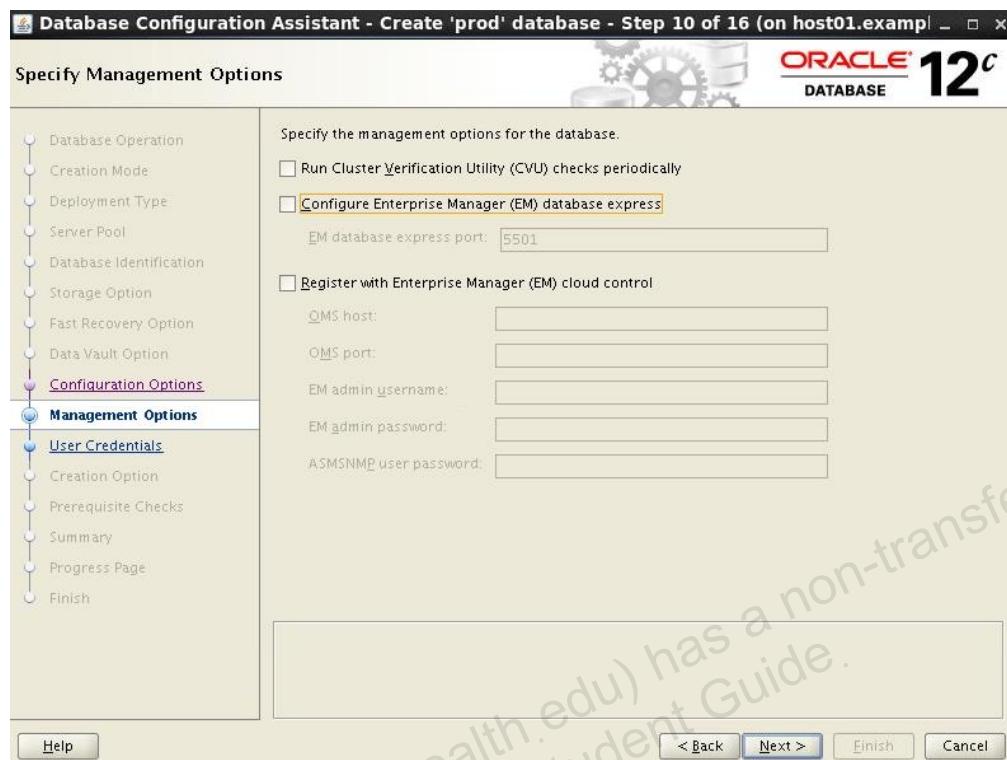
29. On the Select Oracle Data Vault Config Option page, click Next.



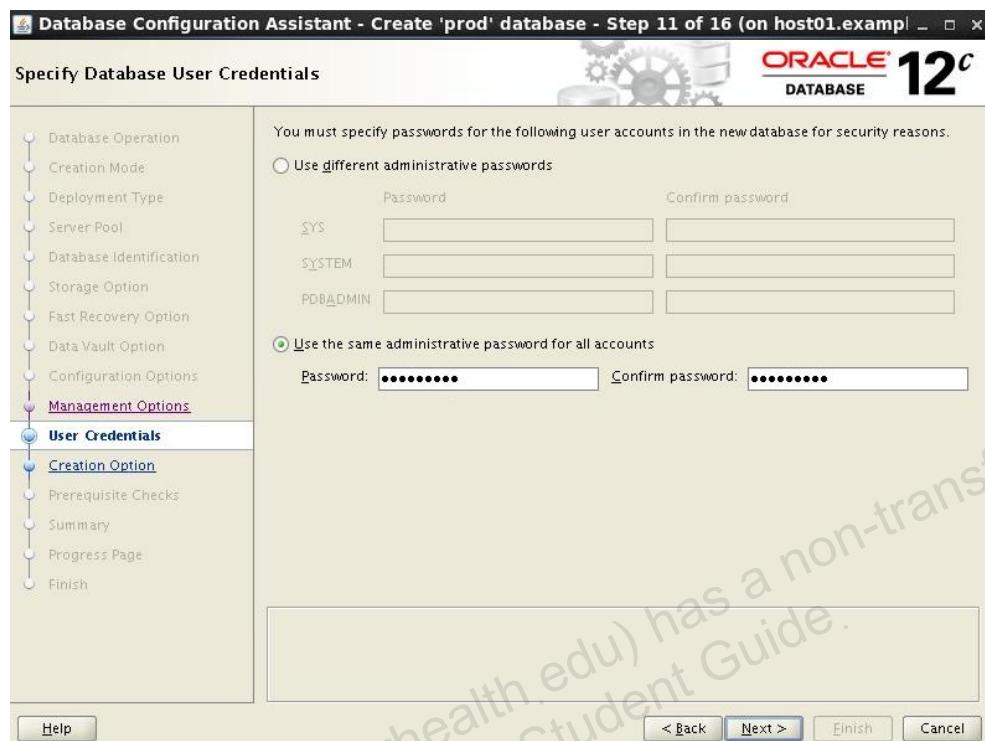
30. On the Specify Configuration Options page, reduce memory to approximately 2000 MB on the slider bar and click Next.



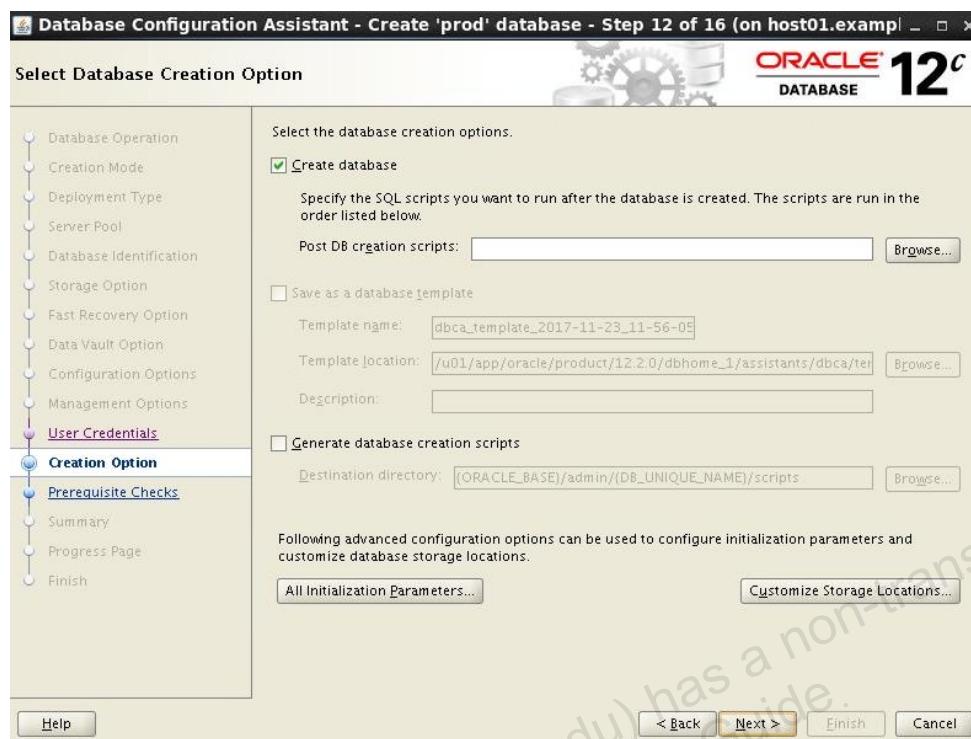
31. On the Specify Management Options page, uncheck the “Run Cluster Verification Utility (CVU) checks periodically” and the “Configure Enterprise Manager (EM) database express” check boxes and click Next.



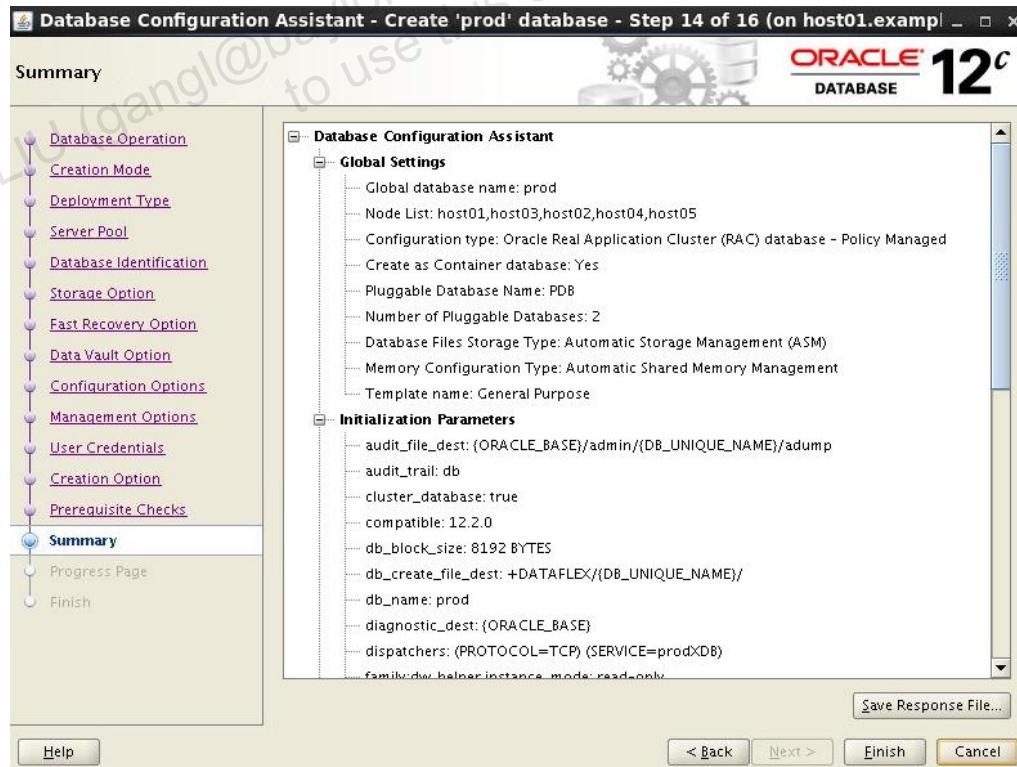
32. On the Specify Database User Credentials page, click the “Use the same administrative password for all accounts” button. Enter the SYS password (*please refer to the Course Practice Environment: Security Credentials page for account passwords*) in both the Password and Confirm Password fields and click Next.



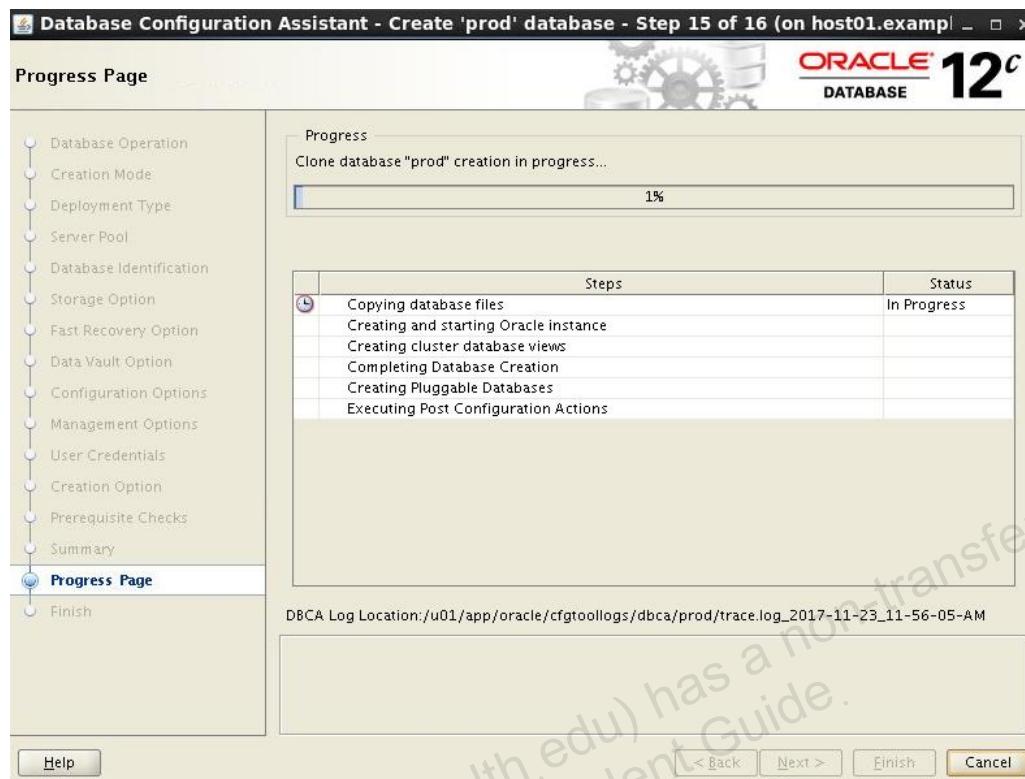
33. On the Select Database Creation Option page, make sure the “Create database” check box is selected and click Next.



34. On the Summary page, review the information and click Finish.



35. Monitor database creation on the Progress Page. **After a few moments, go to the next step. It takes around 25~30 minutes to complete the rest of steps at this stage.**



36. Switch to the `grid` terminal window and monitor file group usage with the `asmcmd lsfg` command. Pay special attention to the file groups being created and utilized and the utilization of the file groups you created.

```
[grid@host01 ~]$ asmcmd lsfg
File Group      Disk Group   Quota Group  Used Quota MB Client Name  Client Type
DEFAULT_FILEGROUP DATAFLEX    GENERIC      1608
PDB1_FG          DATAFLEX    PDB1_QG     0           PDB1        DATABASE
PDB2_FG          DATAFLEX    PDB2_QG     0           pdb2        DATABASE

***** Wait a few moments *****

[grid@host01 ~]$ asmcmd lsfg
File Group      Disk Group   Quota Group  Used Quota MB Client Name  Client Type
DEFAULT_FILEGROUP DATAFLEX    GENERIC      2488
PDB1_FG          DATAFLEX    PDB1_QG     0           PDB1        DATABASE
PDB2_FG          DATAFLEX    PDB2_QG     0           pdb2        DATABASE
ORCL_CDB$ROOT    DATAFLEX    GENERIC      96          ORCL_CDB$ROOT DATABASE

***** Wait a few moments *****

[grid@host01 ~]$ asmcmd lsfg
File Group      Disk Group   Quota Group  Used Quota MB Client Name  Client Type
```

DEFAULT_FILEGROUP	DATAFLEX	GENERIC	1280		
PDB1_FG	DATAFLEX	PDB1_QG	0	PDB1	DATABASE
PDB2_FG	DATAFLEX	PDB2_QG	0	pdb2	DATABASE
ORCL_CDB\$ROOT	DATAFLEX	GENERIC	3448	ORCL_CDB\$ROOT	DATABASE


```
[grid@host01 ~]$ asmcmd lsfg
File Group          Disk Group   Quota Group  Used Quota MB Client Name    Client Type
DEFAULT_FILEGROUP  DATAFLEX     GENERIC      0
PDB1_FG            DATAFLEX     PDB1_QG    0           PDB1          DATABASE
PDB2_FG            DATAFLEX     PDB2_QG    0           pdb2          DATABASE
ORCL_CDB$ROOT     DATAFLEX     GENERIC     3704        ORCL_CDB$ROOT  DATABASE
ORCL_PDB$SEED     DATAFLEX     GENERIC     1512        ORCL_PDB$SEED  DATABASE

***** Wait a few moments *****

[grid@host01 ~]$ asmcmd lsfg
File Group          Disk Group   Quota Group  Used Quota MB Client Name    Client Type
DEFAULT_FILEGROUP  DATAFLEX     GENERIC      0
PDB1_FG          DATAFLEX     PDB1_QG   1552        PDB1          DATABASE
PDB2_FG            DATAFLEX     PDB2_QG    0           pdb2          DATABASE
ORCL_CDB$ROOT     DATAFLEX     GENERIC     4576        ORCL_CDB$ROOT  DATABASE
ORCL_PDB$SEED     DATAFLEX     GENERIC     1512        ORCL_PDB$SEED  DATABASE

***** Wait a few moments *****

[grid@host01 ~]$ asmcmd lsfg
File Group          Disk Group   Quota Group  Used Quota MB Client Name    Client Type
DEFAULT_FILEGROUP  DATAFLEX     GENERIC      0
PDB1_FG            DATAFLEX     PDB1_QG    1984        PDB1          DATABASE
PDB2_FG            DATAFLEX     PDB2_QG    0           pdb2          DATABASE
ORCL_CDB$ROOT     DATAFLEX     GENERIC     6864        ORCL_CDB$ROOT  DATABASE
ORCL_PDB$SEED     DATAFLEX     GENERIC     1512        ORCL_PDB$SEED  DATABASE
PDB2              DATAFLEX     GENERIC     1552        PDB2          DATABASE

[grid@host01 ~]$
```

Note that initially, `DEFAULT_FILEGROUP` is written to. Next, the `ORCL_CDB$ROOT` filegroup is created and populated while `DEFAULT_FILEGROUP` is emptied. Next, the `ORCL_PDB$SEED` filegroup is created and populated. Next, the `PDB1_FG` filegroup is populated with files for `PDB1`. Note that `PDB2_FG` is not used, but a filegroup called `PDB2` is created and populated and assigned to the default quota group called `GENERIC`. This is because we specified `pdb2` rather than `PDB2` for the client name when you created the filegroups. It is obviously case sensitive.

37. Again, notice that file group PDB2 is assigned to quota group GENERIC. Use SQL*Plus to associate filegroup PDB2 with quota group PDB2_QG.

```
[grid@host01 ~]$ asmcmd lsfg
File Group      Disk Group   Quota Group  Used Quota MB Client Name    Client Type
DEFAULT_FILEGROUP DATAFLEX    GENERIC      0
PDB1_FG          DATAFLEX    PDB1_QG     1984        PDB1          DATABASE
PDB2_FG          DATAFLEX    PDB2_QG     0
ORCL_CDB$ROOT   DATAFLEX    GENERIC      6864        ORCL_CDB$ROOT  DATABASE
ORCL_PDB$SEED   DATAFLEX    GENERIC      1512        ORCL_PDB$SEED  DATABASE
PDB2           DATAFLEX    GENERIC    1968        PDB2          DATABASE

[grid@host01 ~]$ sqlplus / as sysasm

SQL*Plus: Release 12.2.0.1.0 Production on Wed Jun 28 00:39:50 2017
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Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 - 64bit
Production

SQL> alter diskgroup DATAFLEX modify filegroup PDB2 set 'quota_group' = 'PDB2_QG';

Diskgroup altered.

SQL> exit

[grid@host01 ~]$ asmcmd lsfg
File Group      Disk Group   Quota Group  Used Quota MB Client Name    Client Type
DEFAULT_FILEGROUP DATAFLEX    GENERIC      0
PDB1_FG          DATAFLEX    PDB1_QG     1776        PDB1          DATABASE
PDB2_FG          DATAFLEX    PDB2_QG     0
ORCL_CDB$ROOT   DATAFLEX    GENERIC      4576        ORCL_CDB$ROOT  DATABASE
ORCL_PDB$SEED   DATAFLEX    GENERIC      1552        ORCL_PDB$SEED  DATABASE
PDB2           DATAFLEX    PDB2_QG    1552        PDB2          DATABASE

[grid@host01 ~]$
```

38. Stop the prod database to save the resource in the practice environment.

```
[grid@host01 ~]$ srvctl stop database -db prod

[grid@host01 ~]$ srvctl status database -db prod
Instance prod_1 is not running on node host02
Instance prod_2 is not running on node host03
Instance prod_3 is not running on node host01

[grid@host01 ~]$
```

39. Return to DBCA and click Close to dismiss.
40. Close all terminal windows opened for this practice.

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Practices for Lesson 7: Administering ASM Files, Directories, and Templates

Practice 7-1: Administering ASM Files, Directories, and Templates

Overview

In this practice, you use several tools to navigate the ASM file hierarchy, manage aliases, and manage templates.

1. ASM is designed to hold database files in a hierarchical structure. Open a terminal session to host01 as the grid user. After setting up the grid environment, navigate the orcl database files with ASMCMD.

```
[oracle@dns ~]$ ssh grid@host01
grid@host01's password:

[grid@host01 ~]$ . oraenv
ORACLE_SID = [grid] ? +ASM1
The Oracle base has been set to /u01/app/grid

[grid@host01 ~]$ asmcmd
ASMCMD> ls
DATA/
DATAFLEX/
FRA/
MGMT/

ASMCMD> ls DATA
ASM/
cdb1/
cluster01/
orapwasm
orcl/

ASMCMD> ls -l DATA/orcl/*
Type          Redund  Striped  Time                  Sys  Name
+DATA/orcl/CONTROLFILE/:
CONTROLFILE    HIGH     FINE      NOV 18 13:00:00   Y
Current.269.960022747

+DATA/orcl/DATAFILE/:
DATAFILE      MIRROR   COARSE    NOV 23 16:00:00   Y
SYSAUX.266.960022657
DATAFILE      MIRROR   COARSE    NOV 21 13:00:00   Y
SYSTEM.273.960022583
DATAFILE      MIRROR   COARSE    NOV 18 13:00:00   Y
UNDOTBS1.274.960022693
```

```

DATAFILE      MIRROR COARSE   NOV 21 14:00:00  Y
UNDOTBS2.276.960023065

DATAFILE      MIRROR COARSE   NOV 18 13:00:00  Y
UNDOTBS3.277.960023067

DATAFILE      MIRROR COARSE   NOV 18 13:00:00  Y
USERS.261.960022693

+DATA/orcl/ONLINELOG/:
ONLINELOG    MIRROR COARSE   NOV 21 22:00:00  Y
group_1.278.960022751
ONLINELOG    MIRROR COARSE   NOV 22 23:00:00  Y
group_2.279.960022751
ONLINELOG    MIRROR COARSE   NOV 23 15:00:00  Y
group_3.281.960022751
ONLINELOG    MIRROR COARSE   NOV 22 00:00:00  Y
group_4.286.960023011
ONLINELOG    MIRROR COARSE   NOV 22 22:00:00  Y
group_5.263.960023021
ONLINELOG    MIRROR COARSE   NOV 23 11:00:00  Y
group_6.264.960023027
ONLINELOG    MIRROR COARSE   NOV 23 06:00:00  Y
group_7.265.960023033
ONLINELOG    MIRROR COARSE   NOV 23 06:00:00  Y
group_8.272.960023045
ONLINELOG    MIRROR COARSE   NOV 22 23:00:00  Y
group_9.275.960023055

+DATA/orcl/PARAMETERFILE/:
PARAMETERFILE MIRROR COARSE   NOV 21 23:00:00  Y
spfile.285.960022915

+DATA/orcl/PASSWORD/:
PASSWORD      HIGH   COARSE   NOV 14 08:00:00  Y
pwdorcl.257.960022559

+DATA/orcl/TEMPFILE/:
TEMPFILE     MIRROR COARSE   NOV 18 13:00:00  Y
TEMP.282.960022785

ASMCMD>

```

2. The default structure may not be the most useful for some sites. Create a set of aliases for directories and files to match a file system. You can create a directory called `oradata` under `+DATA/orcl`. Use ASMCMD to do this.

```
ASMCMD> ls +DATA/orcl
CONTROLFILE/
DATAFILE/
ONLINELOG/
PARAMETERFILE/
PASSWORD/
TEMPFILE/

ASMCMD> mkdir +DATA/orcl/oradata

ASMCMD> ls +DATA/orcl
CONTROLFILE/
DATAFILE/
ONLINELOG/
PARAMETERFILE/
PASSWORD/
TEMPFILE/
oradata/

ASMCMD>
```

3. Use ASMCMD to create an alias called `users_01.dbf` in the `oradata` directory for the `USERS` datafile in `+DATA/orcl/DATAFILE`. List the alias when you have finished. View the file attributes. **Note:** Use your file name.

```
ASMCMD> ls -l DATA/orcl/DATAFILE
Type      Redund  Striped   Time           Sys  Name
DATAFILE  MIRROR  COARSE    NOV 23 16:00:00  Y    SYSAUX.266.960022657
DATAFILE  MIRROR  COARSE    NOV 21 13:00:00  Y    SYSTEM.273.960022583
DATAFILE  MIRROR  COARSE    NOV 18 13:00:00  Y    UNDOTBS1.274.960022693
DATAFILE  MIRROR  COARSE    NOV 21 14:00:00  Y    UNDOTBS2.276.960023065
DATAFILE  MIRROR  COARSE    NOV 18 13:00:00  Y    UNDOTBS3.277.960023067
DATAFILE  MIRROR  COARSE    NOV 18 13:00:00  Y    USERS.261.960022693

ASMCMD> mkalias DATA/orcl/DATAFILE/USERS.261.960022693
DATA/orcl/oradata/users_01.dbf

ASMCMD> ls -l DATA/orcl/oradata
Type      Redund  Striped   Time           Sys  Name
DATAFILE  MIRROR  COARSE    NOV 18 13:00:00  N    users_01.dbf =>
+DATA/orcl/DATAFILE/USERS.261.960022693

ASMCMD>
```

4. Open a terminal session from your desktop to host01 as the oracle user. Determine the name of the instance that is running on host01 and set the environment. Create a new tablespace called XYZ. Use SQL*Plus to create the tablespace with a system-generated datafile name. Determine the orcl instance that is running on host01 and set the environment before starting.

```
[oracle@dns ~]$ ssh oracle@host01
oracle@host01's password:

[oracle@host01 ~]$ pgrep -lf ora_pmon
8065 ora_pmon_orcl_3

[oracle@host01 ~]$ export ORACLE_SID=orcl_3
[oracle@host01 ~]$ export
ORACLE_HOME=/u01/app/oracle/product/12.2.0/dbhome_1
[oracle@host01 ~]$ export PATH=$PATH:$ORACLE_HOME/bin

[oracle@host01 ~]$ sqlplus / as sysdba

SQL*Plus: Release 12.2.0.1.0 Production on Thu Nov 23 17:40:45
2017

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Production

SQL> CREATE TABLESPACE XYZ DATAFILE '+data' SIZE 200M;

Tablespace created.

SQL>
```

5. Return to the grid terminal and inspect the attributes of the XYZ tablespace datafile.

```
ASMCMD> ls -l --absolutePath data/orcl/datafile/xyz*
Type      Redund  Striped   Time                  Sys  Name
DATAFILE  MIRROR  COARSE    NOV 23 17:00:00  Y    none =>
XYZ.260.960831677

ASMCMD>
```

6. In the oracle terminal session, create another data file for the XYZ tablespace. Name the new datafile DATA/ORCL/ORADATA/XYZ_01.dbf.

```
SQL> alter tablespace XYZ add datafile
  '+data/orcl/oradata/XYZ_01.dbf' SIZE 200M;
Tablespace altered.

SQL>
```

