

FAQ's on Oracle 11g R2 Real Application Cluster

Table of Contents

Section 1 - Grid Infrastructure: Clusterware and ASM	5
Oracle Grid Infrastructure	5
[1] Explain the principles and purposes of clusters	5
[2] Describe Cluster hardware best practices	5
[3] Understand Oracle Clusterware Architecture.....	6
[4] Describe how Grid Plug and Play affects Clusterware	7
[5] Describe ASM architecture and components	8
Grid Infrastructure Installation	15
[1] Perform pre-install tasks for Grid Infrastructure.....	15
[2] Install Grid Infrastructure.....	17
[3] Verify the installation.....	19
[4] Configure ASM disk groups	20
[5] Configure ASM volumes	20
[6] Make ASM cluster file system	20
[7] Mount ACFS volumes	20
Administering Oracle Clusterware	20
[1] Display Clusterware management proficiency	20
[2] Demonstrate OCR backup and recovery techniques	23
[3] Managing Network Settings.....	25
Managing Clusterware.....	26
[1] Perform prerequisite steps for extending a cluster.....	26
[2] Use Oracle Universal Installer (OUI) to add a node to an Oracle Clusterware home	26
[3] Use OUI to remove a node from an Oracle Clusterware home	26
Making Applications Highly Available With Oracle Clusterware	26
[1] Describe the High Availability components of Oracle Clusterware	26
[2] Contrast Policy-Managed and Administration Managed databases	26
[3] Describe the functionality of server pools	26
[4] Describe application placement policies	26

FAQ's on Oracle 11g R2 Real Application Cluster

[5]	Create an application Virtual IP (VIP)	26
[6]	Manage application resources	26
	Troubleshooting Oracle Clusterware	26
[1]	Locate Oracle Clusterware log files	26
[2]	Gather all log files using diagcollection.pl	26
[3]	Enable resource debugging	26
[4]	Enable component-level debugging	26
[5]	Enable tracing for Java-based tools	26
[6]	Troubleshoot the Oracle Cluster Registry (OCR) file	26
	Administering ASM Instances	26
[1]	Understand and apply ASM initialization parameters	26
[2]	Manage ASM instances and associated processes	28
[3]	Monitor ASM using the V\$ASM dynamic performance views	31
	Administering ASM Disk Groups	32
[1]	Create and delete ASM disk groups	32
[2]	Set the attributes of an existing ASM disk group	32
[3]	Perform ongoing maintenance tasks on ASM disk groups	35
[4]	Explain key performance and scalability considerations for ASM disk groups	42
	Administering ASM Files, Directories, and Templates	42
[1]	Use different client tools to access ASM files	42
[2]	Describe the format of a fully qualified ASM file name	42
[3]	Explain how ASM files, directories and aliases are created and managed	42
[4]	Understand and manage disk group templates	42
	Administering ASM Cluster File Systems	42
[1]	Administer ASM Dynamic Volume Manager	42
[2]	Manage ASM volumes	42
[3]	Implement ASM Cluster File System	42
[4]	Manage ASM Cluster File System (ACFS)	42
[5]	Use ACFS Snapshots	42
[6]	Using command line tools to Manage ACFS	42
	Section 2 - Real Application Clusters	43
	Real Application Clusters Database Installation	43

FAQ's on Oracle 11g R2 Real Application Cluster

[1]	Install the Oracle database software.....	43
[2]	Create a cluster database	43
[3]	Perform post-database creation tasks	43
[4]	Perform a single instance to RAC conversion.....	43
	RAC Database Administration	43
[1]	Use Enterprise Manager cluster database pages	43
[2]	Define redo log files in a RAC environment	43
[3]	Define undo tablespaces in a RAC environment.....	43
[4]	Start and stop RAC databases and instances	43
[5]	Modify initialization parameters in a RAC environment	43
	Managing Backup and Recovery for RAC	43
[1]	Configure the RAC database to use ARCHIVELOG mode and the flash recovery area	43
[2]	Recover from media failure and instance failures	43
[3]	Tune instance recovery in RAC	43
[4]	Configure RMAN for the RAC environment	43
	RAC DB Monitoring and Tuning.....	43
[1]	Determine RAC-specific tuning components	43
[2]	Determine RAC-specific wait events, global enqueue, and system statistics	43
[3]	Implement the most common RAC tuning tips.....	43
[4]	Use the Cluster Database Performance pages.....	43
[5]	Use the Automatic Workload Repository (AWR) in RAC.....	43
[6]	Use Automatic Database Diagnostic Monitor (ADDM) in RAC.....	43
	Services	43
[1]	Configure and manage services in a RAC environment.....	43
[2]	Use services with client applications.....	43
[3]	Use services with the Database Resource Manager and scheduler	43
[4]	Configure services aggregation and tracing.....	43
	High Availability Connections (Appendix-D).....	44
[1]	Configure client-side, connect-time load balancing and connect-time failover	44
[2]	Configure server-side, connect-time load balancing	44
[3]	Use the Load Balancing Advisory (LBA)	44
[4]	Describe the benefits of Fast Application Notification (FAN)	44

FAQ's on Oracle 11g R2 Real Application Cluster

[5]	Configure server-side callouts	44
[6]	Configure Transparent Application Failover (TAF)	44
	Design for High Availability	44
[1]	Design a Maximum Availability Architecture in your environment	44
[2]	Determine the best RAC and Data Guard topologies for your environment	44
[3]	Configure the Data Guard Broker configuration files in a RAC environment	44
[4]	Patch your RAC system in a rolling fashion	44
	Appendix	44
	Commands and outputs	44
	SRVCTL	44
	CRSCTL	44
	OCRCONFIG	47
	ASM Disk operations	48
	ASMCMD	49

FAQ's on Oracle 11g R2 Real Application Cluster

Section 1 - Grid Infrastructure: Clusterware and ASM

Oracle Grid Infrastructure

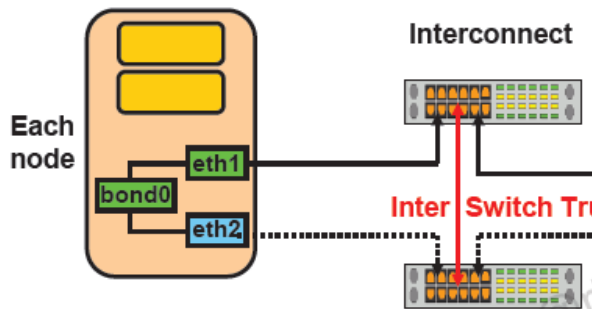
[1] Explain the principles and purposes of clusters

1. Clusterware allows cluster to be managed as a whole, protects the integrity of the cluster, maintain the registry of resources in the cluster and its state, deals with changes in the cluster and provide a common view and access to cluster components.
2. In 11GR2 clusterware is integrated with Automatic Storage Management (ASM) , Provides the capability of ASF Cluster filesystem, a foundation for oracle RAC, a generalized cluster infrastructure for non-database cluster requirement.
3. ASM can be used by clusterware in 11gR2 to host ALL shared file requirements (cluster registry, voting disk, datafiles, controlfiles, spfiles, redo, undo.....
4. Oracle Grid Infrastructure encompasses Oracle Clusterware, ASM and ASM File System
5. Oracle Clusterware is a Shared Disk architecture supporting application load balancing and failover. Its services include Cluster Management, Node monitoring, Event Services, Time Synchronisation, Network management, High Availability etc.,
6. Event Services publishes cluster events so that Applications are aware of changes in the cluster and change their connectivity/behavior.
7. Grid Naming Services can manage network naming within the cluster and manages VIP's

[2] Describe Cluster hardware best practices

1. Each node in a cluster should have atleast 2 Network interface cards. One for public network and one for cluster interconnect. Additional cards are used to connect to storage network, backup etc.,
2. Each NIC should support TCP/IP .
3. Interconnect NIC should support UDP (User data protocol) or RDS (Reliable data socket) for unix/linux communication and TCP for windows OS communication
4. All platforms use Grid interprocess communication
5. NIC's used for a specific purpose should be named the same on all cluster nodes . If "eth0" is used for public network on a node, all nodes in the cluster should use the name "eth0" for public network.
6. Grid naming services (GNS) can be used to dynamically allocate VIP's using DHCP if needed. DHCP should be available in the network. GNS is needed if DHCP needs to be used for VIP's. Otherwise Static IP addresses needs to be utilized for VIP's
7. Link Aggregation in the same switch can be used to achieve NIC redundancy OR to increase network bandwidth. This is achieved by bonding the NIC's.
8. Link aggregation can also be achieved using multiple switches equipped with a inter-switch trunk. This is recommended as the best practice configuration for interconnect. Only Active/Standby mode is supported in this configuration.
9. Configure interconnect on the Fastest BUS, ensure NIC names and slots are identical on all nodes, Define flow control: Receive=on, transmit=off, define full-bit rate supported for the NIC, define full duplex autonegotiate, define MTU to be the same between NIC and SWITCH.
- 10.

FAQ's on Oracle 11g R2 Real Application Cluster



[3] Understand Oracle Clusterware Architecture

1. Oracle clusterware is started by the OS INIT daemon /etc/init.d/init.ohasd
2. Oracle clusterware install modifies /etc/inittab to restart ohasd in the vent of a crash
3. Ohasd is the oracle high availability services daemon

Oracle Clusterware processes

ohasd.bin	oclskd.bin
octssd.bin	crsd.bin
oraagent.bin	gipcd.bin
diskmon.bin	mdnsd.bin
ocssd.bin	gpnpd.bin
evmd.bin	scriptagent.bin
cssdagent	oraagent.bin
orarootagent.bin	

- 4.
5. Oracle Clusterware Process architecture diagram
6. Cluster Ready Services (CRS) is the primary program that handles HA. CRS handles cluster resources and local resources like listener, ASM etc.
7. Cluster Synchronization services (CSS) manages the cluster configuration by managing which nodes are members of the cluster by notifying other nodes when members join and leave the cluster. CSS has 3 component processes. CSS daemon (ocssd), CSS agent (cssdagent), CSS monitor (cssdmonitor). Ccssdagent failure results in clusterware restarting the node.
8. Disk Monitor Daemon(diskmon): Monitors and performs input/output fencing for Exadata storage server
9. Event Manager (EVM) : publishes oracle clusterware events to applications
10. Multicast domain name service (mDNS): Allows DNS requests.
11. Oracle Grid Naming Service (GNS): is a gateway between cluter DNS service (mDNS) and external DNS servers.
12. Oracle Notification services (ONS) : is a publish/subscribe service for Fast-Application-Notification.
13. Oracle Root agent (orarootagent) : is a specialized process that manages resources owned by root like network, grid VIP etc.,

FAQ's on Oracle 11g R2 Real Application Cluster

14. Cluster kill daemon (oclskd): handles instance/node eviction requests that has been escalated to CSS
15. Grid IPC Daemon : handles inter-instance communication

[4] Describe how Grid Plug and Play affects Clusterware

1. Grid Naming Service is used by Grid Plug n play GPnP to : negotiate network identity for itself (node), acquiring additional information it needs to operate from a profile, configuring itself using data from profile to make itself identifiable in the network
2. GPnP domain is a collection of nodes belonging to a single cluster served by GPnP service
3. Node IP Connectivity : The node must have atleast 1 routable interface for public connectivity outside of GPnP domain. Multiple NIC's needs to be identified in the GPnP Profile for public, interconnect , storage etc.
4. Node Unique Identifier: Associated with a node is a unique identifier established thru OSD.
5. Node Personality: Cluster name, network classifications (public/private), storage to be used for ASM and CSS, Digital signatures, Software image for the node
6. Software Image: Software image in Grid plug and play is a READ ONLY collection of software to be run on the nodes of same type. Image should contain the OS, GPnP Software, a security certificate from provisioning authority, and any other software required to configure the node.
7. Gpnp profile is stored in a small xml file
8. Grid Naming Service (GNS) is an integral part of Grid Plug and Play. The only static IP needed for the cluster is the GNS Virtual IP address.

```
[root@my-dns-server ~]# cat /etc/named.conf
// Default initial "Caching Only" name server configuration
...
# Delegate to gns on cluster01
cluster01.example.com #cluster sub-domain# NS cluster01-gns.example.com
# Let the world know to go to the GNS vip
cluster01-gns.example.com 192.0.2.155 # cluster GNS Address
```

- 9.
10. While using Scan Listener, a request to resolve to cluster01-scan.example.com will be forwarded to 192.0.2.155
11. Each node in the cluster runs a multicast DNS (mDNS) process
12. GNS requires a DHCP server running on the network with enough addresses available to assign VIP and SCAN ip's.
13. Single Client Access Name (SCAN) is the address used by the clients to access the cluster.
14. SCAN is a fully qualified hostname located in the GNS subdomain registered to 3 IP addresses.
15. SCAN provides a stable and highly available name for clients to use and masks the individual VIPs of nodes in the cluster.
16. If GNS is used and DHCP server is available, GNS will assign SCAN IP's. Otherwise, SCAN IP's are defined in the DNS server to resolve to 3 IP's .

