



Oracle Flex ASM and Flex Cluster

PRESENTER

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Oracle ACE & Oracle Certified Master (OCM)





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Head-Database Practices
Patterns SDI



ORACLE CERTIFIED MASTER (OCM)

http://education.oracle.com/education/otn/10g_OCM_17_Jun_11/ykumar.htm

ORACLE ACE

https://apex.oracle.com/pls/apex/f?p=19297:4:::NO:4:P4_ID:13023

AUTHOR OF ORACLE TECHNOLOGY NETWORK (OTN) ARTICLES

<http://www.oracle.com/tecchnetwork/es/articles/index.html>

<http://www.oracle.com/tecchnetwork/pt/articles/index.html>

<http://www.oracle.com/tecchnetwork/artides/index.html> -

- (17 Articles for OTN Spanish)
- (14 Articles for OTN Portuguese)
- (2 Articles for OTN English)

ORACLE TECHNOLOGY SPEAKER @USER GROUPS

Speaker @Sangam Y2014

Speaker @Independent Oracle User Group (IOUG) Y2014

Speaker @Oracle Technology Network (OTN) Yathra Y2013, Y2014 & Y2015

Speaker @All India Oracle User Group (AIOUG) Tech Day Y2013 & Y2014

Speaker @All India Oracle User Group (AIOUG) ExadataSIG Y2014

AUTHOR OF TOAD WORLD (CONNECTED INTELLIGENCE)

<https://www.toadworld.com>

Author Of OTech Magazine

<http://otechmag.com/magazine/2015/summer/ravikumar-yv.html>

Author Of All things ORACLE from redgate

<http://allthingsoracle.com/upgrading-a-database-using-recovery-manager-rman-duplicate-command-in-oracle-12c/>

CO-FOUNDER OF ORANORLD

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ORACLE

Certified Master



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ABOUT ME

ORACLE CERTIFICATIONS

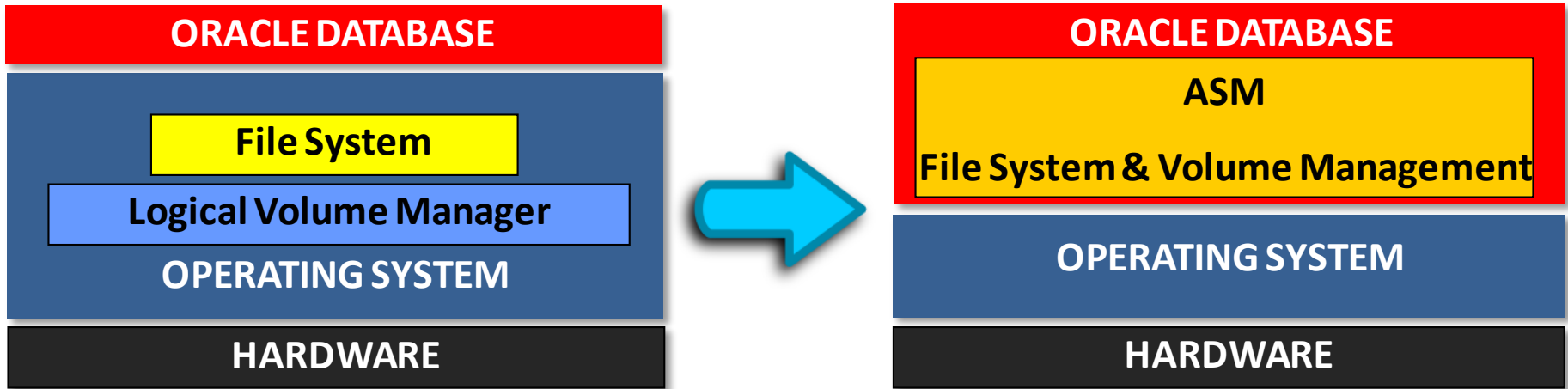
- Oracle Database 10g: Certified Master (10g OCM)
- Oracle Database 10g & 11g: Administering RAC Certified Expert
- Oracle Database 11g: Performance Tuning Certified Expert
- Oracle Exadata 11g Essentials
- Oracle Golden Gate 10 Essentials
- Oracle Database 11g: SQL Tuning Certified Expert
- Oracle 9i & 10g: Managing Oracle on Linux Certified Expert
- Oracle Certified Professional (OCP) – Oracle 11g, 10g, 9i and 8i
- SUN Certified – Solaris System Administrator in SUN Solaris 9



ORACLE

Flex ASM and Flex Cluster







Oracle 10g RAC – VD & OCR Locations

Oracle Universal Installer: Specify Voting Disk Location

Specify Voting Disk Location

The Oracle Clusterware voting disk contains cluster membership information and arbitrates cluster ownership among the nodes of your cluster in the event of network failures. Specify a cluster file system file or a shared raw device that is accessible by the same name from all of the nodes in the cluster. The Installer requires at least 20MB of free space for the voting disk that it creates.

Voting Disk Configuration

Normal Redundancy
Choose this option to enable the Oracle Clusterware to manage two additional copies of your voting disk. Each additional copy requires 20MB of disk space.

External Redundancy
Choose this option if you are using your disk management system to provide voting disk redundancy.

Voting Disk Location:

Additional Voting Disk 1 Location:

Additional Voting Disk 2 Location:

Help Installed Products... Back **Next** Install Cancel

ORACLE

Oracle Universal Installer: Specify Oracle Cluster Registry (OCR) Location

Specify Oracle Cluster Registry (OCR) Location

The Oracle Cluster Registry (OCR) stores cluster and database configuration information. Specify a cluster file system file or a shared raw device containing at least 100MB of free space that is accessible from all of the nodes in the cluster.

OCR Configuration

Normal Redundancy
Choose this option to enable the Oracle Clusterware to manage OCR mirroring. You will need an additional 100 MB of disk space for the mirrored copy.

External Redundancy
Choose this option if you are using your disk management system to provide OCR redundancy.

Specify OCR Location:

Specify OCR Mirror Location:

Help Installed Products... Back Next Install Cancel

ORACLE



Oracle 11g RAC – VD & OCR Locations

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 7 of 16

Storage Option Information

You can place Oracle Cluster Registry (OCR) disks and voting disks on ASM storage or on a file system.