7. Did both the datafiles get system-assigned names?

```
ASMCMD> ls -l --absolutepath data/orcl/oradata/XYZ*
Type      Redund  Striped   Time          Sys  Name
DATAFILE  MIRROR  COARSE    NOV 23 17:00:00 N    XYZ_01.dbf =>
+DATA/orcl/DATAFILE/XYZ.268.960831769

ASMCMD> ls -l --absolutepath data/orcl/datafile/XYZ*
Type      Redund  Striped   Time          Sys  Name
DATAFILE  MIRROR  COARSE    NOV 23 17:00:00 Y    none =>
XYZ.260.960831677
DATAFILE  MIRROR  COARSE    NOV 23 17:00:00 Y
+DATA/orcl/oradata/XYZ_01.dbf => XYZ.268.960831769

ASMCMD>
```

8. Check the current value of compatible.rdbms and changed 12.2 to complete the operation later. List the files in the XYZ tablespace. Exit out of ASMCMD.

```
ASMCMD> lsattr -G DATA -l compatible.rdbms
Name          Value
compatible.rdbms 10.1.0.0.0

ASMCMD> setattr -G DATA compatible.rdbms 12.2.0.0.0

ASMCMD> lsattr -G DATA -l compatible.rdbms
Name          Value
compatible.rdbms 12.2.0.0.0

ASMCMD> ls -l +DATA/orcl/datafile/XYZ*
Type      Redund  Striped   Time          Sys  Name
DATAFILE  MIRROR  COARSE    APR  08 13:00:00 Y
XYZ.293.876489337
DATAFILE  MIRROR  COARSE    APR  08 13:00:00 Y
XYZ.294.876489413
```

```
ASMCMD> exit
[grid@host01 ~]$
```

9. Start a SQL session. Add two templates with HIGH and EXTERNAL redundancy to the DATA disk group.

```
[grid@host01 ~]$ sqlplus / as sysasm

SQL*Plus: Release 12.2.0.1.0 Production on Thu Nov 23 21:14:14
2017

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Production

SQL> alter diskgroup data add template reliable
attribute (HIGH) ;

Diskgroup altered.

SQL> alter diskgroup data add template unreliable
attribute (UNPROTECTED) ;

Diskgroup altered.

SQL> exit

[grid@host01 ~]$
```

10. Use the asmcmd lsdg command to view the disk group space values for the DATA disk group. What is the total disk space in the disk group? How much free space is available?

```
[grid@host01 ~]$ asmcmd lsdg DATA
State      Type      Rebal   Sector  Logical_Sector  Block          AU
Total_MB   Free_MB  Req_mir_free_MB  Usable_file_MB
Offline_disks Voting_files    Name
MOUNTED    NORMAL    N            512           4096  4194304
42000      29340          4200           12570          0
Y DATA/

[grid@host01 ~]$
```

- The `TOTAL_MB` column shows that the size of the disk group is 42000 MB.
 - The available space, which is shown under the `Free_MB` column, is 29340 MB.
11. Switch to the `oracle` terminal session. Create the `TEST01` tablespace with the template named `reliable` to leverage the `HIGH` redundancy in the `DATA` disk group.

```
SQL> create tablespace TEST01
  datafile '+DATA(reliable)' size 200M;

Tablespace created.

SQL>
```

12. In the `grid` terminal session, use `ASMCMD` to find the newly created `TEST01` datafile and its redundancy.

```
[grid@host01 ~]$ asmcmd
ASMCMD> cd data/orcl/datafile
ASMCMD> ls -l
Type      Redund  Striped  Time                Sys  Name
DATAFILE  MIRROR  COARSE   NOV 23 20:00:00  Y    SYSAUX.266.960022657
DATAFILE  MIRROR  COARSE   NOV 21 13:00:00  Y    SYSTEM.273.960022583
DATAFILE  HIGH    COARSE   NOV 23 21:00:00  Y    TEST01.267.960845219
DATAFILE  MIRROR  COARSE   NOV 18 13:00:00  Y
UNDOTBS1.274.960022693
DATAFILE  MIRROR  COARSE   NOV 21 14:00:00  Y
UNDOTBS2.276.960023065
DATAFILE  MIRROR  COARSE   NOV 18 13:00:00  Y
UNDOTBS3.277.960023067
DATAFILE  MIRROR  COARSE   NOV 18 13:00:00  Y    USERS.261.960022693
DATAFILE  MIRROR  COARSE   NOV 23 17:00:00  Y    XYZ.260.960831677
DATAFILE  MIRROR  COARSE   NOV 23 17:00:00  Y    XYZ.268.960831769

ASMCMD>
```

- Even though the `DATA` disk group redundancy is `NORMAL`, the `TEST01` data file was created with the `HIGH` redundancy.
13. Use the `asmcmd lsdg` command to view the disk group space values for the `DATA` disk group. What do you observe?

```
ASMCMD> lsdg DATA
State      Type      Rebal  Sector  Logical_Sector  Block          AU
           Total_MB  Free_MB  Req_mir_free_MB  Usable_file_MB
           Offline_disks  Voting_files  Name
MOUNTED    NORMAL    N          512            512     4096  4194304
           42000     28716            4200            12258          0
Y  DATA/
```

ASMCMD>

- The TOTAL_MB column shows that the size of the disk group is 42000 MB.
- The available space, which is shown under the Free_MB column, is 28716 MB, which is 624 MB less than the one in step 10 (29340 MB)
- $624 \text{ MB} = 200\text{MB} \times 3 \text{ (HIGH redundancy)} + \text{space for metadata}$

14. Switch to the oracle terminal session. Create the TEST02 tablespace with the template named unreliable to use the EXTERNAL redundancy in the DATA disk group.

```
SQL> create tablespace TEST02
datafile '+DATA(unreliable)' size 200M;

Tablespace created.

SQL>
```

15. In the grid terminal session, use ASMCMD to find the newly created TEST02 datafile and its redundancy.

ASMCMD> ls -l						
Type	Redund	Striped	Time	Sys	Name	
DATAFILE	MIRROR	COARSE	NOV 23 20:00:00	Y	SYSAUX.266.960022657	
DATAFILE	MIRROR	COARSE	NOV 21 13:00:00	Y	SYSTEM.273.960022583	
DATAFILE	HIGH	COARSE	NOV 23 21:00:00	Y	TEST01.267.960845219	
DATAFILE	UNPROT	COARSE	NOV 23 21:00:00	Y	TEST02.270.960846257	
DATAFILE	MIRROR	COARSE	NOV 18 13:00:00	Y	UNDOTBS1.274.960022693	
DATAFILE	MIRROR	COARSE	NOV 21 14:00:00	Y	UNDOTBS2.276.960023065	
DATAFILE	MIRROR	COARSE	NOV 18 13:00:00	Y	UNDOTBS3.277.960023067	
DATAFILE	MIRROR	COARSE	NOV 18 13:00:00	Y	USERS.261.960022693	
DATAFILE	MIRROR	COARSE	NOV 23 17:00:00	Y	XYZ.260.960831677	
DATAFILE	MIRROR	COARSE	NOV 23 17:00:00	Y	XYZ.268.960831769	

ASMCMD>

- Even though the DATA disk group redundancy is NORMAL, the TEST02 data file was created with the EXTERNAL redundancy.

16. Use the asmcmd lsdg command to view the disk group space values for the DATA disk group. What do you observe?

ASMCMD> lsdg DATA						
State	Type	Rebal	Sector	Logical_Sector	Block	AU
Total_MB	Free_MB	Req_mir_free_MB		Usable_file_MB		
Offline_disks	Voting_files			Name		

MOUNTED	NORMAL	N	512	512	4096	4194304	
	42000	28512		4200		12156	
	Y	DATA/					0

ASMCMD>

- The TOTAL_MB column shows that the size of the disk group is 42000 MB.
- The available space, which is shown under the Free_MB column, is 28512 MB, which is 204 MB less than the one in step 13 (28716 MB)
- $204 \text{ MB} = 200\text{MB} \times 1$ (EXTERNAL redundancy) + space for metadata

17. Switch to the oracle terminal session to drop the XYZ, TEST01, and TEST02 tablespaces.

```
SQL> drop tablespace XYZ including contents and datafiles;  
  
Tablespace dropped.  
  
SQL> drop tablespace TEST01 including contents and datafiles;  
  
Tablespace dropped.  
  
SQL> drop tablespace TEST02 including contents and datafiles;  
  
Tablespace dropped.  
  
SQL>
```

18. Close all the terminals that were opened for this practice.

Practices for Lesson 8: Administering Oracle ACFS

Practice 8-1: Managing ACFS

Overview

In this practice, you create, register, and mount an ACFS file system for general use. You see the acfs modules that are loaded for ACFS. You create, use, and manage ACFS snapshots.

Scenario: Your database application creates a number of image files that are stored as BFILEs and external tables. These must be stored on a shared resource. An ACFS file system meets that requirement.

- First, create an ASM disk group strictly for ACFS volumes.
 - Create an ASM volume and the ACFS file system. The ACFS volume should be 3 GB on the ACFS disk group.
 - The mount point should be /u01/app/oracle/asfcmounts/images.
 - These operations can be performed with ASMCA, ASMCMD, or SQL*Plus. The ASMCA solution is shown as follows.
1. Open a terminal window to host01 as the root user. Set the environment for ASM. Use the `lsmod` command to list the currently loaded modules. Use the `grep` command to display only the modules that have the `ora` string in them. Note the first three modules in the following list. These modules are required to enable ADVM and ACFS. The `oracleasm` module is loaded to enable ASMLib management of the ASM disks. Check all three nodes.

```
[oracle@dns ~] $ ssh root@host01
root@host01's Password: *****
[root@host01 ~]# . oraenv
ORACLE_SID = [root] ? +ASM1
The Oracle base has been set to /u01/app/grid

[root@host01]# lsmod | grep ora
oracleacfs           4591616  0
oracleadvm           798720   1
oracleoks            659456   2 oracleacfs,oracleadvm

[root@host01]# ssh host02 lsmod | grep ora
oracleacfs           4591616  0
oracleadvm           798720   1
oracleoks            659456   2 oracleacfs,oracleadvm

[root@host01 ~]# ssh host03 lsmod | grep ora
oracleacfs           4591616  0
oracleadvm           798720   1
oracleoks            659456   2 oracleacfs,oracleadvm
[root@host01 ~]#
```

2. Open a terminal window on host01 as the grid user, set the environment.

```
[oracle@dns ~] $ ssh -X grid@host01
grid@host01's Password: <oracle>

[grid@host01]$ . oraenv
ORACLE_SID = [grid] ? +ASM1
The Oracle base has been set to /u01/app/grid

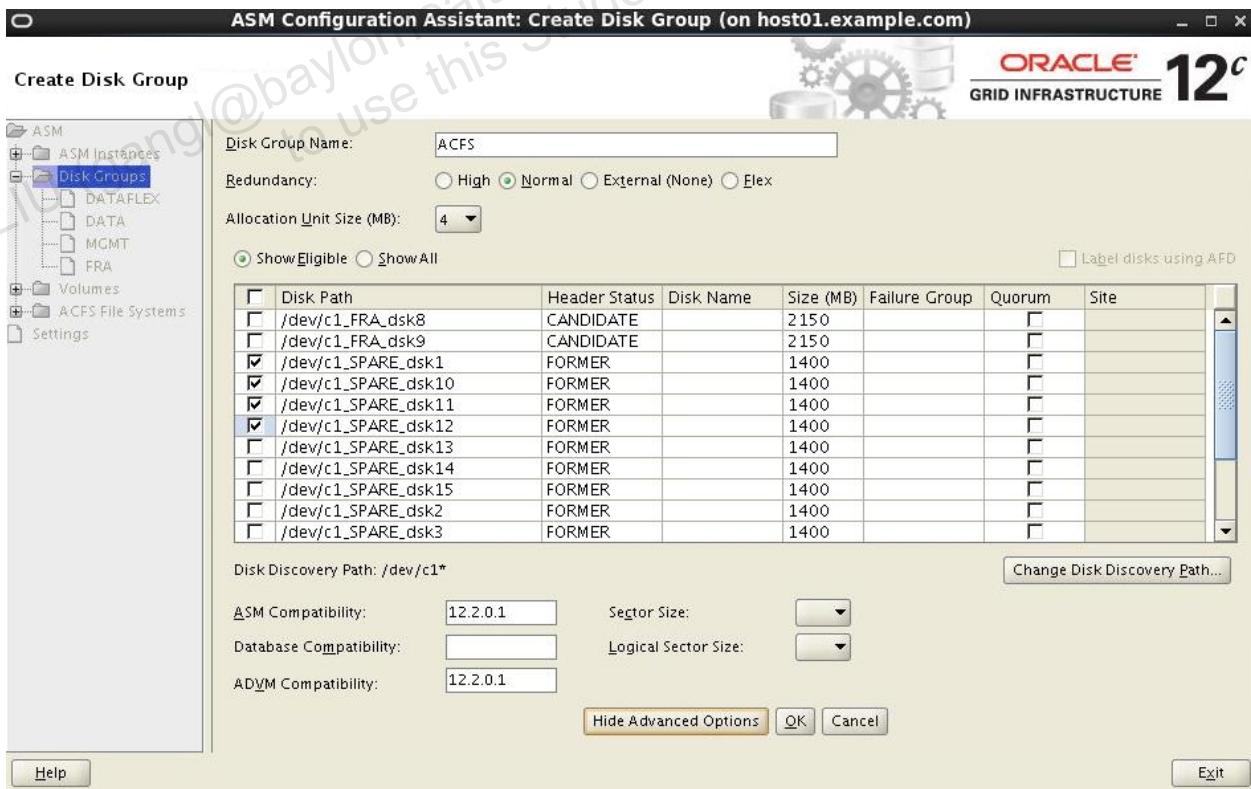
[grid@host01]$
```

3. Start ASMCA and create a disk group called ACFS by using NORMAL redundancy. Use the following four unused 1400 MB disks.

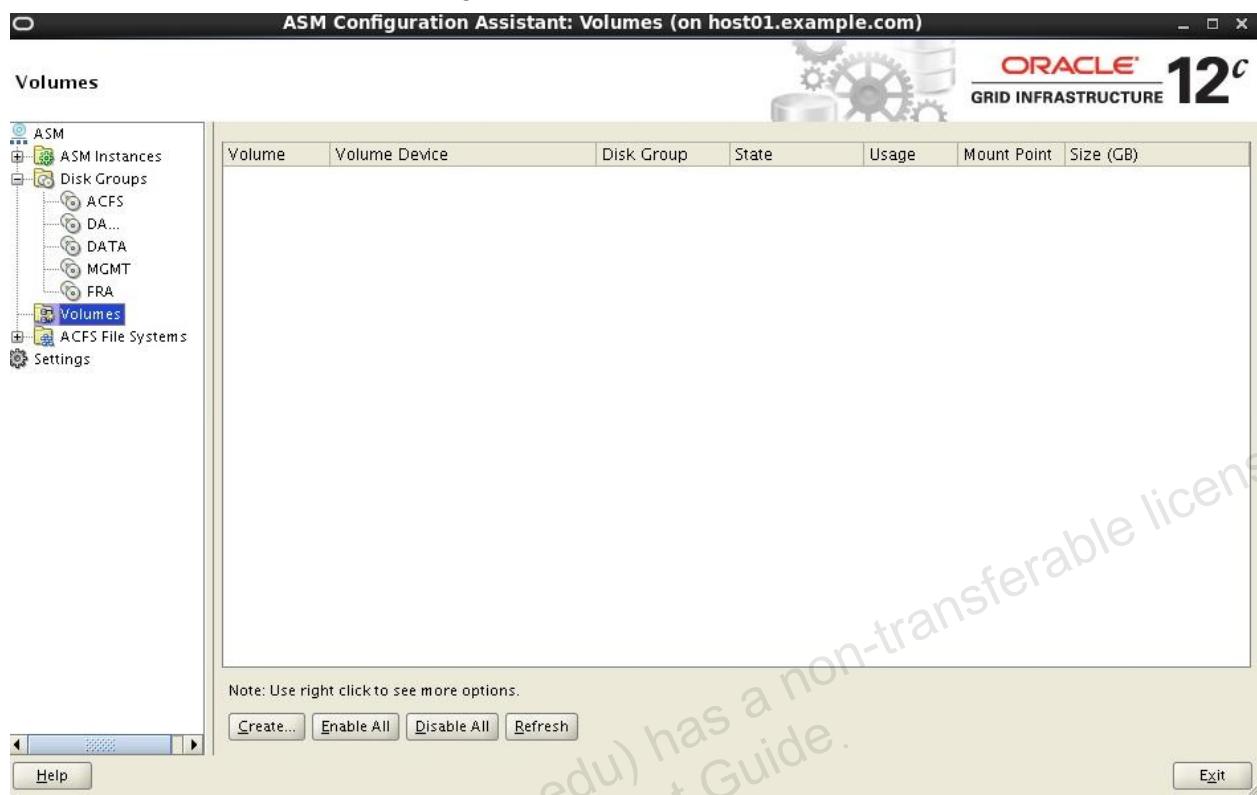
- /dev/c1_SPARE_dsk1
- /dev/c1_SPARE_dsk10
- /dev/c1_SPARE_dsk11
- /dev/c1_SPARE_dsk12

Click Show Advanced Options, ensure that ASM Compatibility is set to 12.2.0.1, and set ADVM Compatibility to 12.2.0.1. Click OK.

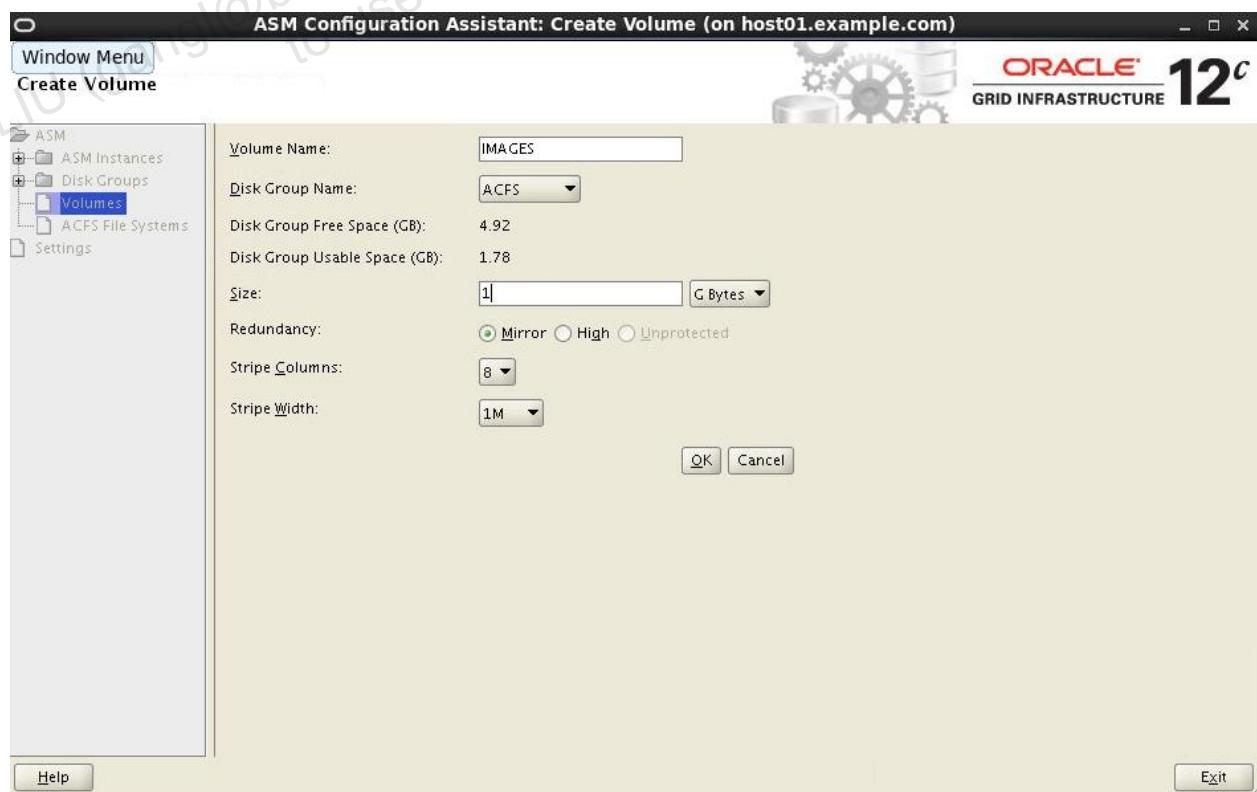
```
[grid@host01]$ asmca
```



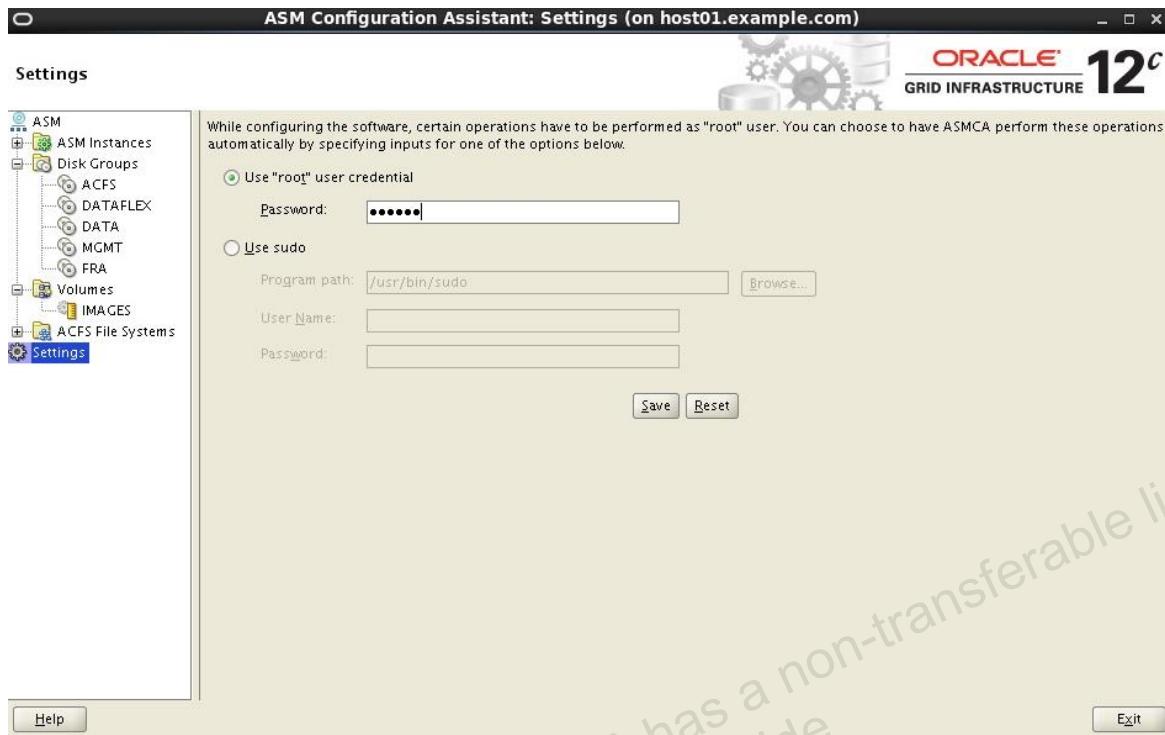
4. Click Volumes in the left hand navigation pane and click Create.



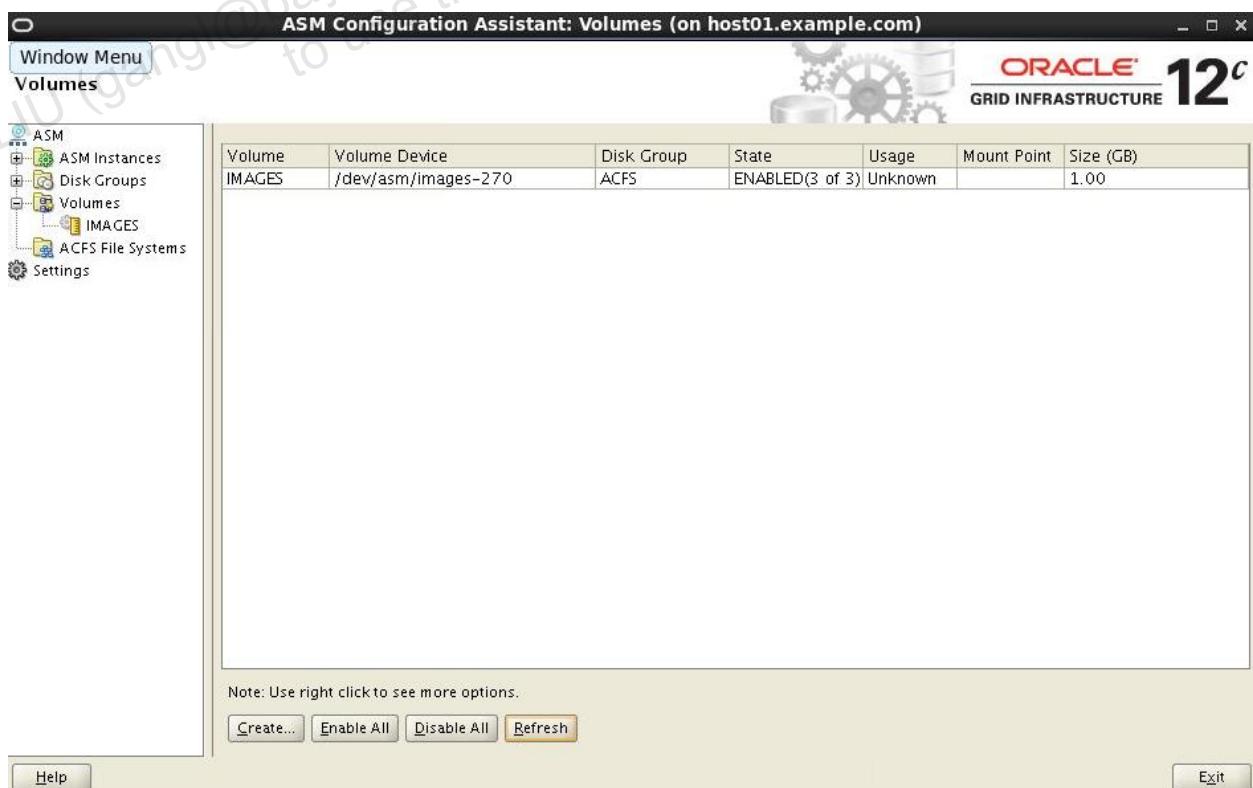
5. Enter IMAGES for Volume Name, Select the ACFS disk group, and make the volume 1 G Bytes in size. Click OK.