FAQ's on Oracle 11g R2 Real Application Cluster

17. During installation Listeners are started on nodes for the scan IP address. Requests are routed to the least used instance.
18. 11gr2 and later instances register with Scan listeners only as remote listeners. Upgraded databases register to scan listeners as remote listeners and also to all the local listeners.
19. PICTURE OF GPNP Architecture

The `init.ohasd` entry in the `/etc/inittab` file is responsible for:

1. Starting Oracle Clusterware when the node boots
2. Mounting shared volumes as required by Oracle Clusterware
3. Managing node evictions
4. Restarting `ohasd` in the event of a crash

The answer is 4.

Which of the following statements regarding Grid Naming Service is *not* true?

1. GNS is an integral component of Grid Plug and Play.
2. Each node in the cluster runs a multicast DNS (mDNS) process.
3. The GNS virtual IP address must be assigned by DHCP.
20. 4. The cluster subdomain is defined as a delegated domain.

Answer is 3.

[5] Describe ASM architecture and components

21. ASM manages oracle database files. ACFS manages other files.
22. From 11gr2 ASM Dynamic volume manager (ADVM) is available to support ASM cluster filesystem

FAQ's on Oracle 11g R2 Real Application Cluster

23. ASM instance does not have a data dictionary and the only way to connect to ASM is by using system privileges:
24. SYSASM: Privileged group OSASM. Full admin privilege
25. SYSDBA: Privileged group OSDBA for ASM. Access to data on ASM, create and delete files, grant and revoke file access
26. SYSOPER: Privileged group OSOPER for ASM. Limited privilege to start/stop ASM.
27. SYS user on ASM is automatically created with SYSASM privilege.
28. Typical OS Groups are:

oinstall:x:501:	→ Inventory
dba:x:502:oracle,adtvault	→ DB
oper:x:503:oracle	→ DB
asmoper:x:504:grid	→ ASM oper
asmadmin:x:505:grid	→ ASM SYSASM
asmdba:x:506:grid,oracle	→ ASM dba

29. Users can be added to the password file using SQLPLUS grant command OR orapwuser command of ASMCMD
30. ASMCMD users cannot connect thru passwordfile. Their privilege is determined by the OS group.
31. A single OS group 'dba' can be used. Multiple groups are needed for separation of duties.
32. For software installation, separate ORACLE_BASE and ORACLE_HOME for 'grid' account installing the grid/asm installation. Do not place the ORACLE_HOME of grid under ORACLE_BASE of grid.
33. ASM Instance:
The SGA in an ASM instance is different in memory allocation and usage than the SGA in a database instance. The SGA in the ASM instance is divided into four primary areas as follows:
 - **Shared Pool:** Used for metadata information
 - **Large Pool:** Used for parallel operations
 - **ASM Cache:** Used for reading and writing blocks during rebalance operations
 - **Free Memory:** Unallocated memory availableThe minimum recommended amount of memory for an ASM instance is 256 MB. Automatic memory management is enabled by default on an ASM instance and will dynamically tune the sizes of the individual SGA memory components. The amount of memory that is needed for an ASM instance will depend on the amount of disk space being managed by ASM.
The second part of the ASM instance is the background processes. An ASM instance can have many background processes; not all are always present.

34. ASM background processes:

FAQ's on Oracle 11g R2 Real Application Cluster

- **ARCn**: The archiver processes
- **CKPT**: The checkpoint process
- **DBWn**: The database writer processes
- **DIAG**: The diagnosability process
- **Jnnn**: Job queue processes
- **LGWR**: The log writer process
- **PMON**: The process monitor process
- **PSP0**: The process spawner process
- **QMNn**: The queue monitor processes
- **RECO**: The recoverer process
- **SMON**: The system monitor process
- **VKTM**: The virtual keeper of time process
- **MMAN**: The memory manager process

35. ASM processes when Clustered ASM and ACFS is used.

- **LMON**: The global enqueue service monitor process
- **LMDn**: The global enqueue service daemons
- **LMSn**: The global cache service processes
- **LCKn**: The lock processes

Additional processes are started when ADVM volumes are configured.

- **VDBG**: The Volume Driver Background process forwards ASM requests to lock or unlock an extent for volume operations to the Dynamic Volume Manager driver. The VDBG is a fatal background process so the unplanned death of this process brings down the ASM instance.
- **VBGn**: Volume Background processes wait for requests from the Dynamic Volume Manager driver, which need to be coordinated with the ASM instance. An example of such a request would be opening or closing an ASM volume file when the Dynamic Volume Manager driver receives an open for a volume (possibly due to a file system mount request) or close for an open volume (possibly due to a file system unmount request). The unplanned death of any of these processes does not have an effect on the ASM instance.
- **VMB**: Volume Membership Background (VMB) coordinates cluster membership with the ASM instance.

36. ASM Instance primary processes:

RBAL: Opens all devices as part of discovery and coordinates rebalance operation

ARBn: One or more slave processes that does rebalance operation

GMON: Responsible for managing disk level activities like drop/offline of disks and advancing ASM diskgroup compatability

MARK: Marks ASM allocation units as stale when needed

Onnn: one or more ASM slave processes forming a pool of connection to the ASM instance for exchanging messages

PZ9n: one or more parallel slave processes used in fetching data on clustered ASM installations from GV\$views.

37. ASM Node listener : This is the process that establishes network connection from ASM clients to ASM instances. Listens on port 1521 by default. Is the same as the database listener. Is capable for listening for all database instances on the same host in addition to ASM, can run concurrently with additional listeners and is named 'tnslsnr' on linux.

38. ASM configuration Files:

FAQ's on Oracle 11g R2 Real Application Cluster

SPFILE : Server parameter file defining the ASM instance

Password file: for remote authentication orapw+ASM

Listener.ora : For defining node listener

39. ASM Group Services:

- Enable the database instance to locate the ASM instance along with credentials to the ASM instance for establishing an Oracle Call Interface (OCI) connection
- Provide assistance in doing lock recovery. The ASM instance maintains certain locks on behalf of database instances. If a database instance were to fail, ASM uses the group services of `ocssd.bin` to confirm that all database processes are terminated before releasing locks.
- Offer guarantee that the ASM disk group number that is assigned to a disk group name at run time is unique

Oracle Clusterware is responsible for node membership and heartbeat monitoring, basic cluster locking, and node evictions.

Oracle Clusterware is responsible for the startup and shutdown of the ASM instance along with the dependent database instances and resources, as well as resources on which ASM depends.

40. ASM Disk Groups:

The ASM disk group consists of one or more ASM disks that provide space and is the fundamental object that ASM manages. Each disk group contains its own metadata and logging information that is required for the management of space within that disk group. ASM files are allocated from disk groups. This is similar to logical volumes or logical units of other disk management solutions. Any ASM file is completely contained within a disk group, but an ASM disk group can contain files from different databases. Although many disk groups can be created, best practices recommend that only two be created. One disk group should be used for all data for multiple databases, and the other disk group should be used for the flash recovery area for multiple databases.

When you create a disk group, you specify an ASM disk group type based on one of the following three redundancy levels:

- Normal for two-way mirroring
- High for three-way mirroring
- External to not use ASM mirroring and rely on the external hardware for redundancy

The redundancy level controls how many disk failures are tolerated without dismounting the disk group or losing data. The redundancy level sets a default for number of copies of ASM file extents, but the redundancy is controlled at the file level.

41. ASM Disk Failure Groups:

A failure group is a subset of the disks in a disk group which could fail at the same time because of shared hardware.

Failure groups enable the mirroring of metadata and user data

The default failure group creation puts every disk in its own failure group

Multiple disks can be placed in a single failure group at disk group creation

Failure groups apply only to normal and high redundancy disk groups

A normal redundancy disk group requires at least two failure groups

FAQ's on Oracle 11g R2 Real Application Cluster

A high redundancy disk group requires atleast 3 failure groups

Failure groups are used to store mirror copies of data when ASM is used for mirroring by declaring the disk group type to be Normal or High at creation time. A normal redundancy disk group requires at least two failure groups to implement two-way mirroring of files. A high redundancy disk group requires at least three failure groups to implement three-way mirroring of files.

There are always failure groups even if they are not explicitly created. If you do not specify a failure group for a disk, that disk is placed in its own failure group with the failure group name the same as the disk name. Therefore, if 20 disks were in a single disk group, there could be 20 failure groups as well. Failure groups have meaning only when used with normal and high redundancy disk groups.

All failure groups within the same disk group should be created with the same capacity to avoid space allocation problems.

42. ASM Disks: ASM disks are storage devices provisioned to ASM disk groups

They can be formed from any of the 5 sources as follows:

- A disk or partition from a storage array
- An entire disk or partitions of a physical disk
- Logical volumes or logical units (LUN)
- Network attached files (NFS)
- Exadata grid disk

Disks are named when added to a diskgroup using a name different than the OS device name

May use different OS device names on different nodes

Are divided into allocation units with sizes 1,2,4,8,16,32, or 64MB

43. ASM Files: ASM supports all database related files.

- Some supported file types:

Control files	Flashback logs	Data Pump dump sets
Data files	DB SPFILE	Data Guard configuration
Temporary data files	RMAN backup sets	Change tracking bitmaps

Online redo log files, archivelog files, rman data file copies, transport data files, ocr files, asm spfilees etc.,

Each ASM file must be contained within a single disk group, but a single Oracle database can have files in multiple disk groups. You can specify user-friendly aliases for ASM files by creating a hierarchical directory structure and use the directory names as prefixes to the file names.

44. ASM Files Extents and Striping: ASM can use variable size extents to support larger files, reduce memory requirements, and improve performance. Each data extent reside on an individual disk, data extents consist of one or more allocation units,

45. The data extent size is : Equal to AU for the first 20,000 extents, Equal to 4x AU for the next 20000 extents, Equal to 16x AU for extents above 40000 extents. ASM stripes files using extents with a coarse method for loadbalancing or a fine method to reduce latency. Coarse-grained striping is equal to AU size. Fine-grained striping is always set to 128KB

FAQ's on Oracle 11g R2 Real Application Cluster

46. ASM Files : Mirroring: ASM mirroring is specified at the file level.

When ASM allocates an extent for a normal redundancy file (two-way mirroring), ASM allocates a primary extent and a secondary extent. ASM chooses the disk on which to store the secondary extent in a different failure group other than the primary extent. The simultaneous failure of all disks in a failure group does not result in data loss.

The table in the slide lists the default disk group, the supported mirroring levels for files within that disk group, and the default mirroring level for any file created in the disk group unless a custom mirroring level is designated.

With an external redundancy disk group, ASM relies on the storage system to provide RAID functionality. Any write errors will cause a forced dismount of the entire disk group. With normal redundancy, a loss of one ASM disk is tolerated. With high redundancy, a loss of two ASM disks in different failure groups is tolerated.

47. ASM components/Clients : Any active database that is using ASM for its storage is a ASM client. ASM clients are tracked in v\$asm_client dynamic performance view.

Each file in ASM is associated with a single database

ASM clients are tracked in the v\$asm_client dynamic performance view. There will exist one row for each combination of distinct database instance name and disk group number being used.

An OCR file stored in ASM is listed as an ASM client with the name +ASM.

ADVM volumes are ASM clients and the file system must be dismounted before the instance can be shut down. ASM volumes have a client name of asmvol.

48. ASM Utilities: Many utilities can be used to administer ASM. Prominent ones are: OUI, ASMCA, OEM, SQLPLUS, ASMCMD, LSNRCTL, SRVCTL, XML DB(ftp and http)

- **Oracle Universal Installer (OUI):** Is used to install the ASM software and can create the initial disk groups
- **ASM Configuration Assistant (ASMCA):** Is used to initially configure the ASM instance and create disk groups. It can be invoked from within the OUI utility.
- **Oracle Enterprise Manager (EM):** Is used to perform central administration of a grid environment, including the ASM instance using a graphical client interface
- **SQL*Plus:** Is used to provide command-line SQL language access to the ASM instance. All ASM commands and administration can be performed with this utility.
- **ASM Command-Line utility (ASMCMD):** Is used for ASM administration from the command line without the SQL language. It uses the UNIX style syntax.
- **Listener controller utility:** (server controller is preferred) Is used to start, stop, and check the status of the listener
- **Server controller utility:** Is used to start, stop, and check the status of all the ASM instances in a cluster environment with a single command
- **XML DB:** Provides FTP and HTTP access to ASM files

49. ASM Scalability: ASM has the following limits. 63 disk groups in a storage system. 10,000 ASM disks in a storage system. 2 TB max storage for each ASM Disk (non-exadata). 4 PetaByte storage for each ASM disk (exadata). 40-Exabyte storage per storage system. 1 million files for each diskgroup. ASM file size limits (database limit is

FAQ's on Oracle 11g R2 Real Application Cluster

128 TB). External redundancy max file size is 140 PB. Normal redundancy max file size is 42 PB. High redundancy max file size is 15 PB.