Automatic Storage Management (ASM)
Choose this option to configure OCR and voting disks on ASM storage.

Shared File System
Choose this option to configure OCR and voting disks on an existing shared file system.

Installation Option
Installation Type
Product Languages
Grid Plug and Play
Cluster Node Information
[Network Interface Usage](#)
Storage Option
[OCR Storage](#)
Voting Disk Storage
Failure Isolation
Operating System Groups
Installation Location
Prerequisite Checks
Summary
Setup
Finish

Help < Back Next > Finish Cancel

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 8 of 15

Create ASM Disk Group

Select Disk Group Characteristics and select disks

Disk Group Name:

Redundancy: High Normal External

Add Disks
 Candidate Disks All Disks

	Disk Path	Size (in MB)	Status
<input type="checkbox"/>	ORCL:DATA2	25595	Candidate
<input type="checkbox"/>	ORCL:DATA3	25595	Candidate
<input type="checkbox"/>	ORCL:DATA4	25595	Candidate
<input type="checkbox"/>	ORCL:DATA5	25595	Candidate
<input type="checkbox"/>	ORCL:DATA6	25595	Candidate
<input type="checkbox"/>	ORCL:DATA7	25595	Candidate
<input type="checkbox"/>	ORCL:DATA8	25595	Candidate
<input checked="" type="checkbox"/>	ORCL:VOTE1	1976	Candidate
<input checked="" type="checkbox"/>	ORCL:VOTE2	1976	Candidate
<input checked="" type="checkbox"/>	ORCL:VOTE3	1976	Candidate

Change Discovery Path

Installation Option
Installation Type
Product Languages
Grid Plug and Play
Cluster Node Information
Network Interface Usage
Storage Option
Create ASM Disk Group
[ASM Password](#)
Operating System Groups
Installation Location
Prerequisite Checks
Summary
Setup
Finish

Help < Back Next > Finish Cancel



Oracle 12c RAC – VD & OCR Locations

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 10 of 19

Storage Option Information

You can place Oracle Cluster Registry (OCR) files and voting disk files on Oracle ASM storage, or on a file system.

Use Standard ASM for storage

Choose this option to configure Local Oracle ASM in this cluster and store OCR and voting disk files on it. ASM instance will be configured on all nodes of the cluster.

Use Oracle Flex ASM for storage

Choose this option to configure OCR and voting disks on ASM storage. ASM instance will be configured on reduced number of cluster nodes.

Use Shared File System

Choose this option to configure OCR and voting disk files on an existing shared file system.

Oracle 12c GRID INFRASTRUCTURE

- Software Updates
- Installation Option
- Cluster Type
- Installation Type
- Product Languages
- Grid Plug and Play
- Cluster Mode Information
- Network Interface Usage
- Grid Infrastructure Manager
- Storage Option**
- OCR Storage
- Voting Disk Storage
- Operating System Groups
- Installation Location
- Root script execution
- Prerequisite Checks
- Summary
- Install Product
- Finish

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 11 of 19

Create ASM Disk Group

Select Disk Group characteristics and select disks

Disk group name:

Redundancy: High Normal External

Allocation Unit Size: MB

Add Disks

Candidate Disks All Disks

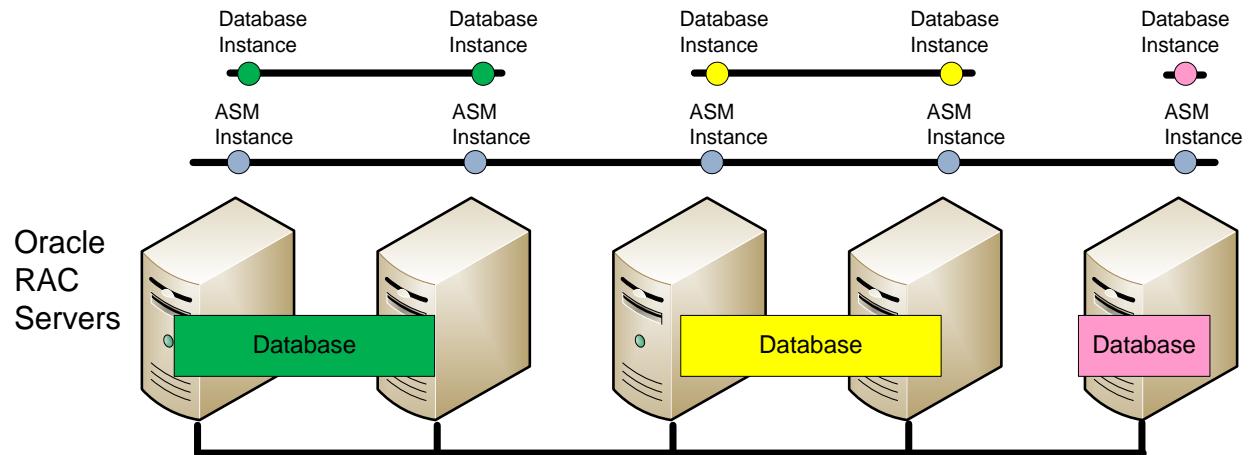
<input type="checkbox"/>	Disk Path	Size (in MB)	Status
<input type="checkbox"/>	ORCLASMDATA01	3905	Candidate
<input type="checkbox"/>	ORCLASMDATA02	3905	Candidate
<input type="checkbox"/>	ORCLASMDATA03	3905	Candidate
<input type="checkbox"/>	ORCLASMDATA04	3905	Candidate
<input type="checkbox"/>	ORCLASMDATA05	3905	Candidate
<input type="checkbox"/>	ORCLASMDATA06	3905	Candidate
<input type="checkbox"/>	ORCLASMDATA07	3905	Candidate
<input type="checkbox"/>	ORCLASMDATA08	3905	Candidate
<input checked="" type="checkbox"/>	ORCLOCR_VOTE01	3905	Candidate
<input checked="" type="checkbox"/>	ORCLOCR_VOTE02	3905	Candidate
<input checked="" type="checkbox"/>	ORCLOCR_VOTE03	3905	Candidate