6. Click Settings and provide the root password. Click Save.



7. Next, you create an ACFS file system by using the newly created volume. Click the IMAGES volume in the left hand navigation pane and take a note of the volume device name. In this example, the device is /dev/asm/images-270. Your name will likely be slightly different.

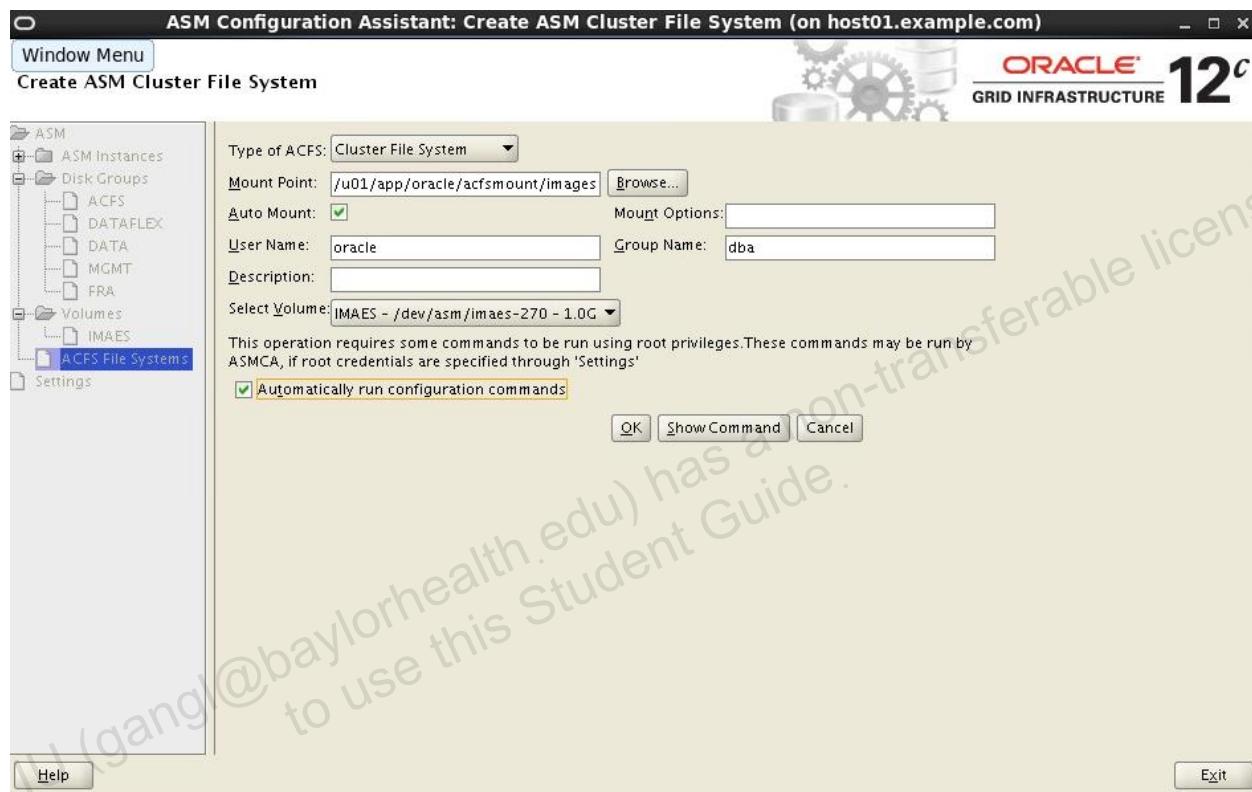


8. Click ACFS File Systems in the navigation pane, and then click Create.

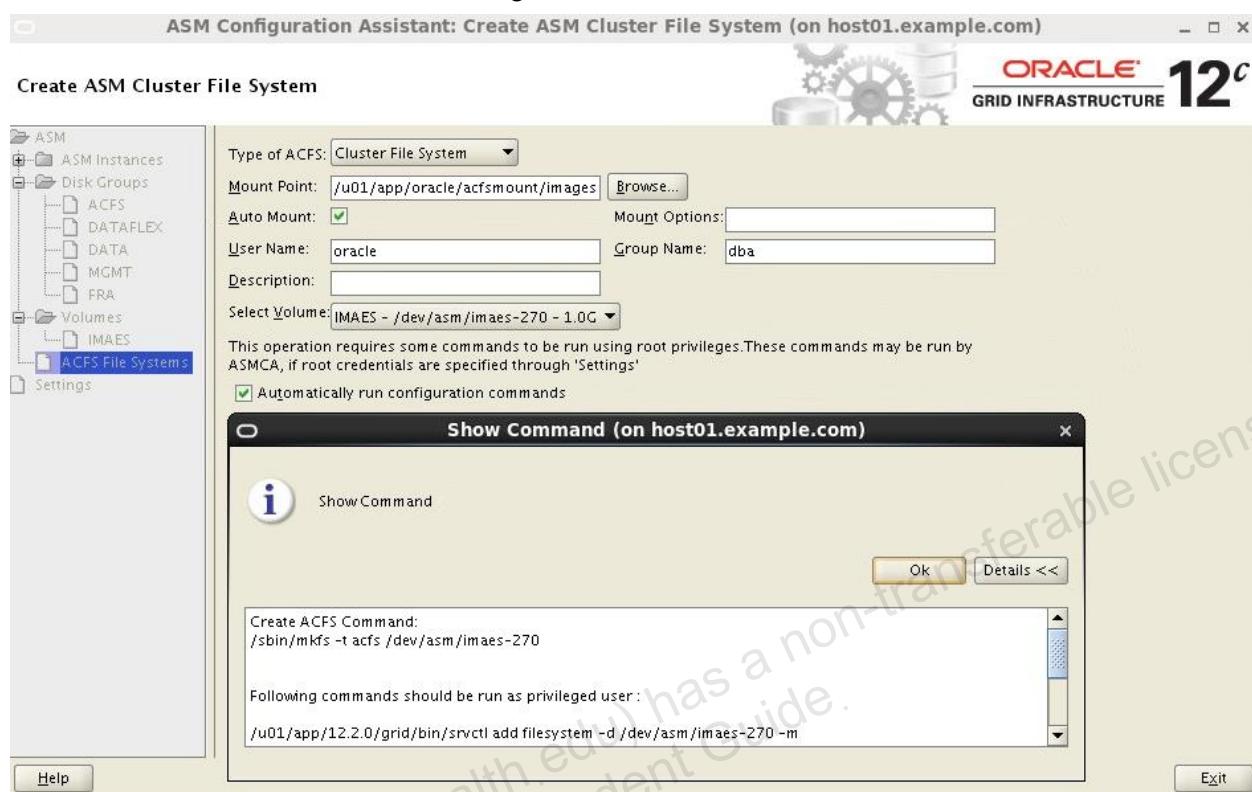


9. Create the ACFS Cluster File System like the following.

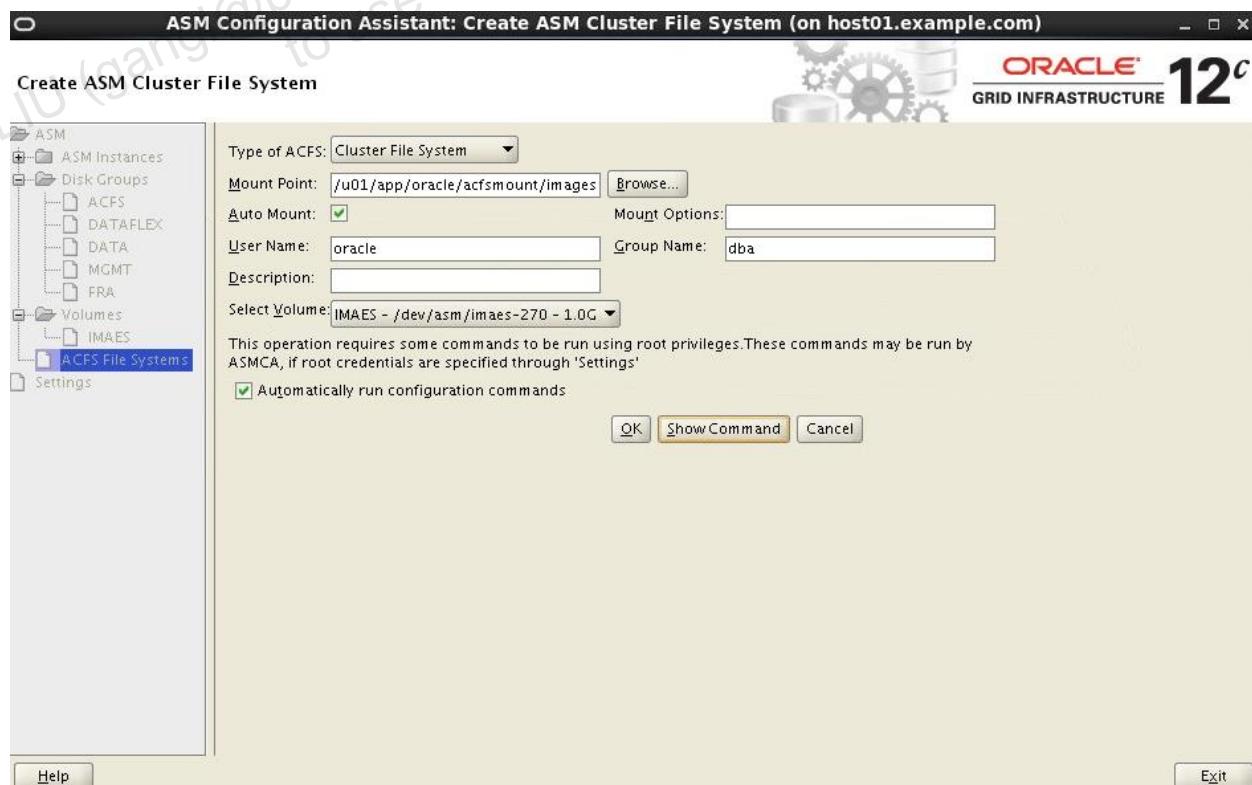
- Select Cluster File System from the Type of ACFS pull down list.
- Enter /u01/app/oracle/acfsmount/images in the Mount Point field.
- The user name should be oracle and the Group Name should be dba.
- Make sure that the correct device is displayed in the Select Volume name field.
- Click the “Automatically run configuration commands” checkbox. Click the “Show Command” button



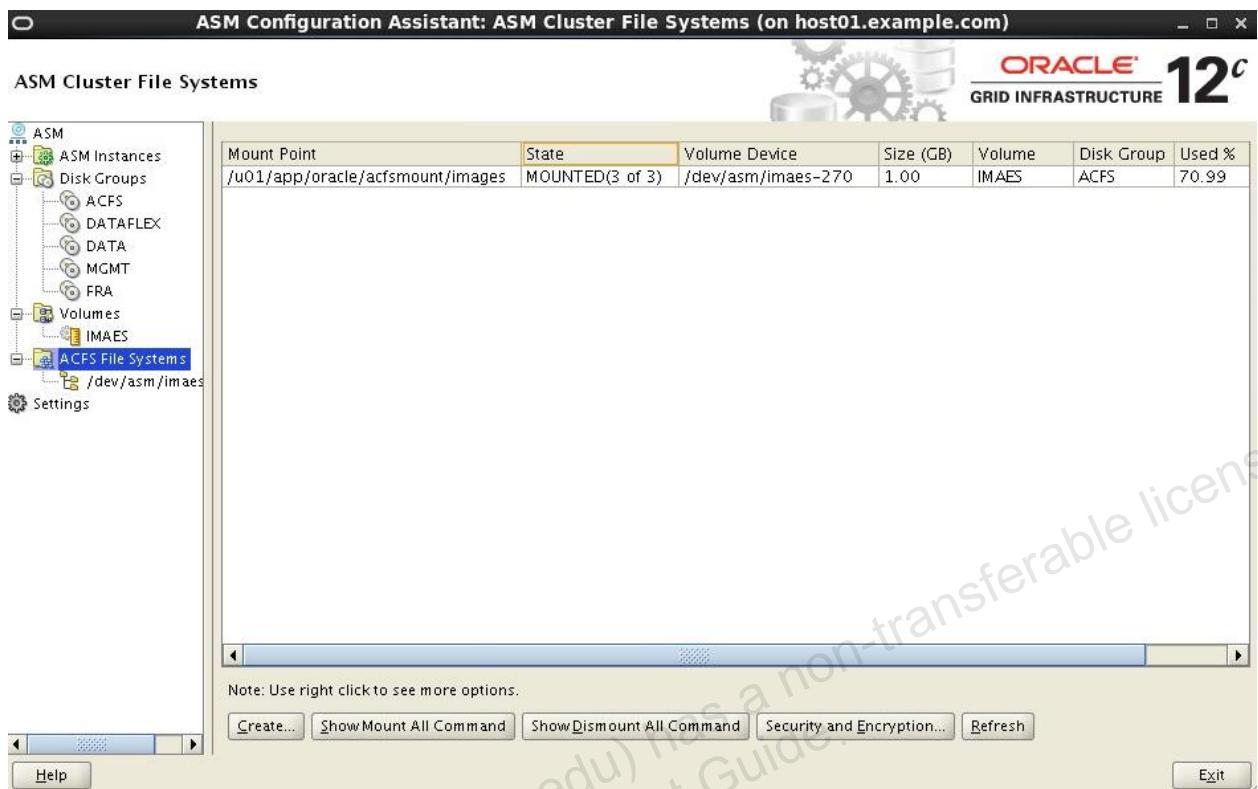
10. Take a moment to review the commands that will be run to create the ACFS file system.
Click OK on the Show Command dialog box.



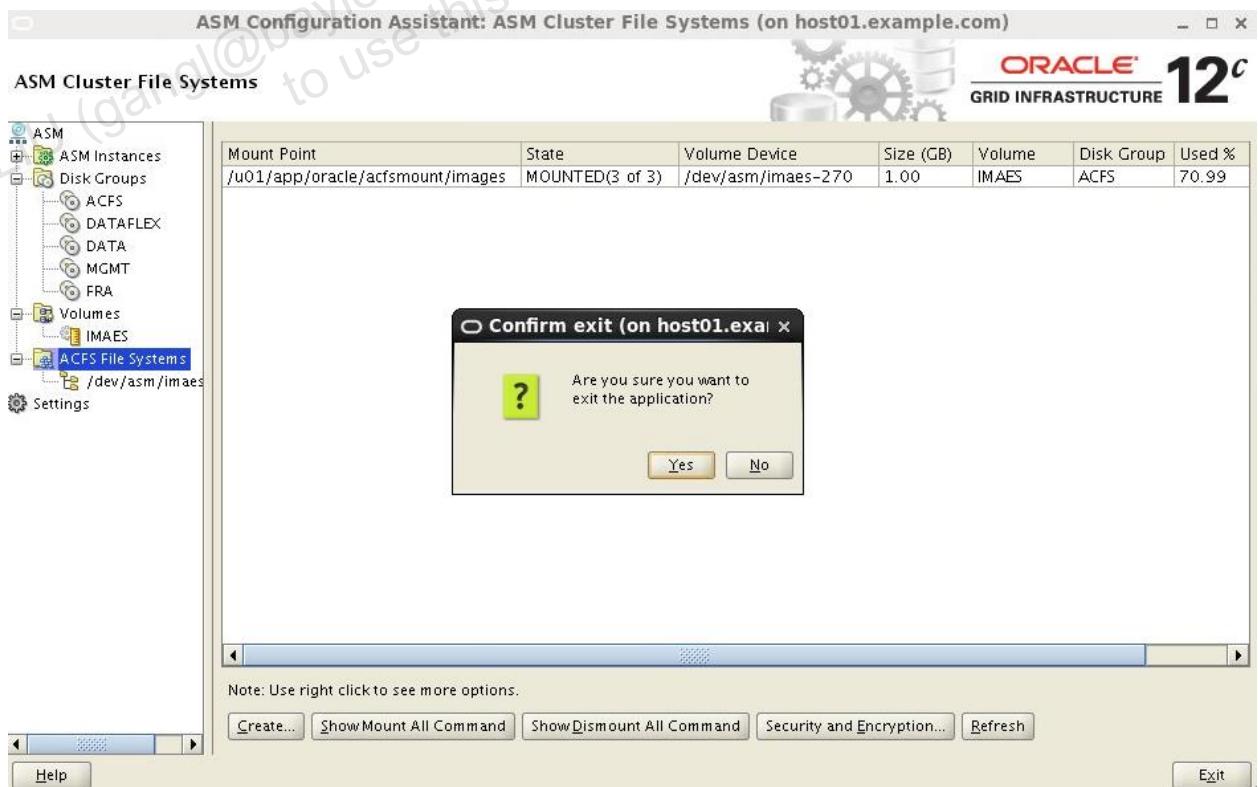
11. Review the information in the Create ASM Cluster File System page and click OK.



12. Click Exit to close ASMCA.



13. Click Yes to Confirm exit.



14. As the grid user, use the crsctl command to inspect the resource that was created for the new ACFS file system. Make sure that it is mounted on all three nodes.

```
[grid@host01 ~]$ crsctl stat res ora.acfs.images.acfs -t
-----
Name          Target  State       Server      State details
-----
Local Resources
-----
ora.acfs.images.acfs
    ONLINE  ONLINE   host01     mounted on /u01/app/
                                oracle/acfsmount/images, STABLE
    ONLINE  ONLINE   host02     mounted on /u01/app/
                                oracle/acfsmount/images, STABLE
    ONLINE  ONLINE   host03     mounted on /u01/app/
                                oracle/acfsmount/images, STABLE
-----
[grid@host01 ~]$
```

15. As the root user, view the registry status of the volume with the acfsutil registry command.

```
[root@host01]# acfsutil registry -l
Device : /dev/asm/images-270 : Mount Point :
/u01/app/oracle/acfsmount/images : Options : none : Nodes : all :
Disk Group : ACFS : Volume : IMAGES : Accelerator Volumes :

[root@host01]#
```

16. An ACFS file system can be resized, and it will automatically resize the volume if there is sufficient space in the disk group. The images file system is near capacity. Increase the file system by 128 MB. As the root user, use the acfsutil size +128M /u01/app/oracle/acfsmount/images command.

```
[root@host01]# acfsutil size +128M /u01/app/oracle/acfsmount/images
acfsutil size: new file system size: 1207959552 (1152MB)

[root@host01 ~]#
```

17. Open a terminal window to host01 as the oracle user to transfer a set of images to /u01/app/oracle/acfsmount/images. Unzip the images in /stage/ASM/labs/less_07/images.zip to the IMAGES file system.

```
[oracle@dns ~]$ ssh oracle@host01
oracle@host01's password:

[oracle@host01]$ cd /stage/ASM/labs/less_07
```

```
[oracle@host01 less_07]$ unzip images.zip -d
/u01/app/oracle/acfsmount/images
Archive: images.zip
  creating: /u01/app/oracle/acfsmount/images/gridInstall/
  inflating: /u01/app/oracle/acfsmount/images/gridInstall/asm.gif
  inflating:
/u01/app/oracle/acfsmount/images/gridInstall/bullet2.gif

...
  inflating:
/u01/app/oracle/acfsmount/images/gridInstall/view_image.gif
  extracting:
/u01/app/oracle/acfsmount/images/gridInstall/white_spacer.gif

[oracle@host01 less_07]$
```

18. Verify that the files have been extracted.

```
[oracle@host01 less_07]$ ls -R  /u01/app/oracle/acfsmount/images
/u01/app/oracle/acfsmount/images:
gridInstall  lost+found

/u01/app/oracle/acfsmount/images/gridInstall:
asm.gif      t20108.gif      t30104.gif      t30119d.gif
bullet2.gif   t20109a.gif    t30105.gif      t30119.gif
bullet.gif    t20109b.gif    t30106.gif      t30120a.gif
divider.gif   t20110.gif     t30107.gif      t30120b.gif
gradient.gif  t20111a.gif    t30108a.gif    t30121d.gif
MoveAllButton.gif  t20111b.gif    t30108.gif      t30123a.gif
MoveButton.gif  t20111c.gif    t30109.gif      t30123b.gif
rpm-oracleasm.gif  t20111.gif     t30110.gif      t30123c.gif
show_me.gif    t20112.gif     t30111.gif      t30201.gif
t10101.gif    t20113.gif     t30112a.gif    t30202.gif
t10102.gif    t20113h.gif    t30112.gif      t30203.gif
t10103.gif    t20114c.gif    t30113a.gif    t30204a.gif
t10201.gif    t20114login.gif  t30113b.gif    t30204.gif
t10202.gif    t20114server.gif  t30114a.gif    t30205.gif
t10203.gif    t20117add.gif   t30114b.gif    t30206.gif
t10204.gif    t20117crtbs.gif  t30114.gif     t30207.gif
t10205.gif    t20117emctl.gif  t30115a.gif    t30208.gif
t20101.gif    t20117tbs.gif   t30115.gif     t40101.gif
t20102.gif    t20119asm.gif   t30116a.gif    t40102.gif
t20103.gif    t2017emctl.gif  t30116b.gif    t40104.gif
t20104.gif    t30101a.gif    t30116c.gif    t40105a.gif
t20105.gif    t30101b.gif    t30116d.gif    t40105b.gif
t20106.gif    t30101c.gif    t30118b.gif    Thumbs.db
t20107a.gif   t30102.gif     t30119b.gif    view_image.gif
```

```
t20107.gif          t30103.gif          t30119c.gif  white_spacer.gif
Cannot open directory ls:/u01/app/oracle/acfsmount/images/lost+found:
Permission denied

[oracle@host01 less_07]$
```

19. Switch to the `root` terminal session to create a snapshot of the `IMAGES` file system. Use the `ACFSUTIL` utility as the `root` user to execute the following command:

```
[root@host01]# /sbin/acfsutil snap create snap_001
/u01/app/oracle/acfsmount/images
acfsutil snap create: Snapshot operation is complete.

[root@host01]#
```

20. Find the `.SNAP` directory and explore the entries. How much space does the `gridInstall` directory tree use? How much space does the `.ACFS/snaps/snap_001/gridInstall` directory tree use?

```
[root@host01]# cd /u01/app/oracle/acfsmount/images

[root@host01 images]# ls -la
total 88
drwxrwx--x 5 oracle dba    4096 May  7 23:31 .
drwxrwxr-x 4 oracle oinstall 4096 May  7 11:53 ..
drwxr-xr-x 2 oracle oinstall 12288 May  7 16:30 gridInstall
drwx----- 2 root   root   65536 May  7 15:04 lost+found

[root@host01 images]# du -h gridInstall
2.0M   gridInstall

[root@host01 images]# ls .ACFS
repl  snaps

[root@host01 images]# ls .ACFS/snaps
snap_001
[root@host01 images]# ls .ACFS/snaps/snap_001
gridInstall

[root@host01 images]# du -h .ACFS/snaps/snap_001/gridInstall
2.0M      .ACFS/snaps/snap_001/gridInstall

[root@host01 images]#
```

21. Delete the `asm.gif` file from the `IMAGES` file system.

```
[root@host01 images]# rm gridInstall/asm.gif
rm: remove regular file `gridInstall/asm.gif'? y

[root@host01 images]#
```

22. Create another snapshot of the IMAGES file system.

```
[root@host01 images]# /sbin/acfsutil snap create snap_002  
/u01/app/oracle/acfsmount/images
```

acfsutil snap create: Snapshot operation is complete.

```
[root@host01 images]#
```

23. How much space is being used by the snapshots and the files that are stored in the IMAGES file system? Use the acfsutil info command to find this information.

```
[root@host01 images]# /sbin/acfsutil info fs  
/u01/app/oracle/acfsmount/images
```

```
ACFS Version: 12.2.0.1.0
on-disk version: 46.0
compatible.advm: 12.2.0.0.0
ACFS compatibility: 12.2.0.0.0
flags: MountPoint,Available
mount time: Sat Nov 25 08:29:27 2017
mount sequence number: 11
allocation unit: 4096
metadata block size: 4096
volumes: 1
total size: 1207959552 ( 1.12 GB )
total free: 360710144 ( 344.00 MB )
file entry table allocation: 8912896
primary volume: /dev/asm/images-270
    label:
    state: Available
    major, minor: 248, 138241
    logical sector size: 512
    size: 1207959552 ( 1.12 GB )
    free: 360710144 ( 344.00 MB )
    metadata read I/O count: 3482
    metadata write I/O count: 643
    total metadata bytes read: 23801856 ( 22.70 MB )
    total metadata bytes written: 28499968 ( 27.18 MB )
    ADVM diskgroup: ACFS
    ADVM resize increment: 67108864
    ADVM redundancy: mirror
    ADVM stripe columns: 8
    ADVM stripe width: 1048576
number of snapshots: 2
snapshot space usage: 17895424 ( 17.07 MB )
replication status: DISABLED
compression status: DISABLED
```

```
[root@host01 images]#
```

- Note that the size of the file system is 1152MB (Step 16), but the size of two snapshots is only 17.07MB instead of 2304MB (1152MB x 2).