User creation in ASM.

```
SQL> connect sys as sysasm
```

Enter password:

Connected.

```
SQL> create user shaji identified by "Cvsdba1#";
```

User created.

```
SQL> grant sysasm to shaji;
```

Grant succeeded.

```
SQL> select * from v$pwfile_users;
```

USERNAME	SYSDB	SYSOP	SYSAS
SYS	TRUE	TRUE	TRUE
ASMSNMP	TRUE	FALSE	FALSE
SHAJI	FALSE	FALSE	TRUE

- **Local connection using operating system authentication.** Operating system users that are members of the OSASM, OSDBA for ASM, or OSOPER for ASM groups can connect to ASM without providing any additional credentials. For example, an operating system user who is a member of the OSASM group can connect to ASM with full administrative privileges using:

```
CONNECT / AS SYSASM
```

Note: A local connection using AS SYSDBA always uses OS authentication even when using the username/password syntax.
- **Local connection using password file authentication.** The following example shows a local connection using password file authentication:

```
CONNECT sys/<sys_password> AS SYSASM
```
- **Remote connection by way of Oracle Net Services using password authentication.** Password-based authentication is also supported remotely using Oracle Net Services. The following example shows a remote connection by way of Oracle Net Services using password authentication.

```
CONNECT sys/<sys_password>@<net_services_alias> AS SYSASM
```

FAQ's on Oracle 11g R2 Real Application Cluster

Grid Infrastructure Installation

[1] Perform pre-install tasks for Grid Infrastructure

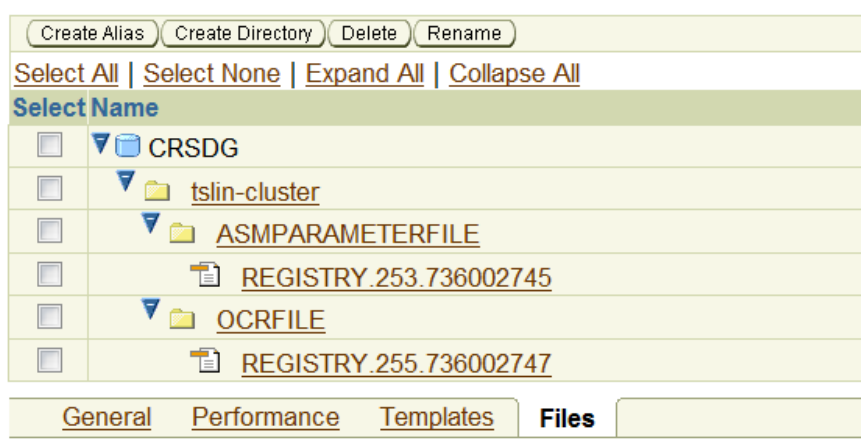
50. Grid Infrastructure files can be stored on ASM, NFS and CFS. ASM cannot store database/grid software. RAW devices are not supported for new installation. Existing RAW device databases can be upgraded to 11gR2.
51. Sizing shared storage for Grid install:
- 52.

Redundancy	Min. no. of disks	OCR files	Voting disk	Total
External	1	280 MB	280MB	560 MB
Normal	3	560 MB	840 MB	1.4 GB
High	5	840 MB	1.4 GB	2.3 GB

Clusterware be used to provide redundancy. When you use external redundancy, the minimum requirement is for one Oracle Cluster Registry (OCR) file and one voting disk of 280 MB each. If Oracle Clusterware is used for implementing normal redundancy, two OCR files and three voting disks of 280 MB each should be created for a total of 1.4 GB. Only five OCR files may be created, but Oracle Clusterware allows up to 15 voting disks to be created. Always configure an odd number of voting disks.

The user account with which you perform the installation must have write permissions to create the files in the path that you specify during the installation. The OCR file locations should have the `root:oinstall` ownership and the voting disk should have the `crs:oinstall` ownership. All file locations should have `0640` permission patterns. These requirements are only for Oracle Clusterware. Additional space for database and applications need to be planned for.

53. OCR and Cluster Registry can be stored on ASM.



54. Cluster configuration information is maintained in OCR. Each node in the cluster maintains an in-memory copy of OCR, along with the CRSD that accesses its OCR

FAQ's on Oracle 11g R2 Real Application Cluster

cache. Only one CRSD process actually reads and writes from the OCR and is responsible for refreshing the cache of all the member nodes. When clients want to update the registry, it communicates to the CRSD on its node which will communicate the same to the CRSD that is responsible for reading/writing to the registry.

55. Grid infrastructure installation now gives 3 locations to create OCR files by default and we can specify upto 5 locations. New installations to raw devices are not supported.
56. Managing Voting Disks: Voting disks can be stored on ASM. Each node should be able to access majority of the voting disks otherwise it will be evicted from the cluster.
57. Voting disks are not regular ASM files. Clusterware knows the locations of the files even if ASM is not available. The number of voting disks is determined by the ASM group redundancy setting.
58. A separate failure group is required for each voting disk. Voting disks are managed by CRSCTL utility. If any node in a cluster is not able to communicate to other nodes, then other nodes will realize that there is no heart-beat with the node having troubles and uses the voting disk to evict the node out of the cluster. The node having issues will realize this via voting disks (clusterware) and will reboot. Clusterware supports upto 15 voting disks.
59. Cluster Log files:
 - CRS logs are in <Grid_Home>/log/<hostname>/crsd/. The crsd.log file is archived every 10 MB (crsd.101, crsd.102, ...).
 - CSS logs are in Grid_HOME /log/<hostname>/cssd/. The cssd.log file is archived every 20 MB (cssd.101, cssd.102, ...).
 - EVM logs are in <Grid_Home>/log/<hostname>/evmd.
 - SRVM (srvctl) and OCR (ocrdump, ocrconfig, ocrcheck) logs are in <Grid_Home>/log/<hostname>/client/ and \$ORACLE_HOME/log/<hostname>/client/.
 - Important Oracle Clusterware alerts can be found in alert<nodename>.log in the <Grid_Home>/log/<hostname> directory.

FAQ's on Oracle 11g R2 Real Application Cluster

```
[grid@tslinrac02 tslinrac02]$ cd $ORACLE_HOME
[grid@tslinrac02 grid]$ pwd
/u01/app/11.2.0/grid
[grid@tslinrac02 grid]$ cd log
[grid@tslinrac02 log]$ pwd
/u01/app/11.2.0/grid/log
[grid@tslinrac02 log]$ ll
total 12
drwxr-xr-x  2 grid oinstall 4096 Nov 25 12:58 crs/
drwxr-xr-t 23 root oinstall 4096 Nov 25 13:13 tslinrac02/
drwxrwxr-x  4 grid asmadmin 4096 Dec 11 17:39 diag/
[grid@tslinrac02 log]$ ll crs
total 0
[grid@tslinrac02 log]$ ll tslinrac02/
total 1056
drwxr-x---  2 grid oinstall    4096 Nov 25 13:13 srv/
drwxr-x---  2 root oinstall    4096 Nov 25 13:13 gnsd/
drwxr-x---  4 grid oinstall    4096 Nov 25 13:13 cvu/
drwxrwxr-t  4 root oinstall    4096 Nov 25 13:13 agent/
drwxr-x---  2 grid oinstall    4096 Nov 25 13:13 admin/
drwxr-xr-x  2 root oinstall    4096 Nov 25 13:13 acfssec/
drwxr-x---  2 root oinstall    4096 Nov 25 13:13 acfsreplroot/
drwxr-x---  2 grid oinstall    4096 Nov 25 13:13 acfsrepl/
drwxr-x---  2 grid oinstall    4096 Nov 25 13:15 mdnsd/
drwxr-x---  2 root oinstall    4096 Nov 25 13:23 crfmond/
drwxr-x---  2 root oinstall    4096 Nov 25 13:23 crflogd/
drwxr-x---  2 grid oinstall    4096 Nov 25 13:23 evmd/
drwxr-x---  2 grid oinstall    4096 Dec  2 23:29 diskmon/
drwxrwxr-t  5 grid oinstall    4096 Dec 11 17:40 racg/
drwxr-x---  2 root oinstall    4096 Feb 25 14:21 ohasd/
drwxr-x---  2 root oinstall    4096 Feb 26 12:33 ctssd/
drwxr-x---  2 grid oinstall    4096 Apr 27 15:26 client/
drwxr-x---  2 grid oinstall    4096 Apr 27 15:27 cssd/
drwxr-x---  2 root oinstall    4096 Apr 27 19:06 crsd/
drwxr-x---  2 grid oinstall    4096 Apr 29 12:42 gipcd/
drwxr-x---  2 grid oinstall    4096 May  4 10:02 gpnpd/
-rw-rw-r--  1 grid oinstall 987788 May  4 13:39 alerttslinrac02.log
[grid@tslinrac02 log]$ ll diag
total 12
drwxrwx--T  3 grid asmadmin 4096 Nov 25 13:14 clients/
drwxr-xr-x  3 grid oinstall 4096 Dec 11 17:39 tnslnsr/
-rw-r-----  1 grid oinstall  13 May  4 10:03 adrci_dir.mif
[grid@tslinrac02 log]$ █
```

60. Installing ASMLIB Manually: Refer to the Jeff Hunters 11g RAC install on linux using lscsi

61. Preparing ASMLib: Refer to the Jeff Hunters 11g RAC install on linux using lscsi

[2] Install Grid Infrastructure

1. Check System requirements: Atleast 1.5GB of memory, 1.5GB of swap space, 1 GB of /tmp and 4-5 GB for software. Check /proc/meminfo for memory/swap setting.

FAQ's on Oracle 11g R2 Real Application Cluster

2. Check Network Requirements: Atleast 2 NIC's should be configured for public and private network. Interface names should be same across all nodes . ex: if eth0 is public ip, then public ip on all remaining nodes should be eth0.

```
[root@tslinrac01 install_scripts]# cat /etc/hosts
# Do not remove the following line, or various programs
# that require network functionality will fail.
127.0.0.1          localhost.localdomain localhost

# Public IP addresses
192.168.1.101      tslinrac01 tslinrac01.dba.com
192.168.1.102      tslinrac02 tslinrac02.dba.com
192.168.1.103      tslinrac03 tslinrac03.dba.com
192.168.1.104      tslinrac04 tslinrac04.dba.com

# Virtual IP addresses

192.168.1.201      tslinrac01-vip tslinrac01-vip.dba.com
192.168.1.202      tslinrac02-vip tslinrac02-vip.dba.com
192.168.1.203      tslinrac03-vip tslinrac03-vip.dba.com
192.168.1.204      tslinrac04-vip tslinrac04-vip.dba.com

# Private interconnects
192.168.50.11      tslinrac01-priv tslinrac01-priv.dba.com
192.168.50.12      tslinrac02-priv tslinrac02-priv.dba.com
192.168.50.13      tslinrac03-priv tslinrac03-priv.dba.com
192.168.50.14      tslinrac04-priv tslinrac04-priv.dba.com

# Storage server and ip
192.168.1.53        tsstore01      tsstore01.dba.com
192.168.70.10       tsstore01-stg tsstore01-stg.dba.com
192.168.70.11       tslinrac01-stg tslinrac01-stg.dba.com
192.168.70.12       tslinrac02-stg tslinrac02-stg.dba.com
192.168.70.13       tslinrac03-stg tslinrac03-stg.dba.com
192.168.70.14       tslinrac04-stg tslinrac04-stg.dba.com
```

3. Public NIC should support TCP/IP. And Private NIC should support UDP
4. Public IP should be registered in DNS server and/or /etc/hosts file.
5. If GNS is used, then Cluster GNS address must be registered in DNS.
6. Use NTP to synchronise time across all nodes. Mismatch in time can result in node eviction.
7. Software Requirements: Refer to platform documentation on the kernel/os requirements.
8. Ensure all required packages are loaded to the OS
9. Create Users and Groups