Oracle 12c GRID INFRASTRUCTURE

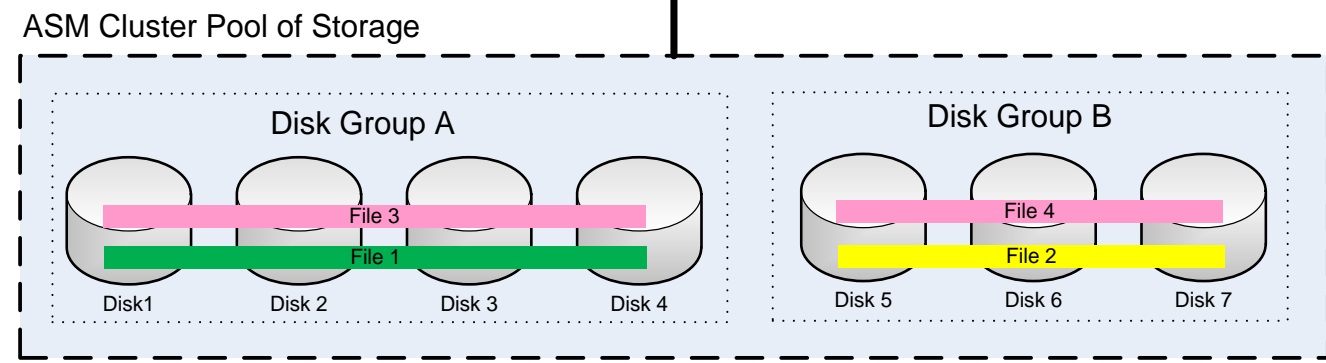
- Software Updates
- Installation Option
- Cluster Type
- Installation Type
- Product Languages
- Grid Plug and Play
- Cluster Mode Information
- Network Interface Usage
- Grid Infrastructure Manager
- Storage Option
- Create ASM Disk Group**
- ASM Password
- Operating System Groups
- Installation Location
- Root script execution
- Prerequisite Checks
- Summary
- Install Product
- Finish



CAPABILITIES OF ASM



1-1 ASM to SERVER



SHARED DISK GROUPS

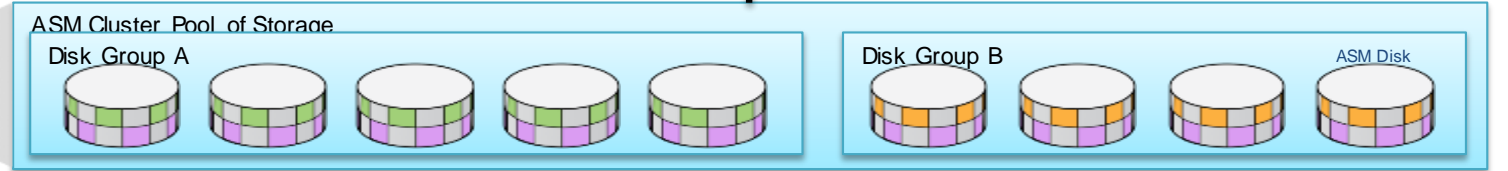
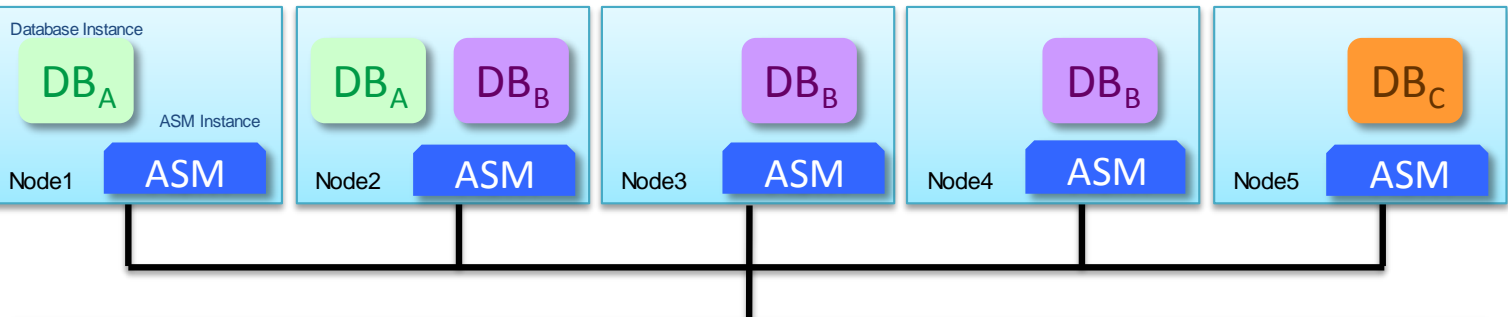
WIDE FILE STRIPING



AUTOMATIC STORAGE MANAGEMENT (ASM) OVERVIEW

Current State ↘

RAC CLUSTER





Oracle Database 11gR2 with ASM



```
login as: oracle
oracle@192.168.xx.xx's password: *****
Last login: Fri Sep 27 06:05:44 2013
```

LOG INTO RAC DATABASE INSTANCE
(RAC1)

```
[oracle@rac1 ~]$ps -ef | grep pmon
oracle 3053 1 0 05:56 ? 00:00:00 asm_pmon +ASM1
oracle 3849 1 0 05:57 ? 00:00:00 ora_p
```

CHECK STATUS OF ASM & RAC DATABASE
INSTANCES

```
[oracle@rac1 ~]$srvctl status asm
ASM is running on rac2,rac1
```

CHECK STATUS OF ASM INSTANCE IN RAC
DATABASE INSTANCES1 (RAC1)

```
[oracle@rac1 ~]$crsctl check cluster
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
```

CHECK STATUS OF CLUSTER IN RAC
DATABASE INSTANCES1 (RAC1)

```
[oracle@rac1 ~]$srvctl stop asm -n rac1 -o abort -f
```

STOP THE ASM INSTANCE IN
RAC DATABASE INSTANCE1
(RAC1)