24. Restore the `asm.gif` file to the file system from the snapshot.

- The snapshot is a sparse file representation of the file system, so you can browse the snapshot as if it were a full file system. All the OS file commands are functional. Find the `asm.gif` file in the snapshot. Perform this operation as the `root` user.

```
[root@host01 images]# cd /u01/app/oracle/acfsmount/images  
  
[root@host01 images]# find .ACFS -name asm.gif  
.ACFS/snaps/snap_001/gridInstall/asm.gif  
[root@host01]#
```

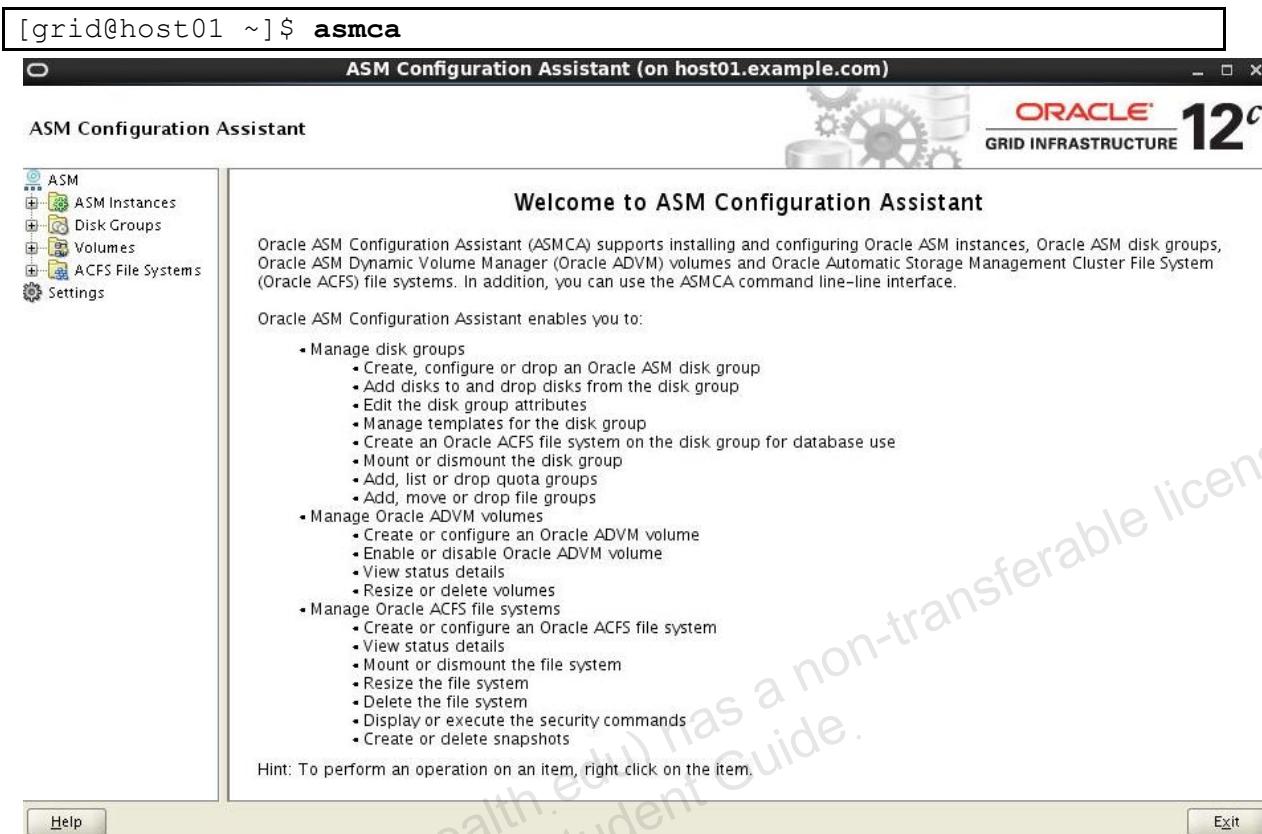
- Restore the `asm.gif` file by copying from the snapshot to the original location.

```
[root@host01 images]# cp ./ACFS/snaps/snap_001/gridInstall/asm.gif  
./gridInstall/asm.gif  
  
[root@host01 images]#
```

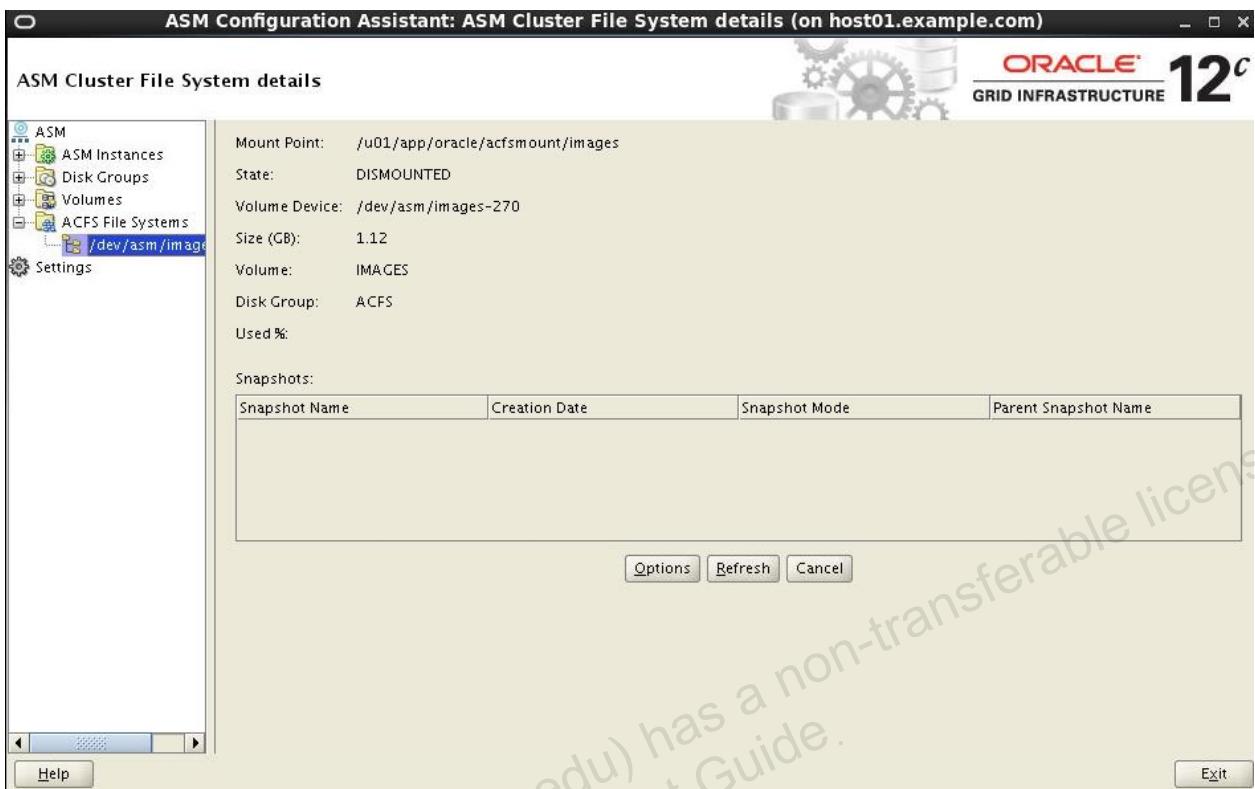
25. Dismount the `IMAGES` file system from all the three nodes. This command must be executed by the `root` user. If the directory is busy, execute `lsof +d /u01/app/oracle/acfsmount/images` to find the user that is holding the directory open and stop that session. **Note:** Use your device name.

```
[root@host01 images]# cd  
  
[root@host01 ~]# srvctl stop filesystem -d /dev/asm/images-270  
  
[root@host01 ~]#
```

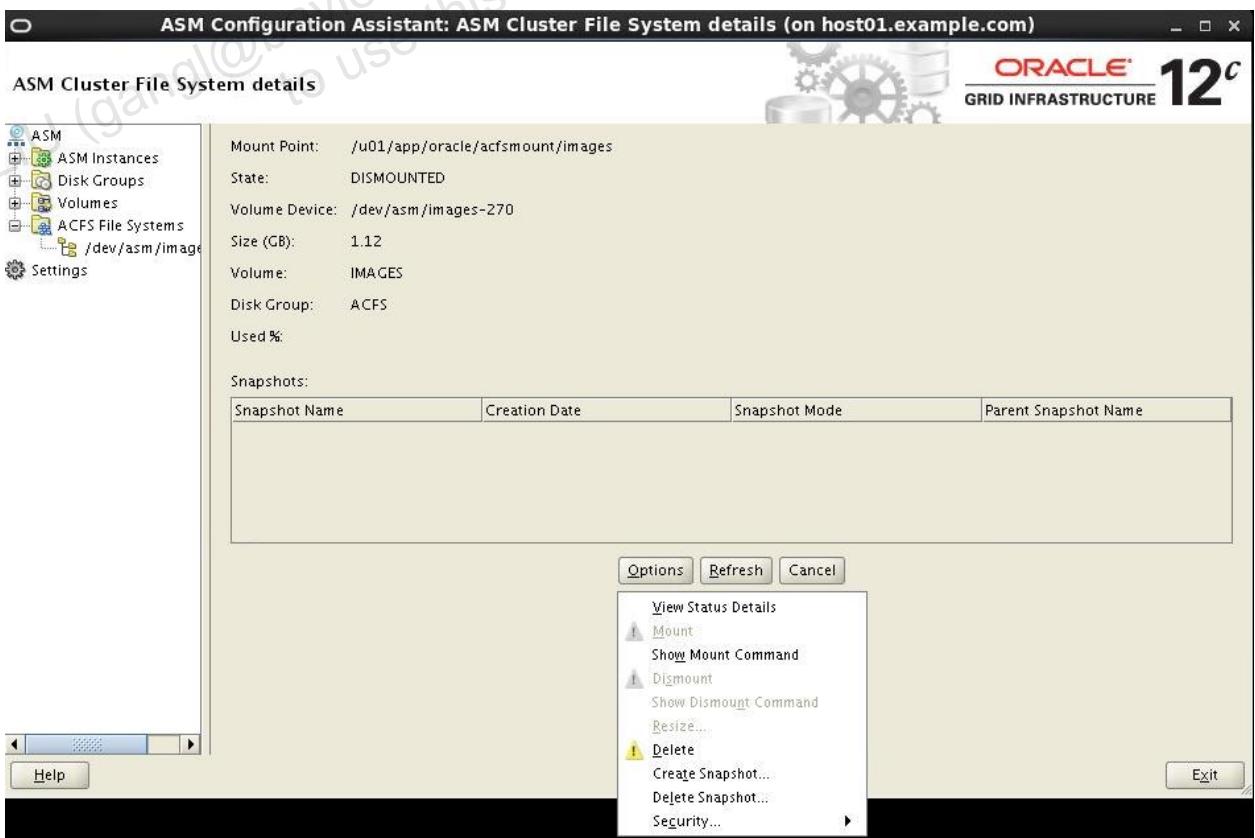
26. As the grid user, start ASMCA to remove the IMAGES ACFS file system and volume.



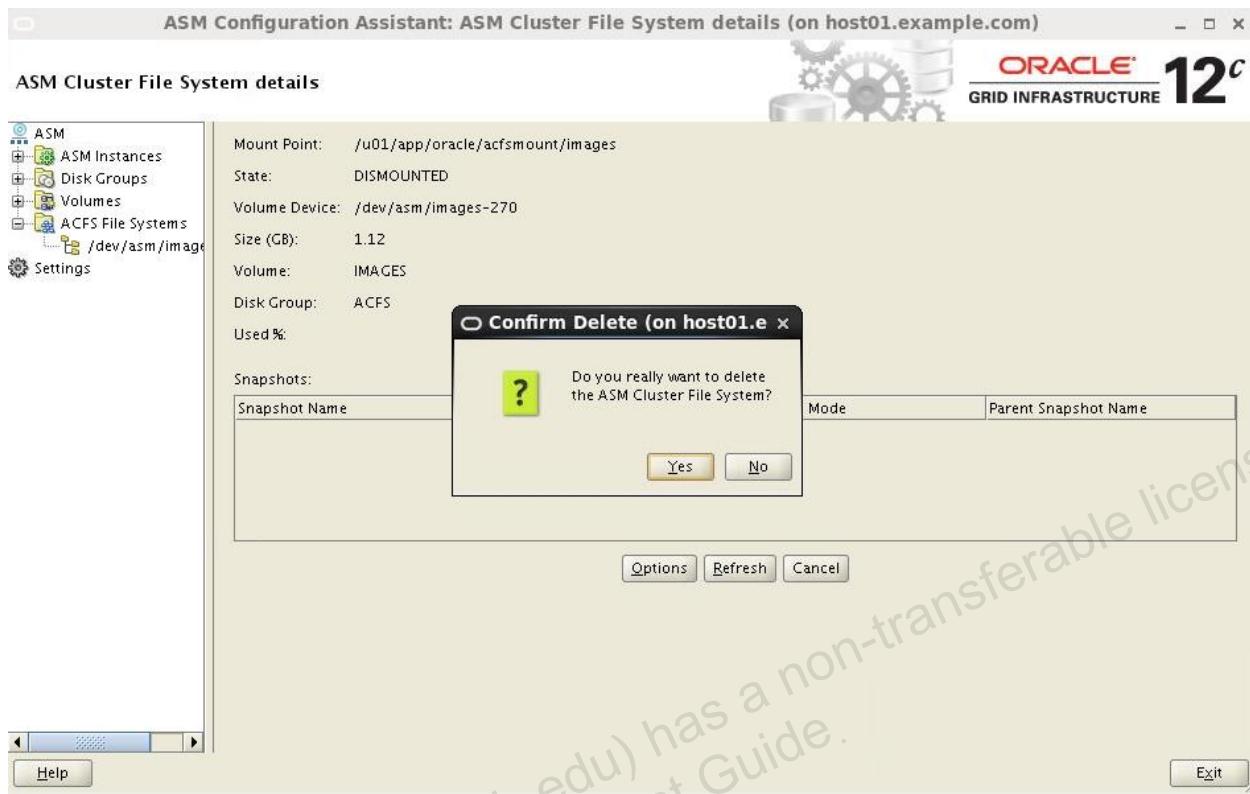
27. Click ACFS File Systems and the Volume Device name in the left hand navigation pane.



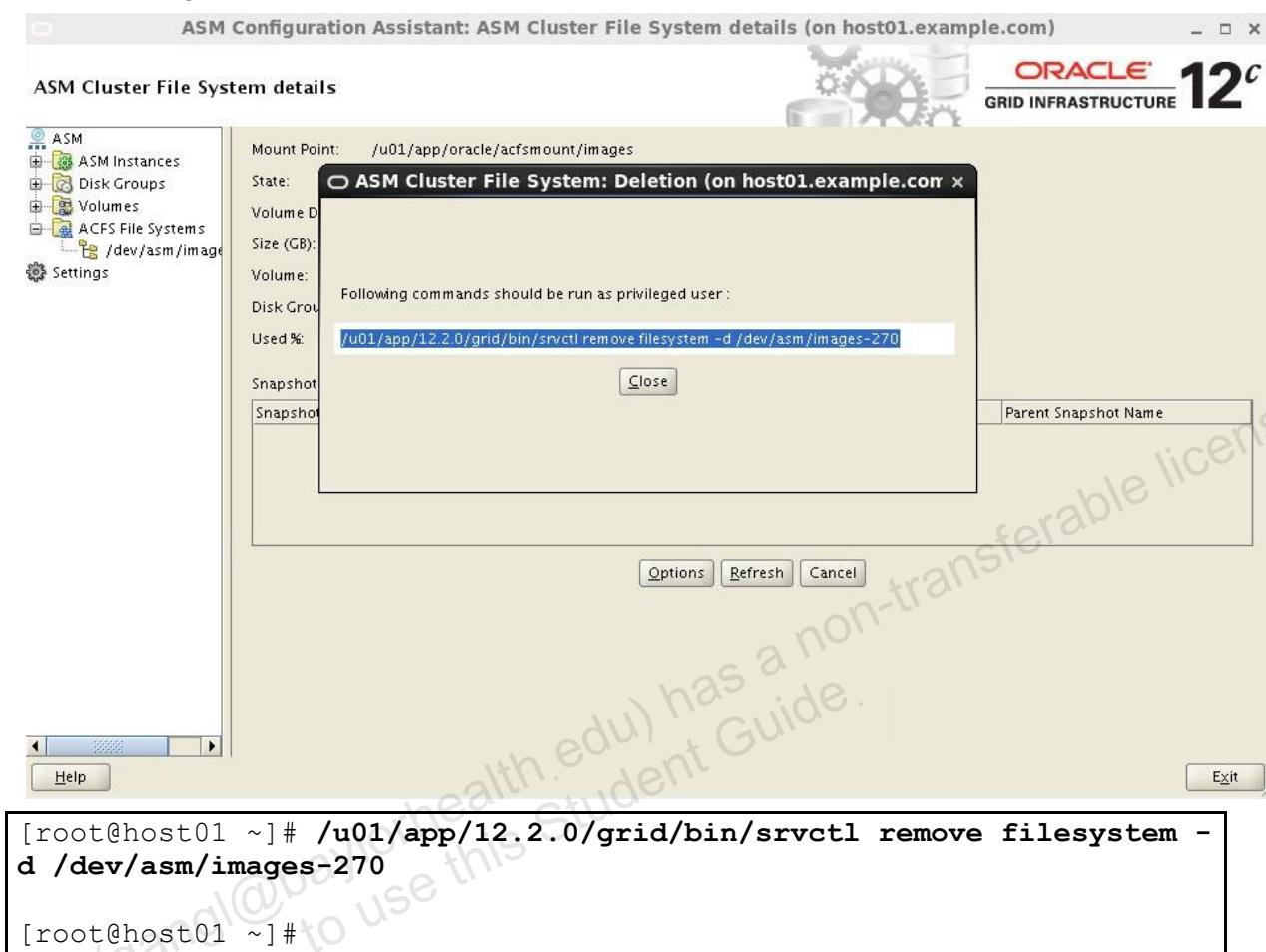
28. Click Options and select Delete to delete the ACFS file system.



29. Click Yes to confirm Delete.



30. In your `root` terminal window, run the script as prompted by the ASM Cluster File System: Delete dialog box.

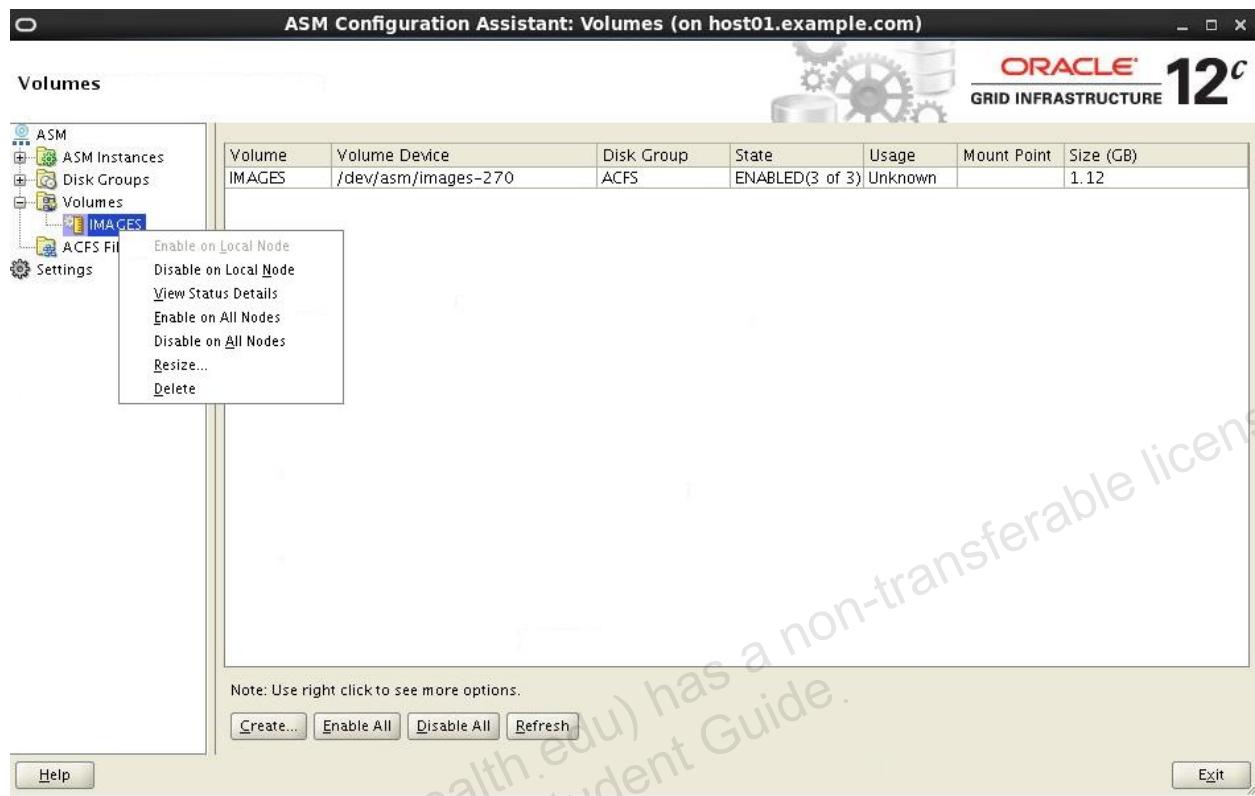


```
[root@host01 ~]# /u01/app/12.2.0/grid/bin/srvctl remove filesystem -d /dev/asm/images-270  
[root@host01 ~]#
```

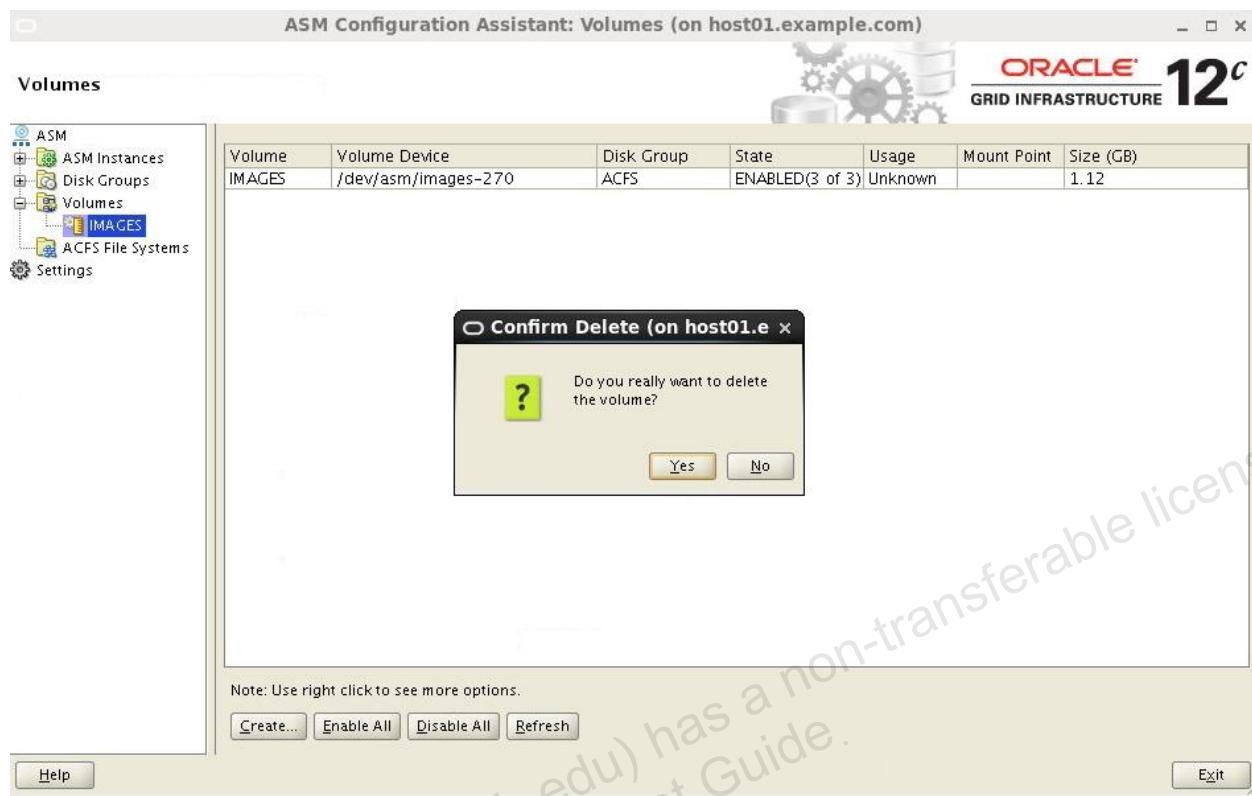
31. Close the dialog box when the script has been run.



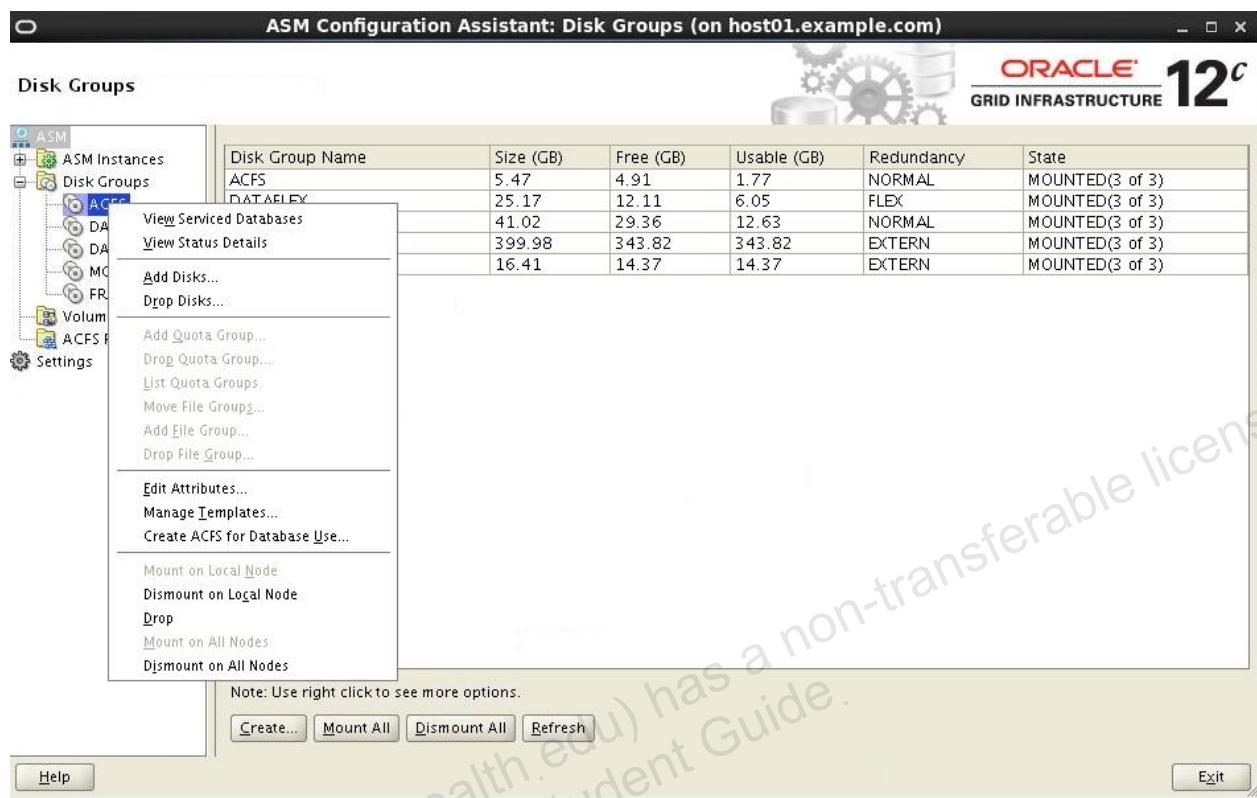
32. Click **Volumes** in the left hand navigation panel. Right-click the Volume Device name (**IMAGES**) and select Delete.