Create all the groups

```
groupadd -g 501 oinstall
groupadd -g 502 dba
groupadd -g 503 oper
```

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FAQ's on Oracle 11g R2 Real Application Cluster

```
groupadd -g 504 asmoper
groupadd -g 505 asmadmin
groupadd -g 506 asmdba
groupadd -g 507 avadmin
```

Create all the users

#1. Create account 'grid' to be owning clusterware and ASM

```
useradd -m -u 501 -g oinstall -G asmadmin,asmdba,asmoper -d /home/grid -s /bin/bash -c "Grid
Infrastructure Owner" grid
echo "set the password for grid"
passwd grid
```

#2. Create 'oracle'

```
useradd -m -u 502 -g oinstall -G dba,oper,asmdba -d /home/oracle -s /bin/bash -c "Oracle
Software Owner" oracle
```

```
echo "Set the password for oracle"
passwd oracle
```

#3. Create user 'adtvault'

```
useradd -m -u 503 -g oinstall -G avadmin,dba -d /home/adtvault -s /bin/bash -c "Audit vault
Software Owner" adtvault
```

10. Set Shell settings for the grid infrastructure user

```
cat >> /etc/security/limits.conf <<EOF
grid soft nproc 2047
grid hard nproc 16384
grid soft nofile 1024
grid hard nofile 65536
oracle soft nproc 2047
oracle hard nproc 16384
oracle soft nofile 1024
oracle hard nofile 65536
EOF
```

```
cat >> /etc/pam.d/login <<EOF
# Added for Oracle Shell Limits
session required /lib/security/pam_limits.so
session required pam_limits.so
EOF
```

11. Install the Grid Software: Refer to the screenshot doc

<https://www.box.net/shared/6x61mq5qmb>

[3] Verify the installation

12. Run command “/u01/app/11.2.0/grid/bin/crsctl stat res -t” to check the state.

FAQ's on Oracle 11g R2 Real Application Cluster

[4] Configure ASM disk groups

13. Check ASM diskgroup creation via doc : <https://www.box.net/shared/m95l2s4496>

14. ASM diskgroups can be created via asmca, grid control, sql, asmcmd,

The asmcmd command shown in the slide performs the same operation if the disk_config.xml file is:

```
<dg name="data" redundancy="normal">
  <fg name="fg1">
    <dsk string="/dev/disk1"/>
    <dsk string="/dev/disk2"/> </fg>
  <fg name="fg2">
    <dsk string="/dev/disk3"/>
    <dsk string="/dev/disk4"/> </fg>
  <a name="compatible.asm" value="11.2"/>
  <a name="compatible.rdbms" value="11.2"/>
  <a name="compatible.advm" value="11.2"/>
</dg>
```

[5] Configure ASM volumes

Refer to doc: <https://www.box.net/shared/simtj0dpd1>

[6] Make ASM cluster file system

Refer to doc <https://www.box.net/shared/simtj0dpd1>

[7] Mount ACFS volumes

Refer to doc <https://www.box.net/shared/simtj0dpd1>

Administering Oracle Clusterware

[1] Display Clusterware management proficiency

1. CRSCTL manages clusterware related operations. Starting/stopping of clusterware, enabling/disabling clusterware daemons, registering cluster resources
2. SRVCTL manages database related operations , starting and stopping instances, services etc.,
3. Enterprise manager : Dbconsole within the cluster and grid control (centralised) can be used to manage the cluster using GUI.
4. Start CRS: Crsctl start crs
5. Stop CRS: crsctl stop crs
[root@tslinrac02 ~]# crsctl stop crs
CRS-2791: Starting shutdown of Oracle High Availability Services-managed resources on 'tslinrac02'

FAQ's on Oracle 11g R2 Real Application Cluster

6. Enable CRS on a node: crsctl enable crs
[root@tslinrac02 ~]# crsctl enable crs
CRS-4622: Oracle High Availability Services autostart is enabled.
7. Disable CRS on a node : crsctl disable crs
[root@tslinrac02 ~]# crsctl disable crs
CRS-4621: Oracle High Availability Services autostart is disabled.
8. Check CRS: crsctl check crs
[root@tslinrac02 ~]# crsctl check crs
CRS-4638: Oracle High Availability Services is online
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
9. Check Cluster: crsctl check cluster
[root@tslinrac02 ~]# crsctl check cluster
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online

NOTE: Check commands does not need ROOT access. Enable/disable/start/stop crsctl commands needs ROOT login

10. Query Voting disks: This can be executed by grid user and does not require CSS To be running
[grid@tslinrac02 ~]\$ crsctl query css votedisk
STATE File Universal Id File Name Disk group
-- ----
1. ONLINE 0af83b84fca64f05bf96f027b6fcafc9 (ORCL:SDAVGCRS1) [CRSDG]
2. ONLINE 3492f4ef75924f56bf57d59ed58f7a6d (ORCL:SDBVGCRS1) [CRSDG]
3. ONLINE 9c2f851a0bdf4fd1bfd08b8d7da459aa (ORCL:SDCVGCRS1) [CRSDG]
Located 3 voting disk(s).
11. Check OCR location:
[grid@tslinrac02 ~]\$ cat /etc/oracle/ocr.loc
ocrconfig_loc=+CRSDG
local_only=FALSE
12. Check OCR using 'ocrcheck': Run as root to get logical corruption status

```
[root@tslinrac02 ~]# ocrcheck
Status of Oracle Cluster Registry is as follows :
  Version             : 3
  Total space (kbytes) : 262120
  Used space (kbytes)  : 3236
  Available space (kbytes) : 258884
  ID                   : 2006039960
  Device/File Name     : +CRSDG
                        Device/File integrity check succeeded
```

FAQ's on Oracle 11g R2 Real Application Cluster

Device/File not configured

Device/File not configured

Device/File not configured

Device/File not configured

Cluster registry integrity check succeeded

Logical corruption check succeeded

13. Checking the integrity of clusterware configuration files: check ocssd.log , ocrcheck, cluvfy

14. Check ocssd.log : grep voting \$ORACLE_HOME/log/tslinrac02/cssd/ocssd.log

```
2011-05-09 05:53:28.181: [ CSSD][3041789632]clssnmReadDiscoveryProfile: voting file discovery string()
2011-05-09 05:53:28.286: [ CSSD][3023043472]clssnmvDiskVerify: discovered a potential voting file
2011-05-09 05:53:28.306: [ CSSD][3023043472]clssnmvDiskVerify: discovered a potential voting file
2011-05-09 05:53:28.332: [ CSSD][3023043472]clssnmvDiskVerify: discovered a potential voting file
2011-05-09 05:53:28.337: [ CSSD][3023043472]clssnmCompleteInitVFDDiscovery: Completing initial voting file discovery
2011-05-09 05:53:28.337: [ CSSD][3023043472]clssnmCompleteVFDDiscovery: Completing voting file discovery
2011-05-09 05:53:28.337: [ CSSD][3023043472] Listing unique IDs for 3 voting files:
2011-05-09 05:53:28.337: [ CSSD][3023043472] voting file 1: 0af83b84-fca64f05-bf96f027-b6fcafc9
2011-05-09 05:53:28.337: [ CSSD][3023043472] voting file 2: 3492f4ef-75924f56-bf57d59e-d58f7a6d
2011-05-09 05:53:28.337: [ CSSD][3023043472] voting file 3: 9c2f851a-0bdf4fd1-bfd08b8d-7da459aa
2011-05-09 05:53:28.748: [ CSSD][3041789632]clssnmvDiskAvailabilityChange: voting file ORCL:SDCVGCRS1 now
online
2011-05-09 05:53:28.778: [ CSSD][3041789632]clssnmvDiskAvailabilityChange: voting file ORCL:SDBVGCRS1 now
online
2011-05-09 05:53:28.809: [ CSSD][3041789632]clssnmvDiskAvailabilityChange: voting file ORCL:SDAVGCRS1 now
online
```

15. Cluster integrity check via 'cluvfy' (run as grid). Gives detailed output

```
[grid@tslinrac01 ~]$ cluvfy comp ocr -n all -verbose
```

Verifying OCR integrity

Checking OCR integrity...

Checking the absence of a non-clustered configuration...

All nodes free of non-clustered, local-only configurations

ASM Running check passed. ASM is running on all specified nodes

Checking OCR config file "/etc/oracle/ocr.loc"...

OCR config file "/etc/oracle/ocr.loc" check successful

Disk group for ocr location "+CRSDG" available on all the nodes

NOTE:

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FAQ's on Oracle 11g R2 Real Application Cluster

This check does not verify the integrity of the OCR contents. Execute 'ocrcheck' as a privileged user to verify the contents of OCR.

OCR integrity check passed

[2] Demonstrate OCR backup and recovery techniques

1. In 11gR2, voting disk data is automatically backed up in the OCR as part of any configuration change. Voting disk data is automatically restored to any new voting disk that is added. Using 'dd' to backup/restore may result in loss of voting disk. Prior to 11gR2, use of 'dd' to backup voting disk after installation was required. From 11gR2 onwards, dd is not supported to backup voting disk. Voting disk is now automatically backed up and manual backup is not required. Use crsctl delete/add command to remove and add a new voting disk. Voting disk data is automatically restored when a new device is added.
2. To add voting disk to non-ASM storage, use the following commands:
Crsctl delete css votedisk <path_to_voting_disk> OR
Crsctl delete css votedisk voting_disk_GUID (where voting_disk_guid is obtained from the column 'File Universal Id' from crsctl query css votedisk command
Crsctl add css votedisk <path_to_voting_Disk>
3. To add a voting disk to ASM:
Crsctl replace votedisk +asm_disk_group_name
4. Migrate voting disk between ASM and non-ASM storage:
Crsctl replace css votedisk {+asm_disk_Group | path_to_voting_disk}
5. Locating OCR automatic backups: ocrconfig -showbackup auto . OCR is automatically backed up. ONLY ONE NODE performs the backup. To show the host and location of the backup file, use the command listed below. Files could be spread across nodes due to outage. The backup frequency and retention policy are: Every four hours. CRS keeps the last three copies. End of Every day: CRS keeps the last two copies. End of Every week: CRS keeps the last 2 copies.

```
[grid@tslinrac02 ~]$ ocrconfig -showbackup auto
```

```
tslinrac01 2011/05/04 22:38:44 /u01/app/11.2.0/grid/cdata/tslin-cluster/backup00.ocr
```

```
tslinrac01 2011/05/04 18:38:43 /u01/app/11.2.0/grid/cdata/tslin-cluster/backup01.ocr
```

```
tslinrac01 2011/05/04 14:38:42 /u01/app/11.2.0/grid/cdata/tslin-cluster/backup02.ocr
```

```
tslinrac01 2011/05/03 22:38:38 /u01/app/11.2.0/grid/cdata/tslin-cluster/day.ocr
```

```
tslinrac02 2011/04/27 20:33:16 /u01/app/11.2.0/grid/cdata/tslin-cluster/week.ocr
```

6. The backup file names generated by automatic ocr backup should not be changed.
7. OCR Automatic backup location should be changed to a shared storage location shared by all nodes. The backup location will be used for both automatic and manual backup. If CRS is stopped on all nodes, then the schedule of the backup is suspended.
8. Change OCR Backup location: ocrconfig -backuploc /backup_nfs/ocr_backup

FAQ's on Oracle 11g R2 Real Application Cluster

9. DO NOT place the OCR backup location on a ASM filesystem
10. Adding, Replacing and repairing OCR locations: Clusterware can manage upto 5 redundant locations.
Ocrconfig -add +DATA2 ---ASM
Ocrconfig -add /dev/sde1 --- LUNS shared on all nodes. Check more on this. Whether it is a LUN or can be on NFS
----To replace the current location
Ocrconfig -replace /dev/sde1 -replacement +DATA2
--To repair OCR configuration. THIS SHOULD BE EXECUTED AFTER STOPPING CRS
Ocrconfig -repair -add +DATA1
11. Delete an OCR location: DO NOT perform ocr deletion until and unless there is another ocr location active and online