Oracle Database 11gR2 with ASM



```
oracle@192.168.xx.xx's password:*****
```

```
Last login: Fri Sep 27 06:05:44 2013
```

```
[oracle@rac1 ~]$ps -ef | grep pmon
```

```
oracle 3053 1 0 05:56 ? 00:00:00 asm_pmon_+ASM1
```

```
oracle 3849 1 0 05:57 ? 00:00:00 ora_pmon_flavia1
```

```
[oracle@rac1 ~]$srvctl status asm
```

```
ASM is running on rac2,rac1
```

```
[oracle@rac1 ~]$crsctl check cluster
```

```
CRS-4537: Cluster Ready Services is online
```

```
CRS-4529: Cluster Synchronization Services is online
```

```
CRS-4533: Event Manager is online
```

```
[oracle@rac1 ~]$srvctl stop asm -n rac1 -o abort -f
```

```
[oracle@rac1 ~]$srvctl status asm
```

CHECK THE STATUS OF ASM INSTANCE IN RAC DATABASE INSTANCE1 (RAC1)



```
Last login: Fri Sep 27 06:05:44 2013
```

```
[oracle@rac1 ~]$ps -ef | grep pmon
```

```
oracle 3053 1 0 05:56 ? 00:00:00 asm_pmon_+ASM1
oracle 3849 1 0 05:57 ? 00:00:00 ora_pmon_flavia1
```

```
[oracle@rac1 ~]$srvctl status asm
```

```
ASM is running on rac2,rac1
```

```
[oracle@rac1 ~]$crsctl check cluster
```

```
CRS-4537: Cluster Ready Services is online
```

```
CRS-4529: Cluster Synchronization Services is online
```

```
CRS-4533: Event Manager is online
```

```
[oracle@rac1 ~]$srvctl stop asm -n rac1 -o abort -f
```

```
[oracle@rac1 ~]$srvctl status asm
```

```
ASM is running on rac2
```



Oracle Database 11gR2 with ASM



```
[oracle@rac1 ~]$ps -ef | grep pmon
oracle  3053    1  0 05:56 ?      00:00:00 asm_pmon_+ASM1
oracle  3849    1  0 05:57 ?      00:00:00 ora_pmon_flavia1

[oracle@rac1 ~]$srvctl status asm
ASM is running on rac2,rac1

[oracle@rac1 ~]$scrsctl check cluster
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online

[oracle@rac1 ~]$srvctl stop asm -n rac1 -o a
[oracle@rac1 ~]$srvctl status asm
ASM is running on rac2

[oracle@rac1 ~]$ps -ef | grep pmon
```

CHECK THE STATUS OF ASM & RAC
DATABASE INSTANCE (RAC1)



```
oracle 3053 1 0 05:56 ? 00:00:00 asm_pmon_+ASM1
oracle 3849 1 0 05:57 ? 00:00:00 ora_pmon_+ASM1
```



SUMMARY

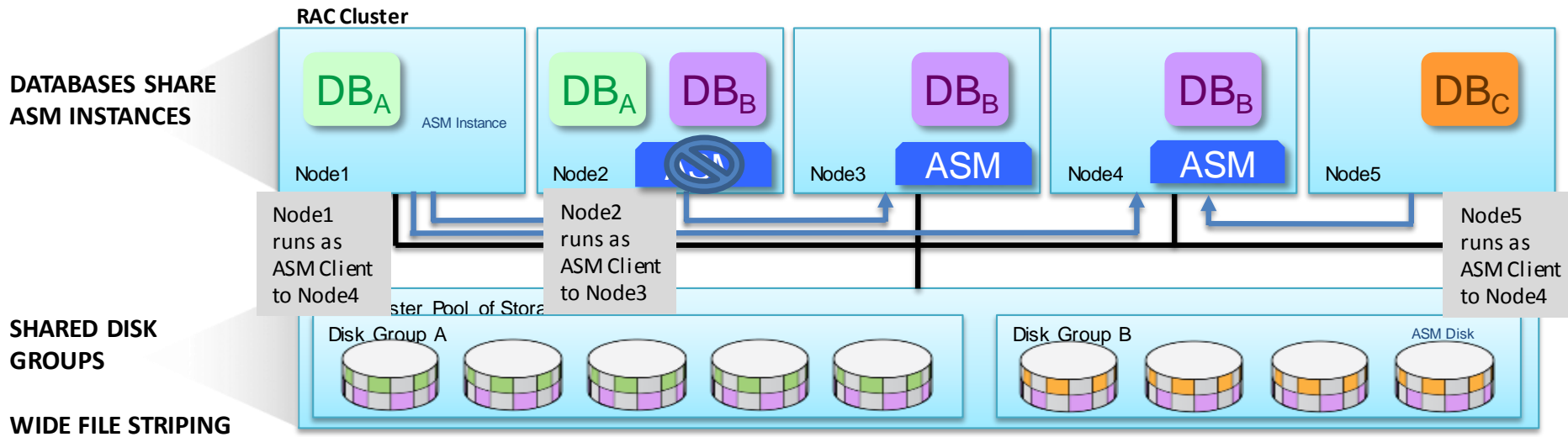
- The database instance is strongly linked to the ASM instance
- If an ASM instance fails ***so will the database instance*** on the same node

```
[oracle@rac1 ~]$ srvctl stop asm -n rac1 -o abort -f
[oracle@rac1 ~]$ srvctl status asm
ASM is running on rac2
[oracle@rac1 ~]$ ps -ef | grep pmon
oracle 7885 5795 0 06:20 pts/0 00:00:00 grep pmon
```



FLEX ASM: ELIMINATE 1:1 SERVER MAPPING

🔄 New: ASM Storage Consolidation in Oracle Database 12c 🔄





```
[oracle@oel6-112-rac1 Desktop]$ hostname  
oel6-112-rac1.localdomain
```

**LOG INTO RAC DATABASE
INSTANCE 1 (RAC1)**

```
[oracle@oel6-112-rac1 Desktop]$ps -ef | grep pmon  
oracle 3325 1 0 17:39 ? 00:00:00 asm_pmon_+ASM1  
oracle 3813 1 0 17:40 ? 00:00:00 mdb_pmon_-MGMTDB  
oracle 5806 1 0 17:42 ? 00:00:00 ora_pmon_orcl1  
oracle 6193 1 0 17:42 ? 00:00:00 apx_pmon_+APX1
```