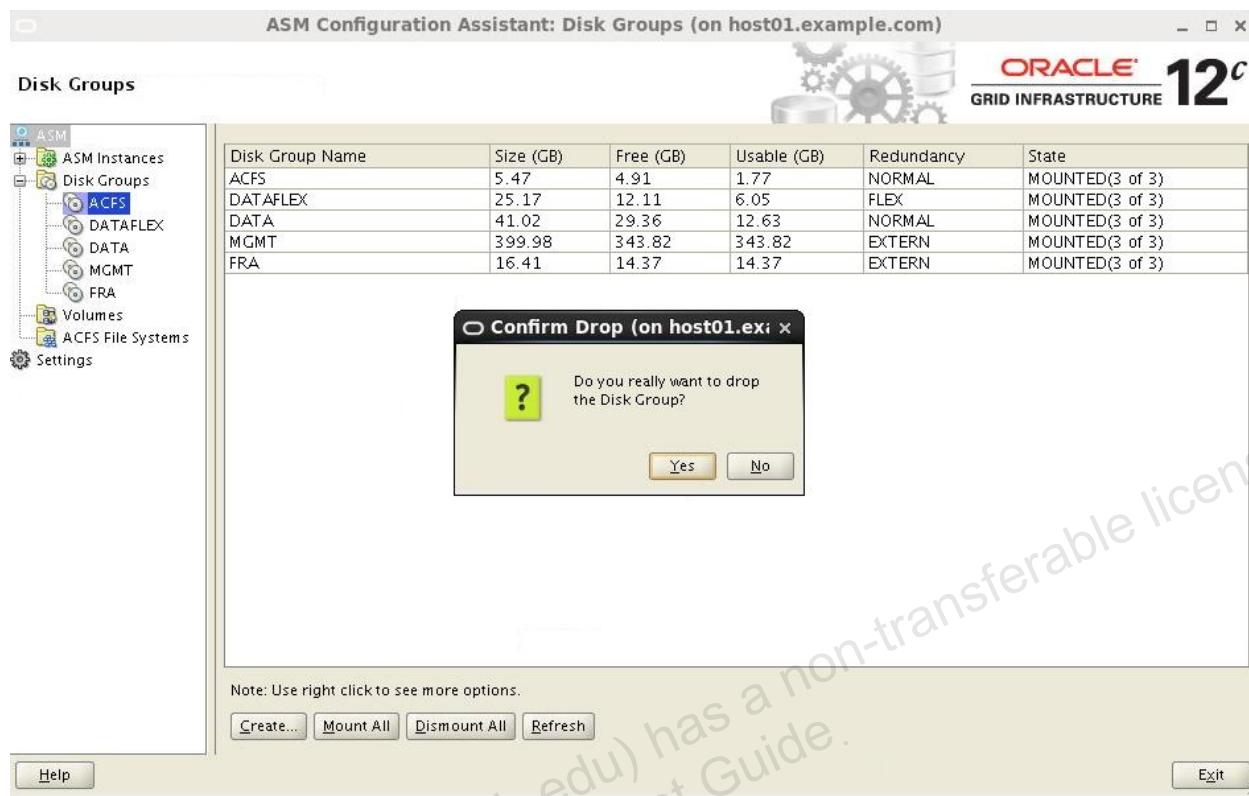
33. Click Yes to Confirm Delete.



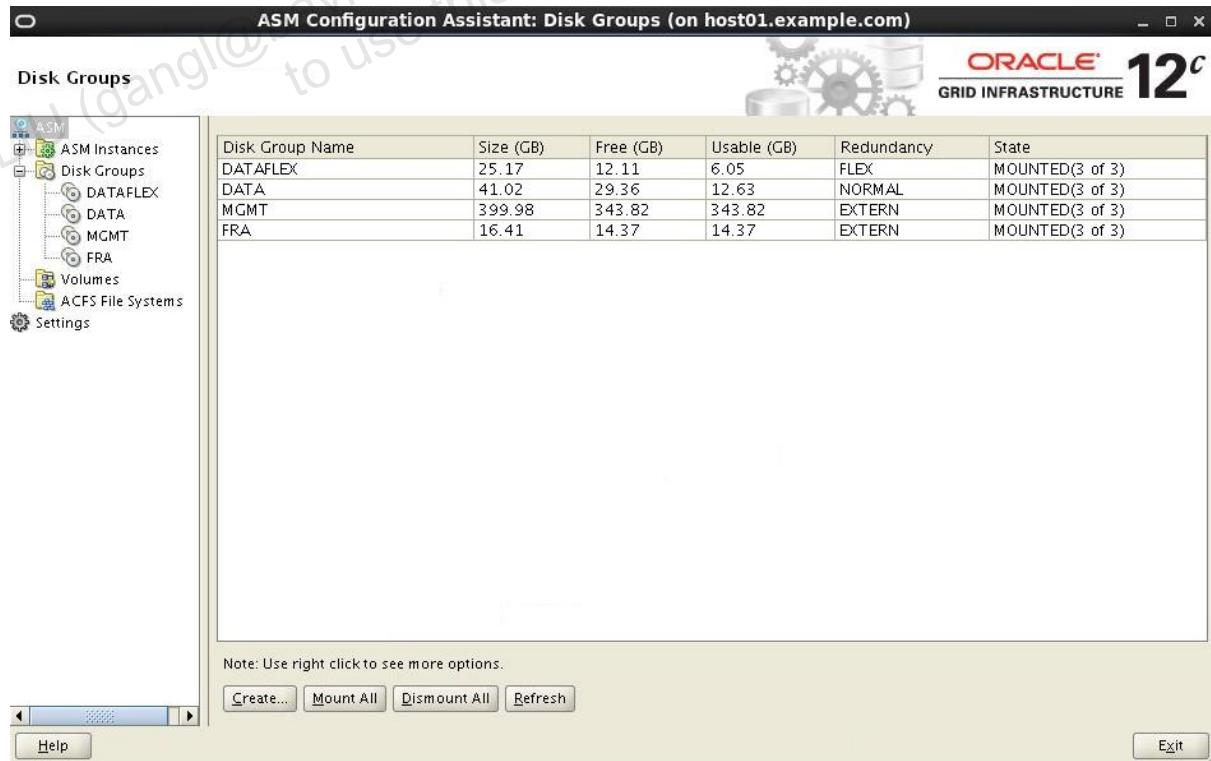
34. Click **Disk Groups** in the left hand navigation panel. Right-click the ASM Disk Group name (ACFS) and select Drop.



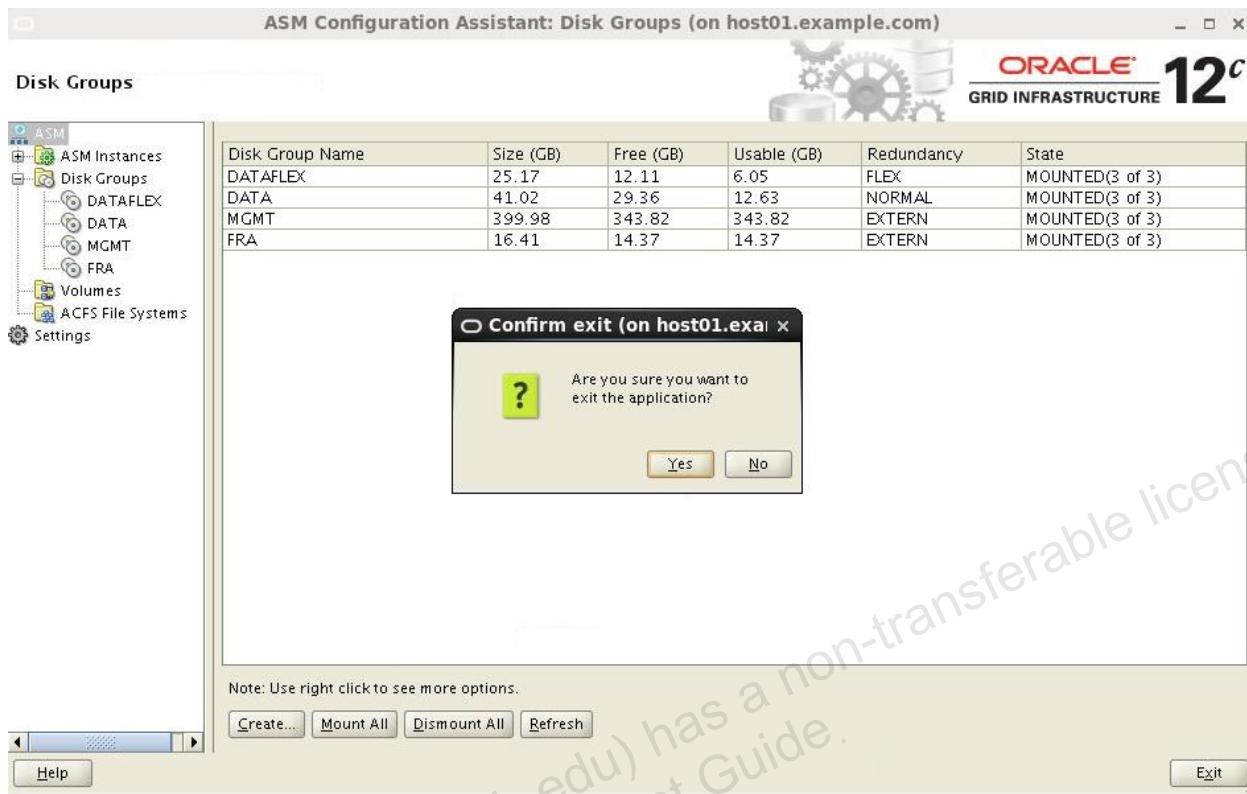
35. Click Yes to confirm Drop.



36. Click Exit to end your ASMCA session.



37. Click Yes to exit.



38. As the grid user, execute `crsctl` to confirm that the resources associated with the ACFS file system have been removed.

- ASM Disk Group resource: `ora.ACFS.dg`
- ADVM resource: `ora.ACFS.IMAGES.advm`
- ACFS resource: `ora.acfs.images.acfs`

```
[grid@host01 ~]$ crsctl stat res ora.ACFS.dg -t
CRS-2613: Could not find resource 'ora.ACFS.dg'.

[grid@host01 ~]$ crsctl stat res ora.ACFS.IMAGES.advm -t
CRS-2613: Could not find resource 'ora.ACFS.IMAGES.advm'.

[grid@host01 ~]$ crsctl stat res ora.acfs.images.acfs -t
CRS-2613: Could not find resource 'ora.acfs.images.acfs'.

[grid@host01 ~]$
```

39. Close all the terminal windows that were opened for this practice.

Practices for Lesson 9: ACFS/ADVM Enhancements

Practice 9-1: ACFS Automatic Resizing

Overview

In this practice, you will create an ACFS file system and configure it for automatic resizing.

1. Open a terminal window on your dns node and ssh to host01 as the grid user. Set the environment using oraenv.

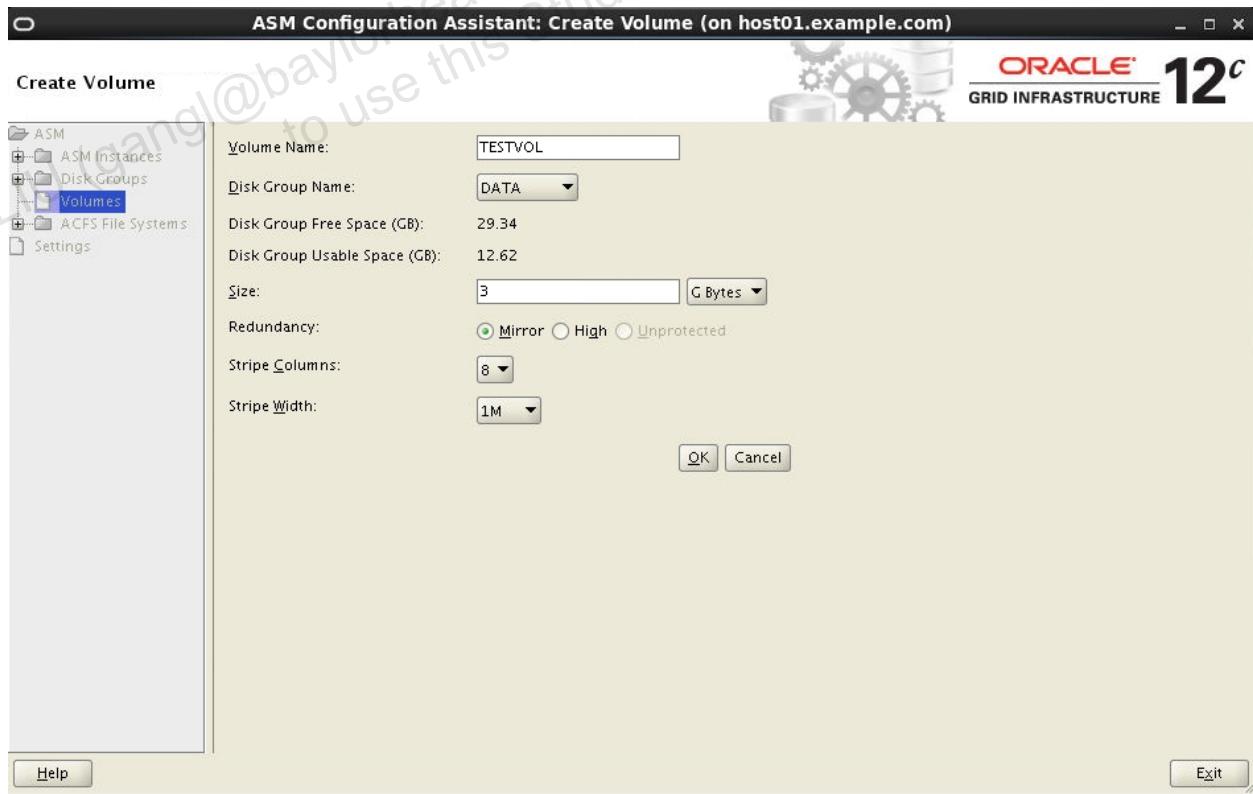
```
[oracle@dns ~]$ ssh -X grid@host01
grid@host01's password:

[grid@host01 ~]$ . oraenv
ORACLE_SID = [grid] ? +ASM1
The Oracle base has been set to /u01/app/grid

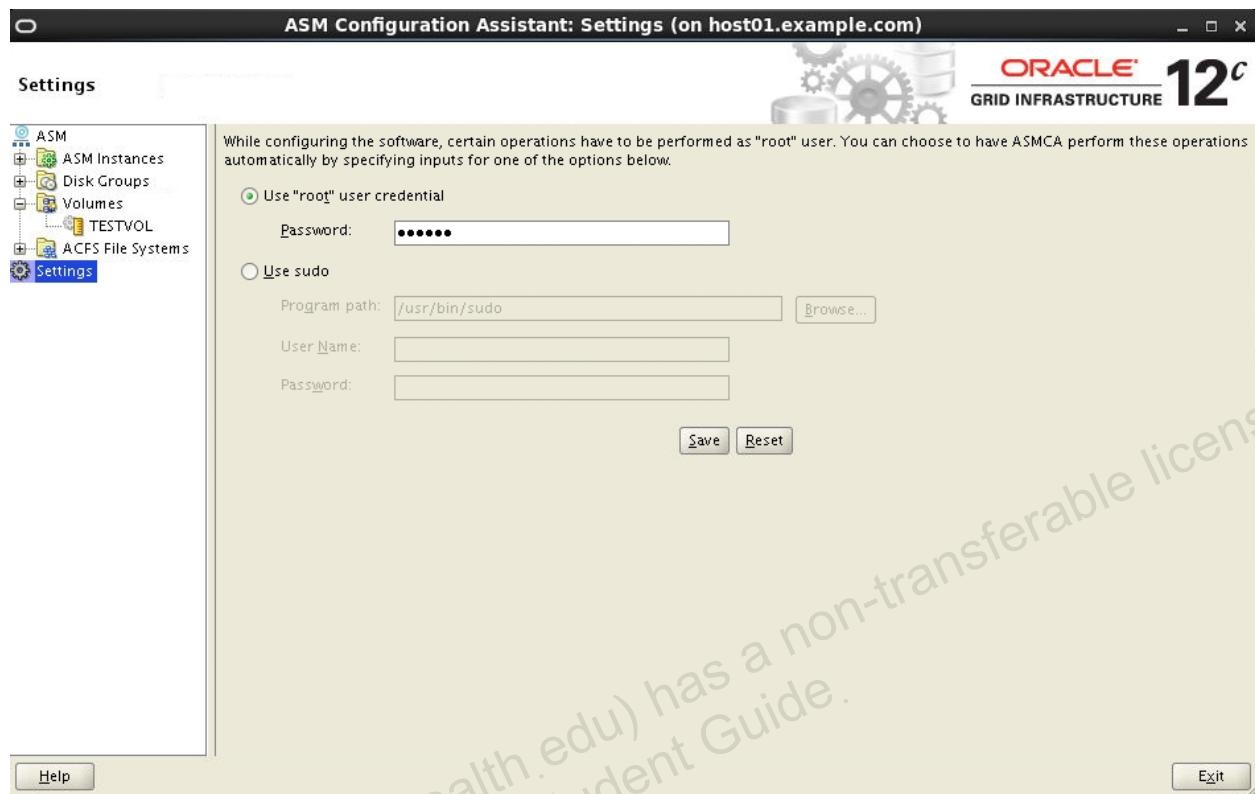
[grid@host01 ~]$ export PATH=$PATH:/sbin

[grid@host01 ~]$ asmca
```

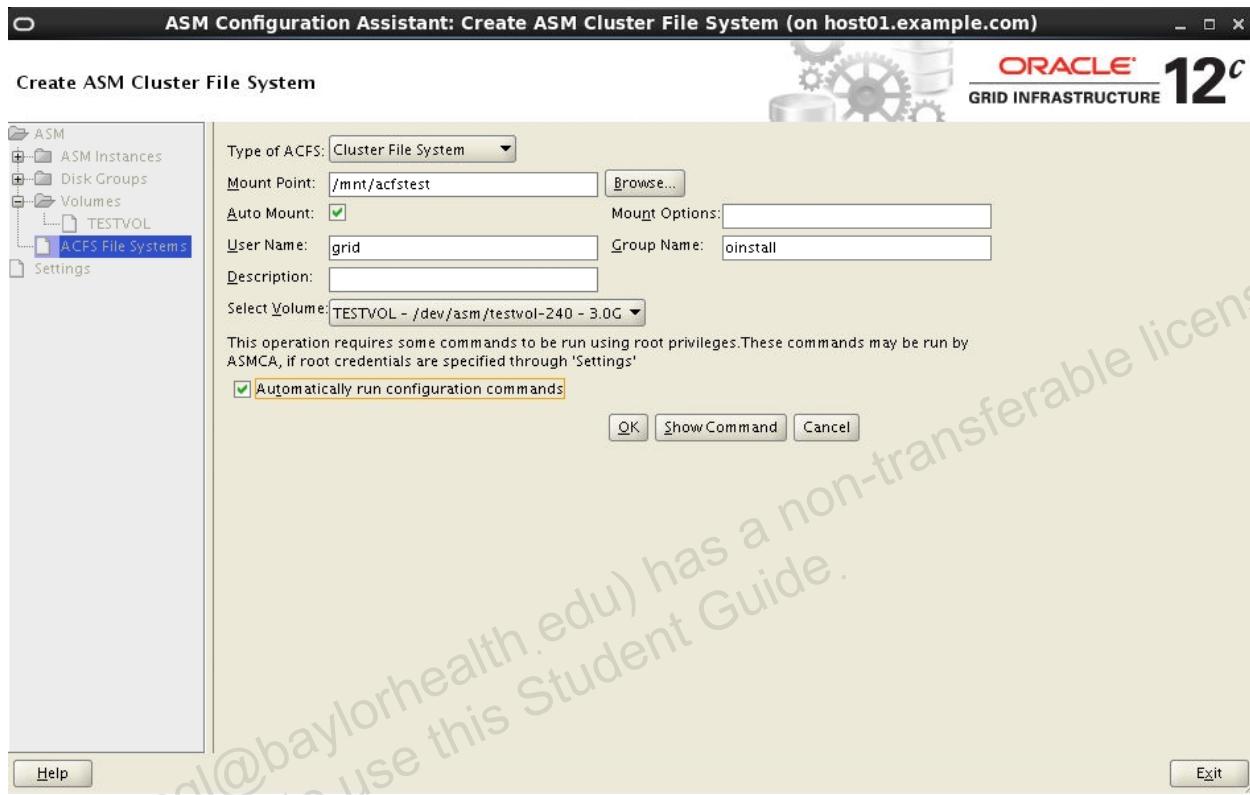
2. Click on **Volumes** in the Navigation pane and click Create. Enter TESTVOL in the Volume Name field. Select DATA from the Disk Group Name pull down list. Make the size of the volume 3 G Bytes as shown below. Click OK.



3. Click on **Settings** in the navigation pane and click the “Use “root” user credential” button. Enter the root password in the Password field and click Save.



4. Click on **ACFS File Systems** in the navigation pane and click Create. Make sure AFCS Type is Cluster File System. Enter /mnt/acfstest in the Mount Point field. The User Name should be grid and Group Name should be oinstall. Ensure that TESTVOL - /dev/asm/testvol-nnn 3.0G is selected from the Select Volume pull down list. Click the “Automatically run configuration commands” check box and click OK.



5. When the file system has been created, click Exit to dismiss ASMCA.
 6. From the grid terminal, check the new file system resources.

```
[grid@host01 ~]$ crsctl stat res -t

-----
Name          Target   State        Server      State
details

-----
Local Resources

-----
ora.ASMNET1LSNR_ASM.lsnr
    ONLINE  ONLINE    host01      STABLE
    ONLINE  ONLINE    host02      STABLE
    ONLINE  ONLINE    host03      STABLE
ora.DATA.TESTVOL.advm
    ONLINE  ONLINE    host01      STABLE
    ONLINE  ONLINE    host02      STABLE
    ONLINE  ONLINE    host03      STABLE
ora.DATA.dg
    ONLINE  ONLINE    host01      STABLE
```

	ONLINE	ONLINE	host02	STABLE
	ONLINE	ONLINE	host03	STABLE
ora.DATAFLEX.dg				
	ONLINE	ONLINE	host01	STABLE
	ONLINE	ONLINE	host02	STABLE
	ONLINE	ONLINE	host03	STABLE
ora.FRA.dg				
	ONLINE	ONLINE	host01	STABLE
	ONLINE	ONLINE	host02	STABLE
	ONLINE	ONLINE	host03	STABLE
ora.LISTENER.lsnr				
	ONLINE	ONLINE	host01	STABLE
	ONLINE	ONLINE	host02	STABLE
	ONLINE	ONLINE	host03	STABLE
	ONLINE	ONLINE	host04	STABLE
	ONLINE	ONLINE	host05	STABLE
ora.LISTENER_LEAF.lsnr				
	OFFLINE	OFFLINE	host04	STABLE
	OFFLINE	OFFLINE	host05	STABLE
ora.MGMT.dg				
	ONLINE	ONLINE	host01	STABLE
	ONLINE	ONLINE	host02	STABLE
	ONLINE	ONLINE	host03	STABLE
ora.chad				
	ONLINE	ONLINE	host01	STABLE
	ONLINE	ONLINE	host02	STABLE
	ONLINE	ONLINE	host03	STABLE
	ONLINE	ONLINE	host04	STABLE
	ONLINE	ONLINE	host05	STABLE
ora.data.testvol.acfs				
	ONLINE	ONLINE	host01	mounted on /mnt/acfs test, STABLE
	ONLINE	ONLINE	host02	mounted on /mnt/acfs test, STABLE
	ONLINE	ONLINE	host03	mounted on /mnt/acfs test, STABLE
ora.net1.network				
	ONLINE	ONLINE	host01	STABLE
	ONLINE	ONLINE	host02	STABLE
	ONLINE	ONLINE	host03	STABLE
	ONLINE	ONLINE	host04	STABLE
	ONLINE	ONLINE	host05	STABLE
ora.ons				
	ONLINE	ONLINE	host01	STABLE
	ONLINE	ONLINE	host02	STABLE
	ONLINE	ONLINE	host03	STABLE
...				
a. [grid@host01 ~]\$				

7. Get file system information using ACFSUTIL.

```
[grid@host01 ~]$ acfsutil info fs /mnt/acfstest
/mnt/acfstest
    ACFS Version: 12.2.0.1.0
    on-disk version:      46.0
    compatible.advm:     12.2.0.0.0
    ACFS compatibility:   12.2.0.0.0
    flags:                MountPoint,Available
    mount time:           Sat Nov 25 10:14:27 2017
    mount sequence number: 12
    allocation unit:       4096
    metadata block size:   4096
    volumes:               1
    total size:            3221225472  (  3.00 GB )
    total free:             2454671360  (  2.29 GB )
    file entry table allocation: 524288
    primary volume:        /dev/asm/testvol-240
        label:
        state:                  Available
        major, minor:            248, 122881
        logical sector size:    512
        size:                   3221225472  (  3.00 GB )
        free:                   2454671360  (  2.29 GB )
        metadata read I/O count: 1165
        metadata write I/O count: 44
        total metadata bytes read: 4980736  (  4.75 MB )
        total metadata bytes written: 593920  ( 580.00 KB )
        ADVM diskgroup:         DATA
        ADVM resize increment: 67108864
        ADVM redundancy:        mirror
        ADVM stripe columns:   8
        ADVM stripe width:     1048576
        number of snapshots:   0
        snapshot space usage: 0  ( 0.00 )
        replication status:    DISABLED
        compression status:    DISABLED

[grid@host01 ~]#
```

8. Check the space available in the new file system as reported by the operating system.

```
[grid@host01 ~]# df -m
Filesystem      1M-blocks  Used  Available  Use% Mounted on
/dev/xvda2          130399  26401      97368  22% /
tmpfs              6144   1264      4880  21% /dev/shm
/dev/xvda1            488    102       362  22% /boot
/dev/xvdf1          11967   6586      4767  59% /stage
/dev/asm/testvol-240    3072    732      2341  24% /mnt/acfstest

[grid@host01 ~]#
```

9. Change directory to /mnt/acfstest. Create a file called testfile1 in /mnt/acfstest, 1500 MB in size using dd. Recheck available space.

```
[grid@host01 ~]# cd /mnt/acfstest/
[grid@host01 acfstest]# dd if=/dev/zero of=/mnt/acfstest/testfile1 bs=100M count=15
15+0 records in
15+0 records out
1572864000 bytes (1.6 GB) copied, 15.4544 s, 102 MB/s

[grid@host01 acfstest]# df -m
Filesystem      1M-blocks   Used   Available  Use% Mounted on
/dev/xvda2        130399  26402     97367  22% /
tmpfs              6144   1264     4880  21% /dev/shm
/dev/xvda1          488    102     362  22% /boot
/dev/xvdf1        11967   6586     4767  59% /stage
/dev/asm/testvol-240  3072   2260     813  74% /mnt/acfstest

[grid@host01 acfstest]#
```

10. Create a file called testfile2 in /mnt/acfstest, 2000 MB in size using dd. What happens?

```
[grid@host01 acfstest]# dd if=/dev/zero of=/mnt/acfstest/testfile2 bs=100M count=20
dd: writing `~/mnt/acfstest/testfile2': No space left on device
9+0 records in
8+0 records out
838860800 bytes (839 MB) copied, 3.39099 s, 247 MB/s

[grid@host01 acfstest]#
```

11. Remove the files.

```
[grid@host01 acfstest]# rm testfile*
[grid@host01 acfstest]#
```

12. Check the autoresize status of the acfstest file system. A “0” indicates disabled, a “1” indicates enabled.

```
[grid@host01 acfstest]# acfsutil info fs -o autoresize /mnt/acfstest
0

[grid@host01 acfstest]#
```

13. Enable autoresize for /mnt/acfstest. Set the autoresize increment to 1GB and the maximum size of the file system to 5GB. Recheck autoresize status.

```
[grid@host01 acfstest]# acfsutil size -a 1G -x 5G /mnt/acfstest
acfsutil size: ACFS-03642: successfully updated auto-resize settings

[grid@host01 acfstest]# acfsutil info fs -o autoresize /mnt/acfstest
1

[grid@host01 acfstest]#
```

14. Check free space again. Your value for /mnt/acfstest may vary.

```
[grid@host01 acfstest]# df -m
Filesystem      1M-blocks  Used  Available  Use%  Mounted on
/dev/xvda2        130399  26404     97365  22%  /
tmpfs              6144   1264     4880  21%  /dev/shm
/dev/xvda1          488    102     362  22%  /boot
/dev/xvdf1        11967   6586     4767  59%  /stage
/dev/asm/testvol-240  3072    764     2309  25%  /mnt/acfstest

[grid@host01 acfstest]#
```

15. Create a file called testfile1 in /mnt/acfstest, 1600 MB in size using dd. Recheck available space. What happened?

```
[grid@host01 acfstest]# dd if=/dev/zero of=/mnt/acfstest/testfile1
bs=100M count=16
16+0 records in
16+0 records out
1677721600 bytes (1.7 GB) copied, 9.40594 s, 178 MB/s

[grid@host01 acfstest]# df -m
Filesystem      1M-blocks  Used  Available  Use%  Mounted on
/dev/xvda2        130399  26404     97364  22%  /
tmpfs              6144   1264     4880  21%  /dev/shm
/dev/xvda1          488    102     362  22%  /boot
/dev/xvdf1        11967   6586     4767  59%  /stage
/dev/asm/testvol-240  4096  2386     1711  59%  /mnt/acfstest

[grid@host01 acfstest]#
```

- The ACFS file system has been resized by 1GB to 4GB since the amount available after the write would have been less than the increment size of 1GB.