Ocrconfig -delete +DATA2 (manually remove the files from ASM dg using ASMCMD)
Ocrconfig -delete /dev/sde1
12. To migrate OCR between ASM to non-asm location and vice versa, check the version of CRS to make sure it is 11g Release 2
[root@tslinrac01 backup_nfs]# crsctl query crs activeversion
Oracle Clusterware active version on the cluster is [11.2.0.2.0]
13. MANUAL backup of OCR:
[root@tslinrac01 backup_nfs]# ocrconfig -manualbackup

tslinrac01 2011/05/10 06:14:36
/backup_nfs/ocr_backup/backup_20110510_061436.ocr
[root@tslinrac01 backup_nfs]# ocrconfig -showbackup manual

tslinrac01 2011/05/10 06:14:36
/backup_nfs/ocr_backup/backup_20110510_061436.ocr
14. MANUAL Logical export backup of OCR:
[root@tslinrac01 ocr_backup]# ocrconfig -export /backup_nfs/ocr_backup/ocr.export1
[root@tslinrac01 ocr_backup]# ls -ltr
total 7516
-rw-----+ 1 root root 7565312 May 10 06:16 backup_20110510_061436.ocr
-rw-rw-rw--+ 1 root root 113772 May 10 2011 ocr.export1
15. Recovering OCR using physical backups:
Ocrconfig -showbackup → locate backups
Crsctl stop cluster -all → Stop clusterware on ALL nodes
Crsctl stop crs → stop oracle HA services on all nodes. Run on all nodes
Ocrconfig -restore <full path to ocr physical backup file>
Crsctl start crs → Start oracle HA services on all nodes. Execute on all nodes

FAQ's on Oracle 11g R2 Real Application Cluster

Cluvfy comp ocr -n all → check the OCR integrity

16. Recovering OCR using logical backups:

Locate the logical backup file of ocr (where it was backed up to)

Crsctl stop cluster -all

Crsctl stop crs → run on all nodes

Ocrconfig -restore /backup_nfs/ocr_backup/ocr.export1 → restore from the logical export

Crsctl start crs → start oracle ha services on all nodes. Execute on all nodes

Cluvfy comp ocr -n all → check the ocr integrity

17. Oracle LOCAL Registry: Each cluster node has a local registry for node specific resources called local registry. OLR is installed and configured when clusterware is installed. One of its functions is to facilitate clusterware startup where ASM stores the OCR and voting disks. This enables the node to join the cluster. Check local registry status by running the command:

```
[root@tslinrac01 ~]# ocrcheck -local
```

Status of Oracle Local Registry is as follows :

```
Version          :      3
Total space (kbytes) :   262120
Used space (kbytes)  :    2580
Available space (kbytes) : 259540
ID                : 1962692928
Device/File Name    : /u01/app/11.2.0/grid/cdata/tslinrac01.olr
                   Device/File integrity check succeeded
```

Local registry integrity check succeeded

Logical corruption check succeeded

18. OLR display contents on screen: ocrdump -local -stdout

19. OLR. Make a manual logical backup: ocrconfig -local -export

/backup_nfs/ocr_backup/ocr.local1

20. OLR. Import from logical backup: ocrconfig -local -import

/backup_nfs/ocr_backup/ocr.local1

21. OLR. Modify OLR file on local node: ocrconfig -local -repair olr <file_name>

[3] Managing Network Settings

1. List the network interfaces available to cluster

```
[grid@tslinrac01 ~]$ oifcfg iflist -p -n
```

```
eth0 192.168.70.0 PRIVATE 255.255.255.0
```

```
eth1 192.168.1.0 PRIVATE 255.255.255.0
```

```
eth2 192.168.50.0 PRIVATE 255.255.255.0
```

```
eth2 169.254.0.0 UNKNOWN 255.255.0.0
```

2. To determine the public and private interfaces configured in clusterware:

```
[grid@tslinrac01 ~]$ oifcfg getif
```

```
eth1 192.168.1.0 global public
```

```
eth2 192.168.50.0 global cluster_interconnect
```

FAQ's on Oracle 11g R2 Real Application Cluster

3. To determine VIP interface IP, subnet, hostname :
[grid@tslinrac01 ~]\$ srvctl config nodeapps -a
Network exists: 1/192.168.1.0/255.255.255.0/eth1, type static
VIP exists: /tslinrac01-vip/192.168.1.201/192.168.1.0/255.255.255.0/eth1, hosting node tslinrac01
VIP exists: /tslinrac02-vip/192.168.1.202/192.168.1.0/255.255.255.0/eth1, hosting node tslinrac02
4. Explore changing VIP address
5. Explore changing the interconnect adapter
6. Explore SCAN listener

Managing Clusterware

- [1] Perform prerequisite steps for extending a cluster
- [2] Use Oracle Universal Installer (OUI) to add a node to an Oracle Clusterware home
- [3] Use OUI to remove a node from an Oracle Clusterware home

Making Applications Highly Available With Oracle Clusterware

- [1] Describe the High Availability components of Oracle Clusterware
- [2] Contrast Policy-Managed and Administration Managed databases
- [3] Describe the functionality of server pools
- [4] Describe application placement policies
- [5] Create an application Virtual IP (VIP)
- [6] Manage application resources

Troubleshooting Oracle Clusterware

- [1] Locate Oracle Clusterware log files
- [2] Gather all log files using diagcollection.pl
- [3] Enable resource debugging
- [4] Enable component-level debugging
- [5] Enable tracing for Java-based tools
- [6] Troubleshoot the Oracle Cluster Registry (OCR) file

Administering ASM Instances

- [1] Understand and apply ASM initialization parameters
 1. ASM init parameters can be set via ALTER SYSTEM or ALTER SESSION statements
 2. INSTANCE_TYPE=ASM is the only mandatory parameter
 3. ASM specific parameters are:

NAME	TYPE	VALUE

asm_diskgroups	string	ORADATA01, ORAFRA01, ACFS1
asm_diskstring	string	
asm_power_limit	integer	1
asm_preferred_read_failure_groups	string	

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FAQ's on Oracle 11g R2 Real Application Cluster

4. A PFILE or SPFILE can be used to manage parameters. In a clustered ASM environment, SPFILE is by default placed in a ASM diskgroup. It can also be located on a clustered filesystem.
5. **ASM_DISKGROUPS** : **ASM_DISKGROUPS** specifies a list of disk groups that ASM automatically mounts on startup. It uses the default value NULL. Set value is ignored during some circumstances like STARTUP NOMOUNT. Can be dynamically set using ALTER SYSTEM. Is automatically modified when a disk group is created, deleted, mounted or unmounted while using a spfile. It must be manually adjusted if using a PFILE.
6. At instance startup, ASM instance attempts to mount the following groups:
 - Diskgroup specified by **ASM_DISKGROUPS** parameter
 - Disk group used by cluster synchronisation services (CSS) for voting disks
 - Disk group used by oracle clusterware for cluster registry
 - Disk group used by ASM to store the ASM spfile.
7. **ASM_DISKSTRING**: This specifies a list of strings that limits the set of disks that ASM instance discovers. Uses the default value of NULL. This means ASM looks at the default path looking for disks that it has read-write access to. Default path is platform specific. Default search path includes ASMLIB disks. It can use * and ? wildcard characters. Can be set dynamically using ALTER SYSTEM . The change will be rejected if the new value cannot find disks on currently mounted disk groups.

The default value of the **ASM_DISKSTRING** parameter is a NULL string. A NULL value causes ASM to search a default path for all disks in the system to which the ASM instance has read-and-write access. The default search path is platform specific. The following list shows the default search path for a selection of common platforms:

Linux: /dev/raw/*

AIX: /dev/rhdisk*

HP-UX: /dev/rdisk/*

Solaris: /dev/rdisk/*

Windows: \\.\ORCLDISK_n

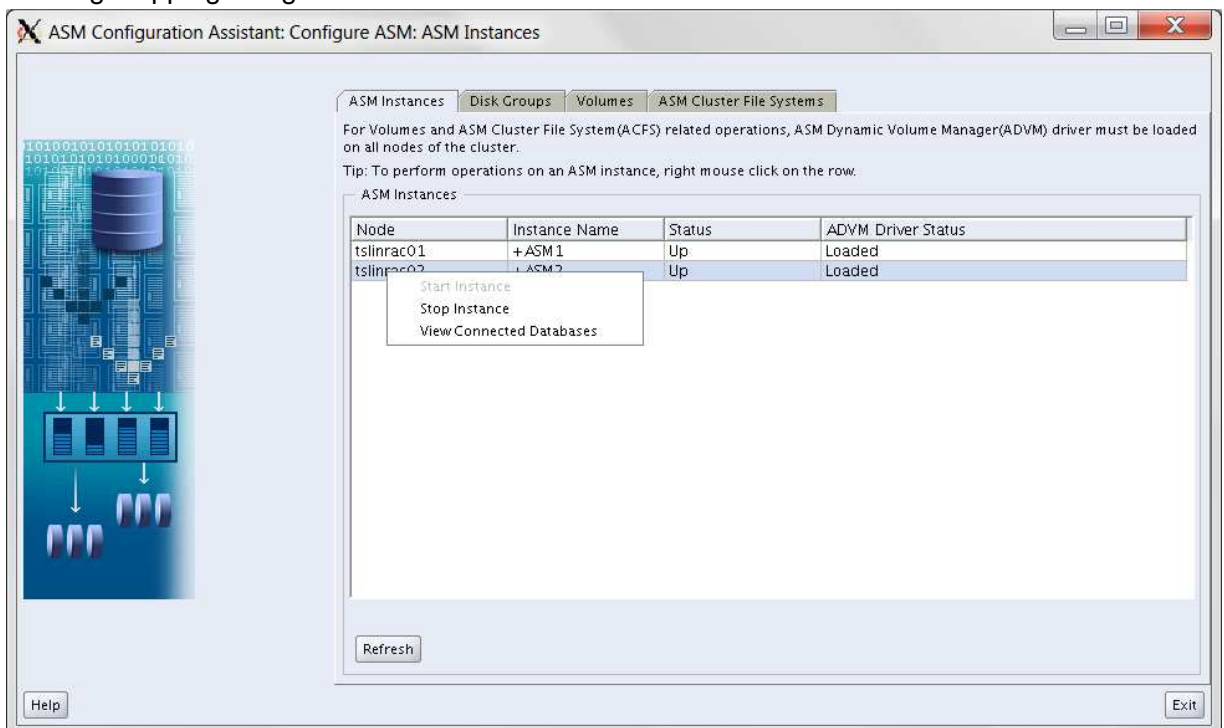
8. **ASM_POWER_LIMIT**: Default is 1. This specifies the default power of rebalancing. 1 is the lowest power which means ASM will use minimal resource during rebalancing. Allowable range is between 0 to 11. 0 disables rebalance operations. Lower values uses lesser resource but takes a longer time for rebalancing. Higher values uses more resources but finishes rebalance operations faster. This parameter can be set dynamically.
9. **INSTANCE_TYPE**: **INSTANCE_TYPE** should be set to ASM. This is a mandatory requirement for asm instances.
10. **CLUSTER_DATABASE** : If this is set to TRUE, then it means storage clustering is enabled. Clustered ASM instance can support, RAC and non-RAC databases. All instances in a cluster should have the same settings.

FAQ's on Oracle 11g R2 Real Application Cluster

11. MEMORY_TARGET: Memory target specifies the total amount of memory used by an ASM instance. Default is 272MB. Minimum is 256MB. Smaller than 256 MB are ignored.