**CHECK THE STATUS OF ASM
& RAC DATABASE
INSTANCES**

```
[oracle@oel6-112-rac1 Desktop]$ srvctl status asm  
ASM is running on oel6-112-rac2,oel6-112-rac1
```

**CHECK THE STATUS OF ASM
INSTANCE IN RAC DATABASE
INSTANCE FROM INSTANCE 1
(RAC 1)**

```
[oracle@oel6-112-rac1 Desktop]$ crsctl check cluster  
CRS-4537: Cluster Ready Services is online  
CRS-4529: Cluster Synchronization Services is online  
CRS-4533: Event Manager is online
```

**CHECK THE STATUS OF CLUSTER
IN INSTANCE 1 (RAC 1)**


```
[oracle@oel6-112-rac1 Desktop]$ asmcmd
ASMCMD> showclustermode
ASM cluster : Flex mode enabled
ASMCMD> showclusterstate
Normal
ASMCMD> exit
```

CHECK IF ORACLE FLEX ASM IS ENABLED OR NOT (RAC1)

```
[oracle@oel6-112-rac2 Desktop]$ asmcmd
ASMCMD> showclustermode
ASM cluster : Flex mode enabled
ASMCMD> showclusterstate
Normal
ASMCMD> exit
```

CHECK IF ORACLE FLEX ASM IS ENABLED OR NOT (RAC2)

```
[oracle@oel6-112-rac1 Desktop]$ srvctl stop asm -node oel6-112-rac1 -stopoption abort -force
```

BRING DOWN THE ASM INSTANCE IN RAC DATABASE INSTANCE 1 (RAC1)

```
[oracle@oel6-112-rac1 Desktop]$ srvctl status asm
PRCR-1070 : Failed to check if resource ora.asm is registered Cannot communicate with crsd
```

CHECK STATUS OF ASM INSTANCE IN RAC DATABASE INSTANCE1 (RAC1)

```
[oracle@oe16-112-rac1 Desktop]$ crsctl check cluster  
CRS-4535: Cannot communicate with Cluster Ready Services  
CRS-4529: Cluster Synchronization Services is online  
CRS-4533: Event Manager is online
```

CHECK STATUS OF CLUSTER SERVICES IN RAC DATABASE INSTANCE1 (RAC1)

```
[oracle@oe16-112-rac1 Desktop]$ ps -ef | grep pmon  
oracle      3813      1  0 17:40 ?          00:00:00 ora_pmon_MGMTDB  
oracle      5806      1  0 17:42 ?          00:00:00 ora_pmon_orcl1  
oracle      6193      1  0 17:42 ?          00:00:00 ora_pmon_AFX1
```

CHECK STATUS OF ASM & RAC

```
[oracle@oe16-112-rac1 Desktop]$
```

NOTE
Here a database instance is associated with the specific ASM instance running in the specific node. If in case due to some reason if the ASM instance was unable to be brought up/services goes down, still the database instance can be brought up as the database instance will look for ASM instance running in the same cluster.





Oracle Database 12cR1 with FLEX ASM



```
[oracle@oel6-112-rac2 Desktop]$ . oraenv
ORACLE_SID = [orcl1] ? orcl1
ORACLE_HOME = [/home/oracle] ? /u01/app/oracle/product/12.1.0/db_1
The Oracle base remains unchanged with value /u01/app/oracle
```

**CHECK STATUS OF RAC DATABASE
INSTANCE RUNNING WITHOUT ASM
INTANCE IN RAC DATABASE INSTANCE1
(RAC1)**



Oracle Database 12cR1 with FLEX ASM



LOG INTO DATABASE INSTANCE FROM RAC DATABASE INSTANCE (RAC1)

```
[oracle@oel6-112-rac1 Desktop]$sqlplus /nolog
SQL*Plus: Release 12.1.0.1.0 Production on Wed Sep 25 18:24:36 2013 Copyright
```

```
SQL>connect sys/oracle@orcl as sysdba
```

```
Connected.
```

```
SQL>select instance_name, instance_number from gv$instance;
```

INSTANCE_NAME	INSTANCE_NUMBER
-----	-----
orcl2	2
orcl1	1

```
SQL>select instance_name, instance_number from v$instance;
```

INSTANCE_NAME	INSTANCE_NUMBER
-----	-----
orcl2	2

```
SQL>connect sys/oracle@orcl as sysdba
```

```
Connected.
```

```
SQL>
```



Oracle Database 12cR1 with FLEX ASM



```
SQL>select instance_name, instance_number from gv$instance;
```

```
INSTANCE_NAME          INSTANCE_NUMBER
-----
orcl1                   1
```

CONNECTING TO ASM INSTANCE OF RAC
DATABASE INSTANCE2 (RAC2) FROM RAC
DATABASE INSTANCE1 (RAC1)

```
[oracle@oel6-112-rac1 Desktop]$ . oraenv
```

```
ORACLE_SID = [orcl1] ? +ASM2
```

```
ORACLE_HOME = [/home/oracle] ? /u01/app/12.1.0/grid
```

The Oracle base remains unchanged with value /u01/app/oracle

```
[oracle@oel6-112-rac1 Desktop]$ asmcmd --privilege sysasm --inst +ASM2
```



```
ASMCMD> lsdg
```

State	Type	Rebal	Sector	Block	AU	Total_MB	Free_MB
Req_mir_free_MB	Usable_file_MB	Offline_disks	Voting_files	Name			
MOUNTED	EXTERN	N	512	4096	1048576	15342	4782
0	4782		0	Y	DATA/		

```
ASMCMD>
```

SUMMARY

The database instance was using a dedicated ASM instance and that ASM instance was forced to stop working simulating a failure, so the database instance reconnected to an existent ASM instance on another node, for this example node 2 (rac2).