16. Create a file called testfile2 in /mnt/acfstest, 1600 MB in size using dd. Recheck available space. What happened?

```
[grid@host01 acfstest]# dd if=/dev/zero of=/mnt/acfstest/testfile2
bs=100M count=16
16+0 records in
16+0 records out
```

```
1677721600 bytes (1.7 GB) copied, 10.89 s, 154 MB/s

[grid@host01 acfstest]# df -m
Filesystem      1M-blocks  Used Available Use% Mounted on
/dev/xvda2        130399  26406     97363  22% /
tmpfs             6144   1264     4880  21% /dev/shm
/dev/xvda1         488    102      362  22% /boot
/dev/xvdf1        11967  6586     4767  59% /stage
/dev/asm/testvol-240  5120  4008     1113  79% /mnt/acfstest

[grid@host01 acfstest]#
```

- Again, the ACFS file system has been resized by 1GB to 5GB. Space used on the device is around 4GB with approximately 1GB of free space left.
17. Create a file called testfile3 in /mnt/acfstest, 1500 MB in size using dd. Recheck available space. What happened?

```
[grid@host01 acfstest]# dd if=/dev/zero of=/mnt/acfstest/testfile3
bs=100M count=16
dd: writing `/mnt/acfstest/testfile3': No space left on device
12+0 records in
11+0 records out
1153433600 bytes (1.2 GB) copied, 6.81639 s, 169 MB/s

[grid@host01 acfstest]# df -m
Filesystem      1M-blocks  Used Available Use% Mounted on
/dev/xvda2        130399  26407     97362  22% /
tmpfs             6144   1264     4880  21% /dev/shm
/dev/xvda1         488    102      362  22% /boot
/dev/xvdf1        11967  6586     4767  59% /stage
/dev/asm/testvol-240  5120  5096      25 100% /mnt/acfstest

[grid@host01 acfstest]#
```

- The dd command writes until the device fills up and errors out. No resizing takes place because the maximum file system size of 5GB has been reached.
18. Remove testfile3 only so the ACFS file system is no longer at 100% utilization.

```
[grid@host01 acfstest]# rm /mnt/acfstest/testfile3

[grid@host01 acfstest]#
```

19. Close all terminals opened for this practice.

Practice 9-2: ACFS Defragmentation

Overview

In this practice, you will explore the `acfsutil defrag` command.

1. Open a terminal window on your dns node and ssh to host01 as the grid user. Set the environment using oraenv.

```
[oracle@dns ~]$ ssh grid@host01
grid@host01's password:

[grid@host01 ~]$ . oraenv
ORACLE_SID = [grid] ? +ASM1
The Oracle base has been set to /u01/app/grid

[grid@host01 ~]$ export PATH=$PATH:/sbin
[grid@host01 ~]$
```

2. Run the `acfsutil defrag -help` command. What objects can ACFS defrag operate on?

```
[grid@host01 ~]$ acfsutil defrag -help

Usage: acfsutil [-h] command ... # (Version 12.2.0.1.0)

-h - help

Command Subcmd      Arguments
----- -----
defrag dir          [-r] <path>
defrag dir          Defrag all files in a specific directory
defrag dir          [-r] recursively traverse directories
defrag dir          <path> path to a specific dir
defrag file         [-i] <path> [<path> ...]
defrag file         Defrag specific files
defrag file         [-i] Estimate reduction in number of
                     extents possible
defrag file         <path> path to a specific file

[root@host01 ~]$
```

- The `acfsutil defrag` command may be used with individual files or directories.

3. Use the acfsutil defrag file command to retrieve fragmentation information for testfile1.

```
[grid@host01 ~]$ acfsutil defrag file -i /mnt/acfstest/testfile1
/mnt/acfstest/testfile1
    number of fragmented extents:          0
    size of fragmented extents:          0  ( 0.00 )

[root@host01 ~]$
```

- There has been no fragmentation of testfile1.

4. Open a terminal window on your dns node and ssh to host01 as the root user. Set the environment using oraenv.

```
[oracle@dns ~]$ ssh root@host01
root@host01's password:

[root@host01 ~]$ . oraenv
ORACLE_SID = [root] ? +ASM1
The Oracle base has been set to /u01/app/grid

[root@host01 ~]$
```

5. List the contents of /mnt/acfstest.

```
[root@host01 ~]# cd /mnt/acfstest

[root@host01 acfstest]# ls -la
total 3285092
drwxrwxr-x. 4 grid oinstall      32768 Nov 25 10:51 .
drwxrwxrwx. 4 root root        4096 Nov 25 10:14 ..
drwx----- 2 root root        65536 Nov 25 10:14 lost+found
-rw-r--r--. 1 root root     1677721600 Nov 25 10:41 testfile1
-rw-r--r--. 1 root root     1677721600 Nov 25 10:45 testfile2

[root@host01 acfstest]# rm -f testfile*
[root@host01 acfstest]# ls -la
total 100
drwxrwxr-x. 4 grid oinstall 32768 Nov 25 11:00 .
drwxrwxrwx. 4 root root    4096 Nov 25 10:14 ..
drwx----- 2 root root    65536 Nov 25 10:14 lost+found

[root@host01 acfstest]#
```

6. Copy some log files to /mnt/acfstest and then defrag the entire directory.

```
[root@host01 acfstest]# cp -pr /u01/app/grid/diag/asm /mnt/acfstest

[root@host01 acfstest]# df -m
Filesystem      1M-blocks  Used  Available  Use%  Mounted on
/dev/xvda2        130399  26411     97358   22%  /
tmpfs             6144    1264     4880   21%  /dev/shm
/dev/xvda1          488    102     362   22%  /boot
/dev/xvdf1        11967   6586     4767   59%  /stage
/dev/asm/testvol-240  5120   1238     3883   25%  /mnt/acfstest

[root@host01 acfstest]# ls -la
total 152
drwxrwxr-x. 5 grid oinstall 32768 Nov 25 11:01 .
drwxrwxrwx. 4 root root     4096 Nov 25 10:14 ..
drwxrwxr-x. 4 grid oinstall 20480 Nov 21 21:43 asm
drwx----- 2 root root     65536 Nov 25 10:14 lost+found

[root@host01 acfstest]# acfsutil defrag dir -r /mnt/acfstest
defragmenting file
/mnt/acfstest/asm/user_root/host_1061175931_107/lck/AM_1096102262_3
454819329.lck ...
defragmenting file
/mnt/acfstest/asm/user_root/host_1061175931_107/lck/AM_3216668543_3
129272988.lck ...
defragmenting file
/mnt/acfstest/asm/user_root/host_1061175931_107/lck/AM_1744845641_3
861997533.lck ...
defragmenting file
/mnt/acfstest/asm/user_root/host_1061175931_107/lck/AM_1096102193_3
488045378.lck ...
defragmenting file
/mnt/acfstest/asm/user_root/host_1061175931_107/metadata/INC_METER_
IMPT_DEF.ams ...
defragmenting file
/mnt/acfstest/asm/user_root/host_1061175931_107/metadata/ADR_INVALI
DATION.ams ...
defragmenting file
/mnt/acfstest/asm/user_root/host_1061175931_107/metadata/ADR_CONTRO
L.ams ...
defragmenting file
/mnt/acfstest/asm/user_root/host_1061175931_107/metadata/INC_METER_
PK_IMPTS.ams ...
defragmenting file
/mnt/acfstest/asm/user_root/host_1061175931_107/alert/log.xml ...
defragmenting file /mnt/acfstest/asm/+asm/i_1.mif ...
```

```

defragmenting file
/mnt/acfstest/asm/+asm/+ASM1/lck/AM_53417_1688101061.lck ...
...
defragmenting file
/mnt/acfstest/asm/user_grid/host_1061175931_107/lck/AM_1096102193_3
488045378.lck ...
defragmenting file
/mnt/acfstest/asm/user_grid/host_1061175931_107/metadata/INC_METER_
IMPT_DEF.ams ...
defragmenting file
/mnt/acfstest/asm/user_grid/host_1061175931_107/metadata/DFW_PURGE_
ITEM.ams ...
defragmenting file
/mnt/acfstest/asm/user_grid/host_1061175931_107/alert/log.xml ...

[root@host01 acfstest]#

```

7. Check free space again and compare with the output in step 6. What is your observation?

```

[root@host01 acfstest]# df -m
Filesystem      1M-blocks  Used Available Use% Mounted on
/dev/xvda2        130399  26411   97358  22% /
tmpfs             6144    1264    4880  21% /dev/shm
/dev/xvda1          488     102     362  22% /boot
/dev/xvdf1        11967   6586   4767  59% /stage
/dev/asm/testvol-240  5120   1238   3883  25% /mnt/acfstest
[root@host01 acfstest]#

```

- You may or may not get the space saving benefit from the acfsutil defrag command. You would need the defragmentation tool very rarely because ACFS algorithm is for allocation and coalescence of free space.
- However, when you can get into fragmented situations under heavy workloads or for compressed files, you can now issue acfsutil defrag dir or acfsutil defrag file commands for on-demand defragmentation. ACFS performs all defrag operations in the background. With the -r option of the acfsutil defrag dir command, you can recursively defrag subdirectories.

8. Remove the /mnt/acfstest/asm directory and its contents.

```

[root@host01 acfstest]# rm -rf asm
[root@host01 acfstest]#

```

9. Close all terminal windows opened for this practice.

Practice 9-3: ACFS Compression

Overview

In this practice, you will use acfsutil compress to compress database files.

1. Open a new terminal window and ssh as oracle to host01 and set the environment using the export command.

```
[oracle@dns ~]$ ssh oracle@host01
oracle@host01's password:

[oracle@host01 ~]$ ps -ef|grep smon
oracle    8072  7974  0 11:15 pts/5      00:00:00 grep ora_smon
oracle    8356      1  0 Nov18 ?          00:00:38 ora_smon_orcl_3

[oracle@host01 ~]$ export
ORACLE_HOME=/u01/app/oracle/product/12.2.0/dbhome_1

[oracle@host01 ~]$ export ORACLE_SID=orcl_3

[oracle@host01 ~]$ export PATH=$PATH:$ORACLE_HOME/bin
[oracle@host01 ~]$
```

2. Start SQL*Plus and query dba_data_files. **Note:** The values in the BLOCKS column may be different.

```
[oracle@host01 ~]$ sqlplus / as sysdba

SQL*Plus: Release 12.2.0.1.0 Production on Wed Jun 28 19:00:51 2017

Copyright (c) 1982, 2016, Oracle. All rights reserved.

Connected to:
Oracle Database 12c Enterprise Edition Release 12.2.0.1.0 - 64bit
Production

SQL> select file_name, blocks from dba_data_files;

FILE_NAME                                     BLOCKS
-----                                         -----
+DATA/ORCL/DATAFILE/system.273.960022583      108800
+DATA/ORCL/DATAFILE/sysaux.266.960022657       272640
+DATA/ORCL/DATAFILE/undotbs2.276.960023065      36480
```

```
+DATA/ORCL/DATAFILE/users.261.960022693          640
+DATA/ORCL/DATAFILE/undotbs3.277.960023067        8960
+DATA/ORCL/DATAFILE/undotbs1.274.960022693        8960

6 rows selected.

SQL> exit

[oracle@host01 ~]$
```

3. Open another terminal window on your dns node and ssh to host01 as the grid user. Set the environment using oraenv.

```
[oracle@dns ~]$ ssh grid@host01
grid@host01's password:

[grid@host01 ~]$ . oraenv
ORACLE_SID = [grid] ? +ASM1
The Oracle base has been set to /u01/app/grid

[grid@host01 ~]$ export PATH=$PATH:/sbin
[grid@host01 ~]$
```

4. Run asmcmd and copy the sysaux file listed in step 2 to /mnt/acfstest. Your exact name will differ somewhat.

```
[grid@host01 ~]$ asmcmd

ASMCMD> cp +DATA/ORCL/DATAFILE/sysaux.266.960022657 /mnt/acfstest

copying +DATA/ORCL/DATAFILE/sysaux.266.960022657 ->
/mnt/acfstest/sysaux.266.960022657

ASMCMD> exit

[grid@host01 ~]$
```

5. Change directory to /mnt/acfstest and list the file. Check the compression status of the new file with the acfsutil compress info command.

```
[grid@host01 ~]$ cd /mnt/acfstest/  
  
[grid@host01 acfstest]$ ls -la  
total 2191520  
drwxrwxr-x. 5 grid oinstall      32768 Nov 25 11:26 .  
drwxrwxrwx. 4 root root        4096 Nov 25 10:14 ..  
drwx----- 2 root root       65536 Nov 25 10:14 lost+found  
-rw-r----- 1 grid oinstall 2243960832 Nov 25 11:26  
sysaux.266.960022657  
  
[grid@host01 acfstest]$ acfsutil compress info  
/mnt/acfstest/sysaux.266.960022657  
  
The file /mnt/acfstest/sysaux.266.960022657 is not compressed.  
  
[grid@host01 acfstest]$
```

6. Turn on compression for /mnt/acfstest.

```
[grid@host01 acfstest]$ acfsutil compress on /mnt/acfstest  
  
acfsutil compress on: ACFS-09130: Root access required  
  
[grid@host01 acfstest]$
```

7. You must be root to enable ACFS compression. Switch user to root, cd to /mnt/acfstest and retry the compress command.

```
[grid@host01 acfstest]$ su -  
Password:  
  
[root@host01 ~]# . oraenv  
ORACLE_SID = [root] ? +ASM1  
The Oracle base has been set to /u01/app/grid  
  
[root@host01 ~]# cd /mnt/acfstest  
  
[root@host01 acfstest]# acfsutil compress on /mnt/acfstest  
  
[root@host01 acfstest]#
```

8. Make a copy of the sysaux file. Call it sysaux_compress. Retrieve the compression information for the file. What do you observe? You may need to wait a few moments to complete the compression operation.

```
[root@host01 acfstest]# cp sysaux.266.960022657 sysaux_compress

[root@host01 acfstest]# acfsutil compress info
/mnt/acfstest/sysaux_compress
Compression Unit size: 32768
Disk storage used:    ( 489.32 MB )
Disk storage saved:   ( 1.61 GB )
Storage used is 22% of what the uncompressed file would use.
File is not scheduled for asynchronous compression.

[root@host01 acfstest]# acfsutil compress info
/mnt/acfstest/sysaux.266.960022657
The file /mnt/acfstest/sysaux.266.960022657 is not compressed.

[root@host01 acfstest]# ls -la
total 2692528
drwxrwxr-x. 4 grid oinstall      32768 Nov 25 11:37 .
drwxrwxrwx. 4 root root        4096 Nov 25 10:14 ..
drwx----- 2 root root       65536 Nov 25 10:14 lost+found
-rw-r----- 1 grid oinstall 2243960832 Nov 25 11:26
sysaux.266.960022657
-rw-r----- 1 root root     2243960832 Nov 25 11:38 sysaux_compress

[root@host01 acfstest]#
```

- The new file is being compressed asynchronously (22% of original, currently, in the example above) although operating system commands show the copied file at its original, expanded size.
- The File is not scheduled for asynchronous compression message indicates compression has finished.
- When compression is enabled on a file system, the existing files are not compressed. Only newly created files are compressed.

9. Turn off compression for /mnt/acfstest.

```
[root@host01 acfstest]# acfsutil compress off /mnt/acfstest

[root@host01 acfstest]# acfsutil compress info
/mnt/acfstest/sysaux_compress
Compression Unit size: 32768
Disk storage used:    ( 489.32 MB )
Disk storage saved:   ( 1.61 GB )
Storage used is 22% of what the uncompressed file would use.
File is not scheduled for asynchronous compression.

[root@host01 acfstest]#
```

- When compression is disabled, the compressed files are not uncompressed.

10. Close all terminals opened for this practice.

Practices for Appendix C-1: Cleanup Script

Practices for Appendix C-1: Cleanup Script

Estimated Time: 20~25min

Assumption

- You have *NOT* configured the ASM disk groups with Oracle ASM Filter Driver (AFD). If you have configured, use `asmca` to fix the issue first working with your instructor.

1. Open a terminal window to connect to `host01` as root user. Run the `reset01.sh` script.

```
[oracle@dns ~] ssh root@host01
root@host01's Password:

[root@host01 ~]# cd /stage/ASM/solutions/less_01/catchup

[root@host01 catchup]# ./reset01.sh
#####
Task 1 of 6: Stop Clusterware on all nodes
#####
Fri Feb  2 06:50:15 UTC 2018

CRS-2673: Attempting to stop 'ora.crsd' on 'host04'
CRS-2673: Attempting to stop 'ora.crsd' on 'host05'
CRS-2790: Starting shutdown of Cluster Ready Services-managed
resources on server 'host04'
CRS-2673: Attempting to stop 'ora.chad' on 'host04'
CRS-2790: Starting shutdown of Cluster Ready Services-managed
resources on server 'host05'
CRS-2673: Attempting to stop 'ora.chad' on 'host05'
CRS-2677: Stop of 'ora.chad' on 'host04' succeeded
CRS-2677: Stop of 'ora.chad' on 'host05' succeeded
CRS-2792: Shutdown of Cluster Ready Services-managed resources on
'host04' has completed
CRS-2792: Shutdown of Cluster Ready Services-managed resources on
'host05' has completed
CRS-2677: Stop of 'ora.crsd' on 'host04' succeeded
CRS-2677: Stop of 'ora.crsd' on 'host05' succeeded
CRS-2673: Attempting to stop 'ora.cluster_interconnect.haip' on
'host04'
CRS-2673: Attempting to stop 'ora.ctssd' on 'host04'
CRS-2673: Attempting to stop 'ora.cluster_interconnect.haip' on
'host05'
CRS-2673: Attempting to stop 'ora.ctssd' on 'host05'
CRS-2673: Attempting to stop 'ora.evmd' on 'host05'
CRS-2673: Attempting to stop 'ora.evmd' on 'host04'
```

```

CRS-2673: Attempting to stop 'ora.storage' on 'host05'
CRS-2677: Stop of 'ora.storage' on 'host05' succeeded
CRS-2673: Attempting to stop 'ora.storage' on 'host04'
CRS-2677: Stop of 'ora.storage' on 'host04' succeeded
CRS-2677: Stop of 'ora.ctssd' on 'host05' succeeded
CRS-2677: Stop of 'ora.ctssd' on 'host04' succeeded
CRS-2677: Stop of 'ora.evmd' on 'host05' succeeded
CRS-2677: Stop of 'ora.evmd' on 'host04' succeeded
CRS-2677: Stop of 'ora.cluster_interconnect.haip' on 'host04'
succeeded
CRS-2677: Stop of 'ora.cluster_interconnect.haip' on 'host05'
succeeded
CRS-2673: Attempting to stop 'ora.cssd' on 'host05'
CRS-2673: Attempting to stop 'ora.cssd' on 'host04'
CRS-2677: Stop of 'ora.cssd' on 'host04' succeeded
CRS-2677: Stop of 'ora.cssd' on 'host05' succeeded
CRS-2673: Attempting to stop 'ora.crsd' on 'host03'
CRS-2673: Attempting to stop 'ora.crsd' on 'host02'
CRS-2790: Starting shutdown of Cluster Ready Services-managed
resources on server 'host03'
CRS-2673: Attempting to stop 'ora.orcl.db' on 'host03'
CRS-2790: Starting shutdown of Cluster Ready Services-managed
resources on server 'host02'
CRS-2673: Attempting to stop 'ora.chad' on 'host03'
CRS-2673: Attempting to stop 'ora.chad' on 'host02'
CRS-2673: Attempting to stop 'ora.orcl.db' on 'host02'
CRS-2673: Attempting to stop 'ora.crsd' on 'host01'
CRS-2790: Starting shutdown of Cluster Ready Services-managed
resources on server 'host01'
CRS-2673: Attempting to stop 'ora.orcl.db' on 'host01'
CRS-2673: Attempting to stop 'ora.qosmserver' on 'host01'
CRS-2673: Attempting to stop 'ora.gns' on 'host01'
CRS-2677: Stop of 'ora.gns' on 'host01' succeeded
CRS-2677: Stop of 'ora.orcl.db' on 'host03' succeeded
CRS-2673: Attempting to stop 'ora.DATA.dg' on 'host03'
CRS-2673: Attempting to stop 'ora.FRA.dg' on 'host03'
CRS-2673: Attempting to stop 'ora.MGMT.dg' on 'host03'
CRS-2673: Attempting to stop 'ora.LISTENER.lsnr' on 'host03'
CRS-2673: Attempting to stop 'ora.LISTENER_SCAN1.lsnr' on 'host03'
CRS-2677: Stop of 'ora.orcl.db' on 'host02' succeeded
CRS-2673: Attempting to stop 'ora.DATA.dg' on 'host02'