[2] Manage ASM instances and associated processes

1. [grid@tslinrac01 ~]\$ srvctl status asm
ASM is running on tslinrac01,tslinrac02
2. [grid@tslinrac01 ~]\$ srvctl status asm -n tslinrac02
ASM is running on tslinrac02
3. Srvctl start asm -n <hostname>
4. Srvctl start asm (on all nodes)
5. Srvctl stop asm (on all nodes)
6. Srvctl start asm [-n node] [-o startoptions]
Start options can be : FORCE, MOUNT, OPEN, NOMOUNT, RESTRICT
7. Srvctl stop asm [-n node] [-o stopoptions]
Stopoptions can be : NORMAL, IMMEDIATE, TRANSACTIONAL, ABORT
8. Srvctl can be used to manage a non-clustered ASM too.
9. Starting/Stopping ASM using SQLPLUS:
 - ORACLE_SID=+ASM1; export ORACLE_SID
 - ORACLE_HOME=/u01/app/11.2.0/grid; export ORACLE_HOME
 - \$ORACLE_HOME/bin/sqlplus / as SYSASM
 - Startup;
10. Starting/stopping using ASMCA



11. Starting/stopping using ASMCMD

FAQ's on Oracle 11g R2 Real Application Cluster

```
$ asmcmd
ASMCMD [+] > shutdown

ASMCMD [+] > shutdown --immediate

ASMCMD [+] > shutdown --abort

ASMCMD> startup --nomount --pfile asm_init.ora

ASMCMD> startup --mount
```

12. Starting/stopping ASM instances containing OCR and voting disks:

- Will be automatically restarted by high availability services daemon
- Use crsctl stop crs
- Stopping oracle clusterware will stop asm also using above command.

```
[root@tslinrac01 ~]# crsctl stop crs
```

```
CRS-2791: Starting shutdown of Oracle High Availability Services-managed resources on 'tslinrac01'
```

```
CRS-2673: Attempting to stop 'ora.crsd' on 'tslinrac01'
```

```
CRS-2790: Starting shutdown of Cluster Ready Services-managed resources on 'tslinrac01'
```

```
CRS-2673: Attempting to stop 'ora.oc4j' on 'tslinrac01'
```

```
CRS-2673: Attempting to stop 'ora.ACFS1.dg' on 'tslinrac01'
```

```
CRS-2673: Attempting to stop 'ora.CRSDG.dg' on 'tslinrac01'
```

```
CRS-2673: Attempting to stop 'ora.registry.acfs' on 'tslinrac01'
```

```
CRS-2673: Attempting to stop 'ora.racdb.svc_racdb1.svc' on 'tslinrac01'
```

```
CRS-2673: Attempting to stop 'ora.cvu' on 'tslinrac01'
```

```
CRS-2673: Attempting to stop 'ora.LISTENER_SCAN1.lsnr' on 'tslinrac01'
```

```
CRS-2677: Stop of 'ora.racdb.svc_racdb1.svc' on 'tslinrac01' succeeded
```

```
CRS-2673: Attempting to stop 'ora.racdb.db' on 'tslinrac01'
```

```
CRS-2672: Attempting to start 'ora.racdb.svc_racdb1.svc' on 'tslinrac02'
```

```
CRS-2676: Start of 'ora.racdb.svc_racdb1.svc' on 'tslinrac02' succeeded
```

```
CRS-2677: Stop of 'ora.cvu' on 'tslinrac01' succeeded
```

```
CRS-2672: Attempting to start 'ora.cvu' on 'tslinrac02'
```

```
CRS-2677: Stop of 'ora.LISTENER_SCAN1.lsnr' on 'tslinrac01' succeeded
```

```
CRS-2673: Attempting to stop 'ora.scan1.vip' on 'tslinrac01'
```

```
CRS-2677: Stop of 'ora.scan1.vip' on 'tslinrac01' succeeded
```

```
CRS-2672: Attempting to start 'ora.scan1.vip' on 'tslinrac02'
```

```
CRS-2676: Start of 'ora.cvu' on 'tslinrac02' succeeded
```

```
CRS-2677: Stop of 'ora.racdb.db' on 'tslinrac01' succeeded
```

```
CRS-2673: Attempting to stop 'ora.ORADATA01.dg' on 'tslinrac01'
```

```
CRS-2673: Attempting to stop 'ora.ORAFRA01.dg' on 'tslinrac01'
```

```
CRS-2676: Start of 'ora.scan1.vip' on 'tslinrac02' succeeded
```

```
CRS-2672: Attempting to start 'ora.LISTENER_SCAN1.lsnr' on 'tslinrac02'
```

```
CRS-2676: Start of 'ora.LISTENER_SCAN1.lsnr' on 'tslinrac02' succeeded
```

```
CRS-2677: Stop of 'ora.registry.acfs' on 'tslinrac01' succeeded
```

```
CRS-2677: Stop of 'ora.oc4j' on 'tslinrac01' succeeded
```

```
CRS-2672: Attempting to start 'ora.oc4j' on 'tslinrac02'
```

FAQ's on Oracle 11g R2 Real Application Cluster

CRS-2677: Stop of 'ora.ORADATA01.dg' on 'tslinrac01' succeeded
CRS-2677: Stop of 'ora.ORAFRA01.dg' on 'tslinrac01' succeeded
CRS-2677: Stop of 'ora.ACFS1.dg' on 'tslinrac01' succeeded
CRS-2676: Start of 'ora.oc4j' on 'tslinrac02' succeeded
CRS-2677: Stop of 'ora.CRSDG.dg' on 'tslinrac01' succeeded
CRS-2673: Attempting to stop 'ora.asm' on 'tslinrac01'
CRS-2677: Stop of 'ora.asm' on 'tslinrac01' succeeded
CRS-2673: Attempting to stop 'ora.LISTENER.lsnr' on 'tslinrac01'
CRS-2677: Stop of 'ora.LISTENER.lsnr' on 'tslinrac01' succeeded
CRS-2673: Attempting to stop 'ora.tslinrac01.vip' on 'tslinrac01'
CRS-2677: Stop of 'ora.tslinrac01.vip' on 'tslinrac01' succeeded
CRS-2672: Attempting to start 'ora.tslinrac01.vip' on 'tslinrac02'
CRS-2676: Start of 'ora.tslinrac01.vip' on 'tslinrac02' succeeded
CRS-2673: Attempting to stop 'ora.ons' on 'tslinrac01'
CRS-2677: Stop of 'ora.ons' on 'tslinrac01' succeeded
CRS-2673: Attempting to stop 'ora.net1.network' on 'tslinrac01'
CRS-2677: Stop of 'ora.net1.network' on 'tslinrac01' succeeded
CRS-2792: Shutdown of Cluster Ready Services-managed resources on 'tslinrac01' has completed
CRS-2677: Stop of 'ora.crsd' on 'tslinrac01' succeeded
CRS-2673: Attempting to stop 'ora.crf' on 'tslinrac01'
CRS-2673: Attempting to stop 'ora.ctssd' on 'tslinrac01'
CRS-2673: Attempting to stop 'ora.evmd' on 'tslinrac01'
CRS-2673: Attempting to stop 'ora.asm' on 'tslinrac01'
CRS-2673: Attempting to stop 'ora.drivers.acfs' on 'tslinrac01'
CRS-2673: Attempting to stop 'ora.mdnsd' on 'tslinrac01'
CRS-2677: Stop of 'ora.mdnsd' on 'tslinrac01' succeeded
CRS-2677: Stop of 'ora.asm' on 'tslinrac01' succeeded
CRS-2673: Attempting to stop 'ora.cluster_interconnect.haip' on 'tslinrac01'
CRS-2677: Stop of 'ora.drivers.acfs' on 'tslinrac01' succeeded
CRS-2677: Stop of 'ora.crf' on 'tslinrac01' succeeded
CRS-2677: Stop of 'ora.cluster_interconnect.haip' on 'tslinrac01' succeeded
CRS-2677: Stop of 'ora.evmd' on 'tslinrac01' succeeded
CRS-2677: Stop of 'ora.ctssd' on 'tslinrac01' succeeded
CRS-2673: Attempting to stop 'ora.cssd' on 'tslinrac01'
CRS-2677: Stop of 'ora.cssd' on 'tslinrac01' succeeded
CRS-2673: Attempting to stop 'ora.gipcd' on 'tslinrac01'
CRS-2673: Attempting to stop 'ora.diskmon' on 'tslinrac01'
CRS-2677: Stop of 'ora.gipcd' on 'tslinrac01' succeeded
CRS-2673: Attempting to stop 'ora.gpnpd' on 'tslinrac01'
CRS-2677: Stop of 'ora.diskmon' on 'tslinrac01' succeeded
CRS-2677: Stop of 'ora.gpnpd' on 'tslinrac01' succeeded
CRS-2793: Shutdown of Oracle High Availability Services-managed resources on 'tslinrac01' has completed
CRS-4133: Oracle High Availability Services has been stopped.
[root@tslinrac01 ~]# ps -ef | grep pmon
root 2722 31110 0 23:34 pts/1 00:00:00 grep pmon
[root@tslinrac01 ~]# ps -ef | grep oracle
root 2725 31110 0 23:34 pts/1 00:00:00 grep oracle
oracle 15577 1 0 May23 ? 00:00:01
/u01/app/oracle/product/agent10g/agent10g/perl/bin/perl
/u01/app/oracle/product/agent10g/agent10g/bin/emwd.pl agent
/u01/app/oracle/product/agent10g/agent10g/tslinrac01/sysman/log/emagent.nohup

FAQ's on Oracle 11g R2 Real Application Cluster

```
oracle 15593 15577 0 May23 ? 00:01:59
/u01/app/oracle/product/agent10g/agent10g/bin/emagent
[root@tslinrac01 ~]# ps -ef | grep grid
root 2985 31110 0 23:34 pts/1 00:00:00 grep grid
```

13. crsctl start crs
Starts high availability services, asm, databases etc.,

[3] Monitor ASM using the V\$ASM dynamic performance views

1. v\$asm_alias
2. v\$ASM_DISK

```
1* select
group_number,disk_number,MOUNT_STATUS,HEADER_STATUS,MODE_STATUS,STATE,REDUNDANCY,FAILGROU
P from v$asm_disk
SQL> /
```

GROUP_NUMBER	DISK_NUMBER	MOUNT_S	HEADER_STATU	MODE_ST	STATE	REDUNDA	FAILGROUP
--------------	-------------	---------	--------------	---------	-------	---------	-----------

0	3	CLOSED	PROVISIONED	ONLINE	NORMAL	UNKNOWN	
0	8	CLOSED	PROVISIONED	ONLINE	NORMAL	UNKNOWN	
0	12	CLOSED	PROVISIONED	ONLINE	NORMAL	UNKNOWN	
0	13	CLOSED	PROVISIONED	ONLINE	NORMAL	UNKNOWN	
0	14	CLOSED	PROVISIONED	ONLINE	NORMAL	UNKNOWN	
0	16	CLOSED	PROVISIONED	ONLINE	NORMAL	UNKNOWN	
0	18	CLOSED	PROVISIONED	ONLINE	NORMAL	UNKNOWN	
0	17	CLOSED	PROVISIONED	ONLINE	NORMAL	UNKNOWN	
1	2	CACHED	MEMBER	ONLINE	NORMAL	UNKNOWN	ACFS1FG1
2	0	CACHED	MEMBER	ONLINE	NORMAL	UNKNOWN	SDAVGCRS1
3	0	CACHED	MEMBER	ONLINE	NORMAL	UNKNOWN	SDAVGDB1

GROUP_NUMBER	DISK_NUMBER	MOUNT_S	HEADER_STATU	MODE_ST	STATE	REDUNDA	FAILGROUP
--------------	-------------	---------	--------------	---------	-------	---------	-----------

4	0	CACHED	MEMBER	ONLINE	NORMAL	UNKNOWN	SDAVGFRA1
1	0	CACHED	MEMBER	ONLINE	NORMAL	UNKNOWN	ACFS1FG2
2	1	CACHED	MEMBER	ONLINE	NORMAL	UNKNOWN	SDBVGCRS1
3	1	CACHED	MEMBER	ONLINE	NORMAL	UNKNOWN	SDBVGDB1
4	1	CACHED	MEMBER	ONLINE	NORMAL	UNKNOWN	SDBVGFR1
1	3	CACHED	MEMBER	ONLINE	NORMAL	UNKNOWN	ACFS1FG3
2	2	CACHED	MEMBER	ONLINE	NORMAL	UNKNOWN	SDCVGCRS1
1	1	CACHED	MEMBER	ONLINE	NORMAL	UNKNOWN	ACFS1FG4

19 rows selected.

3. v\$ASM_DISKGROUP
4. v\$ASM_OPERATION
5. V\$ASM_FIIESYSTEM
6. V\$ASM_ATTRIBUTE
7. V\$ASM_DISK_IOSTAT
8. V\$ASM_DISKGROUP_STAT
9. V\$ASM_TEMPLATE
10. V\$ASM_CLIENT
11. V\$ASM_DISK_STAT
12. V\$ASM_FILE

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FAQ's on Oracle 11g R2 Real Application Cluster

13. V\$ASM_ACFSVOLUME

Administering ASM Disk Groups

[1] Create and delete ASM disk groups

1. Creating a Diskgroup using SQLPLUS

Create the diskgroup with 2 failgroups with slices from different disks.

```
CREATE DISKGROUP TEST_DG NORMAL REDUNDANCY DISK
'ORCL:SDAVGDB2' SIZE 51199 M , 'ORCL:SDBVGDB2' SIZE 51199 M CREATE
DISKGROUP ORADATA02 NORMAL REDUNDANCY
FAILGROUP FAILG1 DISK
'ORCL:SDAVGDB2' SIZE 51199 M,
'ORCL:SDBVGDB2' SIZE 51199 M
FAILGROUP FAILG2 DISK
'ORCL:SDCVGDB1' SIZE 51199 M,
'ORCL:SDDVGDB2' SIZE 51199 M
ATTRIBUTE 'au_size'='4M',
'compatible.asm' = '11.2',
'compatible.rdbms' = '11.2',
'compatible.advm' = '11.2';
```

Node: Connect to remaining ASM instances and mount the newly created diskgroup.

```
SQL> connect / as sysasm
Connected.
SQL> alter diskgroup ORADATA02 mount;
```

2. Creating a new diskgroup using ASMCMD

Use “chdg” to create diskgroup using ASMCMD. Details to chdg should be provided in XML format.

```
ASMCMD> chdg '<chdg> <dg name="DATA" power="3"> <drop> <fg
name="FG1"> </fg> <dsk name="DATA_0001" /> </drop> <add> <fg
name="FG2"> <dsk string="/dev/disk5"/> </fg> </add> </chdg>'
```

[2] Set the attributes of an existing ASM disk group

Disk group attributes are parameters that are bound to a disk group, rather than an Oracle ASM instance.