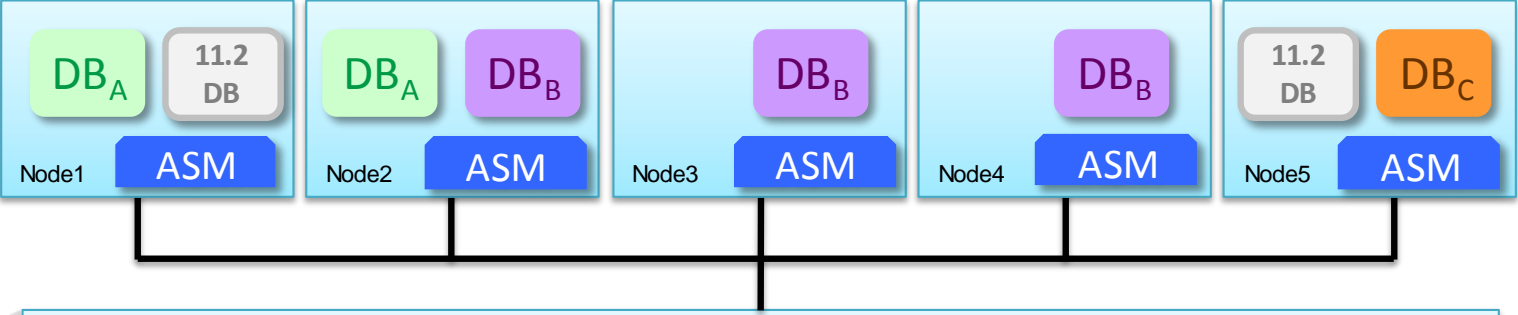


FLEX ASM: SUPPORTING ORACLE DATABASE 11g

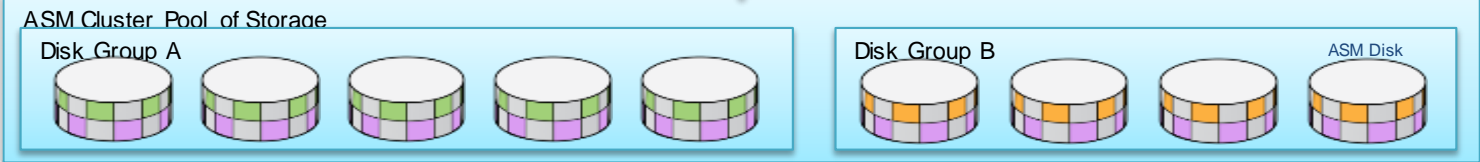
Previous Database versions will host Local ASM Instance

RAC CLUSTER

DATABASES SHARE ASM INSTANCES



SHARED DISK GROUPS



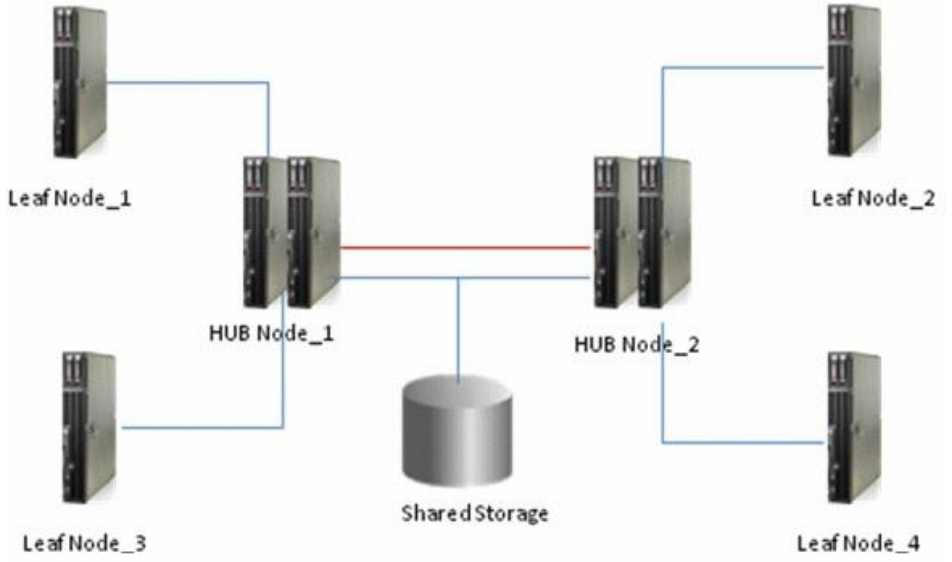
WIDE FILE STRIPING



Oracle FLEX CLUSTER

- Comprises of a Hub and Leaf architecture where in only the Hub nodes will only have direct access to Oracle Cluster Registry (OCR) and Voting Disk (VD)
- However application can access the database via Leaf nodes without ASM instance NOT running on Leaf nodes
- The connection to the database is through Hub making it transparent for the application

Depicts a typical Oracle flex cluster with four Leaf nodes and two Hub nodes. In a nutshell Oracle Flex Cluster requires Oracle Flex ASM.

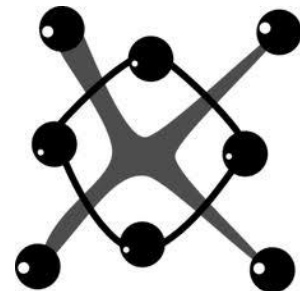




HUB NODES & LEAF NODES

Hub Nodes

They are connected among them via private network and have direct access to the shared storage just like previous versions. These nodes are the ones that access the **Oracle Cluster Registry (OCR)** and **Voting Disk (VD)** directly.



Leaf Nodes

These nodes are lighter and are not connected among them, neither access the shared storage like the Hub Nodes. Each Leaf Node communicates with the Hub Node that is attached to, and its connected to the cluster via the Hub Node that is linked to.