```

CRS-2673: Attempting to stop 'ora.FRA.dg' on 'host02'

```
CRS-2673: Attempting to stop 'ora.MGMT.dg' on 'host02'
CRS-2673: Attempting to stop 'ora.LISTENER.lsnr' on 'host02'
CRS-2673: Attempting to stop 'ora.LISTENER_SCAN2.lsnr' on 'host02'
CRS-2677: Stop of 'ora.DATA.dg' on 'host03' succeeded
CRS-2677: Stop of 'ora.FRA.dg' on 'host03' succeeded
CRS-2677: Stop of 'ora.MGMT.dg' on 'host03' succeeded
CRS-2673: Attempting to stop 'ora.asm' on 'host03'
CRS-2677: Stop of 'ora.DATA.dg' on 'host02' succeeded
CRS-2677: Stop of 'ora.MGMT.dg' on 'host02' succeeded
CRS-2677: Stop of 'ora.FRA.dg' on 'host02' succeeded
CRS-2677: Stop of 'ora.LISTENER.lsnr' on 'host03' succeeded
CRS-2673: Attempting to stop 'ora.asm' on 'host02'
CRS-2677: Stop of 'ora.LISTENER_SCAN1.lsnr' on 'host03' succeeded
CRS-2673: Attempting to stop 'ora.host03.vip' on 'host03'
CRS-2673: Attempting to stop 'ora.scan1.vip' on 'host03'
CRS-2677: Stop of 'ora.orcl.db' on 'host01' succeeded
CRS-2673: Attempting to stop 'ora.LISTENER.lsnr' on 'host01'
CRS-2673: Attempting to stop 'ora.LISTENER_SCAN3.lsnr' on 'host01'
CRS-2673: Attempting to stop 'ora.cvu' on 'host01'
CRS-2673: Attempting to stop 'ora.gns.vip' on 'host01'
CRS-2677: Stop of 'ora.LISTENER.lsnr' on 'host02' succeeded
CRS-2677: Stop of 'ora.LISTENER_SCAN2.lsnr' on 'host02' succeeded
CRS-2677: Stop of 'ora.asm' on 'host02' succeeded
CRS-2673: Attempting to stop 'ora.ASMNET1LSNR_ASM.lsnr' on 'host02'
CRS-2677: Stop of 'ora.LISTENER_SCAN3.lsnr' on 'host01' succeeded
CRS-2673: Attempting to stop 'ora.host02.vip' on 'host02'
CRS-2673: Attempting to stop 'ora.scan2.vip' on 'host02'
CRS-2673: Attempting to stop 'ora.scan3.vip' on 'host01'
CRS-2677: Stop of 'ora.cvu' on 'host01' succeeded
CRS-2677: Stop of 'ora.LISTENER.lsnr' on 'host01' succeeded
CRS-2677: Stop of 'ora.asm' on 'host03' succeeded
CRS-2673: Attempting to stop 'ora.ASMNET1LSNR_ASM.lsnr' on 'host03'
CRS-2677: Stop of 'ora.gns.vip' on 'host01' succeeded
CRS-2677: Stop of 'ora.host02.vip' on 'host02' succeeded
CRS-2677: Stop of 'ora.host03.vip' on 'host03' succeeded
CRS-2677: Stop of 'ora.scan1.vip' on 'host03' succeeded
CRS-2677: Stop of 'ora.scan3.vip' on 'host01' succeeded
CRS-2677: Stop of 'ora.ASMNET1LSNR_ASM.lsnr' on 'host02' succeeded
CRS-2677: Stop of 'ora.scan2.vip' on 'host02' succeeded
CRS-2677: Stop of 'ora.qosmserver' on 'host01' succeeded
CRS-2677: Stop of 'ora.chad' on 'host03' succeeded
CRS-2677: Stop of 'ora.chad' on 'host02' succeeded
```

```
CRS-2673: Attempting to stop 'ora.chad' on 'host01'
CRS-2673: Attempting to stop 'ora.ons' on 'host02'
CRS-2677: Stop of 'ora.ons' on 'host02' succeeded
CRS-2673: Attempting to stop 'ora.net1.network' on 'host02'
CRS-2677: Stop of 'ora.net1.network' on 'host02' succeeded
CRS-2792: Shutdown of Cluster Ready Services-managed resources on
'host02' has completed
CRS-2677: Stop of 'ora.ASMNET1LSNR_ASM.lsnr' on 'host03' succeeded
CRS-2673: Attempting to stop 'ora.ons' on 'host03'
CRS-2677: Stop of 'ora.ons' on 'host03' succeeded
CRS-2673: Attempting to stop 'ora.net1.network' on 'host03'
CRS-2677: Stop of 'ora.net1.network' on 'host03' succeeded
CRS-2792: Shutdown of Cluster Ready Services-managed resources on
'host03' has completed
CRS-2677: Stop of 'ora.crsd' on 'host02' succeeded
CRS-2673: Attempting to stop 'ora.ctssd' on 'host02'
CRS-2673: Attempting to stop 'ora.evmd' on 'host02'
CRS-2673: Attempting to stop 'ora.storage' on 'host02'
CRS-2677: Stop of 'ora.storage' on 'host02' succeeded
CRS-2673: Attempting to stop 'ora.asm' on 'host02'
CRS-2677: Stop of 'ora.crsd' on 'host03' succeeded
CRS-2673: Attempting to stop 'ora.ctssd' on 'host03'
CRS-2673: Attempting to stop 'ora.evmd' on 'host03'
CRS-2673: Attempting to stop 'ora.storage' on 'host03'
CRS-2677: Stop of 'ora.storage' on 'host03' succeeded
CRS-2677: Stop of 'ora.ctssd' on 'host02' succeeded
CRS-2677: Stop of 'ora.evmd' on 'host02' succeeded
CRS-2673: Attempting to stop 'ora.asm' on 'host03'
CRS-2677: Stop of 'ora.ctssd' on 'host03' succeeded
CRS-2677: Stop of 'ora.evmd' on 'host03' succeeded
CRS-2677: Stop of 'ora.chad' on 'host01' succeeded
CRS-2673: Attempting to stop 'ora.mgmtdb' on 'host01'
CRS-2677: Stop of 'ora.asm' on 'host02' succeeded
CRS-2677: Stop of 'ora.asm' on 'host03' succeeded
CRS-2673: Attempting to stop 'ora.cluster_interconnect.haip' on
'host02'
CRS-2677: Stop of 'ora.cluster_interconnect.haip' on 'host02'
succeeded
CRS-2673: Attempting to stop 'ora.cluster_interconnect.haip' on
'host03'
CRS-2677: Stop of 'ora.cluster_interconnect.haip' on 'host03'
succeeded
CRS-2673: Attempting to stop 'ora.cssd' on 'host02'
CRS-2677: Stop of 'ora.cssd' on 'host02' succeeded
```

```
CRS-2673: Attempting to stop 'ora.cssd' on 'host03'
CRS-2677: Stop of 'ora.cssd' on 'host03' succeeded
CRS-2677: Stop of 'ora.mgmtdb' on 'host01' succeeded
CRS-2673: Attempting to stop 'ora.MGMTLSNR' on 'host01'
CRS-2673: Attempting to stop 'ora.MGMT.dg' on 'host01'
CRS-2673: Attempting to stop 'ora.DATA.dg' on 'host01'
CRS-2673: Attempting to stop 'ora.FRA.dg' on 'host01'
CRS-2677: Stop of 'ora.MGMT.dg' on 'host01' succeeded
CRS-2677: Stop of 'ora.DATA.dg' on 'host01' succeeded
CRS-2677: Stop of 'ora.FRA.dg' on 'host01' succeeded
CRS-2673: Attempting to stop 'ora.asm' on 'host01'
CRS-2677: Stop of 'ora.MGMTLSNR' on 'host01' succeeded
CRS-2673: Attempting to stop 'ora.host01.vip' on 'host01'
CRS-2677: Stop of 'ora.host01.vip' on 'host01' succeeded
CRS-2677: Stop of 'ora.asm' on 'host01' succeeded
CRS-2673: Attempting to stop 'ora.ASMNET1LSNR_ASM.lsnr' on 'host01'
CRS-2677: Stop of 'ora.ASMNET1LSNR_ASM.lsnr' on 'host01' succeeded
CRS-2673: Attempting to stop 'ora.ons' on 'host01'
CRS-2677: Stop of 'ora.ons' on 'host01' succeeded
CRS-2673: Attempting to stop 'ora.net1.network' on 'host01'
CRS-2677: Stop of 'ora.net1.network' on 'host01' succeeded
CRS-2792: Shutdown of Cluster Ready Services-managed resources on
'host01' has completed
CRS-2677: Stop of 'ora.crsd' on 'host01' succeeded
CRS-2673: Attempting to stop 'ora.ctssd' on 'host01'
CRS-2673: Attempting to stop 'ora.evmd' on 'host01'
CRS-2673: Attempting to stop 'ora.storage' on 'host01'
CRS-2677: Stop of 'ora.storage' on 'host01' succeeded
CRS-2673: Attempting to stop 'ora.asm' on 'host01'
CRS-2677: Stop of 'ora.ctssd' on 'host01' succeeded
CRS-2677: Stop of 'ora.evmd' on 'host01' succeeded
CRS-2677: Stop of 'ora.asm' on 'host01' succeeded
CRS-2673: Attempting to stop 'ora.cluster_interconnect.haip' on
'host01'
CRS-2677: Stop of 'ora.cluster_interconnect.haip' on 'host01'
succeeded
CRS-2673: Attempting to stop 'ora.cssd' on 'host01'
CRS-2677: Stop of 'ora.cssd' on 'host01' succeeded
CRS-2791: Starting shutdown of Oracle High Availability Services-
managed resources on 'host01'
CRS-2673: Attempting to stop 'ora.mdnsd' on 'host01'
CRS-2673: Attempting to stop 'ora.crf' on 'host01'
CRS-2673: Attempting to stop 'ora.gpnpd' on 'host01'
```

```
CRS-2673: Attempting to stop 'ora.drivers.acfs' on 'host01'
CRS-2677: Stop of 'ora.drivers.acfs' on 'host01' succeeded
CRS-2677: Stop of 'ora.mdnsd' on 'host01' succeeded
CRS-2677: Stop of 'ora.gpnpd' on 'host01' succeeded
CRS-2677: Stop of 'ora.crf' on 'host01' succeeded
CRS-2673: Attempting to stop 'ora.gipcd' on 'host01'
CRS-2677: Stop of 'ora.gipcd' on 'host01' succeeded
CRS-2793: Shutdown of Oracle High Availability Services-managed
resources on 'host01' has completed
CRS-4133: Oracle High Availability Services has been stopped.
CRS-2791: Starting shutdown of Oracle High Availability Services-
managed resources on 'host02'
CRS-2673: Attempting to stop 'ora.drivers.acfs' on 'host02'
CRS-2673: Attempting to stop 'ora.mdnsd' on 'host02'
CRS-2673: Attempting to stop 'ora.crf' on 'host02'
CRS-2673: Attempting to stop 'ora.gpnpd' on 'host02'
CRS-2677: Stop of 'ora.drivers.acfs' on 'host02' succeeded
CRS-2677: Stop of 'ora.crf' on 'host02' succeeded
CRS-2673: Attempting to stop 'ora.gipcd' on 'host02'
CRS-2677: Stop of 'ora.gpnpd' on 'host02' succeeded
CRS-2677: Stop of 'ora.mdnsd' on 'host02' succeeded
CRS-2677: Stop of 'ora.gipcd' on 'host02' succeeded
CRS-2793: Shutdown of Oracle High Availability Services-managed
resources on 'host02' has completed
CRS-4133: Oracle High Availability Services has been stopped.
CRS-2791: Starting shutdown of Oracle High Availability Services-
managed resources on 'host03'
CRS-2673: Attempting to stop 'ora.drivers.acfs' on 'host03'
CRS-2673: Attempting to stop 'ora.crf' on 'host03'
CRS-2673: Attempting to stop 'ora.mdnsd' on 'host03'
CRS-2673: Attempting to stop 'ora.gpnpd' on 'host03'
CRS-2677: Stop of 'ora.drivers.acfs' on 'host03' succeeded
CRS-2677: Stop of 'ora.crf' on 'host03' succeeded
CRS-2673: Attempting to stop 'ora.gipcd' on 'host03'
CRS-2677: Stop of 'ora.mdnsd' on 'host03' succeeded
CRS-2677: Stop of 'ora.gpnpd' on 'host03' succeeded
CRS-2677: Stop of 'ora.gipcd' on 'host03' succeeded
CRS-2793: Shutdown of Oracle High Availability Services-managed
resources on 'host03' has completed
CRS-4133: Oracle High Availability Services has been stopped.
CRS-2791: Starting shutdown of Oracle High Availability Services-
managed resources on 'host04'
CRS-2673: Attempting to stop 'ora.crf' on 'host04'
CRS-2673: Attempting to stop 'ora.mdnsd' on 'host04'
```

```

CRS-2673: Attempting to stop 'ora.drivers.acfs' on 'host04'
CRS-2673: Attempting to stop 'ora.gpnpd' on 'host04'
CRS-2677: Stop of 'ora.crf' on 'host04' succeeded
CRS-2673: Attempting to stop 'ora.gipcd' on 'host04'
CRS-2677: Stop of 'ora.drivers.acfs' on 'host04' succeeded
CRS-2677: Stop of 'ora.mdnscd' on 'host04' succeeded
CRS-2677: Stop of 'ora.gipcd' on 'host04' succeeded
CRS-2677: Stop of 'ora.gpnpd' on 'host04' succeeded
CRS-2793: Shutdown of Oracle High Availability Services-managed
resources on 'host04' has completed
CRS-4133: Oracle High Availability Services has been stopped.
CRS-2791: Starting shutdown of Oracle High Availability Services-
managed resources on 'host05'
CRS-2673: Attempting to stop 'ora.mdnscd' on 'host05'
CRS-2673: Attempting to stop 'ora.gpnpd' on 'host05'
CRS-2673: Attempting to stop 'ora.crf' on 'host05'
CRS-2673: Attempting to stop 'ora.drivers.acfs' on 'host05'
CRS-2677: Stop of 'ora.drivers.acfs' on 'host05' succeeded
CRS-2677: Stop of 'ora.gpnpd' on 'host05' succeeded
CRS-2677: Stop of 'ora.mdnscd' on 'host05' succeeded
CRS-2677: Stop of 'ora.crf' on 'host05' succeeded
CRS-2673: Attempting to stop 'ora.gipcd' on 'host05'
CRS-2677: Stop of 'ora.gipcd' on 'host05' succeeded
CRS-2793: Shutdown of Oracle High Availability Services-managed
resources on 'host05' has completed
CRS-4133: Oracle High Availability Services has been stopped.

#####
Task 2 of 6: Blunt force execution of ohasd
#####
Fri Feb  2 06:52:27 UTC 2018

sh: cannot set terminal process group (-1): Inappropriate ioctl for
device
sh: no job control in this shell
sh: cannot set terminal process group (-1): Inappropriate ioctl for
device
sh: no job control in this shell
sh: cannot set terminal process group (-1): Inappropriate ioctl for
device
sh: no job control in this shell
sh: cannot set terminal process group (-1): Inappropriate ioctl for
device
sh: no job control in this shell

```

```
#####
Task 3 of 6: Blast the Grid Home and asst. directories
#####
Fri Feb  2 06:52:28 UTC 2018
```

```
#####
Task 4 of 6: remove OHASD init files
#####
Fri Feb  2 06:53:43 UTC 2018
```

```
#####
Task 5 of 6: remove /etc/oratab /etc/oracle/* if they exist
#####
Fri Feb  2 06:53:45 UTC 2018
```

```
#####
Task 6 of 6: Reconfigure ASM Disks
#####
Fri Feb  2 06:53:53 UTC 2018
```

```
File is /dev/c1_DATA1_dsk1
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.3802 s, 34.1 MB/s
File is /dev/c1_DATA1_dsk10
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 16.1893 s, 32.4 MB/s
File is /dev/c1_DATA1_dsk11
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 14.8967 s, 35.2 MB/s
File is /dev/c1_DATA1_dsk12
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.6356 s, 33.5 MB/s
File is /dev/c1_DATA1_dsk13
500+0 records in
```

```
500+0 records out
524288000 bytes (524 MB) copied, 15.2118 s, 34.5 MB/s
File is /dev/c1_DATA1_dsk14
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.4589 s, 33.9 MB/s
File is /dev/c1_DATA1_dsk2
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.2421 s, 34.4 MB/s
File is /dev/c1_DATA1_dsk3
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.7726 s, 33.2 MB/s
File is /dev/c1_DATA1_dsk4
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 16.183 s, 32.4 MB/s
File is /dev/c1_DATA1_dsk5
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.5332 s, 33.8 MB/s
File is /dev/c1_DATA1_dsk6
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 14.4756 s, 36.2 MB/s
File is /dev/c1_DATA1_dsk7
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.6824 s, 33.4 MB/s
File is /dev/c1_DATA1_dsk8
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 14.2983 s, 36.7 MB/s
File is /dev/c1_DATA1_dsk9
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.4995 s, 33.8 MB/s
File is /dev/c1_FRA_dsk1
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 14.9146 s, 35.2 MB/s
```

```
File is /dev/c1_FRA_dsk10
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.6884 s, 33.4 MB/s
File is /dev/c1_FRA_dsk11
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.3823 s, 34.1 MB/s
File is /dev/c1_FRA_dsk12
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.5148 s, 33.8 MB/s
File is /dev/c1_FRA_dsk13
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 14.8512 s, 35.3 MB/s
File is /dev/c1_FRA_dsk14
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 16.4422 s, 31.9 MB/s
File is /dev/c1_FRA_dsk2
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.3861 s, 34.1 MB/s
File is /dev/c1_FRA_dsk3
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.8307 s, 33.1 MB/s
File is /dev/c1_FRA_dsk4
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.2769 s, 34.3 MB/s
File is /dev/c1_FRA_dsk5
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 16.0431 s, 32.7 MB/s
File is /dev/c1_FRA_dsk6
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.3924 s, 34.1 MB/s
File is /dev/c1_FRA_dsk7
500+0 records in
```

```
500+0 records out
524288000 bytes (524 MB) copied, 15.9975 s, 32.8 MB/s
File is /dev/c1_FRA_dsk8
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.8971 s, 33.0 MB/s
File is /dev/c1_FRA_dsk9
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.2763 s, 34.3 MB/s
File is /dev/c1_SPARE_dsk1
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.8795 s, 33.0 MB/s
File is /dev/c1_SPARE_dsk10
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.6957 s, 33.4 MB/s
File is /dev/c1_SPARE_dsk11
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.5577 s, 33.7 MB/s
File is /dev/c1_SPARE_dsk12
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.0733 s, 34.8 MB/s
File is /dev/c1_SPARE_dsk13
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.9384 s, 32.9 MB/s
File is /dev/c1_SPARE_dsk14
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 14.4597 s, 36.3 MB/s
File is /dev/c1_SPARE_dsk15
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.6399 s, 33.5 MB/s
File is /dev/c1_SPARE_dsk2
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.6163 s, 33.6 MB/s
```

```
File is /dev/c1_SPARE_dsk3
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 16.0978 s, 32.6 MB/s
File is /dev/c1_SPARE_dsk5
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.3544 s, 34.1 MB/s
File is /dev/c1_SPARE_dsk6
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 16.1956 s, 32.4 MB/s
File is /dev/c1_SPARE_dsk7
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 14.9906 s, 35.0 MB/s
File is /dev/c1_SPARE_dsk8
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.7242 s, 33.3 MB/s
File is /dev/c1_SPARE_dsk9
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.3492 s, 34.2 MB/s
File is /dev/c1_MGMT_dsk1
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.8166 s, 33.1 MB/s
File is /dev/c1_MGMT_dsk10
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.3177 s, 34.2 MB/s
File is /dev/c1_MGMT_dsk11
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.5019 s, 33.8 MB/s
File is /dev/c1_MGMT_dsk12
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.0973 s, 34.7 MB/s
File is /dev/c1_MGMT_dsk13
500+0 records in
```

```
500+0 records out
524288000 bytes (524 MB) copied, 15.6118 s, 33.6 MB/s
File is /dev/c1_MGMT_dsk14
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 119.925 s, 4.4 MB/s
File is /dev/c1_MGMT_dsk2
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.151 s, 34.6 MB/s
File is /dev/c1_MGMT_dsk3
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.8417 s, 33.1 MB/s
File is /dev/c1_MGMT_dsk4
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 14.9499 s, 35.1 MB/s
File is /dev/c1_MGMT_dsk5
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.7069 s, 33.4 MB/s
File is /dev/c1_MGMT_dsk6
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.2488 s, 34.4 MB/s
File is /dev/c1_MGMT_dsk7
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.2711 s, 34.3 MB/s
File is /dev/c1_MGMT_dsk8
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 14.3458 s, 36.5 MB/s
File is /dev/c1_MGMT_dsk9
500+0 records in
500+0 records out
524288000 bytes (524 MB) copied, 15.96 s, 32.9 MB/s

#####
Completed All 6 Tasks
#####
```

Fri Feb 2 07:10:04 UTC 2018

Elapsed Real Time: 19:49.09
 [root@host01 catchup]#

2. Optionally, delete the large files in the /var/log and /tmp directories.

```
[root@host01 catchup]# ssh host01 rm -f /var/log/mess*
[root@host01 catchup]# ssh host02 rm -f /var/log/mess*
[root@host01 catchup]# ssh host03 rm -f /var/log/mess*
[root@host01 catchup]# ssh host04 rm -f /var/log/mess*
[root@host01 catchup]# ssh host05 rm -f /var/log/mess*
[root@host01 catchup]#
[root@host01 catchup]# ssh host01 rm -rf /tmp/*
[root@host01 catchup]# ssh host02 rm -rf /tmp/*
[root@host01 catchup]# ssh host03 rm -rf /tmp/*
[root@host01 catchup]# ssh host04 rm -rf /tmp/*
[root@host01 catchup]# ssh host05 rm -rf /tmp/*
[root@host01 catchup]#
```

3. Optionally, purge the deleted files that are held open to reclaim disk space.

```
[root@host01 catchup]# lsof |grep delete
java      4322      root    txt      REG            202,2
7734     745648          /u01/app/12.2.0/grid/jdk/jre/bin/java
(deleted)
...
[root@host01 catchup]# kill -9 4322
[root@host01 catchup]# lsof |grep delete
[root@host01 catchup]#
[root@host01 catchup]# ssh host02 lsof|grep delete
java      29466      root    txt      REG            202,2
7734     986836 /u01/app/12.2.0/grid/jdk/jre/bin/java (deleted)
...
[root@host01 catchup]# ssh host02 kill -9 29466
[root@host01 catchup]# ssh host02 lsof |grep delete
[root@host01 catchup]#
[root@host01 catchup]# ssh host03 lsof|grep delete
java      20160      root    txt      REG            202,2
7734     1518544 /u01/app/12.2.0/grid/jdk/jre/bin/java (deleted)
...
[root@host01 catchup]# ssh host03 kill -9 20160
[root@host01 catchup]# ssh host03 lsof|grep delete
[root@host01 catchup]#
[root@host01 catchup]# ssh host04 lsof|grep delete
nautilus  3002      oracle   19r      REG            202,2
524     1581093 /home/oracle/.local/share/gvfs-metadata/home
(deleted)
nautilus  3002      oracle   20r      REG            202,2
32768    1583605 /home/oracle/.local/share/gvfs-metadata/home-
cdd03e8e.log (deleted)
java      23432      root    txt      REG            202,2
```

```

7734      360449 /u01/app/12.2.0/grid/jdk/jre/bin/java (deleted)
...
[root@host01 catchup]# ssh host04 kill -9 3002 23432
[root@host01 catchup]# ssh host04 lsof|grep delete
[root@host01 catchup]#
[root@host01 catchup]# ssh host05 lsof|grep delete
java      14322      root    txt      REG          202,2
7734      114768 /u01/app/12.2.0/grid/jdk/jre/bin/java (deleted)
...
tail      21883      grid    3r      REG          202,2
5800      1430917
/u01/app/12.2.0/grid/install/root_host05.example.com_2018-01-
27_11-36-01-428452867.log (deleted)
[root@host01 catchup]# ssh host05 kill -9 14322 21883
[root@host01 catchup]# ssh host05 lsof|grep delete
[root@host01 catchup]#

```

4. Make sure the root file system (/) has enough space. The available space should be close enough to the one in the output.

```

[root@host01 catchup]# ssh host01 df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/xvda2     128G  7.2G  114G  6% /
tmpfs           6.0G   76K   6.0G  1% /dev/shm
/dev/xvda1     488M  133M  330M 29% /boot
/dev/xvdf1      12G   6.5G  4.7G 58% /stage

[root@host01 catchup]# ssh host02 df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/xvda2     29G   5.6G  22G  21% /
tmpfs           6.0G   0    6.0G  0% /dev/shm
/dev/xvda1     488M  133M  330M 29% /boot
/dev/xvdf1      12G   6.5G  4.7G 58% /stage

[root@host01 catchup]# ssh host03 df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/xvda2     29G   5.4G  23G  20% /
tmpfs           4.9G   0    4.9G  0% /dev/shm
/dev/xvda1     488M  107M  356M 24% /boot
/dev/xvdf1      12G   6.5G  4.7G 58% /stage

[root@host01 catchup]# ssh host04 df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/xvda2     29G   5.4G  23G  20% /
tmpfs           4.9G   76K   4.9G  1% /dev/shm
/dev/xvda1     488M  108M  356M 24% /boot
/dev/xvdf1      12G   6.5G  4.7G 58% /stage

[root@host01 catchup]# ssh host05 df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/xvda2     29G   5.5G  22G  20% /
tmpfs           4.8G   76K   4.8G  1% /dev/shm
/dev/xvda1     488M  117M  346M 26% /boot

```

```
/dev/xvdf1      12G  6.5G  4.7G  58% /stage  
[root@host01 catchup]#
```

5. Now, you can run the **catchup** script (`less01_grid_catchup.sh`) to install and configure the Grid Infrastructure software.

- Refer to **Appendix A-2:** Catchup for Practice 1 (Grid Infrastructure)

Practices for Appendix C-2: Catchup Script for Practice 1 (Grid Infrastructure)

Estimated Time: 60min

1. Open a terminal window to connect to host01 as root user. Make sure the /u01/app/12.2.0/grid directory is empty.

```
[oracle@dns ~] ssh root@host01
root@host01's Password:

[root@host01 ~]# ssh host01 ls -l /u01/app/12.2.0/grid
ls: cannot access /u01/app/12.2.0/grid: No such file or directory

[root@host01 ~]# ssh host02 ls -l /u01/app/12.2.0/grid
ls: cannot access /u01/app/12.2.0/grid: No such file or directory

[root@host01 ~]# ssh host03 ls -l /u01/app/12.2.0/grid
ls: cannot access /u01/app/12.2.0/grid: No such file or directory

[root@host01 ~]# ssh host04 ls -l /u01/app/12.2.0/grid
ls: cannot access /u01/app/12.2.0/grid: No such file or directory

[root@host01 ~]# ssh host05 ls -l /u01/app/12.2.0/grid
ls: cannot access /u01/app/12.2.0/grid: No such file or directory

[root@host01 ~]#
```

2. Run the less01_grid_catchup.sh script.

```
[root@host01 ~]# cd /stage/ASM/solutions/less_01/catchup
[root@host01 ~]# ./less01_grid_catchup.sh

#####
Task 1 of 7: Creating software directories
#####
Fri Feb 2 17:42:03 UTC 2018

#####
Task 2 of 7: Configuring NSCD
#####
Fri Feb 2 17:42:08 UTC 2018

#####
Task 3 of 7: Configuring shell limits
#####
Fri Feb 2 17:42:11 UTC 2018

bash_profile          100%   194      0.2KB/s  00:00
bash_profile          100%   194      0.2KB/s  00:00
limits.conf           100%  1400     1.4KB/s  00:00
```

```
profile          100% 1308     1.3KB/s  00:00
profile          100% 1308     1.3KB/s  00:00
bash_profile    100% 194      0.2KB/s  00:00
bash_profile    100% 194      0.2KB/s  00:00
limits.conf     100% 1400     1.4KB/s  00:00
profile          100% 1308     1.3KB/s  00:00
profile          100% 1308     1.3KB/s  00:00
bash_profile    100% 194      0.2KB/s  00:00
bash_profile    100% 194      0.2KB/s  00:00
limits.conf     100% 1400     1.4KB/s  00:00
profile          100% 1308     1.3KB/s  00:00
profile          100% 1308     1.3KB/s  00:00
bash_profile    100% 194      0.2KB/s  00:00
bash_profile    100% 194      0.2KB/s  00:00
limits.conf     100% 1400     1.4KB/s  00:00
profile          100% 1308     1.3KB/s  00:00
profile          100% 1308     1.3KB/s  00:00
bash_profile    100% 194      0.2KB/s  00:00
bash_profile    100% 194      0.2KB/s  00:00
limits.conf     100% 1400     1.4KB/s  00:00
profile          100% 1308     1.3KB/s  00:00
profile          100% 1308     1.3KB/s  00:00
bash_profile    100% 194      0.2KB/s  00:00
bash_profile    100% 194      0.2KB/s  00:00
limits.conf     100% 1400     1.4KB/s  00:00
profile          100% 1308     1.3KB/s  00:00
profile          100% 1308     1.3KB/s  00:00
#####
Task 4 of 7: Unzipping the Grid Infrastructure SW
#####
Fri Feb  2 17:42:16 UTC 2018

Archive: /stage/clusterware.zip
  creating: /u01/app/12.2.0/grid/addnode/
  inflating: /u01/app/12.2.0/grid/addnode/addnode_oraparam.ini.sbs
  inflating: /u01/app/12.2.0/grid/addnode/addnode.pl
  inflating: /u01/app/12.2.0/grid/addnode/addnode.sh
  inflating: /u01/app/12.2.0/grid/addnode/addnode_oraparam.ini
  creating: /u01/app/12.2.0/grid/assistants/
  creating: /u01/app/12.2.0/grid/assistants/jlib/
  inflating: /u01/app/12.2.0/grid/assistants/jlib/initconfig
  inflating: /u01/app/12.2.0/grid/assistants/jlib/appfwk.jar
...
/u01/app/12.2.0/grid/lib/libodm12.so -> libodmd12.so
/u01/app/12.2.0/grid/lib/libagtsh.so -> libagtsh.so.1.0
/u01/app/12.2.0/grid/lib/libclntsh.so -> libclntsh.so.12.1
/u01/app/12.2.0/grid/lib/libocci.so -> libocci.so.12.1
#####
Task 5 of 7: Installing cvuqdisk RPM
#####
Fri Feb  2 17:44:29 UTC 2018

Preparing...
#####
[100%]
  package cvuqdisk-1.0.10-1.x86_64 is already installed
```

```

Preparing...
#####
    package cvuqdisk-1.0.10-1.x86_64 is already installed

```

- After a few moments, the Oracle Grid Infrastructure Setup Wizard is launched.

```

#####
Task 6 of 7: Run OUI to create the cluster
#####
Fri Feb  2 17:44:34 UTC 2018

Launching Oracle Grid Infrastructure Setup Wizard...

You can find the log of this install session at:
  /tmp/GridSetupActions2018-02-02_05-44-34PM/gridSetupActions2018-02-
  02_05-44-34PM.log

```

- Open a terminal window connected to host01 as the root user and monitor the installation progress. The following tasks are performed in this stage.