FAQ's on Oracle 11g R2 Real Application Cluster

Disk group attributes can be set when a disk group is created or altered, unless otherwise noted in the following list.

- ACCESS_CONTROL.ENABLED

This attribute can only be set when altering a disk group.

For information about the ACCESS_CONTROL.ENABLED attribute, see ["Using SQL Statements to Set Disk Group Attributes for Oracle ASM File Access Control"](#).

- ACCESS_CONTROL.UMASK

This attribute can only be set when altering a disk group.

For information about the ACCESS_CONTROL.UMASK attribute, see ["Using SQL Statements to Set Disk Group Attributes for Oracle ASM File Access Control"](#).

- AU_SIZE

This attribute can only be set when creating a disk group. When you create a disk group, you can set the Oracle ASM allocation unit size with the AU_SIZE disk group attribute. The values can be 1, 2, 4, 8, 16, 32, or 64 MB, depending on the specific disk group compatibility level. Larger AU sizes typically provide performance advantages for data warehouse applications that use large sequential reads. Default is 1M.

- CELL.SMART_SCAN_CAPABLE

This attribute is only applicable to Oracle Exadata storage.

- COMPATIBLE.ASM

The value for the disk group COMPATIBLE.ASM attribute determines the minimum software version for an Oracle ASM instance that can use the disk group. This setting also affects the format of the data structures for the Oracle ASM metadata on the disk. The format of other file contents is determined by Oracle ASM Dynamic Volume Manager (Oracle ADVM) and the database instance.

For Oracle ASM in Oracle Database 11g, 10.1 is the default setting for the COMPATIBLE.ASM attribute when using the SQL CREATE DISKGROUP statement, the ASMCMD mkgd command, and Oracle Enterprise Manager Create Disk Group page. When creating a disk group with ASMCA, the default setting is 11.2..

- COMPATIBLE.RDBMS

The value for the disk group COMPATIBLE.RDBMS attribute determines the minimum COMPATIBLE database initialization parameter setting for any database instance that is allowed to use the disk group. Before advancing the COMPATIBLE.RDBMS attribute, ensure that the values for the COMPATIBLE initialization parameter for all of the databases that access the disk group are set to at least the value of the new setting for COMPATIBLE.RDBMS.

FAQ's on Oracle 11g R2 Real Application Cluster

For example, if the COMPATIBLE initialization parameters of the databases are set to either 11.1 or 11.2, then COMPATIBLE.RDBMS can be set to any value between 10.1 and 11.1 inclusively.

For Oracle ASM in Oracle Database 11g, 10.1 is the default setting for the COMPATIBLE.RDBMS attribute when using the SQL CREATE DISKGROUP statement, the ASMCMD mkgd command, ASMCA Create Disk Group page, and Oracle Enterprise Manager Create Disk Group page.

- COMPATIBLE.ADVM

The value for the disk group COMPATIBLE.ADVM attribute determines whether the disk group can contain Oracle ASM volumes. The value must be set to 11.2 or higher. Before setting this attribute, the COMPATIBLE.ASM value must be 11.2 or higher. Also, the Oracle ADVM volume drivers must be loaded in the supported environment.

By default, the value of the COMPATIBLE.ADVM attribute is empty until set.

- DISK_REPAIR_TIME

This attribute can only be set when altering a disk group.

For information about the DISK_REPAIR_TIME attribute, see ["Oracle ASM Fast Mirror Resync"](#).

- SECTOR_SIZE

This attribute can only be set when creating a disk group.

For information about the SECTOR_SIZE attribute, see ["Specifying the Sector Size for Drives"](#).

Oracle supports 4KB sector disk drives.

- In emulation mode:
 - No changes but there are performance penalties
- In native mode, there is no performance penalty with:
 - Oracle database files
 - ASM files, at the disk group level

ACFS/ADVM does not support 4KB sector disk drives.

FAQ's on Oracle 11g R2 Real Application Cluster

There are two types of 4 KB sector disks: emulation mode and native mode.

- 4 KB sector disks in emulation mode have eight logical sectors per physical sector (as shown in the slide). They maintain a 512-byte interface to their 4 KB physical sectors—that is, the logical block address (LBA) references 512 bytes on disk.
- 4 KB sector disks in native mode have one logical sector per physical sector (as shown in the slide). So, there is only the 4 KB interface. In other words, the LBA references 4096 bytes on disk.

Emulation mode can hurt performance because the disk drive reads the 4 KB sector into disk cache memory, changes the 512-byte section, and then writes the entire 4 KB sector back to disk. For example, when redo is being written to disk in 512 chunks, each write requires a read of the 4KB sector, an update of the 512-byte section, and then a write. With native mode, the 4 KB sector is written without requiring a read and update.

In addition to the disk group attributes listed in this section, template attributes are also assigned to a disk group. For information about template attributes, see ["Managing Disk Group Templates"](#).

You can display disk group attributes with the V\$ASM_ATTRIBUTE view and the ASMCMD lsattr command. For an example of the use of the V\$ASM_ATTRIBUTE view, see [Example 6-1](#). For information about the lsattr command, see ["lsattr"](#).

Table 4-2 Examples of disk group compatibility attribute settings

COMPATIBLE.ASM	COMPATIBLE.RDBMS	COMPATIBLE.ADV	ASM Instance Version	COMPATIBLE Setting for RDBMS Instance
10.1	10.1	n/a	>= 10.1	>= 10.1
11.1	10.1	n/a	>= 11.1	>= 10.1
11.2	11.1	11.2	>= 11.2	>= 11.1
11.2	11.2	11.2	>= 11.2	>= 11.2

Table 4-3 Features enabled by disk group compatibility attribute settings

Disk Group Features Enabled	COMPATIBLE.ASM	COMPATIBLE.RDBMS	COMPATIBLE.ADV
Support for larger AU sizes (32 or 64 MB)	>= 11.1	>= 11.1	n/a
Attributes are displayed in the V\$ASM_ATTRIBUTE view	>= 11.1	n/a	n/a
Fast mirror resync	>= 11.1	>= 11.1	n/a
Variable size extents	>= 11.1	>= 11.1	n/a
Exadata storage	>= 11.1.0.7	>= 11.1.0.7	n/a
Intelligent Data Placement	>= 11.2	>= 11.2	n/a
OCR and voting files in a disk group	>= 11.2	n/a	n/a
Sector size set to nondefault value	>= 11.2	>= 11.2	n/a
Oracle ASM SPFILE in a disk group	>= 11.2	n/a	n/a
Oracle ASM File Access Control	>= 11.2	>= 11.2	n/a
Volumes in disk groups	>= 11.2	n/a	>= 11.2
ASM_POWER_LIMIT value up to 1024	>= 11.2.0.2	n/a	n/a
Encryption, replication, security, tagging	>= 11.2.0.2	n/a	>= 11.2.0.2

Table 4-4 Maximum Oracle ASM file sizes for disk groups with AU_SIZE equal to 1 MB

Redundancy	COMPATIBLE.RDBMS = 10.1	COMPATIBLE.RDBMS >= 11.1
External	16 TB	140 PB
Normal	5.8 TB	23 PB
High	3.9 TB	15 PB

[3] Perform ongoing maintenance tasks on ASM disk groups

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FAQ's on Oracle 11g R2 Real Application Cluster

Add data to the newly created diskgroup. This is to test the effects of rebalance operations.

```
CREATE DISKGROUP ORADATA02 NORMAL REDUNDANCY
```

```
FAILGROUP FAILG1 DISK
```

```
'ORCL:SDAVGDB2' SIZE 51199 M,
```

```
'ORCL:SDBVGDB2' SIZE 51199 M
```

```
FAILGROUP FAILG2 DISK
```

```
'ORCL:SDCVGDB1' SIZE 51199 M,
```

```
'ORCL:SDDVGDB2' SIZE 51199 M
```

```
ATTRIBUTE 'au_size'='4M',
```

```
'compatible.asm' = '11.2',
```

```
'compatible.rdbms' = '11.2',
```

```
'compatible.advm' = '11.2';
```

1. Extend and existing diskgroup by adding disks and specifying failgroup and without rebalancing

```
SQL> !cat alter_dg_oradata02_add_disk.sql
```

```
ALTER DISKGROUP ORADATA02
```

```
ADD FAILGROUP FAILG3 DISK
```

```
'ORCL:SDCVGDB2' SIZE 51199 M,
```

```
'ORCL:SDDVGDB1' SIZE 51199 M
```

```
;
```

2. Rebalance the diskgroup after adding a disk with low rebalance power and note down the cpu consumption

Data distribution before rebalance.

The screenshot shows the 'Member Disks' page in Oracle Enterprise Manager. It displays a table with columns: Select Disk, Failure Group, Path, Library, Read/Write Errors, State, Mode, Size (GB), Used (GB), and Used (%). The table lists six disks across three failgroups: FAILG1, FAILG2, and FAILG3. Each disk is 50.00 GB in size. The 'Used' column shows varying amounts of space used, with corresponding progress bars and percentages.

Select Disk	Failure Group	Path	Library	Read/Write Errors	State	Mode	Size (GB)	Used (GB)	Used (%)
<input type="checkbox"/> SDAVGDB2	FAILG1	ORCL.SDAVGDB2	ASM LIBRARY - GENERIC LINUX, VERSION 2.0.4 (KABI_V2)	0	NORMAL	ONLINE	50.00	5.08	10.16
<input type="checkbox"/> SDBVGDB2	FAILG1	ORCL.SDBVGDB2	ASM LIBRARY - GENERIC LINUX, VERSION 2.0.4 (KABI_V2)	0	NORMAL	ONLINE	50.00	5.07	10.13
<input type="checkbox"/> SDCVGDB1	FAILG2	ORCL.SDCVGDB1	ASM LIBRARY - GENERIC LINUX, VERSION 2.0.4 (KABI_V2)	0	NORMAL	ONLINE	50.00	5.06	10.13
<input type="checkbox"/> SDCVGDB2	FAILG3	ORCL.SDCVGDB2	ASM LIBRARY - GENERIC LINUX, VERSION 2.0.4 (KABI_V2)	0	NORMAL	ONLINE	50.00	0.01	0.02
<input type="checkbox"/> SDDVGDB1	FAILG2	ORCL.SDDVGDB1	ASM LIBRARY - GENERIC LINUX, VERSION 2.0.4 (KABI_V2)	0	NORMAL	ONLINE	50.00	0.01	0.02
<input type="checkbox"/> SDDVGDB2	FAILG2	ORCL.SDDVGDB2	ASM LIBRARY - GENERIC LINUX, VERSION 2.0.4 (KABI_V2)	0	NORMAL	ONLINE	50.00	5.08	10.16

```
1 select a.GROUP_NUMBER,a.name,b.NAME,b.FAILGROUP,b.OS_MB,b.total_mb,b.free_mb
```

```
2 from v$asm_diskgroup a,v$asm_disk b
```

```
3 where a.GROUP_NUMBER=b.GROUP_NUMBER
```

```
4* and a.group_number=5
```

```
SQL> /
```

GROUP_NUMBER	NAME	NAME	FAILGROUP	OS_MB	TOTAL_MB	FREE_MB
5	ORADATA02	SDDVGDB2	FAILG2	51199	51196	45992
5	ORADATA02	SDCVGDB1	FAILG2	51199	51196	46012
5	ORADATA02	SDCVGDB2	FAILG3	51199	51196	51188
5	ORADATA02	SDAVGDB2	FAILG1	51199	51196	45996
5	ORADATA02	SDDVGDB1	FAILG3	51199	51196	51188
5	ORADATA02	SDBVGDB2	FAILG1	51199	51196	46008

6 rows selected.

```
SQL> !cat alter_dg_oradata02_rebalance_2.sql
```

```
ALTER DISKGROUP oradata02 REBALANCE POWER 2 WAIT;
```

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FAQ's on Oracle 11g R2 Real Application Cluster

Diskgroup altered.