FLEX ASM & FLEX CLUSTER

Flex ASM

- ✓ Higher Availability (DB instances can use remote ASM instances)
 - *Planned or Unplanned downtime*
- ✓ Reduces per-node ASM instance overhead
 - *ASM only needs to run on 3 nodes in the cluster*
- ✓ Facilitates DB, Cluster & server consolidation
- ✓ Multiple DB's & applications in a cluster

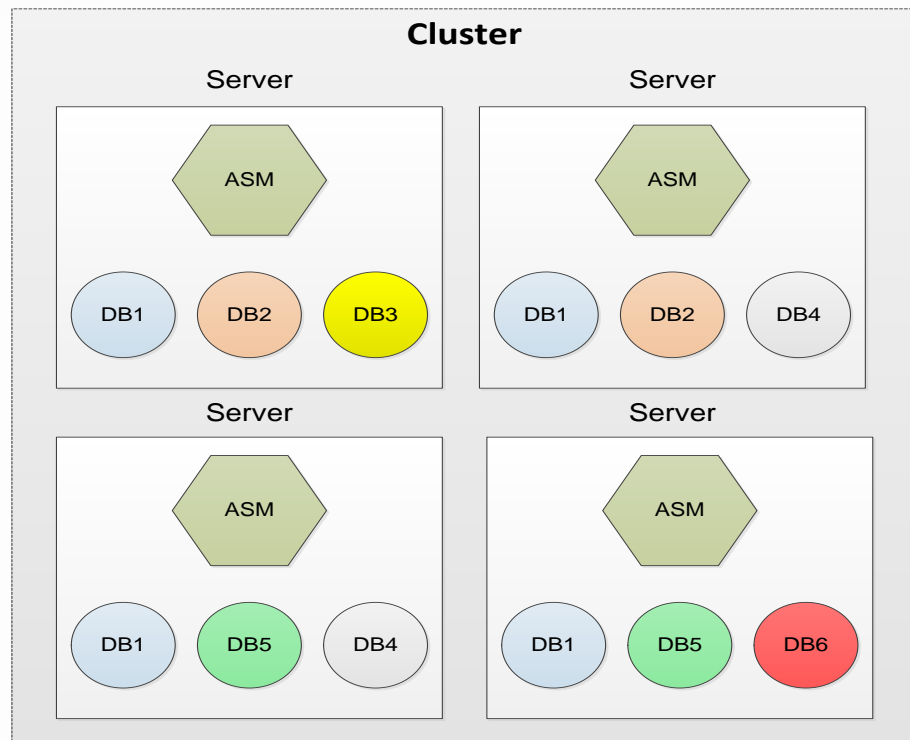
Flex CLUSTER

- ✓ Less complex configuration and management for non-database nodes
- ✓ Less complex configuration for Non-Database nodes, such as Processing Nodes, Application / Web Server Nodes etc.



PREVIOUS ASM CLUSTER

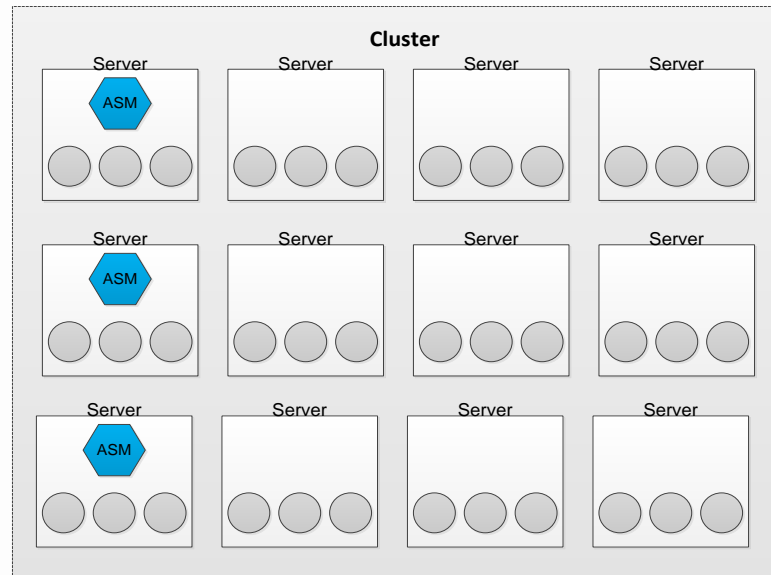
- ASM architecture utilized an ASM instance on every server
- Database instances dependent on node-specific ASM instance
- ASM overhead scaled with size of cluster





NEW ASM CLUSTER

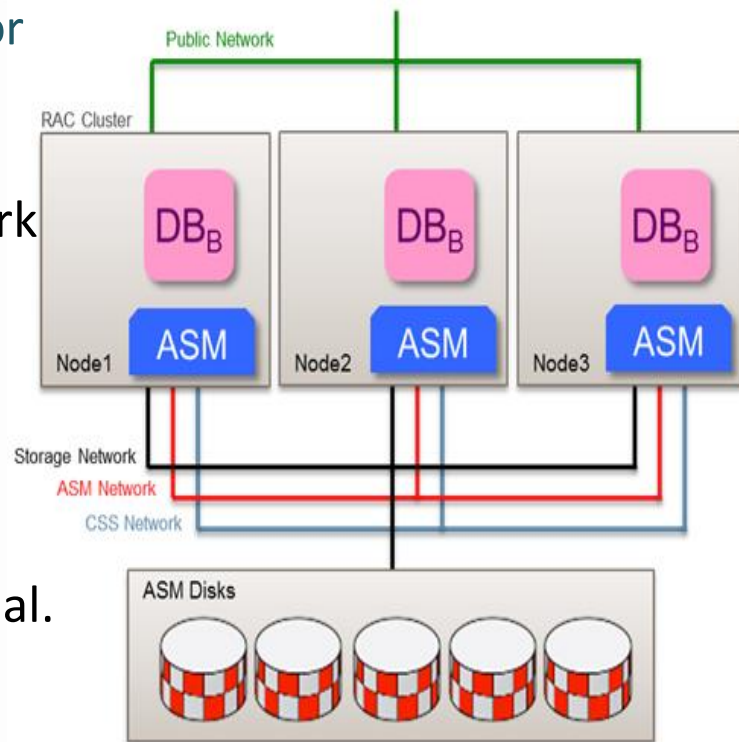
- Eliminates requirement for an ASM instance on every cluster server
- Database instances connects to any ASM instance in the cluster
- Database instances can failover to a secondary ASM instance
- Administrators specify the cardinality of ASM instances (default is 3)
- Clusterware ensures ASM cardinality is maintained





FLEX ASM NETWORK

- Flex ASM adds the ASM network, which is used for communication between ASM and its clients
- Oracle 12c, you can now create a separate network dedicated for ASM communication.
- Need to mention the network address during the installation
- This dedicated ASM network is completely optional. The default is the pre-12c behavior of using the Clusterware interconnect for ASM communication