- Installing Oracle Grid Infrastructure on host01 to host05
- Creating the MGMT database
- Running the CLUVFY utility

```

[oracle@dns ~]$ ssh root@host01
root@host01's password:

[root@host01 ~]# tail -f /tmp/GridSetupActions2018-02-02_05-44-
34PM/gridSetupActions2018-02-02_05-44-34PM.log

...

INFO: [Timestamp] Successfully executed the flow in SILENT mode
INFO: [Timestamp] Finding the most appropriate exit status for the
current application
INFO: [Timestamp] inventory location is/u01/app/oraInventory
INFO: [Timestamp] Finding the most appropriate exit status for the
current application
INFO: [Timestamp] Exit Status is 0
INFO: [Timestamp] Shutdown Oracle Grid Infrastructure 12c Release 2
Installer

```

5. Switch to the first terminal window to monitor the rest of tasks.

```
You can find the log of this install session at:  
/tmp/GridSetupActions2018-02-02_05-44-34PM/gridSetupActions2018-02-  
02_05-44-34PM.log  
  
Successfully Setup Software  
Moved the install session logs to :  
/u01/app/oraInventory/logs/GridSetupActions2017-12-07_01-16-57PM  
  
As a root user, execute the following script(s):  
1. /u01/app/oraInventory/orainstRoot.sh  
2. /u01/app/12.2.0/grid/root.sh  
  
Execute /u01/app/oraInventory/orainstRoot.sh on the following nodes:  
[host01, host02, host03, host04, host05]  
Execute /u01/app/12.2.0/grid/root.sh on the following nodes:  
[host01, host02, host03, host04, host05]  
  
Execute the script on the local node first. After successful  
completion, you can execute the script in parallel on all other nodes.  
Oracle recommends that the script executes on all HB nodes before  
executing the script on LEAF nodes.  
  
Successfully Setup Software.  
As install user, execute the following command to complete the  
configuration.  
/u01/app/12.2.0/grid/gridSetup.sh -executeConfigTools -  
responseFile /stage/RAC/solutions/less_01/catchup/less01_grid.rsp [-  
silent]  
  
Moved the install session logs to:  
/u01/app/oraInventory/logs/GridSetupActions2018-02-02_05-44-34PM  
Changing permissions of /u01/app/oraInventory.  
Adding read,write permissions for group.  
Removing read,write,execute permissions for world.  
  
Changing groupname of /u01/app/oraInventory to oinstall.  
The execution of the script is complete.  
Changing permissions of /u01/app/oraInventory.  
Adding read,write permissions for group.  
Removing read,write,execute permissions for world.  
  
Changing groupname of /u01/app/oraInventory to oinstall.  
The execution of the script is complete.  
Changing permissions of /u01/app/oraInventory.  
Adding read,write permissions for group.  
Removing read,write,execute permissions for world.  
  
Changing groupname of /u01/app/oraInventory to oinstall.  
The execution of the script is complete.
```

```
Changing permissions of /u01/app/oraInventory.  
Adding read,write permissions for group.  
Removing read,write,execute permissions for world.  
  
Changing groupname of /u01/app/oraInventory to oinstall.  
The execution of the script is complete.  
Changing permissions of /u01/app/oraInventory.  
Adding read,write permissions for group.  
Removing read,write,execute permissions for world.  
  
Changing groupname of /u01/app/oraInventory to oinstall.  
The execution of the script is complete.  
Check /u01/app/12.2.0/grid/install/root_host01.example.com_2018-02-  
02_18-00-22-350262475.lo for the output of root script  
Check /u01/app/12.2.0/grid/install/root_host02.example.com_2018-02-  
02_18-13-48-077925368.lo for the output of root script  
Check /u01/app/12.2.0/grid/install/root_host03.example.com_2018-02-  
02_18-19-28-852096296.lo for the output of root script  
Check /u01/app/12.2.0/grid/install/root_host04.example.com_2018-02-  
02_18-25-05-782707676.lo for the output of root script  
Check /u01/app/12.2.0/grid/install/root_host05.example.com_2018-02-  
02_18-28-50-031415660.lo for the output of root script  
  
#####
Task 7 of 7: Run the config tools to complete cluster config
#####
Fri Feb  2 11:16:21 UTC 2018  
  
Fri Feb  2 18:32:32 UTC 2018  
  
Setting the invPtrLoc to /u01/app/12.2.0/grid/oraInst.loc  
perform - mode is starting for action: configure  
  
perform - mode finished for action: configure  
  
You can see the log file:  
/u01/app/12.2.0/grid/cfgtoollogs/oui/configActions2018-02-02_06-3-34-  
PM.log  
  
Post configuration completed successfully  
  
Fri Feb  2 18:34:50 UTC 2018  
Elapsed Real Time: 52:46.75  
  
[root@host01 catchup] #
```

6. Open a new terminal window connected to host01 as the grid user. Check the status of the cluster. Ensure that all the listed services are online on all cluster nodes.

```
[oracle@dns ~]$ ssh grid@host01
grid@host01's password:

[grid@host01 ~]$ . oraenv
ORACLE_SID = [grid] ? +ASM1
The oracle base has been set to /u01/app/grid

[grid@host01 ~]$ crsctl check cluster -all

*****
host01:
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
*****
host02:
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
*****
host03:
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
*****
host04:
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
*****
host05:
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
*****
```

[grid@host01 ~]\$ crsctl stat res -t

Name	Target	State	Server	State details
<hr/> Local Resources <hr/>				
ora.ASMNET1LSNR_ASM.lsnr	ONLINE	ONLINE	host01	STABLE
	ONLINE	ONLINE	host02	STABLE
	ONLINE	ONLINE	host03	STABLE
ora.DATA.dg	ONLINE	ONLINE	host01	STABLE
	ONLINE	ONLINE	host02	STABLE

	ONLINE	ONLINE	host03	STABLE
ora.LISTENER.lsnr				
	ONLINE	ONLINE	host01	STABLE
	ONLINE	ONLINE	host02	STABLE
	ONLINE	ONLINE	host03	STABLE
ora.LISTENER_LEAF.lsnr				
	OFFLINE	OFFLINE	host04	STABLE
	OFFLINE	OFFLINE	host05	STABLE
ora.MGMT.dg				
	ONLINE	ONLINE	host01	STABLE
	ONLINE	ONLINE	host02	STABLE
	ONLINE	ONLINE	host03	STABLE
ora.chad				
	ONLINE	ONLINE	host01	STABLE
	ONLINE	ONLINE	host02	STABLE
	ONLINE	ONLINE	host03	STABLE
	ONLINE	ONLINE	host04	STABLE
	ONLINE	ONLINE	host05	STABLE
ora.net1.network				
	ONLINE	ONLINE	host01	STABLE
	ONLINE	ONLINE	host02	STABLE
	ONLINE	ONLINE	host03	STABLE
ora.ons				
	ONLINE	ONLINE	host01	STABLE
	ONLINE	ONLINE	host02	STABLE
	ONLINE	ONLINE	host03	STABLE
ora.proxy_advm				
	OFFLINE	OFFLINE	host01	STABLE
	OFFLINE	OFFLINE	host02	STABLE
	OFFLINE	OFFLINE	host03	STABLE
<hr/>				
Cluster Resources				
<hr/>				
ora.LISTENER_SCAN1.lsnr				
	1	ONLINE	ONLINE	host03
ora.LISTENER_SCAN2.lsnr				
	1	ONLINE	ONLINE	host02
ora.LISTENER_SCAN3.lsnr				
	1	ONLINE	ONLINE	host01
ora.MGMLSRR				
	1	ONLINE	ONLINE	host01
				169.254.2.192
				192.168.1.101
				192.168.2.101
				, STABLE
ora.asm				
	1	ONLINE	ONLINE	host01
	2	ONLINE	ONLINE	host03
	3	ONLINE	ONLINE	host02
ora.cvu				
	1	ONLINE	ONLINE	host01
ora.gns				
	1	ONLINE	ONLINE	host01
ora.gns.vip				

	1	ONLINE	ONLINE	host01	STABLE
ora.host01.vip	1	ONLINE	ONLINE	host01	STABLE
ora.host02.vip	1	ONLINE	ONLINE	host02	STABLE
ora.host03.vip	1	ONLINE	ONLINE	host03	STABLE
ora.mgmtdb	1	ONLINE	ONLINE	host01	Open, STABLE
ora.qosmserver	1	ONLINE	ONLINE	host01	STABLE
ora.scan1.vip	1	ONLINE	ONLINE	host03	STABLE
ora.scan2.vip	1	ONLINE	ONLINE	host02	STABLE
ora.scan3.vip	1	ONLINE	ONLINE	host01	STABLE

1. Optionally, delete the large files in the /var/log and /tmp directories.

```
[root@host01 catchup]# ssh host01 rm -f /var/log/mess*
[root@host01 catchup]# ssh host02 rm -f /var/log/mess*
[root@host01 catchup]# ssh host03 rm -f /var/log/mess*
[root@host01 catchup]# ssh host04 rm -f /var/log/mess*
[root@host01 catchup]# ssh host05 rm -f /var/log/mess*
[root@host01 catchup]#
[root@host01 catchup]# ssh host01 rm -rf /tmp/*
[root@host01 catchup]# ssh host02 rm -rf /tmp/*
[root@host01 catchup]# ssh host03 rm -rf /tmp/*
[root@host01 catchup]# ssh host04 rm -rf /tmp/*
[root@host01 catchup]# ssh host05 rm -rf /tmp/*
[root@host01 catchup]#
```

2. Optionally, purge the deleted files that are held open to reclaim disk space.

```
[root@host01 catchup]# lsof |grep delete
java      4322      root  txt      REG          202,2
7734      745648                  /u01/app/12.2.0/grid/jdk/jre/bin/java
(deleted)
...
[root@host01 catchup]# kill -9 4322
[root@host01 catchup]# lsof |grep delete
[root@host01 catchup]#
[root@host01 catchup]# ssh host02 lsof|grep delete
java      29466      root  txt      REG          202,2
7734      986836 /u01/app/12.2.0/grid/jdk/jre/bin/java (deleted)
...
[root@host01 catchup]# ssh host02 kill -9 29466
[root@host01 catchup]# ssh host02 lsof |grep delete
```

```
[root@host01 catchup]#
[root@host01 catchup]# ssh host03 lsof|grep delete
java      20160      root    txt      REG          202,2
7734    1518544 /u01/app/12.2.0/grid/jdk/jre/bin/java (deleted)
...
[root@host01 catchup]# ssh host03 kill -9 20160
[root@host01 catchup]# ssh host03 lsof|grep delete
[root@host01 catchup]#
[root@host01 catchup]# ssh host04 lsof|grep delete
nautilus   3002    oracle   19r      REG          202,2
524    1581093 /home/oracle/.local/share/gvfs-metadata/home
(deleted)
nautilus   3002    oracle   20r      REG          202,2
32768    1583605 /home/oracle/.local/share/gvfs-metadata/home-
cd03e8e.log (deleted)
java      23432      root    txt      REG          202,2
7734    360449 /u01/app/12.2.0/grid/jdk/jre/bin/java (deleted)
...
[root@host01 catchup]# ssh host04 kill -9 3002 23432
[root@host01 catchup]# ssh host04 lsof|grep delete
[root@host01 catchup]#
[root@host01 catchup]# ssh host05 lsof|grep delete
java      14322      root    txt      REG          202,2
7734    114768 /u01/app/12.2.0/grid/jdk/jre/bin/java (deleted)
...
tail     21883      grid    3r      REG          202,2
5800    1430917
/u01/app/12.2.0/grid/install/root_host05.example.com_2018-01-
27_11-36-01-428452867.log (deleted)
[root@host01 catchup]# ssh host05 kill -9 14322 21883
[root@host01 catchup]# ssh host05 lsof|grep delete
[root@host01 catchup]#
```

7. Now, you can run the **catchup** script (`less01_db_catchup.sh`) to install Oracle database SW and create the `orcl` database.
 - Refer to **Appendix A-3: Catchup for Practice 1 (Database)**

Practices for Appendix C-3: Catchup Script for Practice 1 (Database)

Estimated Time: 40min

1. Open a terminal window to connect to host01 as root user. Make sure that the root file system (/) has at least 8GB of free space.

```
[oracle@dns ~] ssh root@host01
root@host01's Password:
[root@host01 ~]# ssh host01 df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/xvda2     128G   18G  104G  15% /
tmpfs          6.0G  641M  5.4G  11% /dev/shm
/dev/xvda1     488M  133M  330M  29% /boot
/dev/xvdf1      12G   6.5G  4.7G  58% /stage
[root@host01 ~]#
[root@host01 ~]# ssh host02 df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/xvda2     29G   15G  14G  52% /
tmpfs          6.0G  640M  5.4G  11% /dev/shm
/dev/xvda1     488M  133M  330M  29% /boot
/dev/xvdf1      12G   6.5G  4.7G  58% /stage
[root@host01 ~]#
[root@host01 ~]# ssh host03 df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/xvda2     29G   15G  14G  52% /
tmpfs          4.9G  640M  4.3G  13% /dev/shm
/dev/xvda1     488M  107M  356M  24% /boot
/dev/xvdf1      12G   6.5G  4.7G  58% /stage
[root@host01 ~]#
[root@host01 ~]# ssh host04 df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/xvda2     29G   15G  14G  52% /
tmpfs          4.9G   76K  4.9G   1% /dev/shm
/dev/xvda1     488M  108M  356M  24% /boot
/dev/xvdf1      12G   6.5G  4.7G  58% /stage
[root@host01 ~]#
[root@host01 ~]# ssh host05 df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/xvda2     29G   15G  14G  52% /
tmpfs          4.8G   76K  4.8G   1% /dev/shm
/dev/xvda1     488M  117M  346M  26% /boot
/dev/xvdf1      12G   6.5G  4.7G  58% /stage
[root@host01 ~]#
```

2. Run the less01_db_catchup.sh script.

```
[root@host01 ~]# cd /stage/ASM/solutions/less_01/catchup
[root@host01 catchup]# ./less01_db_catchup.sh

#####
Task 1 of 5: Create and mount FRA disk group
```

```
# ##### Fri Dec 8 09:13:34 UTC 2017
```

```
#####
Task 2 of 5: Change the permission on /u01/app
#####
Fri Dec  8 09:13:38 UTC 2017
```

```
#####
Task 3 of 5: Run OUI to install software
#####
Fri Dec  8 09:13:39 UTC 2017
```

Starting Oracle Universal Installer...

Checking Temp space: must be greater than 500 MB. Actual 106913 MB
Passed

Checking swap space: must be greater than 150 MB. Actual 10699 MB Passed
Preparing to launch Oracle Universal Installer from /tmp/OraInstall2017-12-08_09-13-39AM. Please wait ... You can find the log of this install session at:

/u01/app/oraInventory/logs/installActions2017-12-08_09-13-39AM.log

Prepare in progress.

Prepare successful.

Copy files in progress.

14%	Done.
20%	Done.
25%	Done.
30%	Done.
36%	Done.
45%	Done.
50%	Done.
55%	Done.
60%	Done.
65%	Done.

Copy files successful.

Link binaries in progress.

Link binaries successful.

Setup files in progress.

Setup files successful.

Setup Inventory in progress.

Setup Inventory successful.

Finish Setup successful.

The installation of Oracle Database 12c was successful.

Please check '/u01/app/oraInventory/logs/silentInstall2017-12-08_09-13-39AM.log' for more details.

Copy Files to Remote Nodes in progress.

Copy Files to Remote Nodes successful.

..... 85% Done.

Prepare in progress.

Prepare successful.

.....

Setup in progress.

.....

Setup successful.

The Cluster Node Addition of /u01/app/oracle/product/12.2.0/dbhome_1 was successful.

Please check '/u01/app/oraInventory/logs/silentInstall2017-12-08_09-13-39AM.log' for more details.

Setup Oracle Base in progress.

Setup Oracle Base successful.

..... 97% Done.

As a root user, execute the following script(s):

1. /u01/app/oracle/product/12.2.0/dbhome_1/root.sh

Execute /u01/app/oracle/product/12.2.0/dbhome_1/root.sh on the following nodes:

[host01, host03, host02, host04, host05]

..... 100% Done.

Successfully Setup Software.

Starting Oracle Universal Installer...

Checking Temp space: must be greater than 500 MB. Actual 99149 MB Passed

Checking swap space: must be greater than 150 MB. Actual 10684 MB Passed

Preparing to launch Oracle Universal Installer from /tmp/OraInstall2017-12-08_09-33-46AM. Please wait ...

#####

Task 4 of 5: Run root scripts

#####

Fri Dec 8 09:33:59 UTC 2017

Check

```
/u01/app/oracle/product/12.2.0/dbhome_1/install/root_host01.example.com_2017-  
12-08_09-33-59-216859428.log for the output of root script  
Check  
/u01/app/oracle/product/12.2.0/dbhome_1/install/root_host02.example.com_2017-  
12-08_09-34-00-356267198.log for the output of root script  
Check  
/u01/app/oracle/product/12.2.0/dbhome_1/install/root_host03.example.com_2017-  
12-08_09-34-00-809833542.log for the output of root script  
Check  
/u01/app/oracle/product/12.2.0/dbhome_1/install/root_host04.example.com_2017-  
12-08_09-34-01-219757557.log for the output of root script  
Check  
/u01/app/oracle/product/12.2.0/dbhome_1/install/root_host05.example.com_2017-  
12-08_09-34-01-674218372.log for the output of root script  
  
#####  
Task 5 of 5: Run DBCA to create database  
#####  
Fri Dec 8 09:34:01 UTC 2017  
  
You can find the logs of this session at:  
/u01/app/oraInventory/logs  
  
[FATAL] [INS-32601] The Installer has detected that there are no config tools  
to execute for the specified Oracle home.  
[WARNING] [DBT-12504] For Policy Managed database, database instance may come  
up on local node depending on node availability. Sample schema on local node  
will be configured only when database instance comes up on local node.  
Copying database files  
1% complete  
2% complete  
15% complete  
27% complete  
Creating and starting Oracle instance  
29% complete  
32% complete  
36% complete  
40% complete  
43% complete  
44% complete  
45% complete  
47% complete  
Creating cluster database views  
49% complete  
65% complete  
Completing Database Creation  
66% complete  
67% complete  
70% complete  
71% complete  
73% complete  
74% complete  
Executing Post Configuration Actions
```

```
100% complete
Look at the log file "/u01/app/oracle/cfgtoollogs/dbca/orcl/orcl.log" for
further details.
```

Fri Dec 8 09:46:10 UTC 2017

```
[root@host01 catchup]#
```

3. Optionally, delete the large files in the /var/log directory.

```
[root@host01 catchup]# ssh host01 rm -f /var/log/mess*
[root@host01 catchup]# ssh host02 rm -f /var/log/mess*
[root@host01 catchup]# ssh host03 rm -f /var/log/mess*
[root@host01 catchup]# ssh host04 rm -f /var/log/mess*
[root@host01 catchup]# ssh host05 rm -f /var/log/mess*
[root@host01 catchup]#
[root@host01 catchup]# ssh host01 rm -rf /tmp/*
[root@host01 catchup]# ssh host02 rm -rf /tmp/*
[root@host01 catchup]# ssh host03 rm -rf /tmp/*
[root@host01 catchup]# ssh host04 rm -rf /tmp/*
[root@host01 catchup]# ssh host05 rm -rf /tmp/*
[root@host01 catchup]#
```

4. Optionally, purge the deleted files that are held open to reclaim disk space.

```
[root@host01 catchup]# lsof |grep delete
java      4322      root  txt    REG          202,2
7734     745648                  /u01/app/12.2.0/grid/jdk/jre/bin/java
(deleted)
...
[root@host01 catchup]# kill -9 4322
[root@host01 catchup]# lsof |grep delete
[root@host01 catchup]#
[root@host01 catchup]# ssh host02 lsof|grep delete
java      29466      root  txt    REG          202,2
7734     986836 /u01/app/12.2.0/grid/jdk/jre/bin/java (deleted)
...
[root@host01 catchup]# ssh host02 kill -9 29466
[root@host01 catchup]# ssh host02 lsof |grep delete
[root@host01 catchup]#
[root@host01 catchup]# ssh host03 lsof|grep delete
java      20160      root  txt    REG          202,2      7734
1518544 /u01/app/12.2.0/grid/jdk/jre/bin/java (deleted)
...
[root@host01 catchup]# ssh host03 kill -9 20160
[root@host01 catchup]# ssh host03 lsof|grep delete
[root@host01 catchup]#
[root@host01 catchup]# ssh host04 lsof|grep delete
nautilus   3002      oracle  19r    REG          202,2
524     1581093 /home/oracle/.local/share/gvfs-metadata/home
(deleted)
nautilus   3002      oracle  20r    REG          202,2
32768    1583605 /home/oracle/.local/share/gvfs-metadata/home-
```

```

cdd03e8e.log (deleted)
java      23432      root  txt      REG          202,2
7734    360449 /u01/app/12.2.0/grid/jdk/jre/bin/java (deleted)
...
[root@host01 catchup]# ssh host04 kill -9 3002 23432
[root@host01 catchup]# ssh host04 lsof|grep delete
[root@host01 catchup]#
[root@host01 catchup]# ssh host05 lsof|grep delete
java      14322      root  txt      REG          202,2      7734
114768 /u01/app/12.2.0/grid/install/root_host05.example.com_2018-
01-27_11-36-01-428452867.log (deleted)
tail     21883      grid   3r      REG          202,2      5800
1430917 /u01/app/12.2.0/grid/install/root_host05.example.com_2018-
01-27_11-36-01-428452867.log (deleted)
[root@host01 catchup]# ssh host05 kill -9 14322 21883
[root@host01 catchup]# ssh host05 lsof|grep delete
[root@host01 catchup]#

```

5. Make sure the root file system (/) has enough free space (5GB+). The available space should be close enough to the one in the output.

```

[root@host01 ~]# ssh host01 df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/xvda2     128G   22G  100G  18% /
tmpfs          6.0G  641M  5.4G  11% /dev/shm
/dev/xvda1     488M  133M  330M  29% /boot
/dev/xvdf1      12G   6.5G  4.7G  58% /stage
[root@host01 ~]#
[root@host01 ~]# ssh host02 df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/xvda2     29G   22G   6.4G  77% /
tmpfs          6.0G  641M  5.4G  11% /dev/shm
/dev/xvda1     488M  133M  330M  29% /boot
/dev/xvdf1      12G   6.5G  4.7G  58% /stage
[root@host01 ~]#
[root@host01 ~]# ssh host03 df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/xvda2     29G   23G   5.2G  82% /
tmpfs          4.9G  641M  4.3G  13% /dev/shm
/dev/xvda1     488M  107M  356M  24% /boot
/dev/xvdf1      12G   6.5G  4.7G  58% /stage
[root@host01 ~]#
[root@host01 ~]# ssh host04 df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/xvda2     29G   23G   5.2G  82% /
tmpfs          4.9G  76K   4.9G   1% /dev/shm
/dev/xvda1     488M  108M  356M  24% /boot
/dev/xvdf1      12G   6.5G  4.7G  58% /stage
[root@host01 ~]#
[root@host01 ~]# ssh host05 df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/xvda2     29G   23G   5.2G  82% /
tmpfs          4.8G  76K   4.8G   1% /dev/shm

```

```
/dev/xvda1      488M  117M  346M  26% /boot
/dev/xvdf1      12G   6.5G  4.7G  58% /stage

[root@host01 catchup] #
```

6. Open a terminal window connected to host01 as the oracle user and check the database status and configuration details.

```
[oracle@dns ~]$ ssh oracle@host01
oracle@host01's password:

[oracle@host01 ~]$ export
ORACLE_HOME=/u01/app/oracle/product/12.2.0/dbhome_1

[oracle@host01 ~]$ export PATH=$PATH:$ORACLE_HOME/bin

[oracle@host01 ~]$ srvctl status database -db orcl
Instance orcl_1 is running on node host02
Instance orcl_2 is running on node host03
Instance orcl_3 is running on node host01

[oracle@host01 ~]$ srvctl config database -db orcl
Database unique name: orcl
Database name: orcl
Oracle home: /u01/app/oracle/product/12.2.0/dbhome_1
Oracle user: oracle
Spfile: +DATA/ORCL/PARAMETERFILE/spfile.297.958993403
Password file: +DATA/ORCL/PASSWORD/pwdorcl.284.958993065
Domain:
Start options: open
Stop options: immediate
Database role: PRIMARY
Management policy: AUTOMATIC
Server pools: orcldb
Disk Groups: FRA,DATA
Mount point paths:
Services:
Type: RAC
Start concurrency:
Stop concurrency:
OSDBA group: dba
OSOPER group: oper
Database instances:
Configured nodes:
CSS critical: no
CPU count: 0
Memory target: 0
Maximum memory: 0
Default network number for database services:
Database is policy managed

[oracle@host01 ~]$
```

7. Close all terminals opened for this practice.

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