Managing Flex ASM

- Flex ASM requires minimal monitoring and ongoing management
- Primary objective is that instances are up and running
- **SRVCTL Command** for:
 - Checking ASM instance status
 - Setting cardinality
 - Starting – Stopping - and - Relocating ASM instances
- No Flex ASM-specific instance parameters are required
- Default settings will effectively support most situations
- ASM server instances use automatic memory management
- **Flex ASM** is managed by **ASMCA, CRSCTL, SQL*Plus** and **SRVCTL**





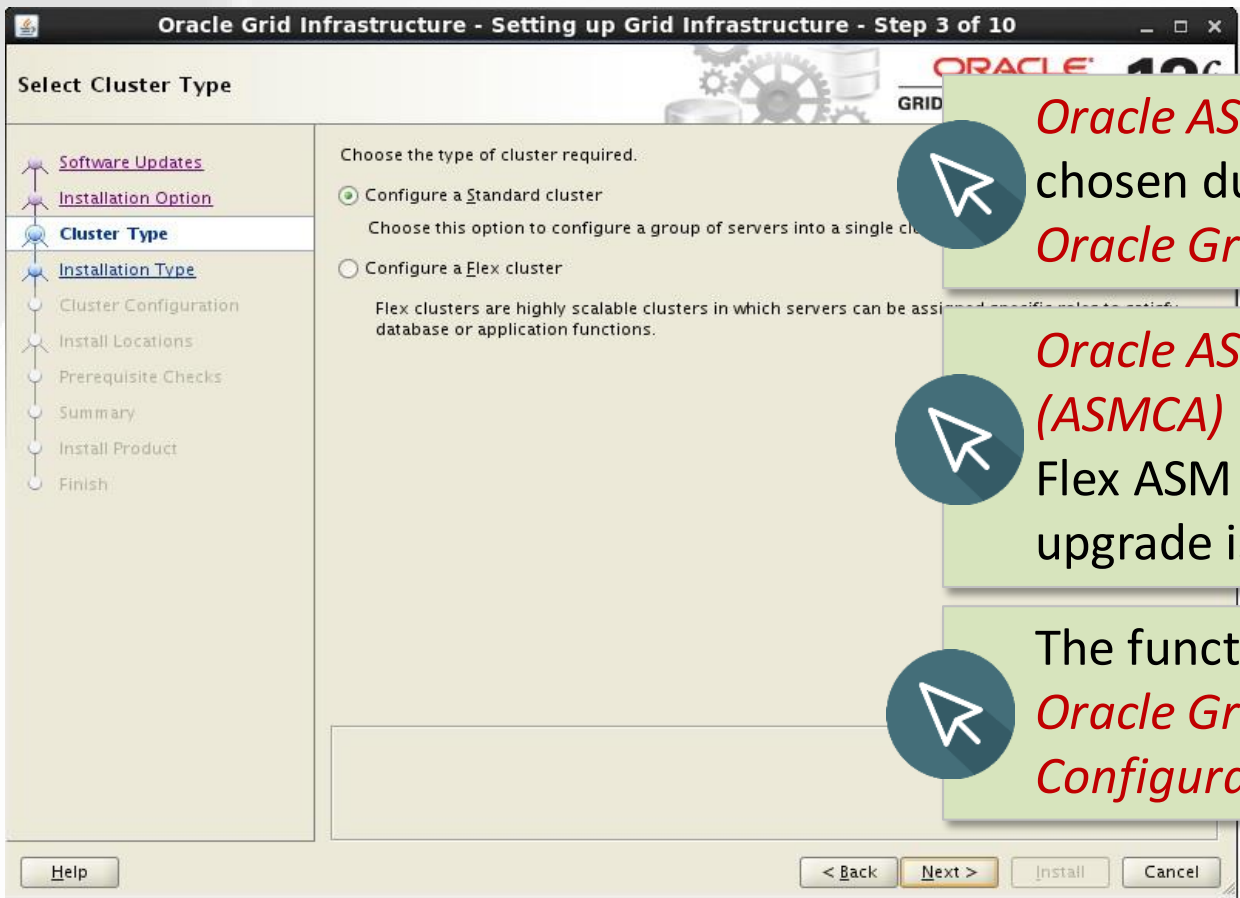
Flex Features

- Increase maximum number of Disk Groups to 511 (*Previous limit was 63*)
- Command for renaming ASM Disk
- **ASM Relocate Command**
 - Clients are automatically relocated to another instance if an Oracle ASM instance fails
 - When necessary, Clients can be manually relocated using the `ALTER SYSTEM RELOCATE CLIENT` command





New Option in Grid Infrastructure



Oracle ASM Deployment Model can be chosen during the installation of *Oracle Grid Infrastructure*

Oracle ASM Configuration Assistant (ASMCA) can be used to enable Oracle Flex ASM after the installation / upgrade is performed

The functionality is available only in an *Oracle Grid Infrastructure Configuration*



Conversion of Standard Cluster to **Oracle Flex ASM Cluster**



Convert to Oracle Flex ASM

Oracle Flex ASM enables an Oracle ASM instance to run on a separate physical server from the database servers. Oracle Flex ASM must be loaded with Oracle ASM on the server. Oracle Flex ASM must be loaded with Oracle ASM on the server.



CHECK CLUSTER MODE AND CLUSTER STATE AFTER LOGGING INTO ASMCMD PROMPT

```
[oracle@racnroll1 ~]$ asmcmd
ASMCMD>showversion
ASM version           : 12.1.0.1.0
ASMCMD>showclusterstate
Normal
ASMCMD>showclustermode
ASM cluster : Flex mode enabled
```

```
CRS-2672: Attempting to start 'ora.storage' on 'racnroll2'
CRS-2676: Start of 'ora.storage' on 'racnroll2' succeeded
CRS-2672: Attempting to start 'ora.crsd' on 'racnroll2'
CRS-2676: Start of 'ora.crsd' on 'racnroll2' succeeded
Cluster bounced in node racnroll2
[root@racnroll1 ~]#
```



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Thanks for your
Time