Elapsed: 00:08:44.68

```
1* select * from v$ASM_OPERATION
SQL> /
```

GROUP_NUMBER	OPERA	STAT	POWER	ACTUAL	SO FAR	EST_WORK	EST_RATE	EST_MINUTES	ERROR_CODE
5	REBAL	RUN	2	2	636	2144	368	4	

Host: ts1nrac01 > Automatic Storage Management - ASM1: ts1nrac01 >

Pending Operations: ORADATA02

Logged in As SYS / SYSASM

Data Retrieved May 25, 2011 9:29:40 PM EDT Refresh: Real Time: Manual Refresh (Refresh)						
Operation Type	Status	Desired Power	Actual Power	Operation Rate (Units per minute)	% Complete	Remaining Time (minutes)
REBAL	RUN	2	2	393	85.12	0

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It took 8 minutes with power limit set to 2.

- Restart the rebalance operation with a higher rebalance power and note down the cpu consumption.

```
SQL> !cat alter_dg_oradata02_drop_failg3.sql
```

```
ALTER DISKGROUP oradata02 drop DISKS IN FAILGROUP FAILG3;
```

```
SQL> @alter_dg_oradata02_drop_failg3.sql
```

Diskgroup altered.

Member Disks									
View By Disk (Add)									
Resize Online Offline Recover Bad Blocks Remove									
Select All Select None									
Select Disk	Failure Group	Path	Library	Read/Write Errors/State	Mode	Size (GB)	Used (GB)	Used (%)	
<input type="checkbox"/> SDAVGDB2	FAILG1	ORCL:SDAVGDB2	ASM LIBRARY - GENERIC LINUX, VERSION 2.0.4 (KABI_V2)	0 NORMAL	ONLINE	50.00	3.41	6.81	
<input type="checkbox"/> SDBVGDB2	FAILG1	ORCL:SDBVGDB2	ASM LIBRARY - GENERIC LINUX, VERSION 2.0.4 (KABI_V2)	0 NORMAL	ONLINE	50.00	3.42	6.84	
<input type="checkbox"/> SDCVGDB1	FAILG2	ORCL:SDCVGDB1	ASM LIBRARY - GENERIC LINUX, VERSION 2.0.4 (KABI_V2)	0 NORMAL	ONLINE	50.00	3.41	6.83	
<input type="checkbox"/> SDCVGDB2	FAILG3	ORCL:SDCVGDB2	ASM LIBRARY - GENERIC LINUX, VERSION 2.0.4 (KABI_V2)	0 DROPPING	ONLINE	50.00	3.39	6.78	
<input type="checkbox"/> SDDVGDB1	FAILG3	ORCL:SDDVGDB1	ASM LIBRARY - GENERIC LINUX, VERSION 2.0.4 (KABI_V2)	0 DROPPING	ONLINE	50.00	3.39	6.79	
<input type="checkbox"/> SDDVGDB2	FAILG2	ORCL:SDDVGDB2	ASM LIBRARY - GENERIC LINUX, VERSION 2.0.4 (KABI_V2)	0 NORMAL	ONLINE	50.00	3.41	6.81	
General Performance Templates Files									

```
1 select a.GROUP_NUMBER,a.name,b.NAME,b.FAILGROUP,b.total_mb,b.free_mb,MODE_STATUS,b.STATE
2 from v$asm_diskgroup a,v$asm_disk b
3 where a.GROUP_NUMBER=b.GROUP_NUMBER
4* and a.group_number=5
SQL> /
```

GROUP_NUMBER	NAME	NAME	FAILGROUP	TOTAL_MB	FREE_MB	MODE_ST
5	ORADATA02	SDDVGDB2	FAILG2	51196	47708	ONLINE NORMAL
5	ORADATA02	SDCVGDB1	FAILG2	51196	47700	ONLINE NORMAL
5	ORADATA02	SDCVGDB2	FAILG3	51196	47724	ONLINE DROPPING
5	ORADATA02	SDAVGDB2	FAILG1	51196	47708	ONLINE NORMAL
5	ORADATA02	SDDVGDB1	FAILG3	51196	47720	ONLINE DROPPING
5	ORADATA02	SDBVGDB2	FAILG1	51196	47696	ONLINE NORMAL

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FAQ's on Oracle 11g R2 Real Application Cluster

6 rows selected.

```
SQL> select * from v$asm_operation;
```

GROUP_NUMBER	OPERA	STAT	POWER	ACTUAL	SO FAR	EST_WORK	EST_RATE	EST_MINUTES	ERROR_CODE
5	REBAL	WAIT	0						

Rebalance it manual.

```
SQL> ALTER DISKGROUP oradata02 REBALANCE POWER 11 wait;
```

Host: tselrac01 > Automatic Storage Management +ASM1 tselrac01 > Logged in As SYS / SYSASM

Pending Operations: ORADATA02

Data Retrieved May 25, 2011 9:49:29 PM EDT Refresh Real Time: Manual Refresh Refresh									
Operation Type	Status	Desired Power	Actual Power	Operation Rate (Units per minute)	% Complete	Remaining Time (minutes)			
REBAL	RUN	11	11	543	14.61	3			

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top - 21:57:03 up 2 days, 2:11, 2 users, load average: 1.65, 1.43, 1.32

Tasks: 305 total, 2 running, 303 sleeping, 0 stopped, 0 zombie

Cpu(s): 5.6%us, 3.2%sy, 0.0%ni, 20.6%id, 47.4%wa, 6.0%hi, 17.2%si, 0.0%st

Mem: 4154652k total, 3771728k used, 382924k free, 208128k buffers

Swap: 4096564k total, 0k used, 4096564k free, 2406536k cached

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
10644	grid	15	0	534m	129m	39m	S	6.0	3.2	0:11.51	oracle
3242	root	RT	0	76220	73m	46m	R	1.7	1.8	11:44.05	osysmond.bin

```
1* select * from v$asm_operation
SQL> /
```

GROUP_NUMBER	OPERA	STAT	POWER	ACTUAL	SO FAR	EST_WORK	EST_RATE	EST_MINUTES	ERROR_CODE
5	REBAL	RUN	11	11	1437	2375	475	1	

```
1 select
a.GROUP_NUMBER,a.name,b.NAME,b.FAILGROUP,b.OS_MB,b.total_mb,b.free_mb,MOUNT_STATUS,HEADER_STATUS,MOD
E_STATUS,b.STATE
2 from v$asm_diskgroup a,v$asm_disk b
3 where a.GROUP_NUMBER=b.GROUP_NUMBER
4* and a.group_number=5
SQL> /
```

GROUP_NUMBER	NAME	NAME	FAILGROUP	OS_MB	TOTAL_MB	FREE_MB
MOUNT_S	HEADER_STATU	MODE_ST	STATE			
5	ORADATA02	SDBVGDB2	FAILG1	51199	51196	46000
MEMBER	ONLINE	NORMAL				CACHED
5	ORADATA02	SDAVGDB2	FAILG1	51199	51196	46004
MEMBER	ONLINE	NORMAL				CACHED
5	ORADATA02	SDDVGDB2	FAILG2	51199	51196	46000
MEMBER	ONLINE	NORMAL				CACHED
5	ORADATA02	SDCVGDB1	FAILG2	51199	51196	46004
MEMBER	ONLINE	NORMAL				CACHED

Elapsed: 00:00:00.23

Now add the disks back again.

```
SQL> !cat alter_dg_oradata02_add_disk.sql
ALTER DISKGROUP ORADATA02
```

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FAQ's on Oracle 11g R2 Real Application Cluster

```
ADD FAILGROUP FAILG3 DISK
'ORCL:SDCVGDB2' SIZE 51199 M,
'ORCL:SDDVGDB1' SIZE 51199 M
;
```

SQL> @alter_dg_oradata02_add_disk.sql

Diskgroup altered.

Elapsed: 00:00:13.49

Now manually rebalance.

```
SQL> !cat alter_dg_oradata02_rebalance_6.sql
ALTER DISKGROUP oradata02 REBALANCE POWER 8 ;
```

SQL> @alter_dg_oradata02_rebalance_6.sql

Diskgroup altered.

Elapsed: 00:00:07.53

It took 8 minutes with power limit set to 2

It took 5-6 minutes with power limit set to 8

SQL> /

GROUP_NUMBER	OPERATION	STATUS	POWER	ACTUAL	SO FAR	EST_WORK	EST_RATE	EST_MINUTES	ERROR_CODE
5	REBAL	RUN	8	8	487	2130	349	4	

```
select
a.GROUP_NUMBER,a.name,b.NAME,b.FAILGROUP,b.OS_MB,b.total_mb,b.free_mb,MOUNT_STATUS,HEADER_STATUS,MODE_STATUS,b.STATE
from v$asm_diskgroup a,v$asm_disk b
where a.GROUP_NUMBER=b.GROUP_NUMBER
and a.group_number=5
/SQL> 2 3 4 5
```

GROUP_NUMBER	NAME	NAME	FAILGROUP	OS_MB	TOTAL_MB	FREE_MB
MOUNT_S	HEADER_STATU	MODE_ST	STATE			
5	ORADATA02	SDDVGDB2	FAILG2	51199	51196	47708
MEMBER	ONLINE	NORMAL				CACHED
5	ORADATA02	SDCVGDB1	FAILG2	51199	51196	47700
MEMBER	ONLINE	NORMAL				CACHED
5	ORADATA02	SDCVGDB2	FAILG3	51199	51196	47720
MEMBER	ONLINE	NORMAL				CACHED
5	ORADATA02	SDAVGDB2	FAILG1	51199	51196	47708
MEMBER	ONLINE	NORMAL				CACHED
5	ORADATA02	SDDVGDB1	FAILG3	51199	51196	47724
MEMBER	ONLINE	NORMAL				CACHED
5	ORADATA02	SDBVGDB2	FAILG1	51199	51196	47696
MEMBER	ONLINE	NORMAL				CACHED

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FAQ's on Oracle 11g R2 Real Application Cluster

6 rows selected.

Elapsed: 00:00:00.22

4. Adding/dropping disks in the same command:
This is useful when replacing disks and avoids multiple rebalance operations.
ALTER DISKGROUP FRA
ADD Disk 'ORCL:SDE7' NAME 'FRA_DISK5' size 977 M,
Disk 'ORCL:SDE8' NAME 'FRA_DISK6' size 977 M
DROP DISK FRA_DISK1, FRA_DISK2;

5. Drop a disk from the newly created diskgroup.
Drop diskgroup data;
Drop diskgroup data including contents;
Drop diskgroup data force including contents;

6. Undropping disks in a disk group
This feature can be used to cancel any pending asm disk drop operations.

```
ALTER DISKGROUP <dg> UNDROP disks;
```

7. Mounting disk groups and unmounting disk groups
ALTER DISKGROUP DATA MOUNT;
AKTER DISKGROUP DG1, DG2 MOUNT;
ALTER DISKGROUP ALL DISMOUNT;

8. View ALL connected clients
SQL> select g.name disk_group,c.*
2 from v\$asm_client c,v\$asm_diskgroup g
3 where c.group_number=g.group_number
4 and g.name='ORADATA01';

DISK_GROUP	GROUP_NUMBER	INSTANCE_N	DB_NAME	STATUS	SOFTWARE_V	COMPATIBLE
ORADATA01	3	racdb1	racdb	CONNECTED	11.2.0.2.0	11.2.0.0.0

9. Checking consistency of disk group metadata
alter diskgroup ORADATA01 check [REPAIR | NOREPAIR];

Diskgroup altered.

10. ASM Fast Mirror Resync

FAQ's on Oracle 11g R2 Real Application Cluster

Whenever ASM is unable to write an extent, ASM takes the associated disk offline. If the corresponding disk group uses ASM mirroring (NORMAL or HIGH redundancy), at least one mirror copy of the same extent exists on another disk in the disk group.

Before Oracle Database 11g, ASM assumed that an offline disk contains only stale data and no longer reads from such disks. Shortly after a disk is put offline, ASM drops it from the disk group by re-creating the extents allocated to the disk on the remaining disks in the disk group using mirrored extent copies. This process is quite resource intensive and can take hours to complete. If the disk is replaced or the failure is repaired, the disk must be added again and another rebalance operation must take place.

ASM fast mirror resync significantly reduces the time required to resynchronize a transient failure of a disk. When a disk goes offline following a transient failure, ASM tracks the extents that are modified during the outage. When the transient failure is repaired, ASM can quickly resynchronize only the ASM disk extents that have been affected during the outage.

Using ASM fast mirror resync, the failed disk is taken offline but not dropped if you have set the `DISK_REPAIR_TIME` attribute for the corresponding disk group. The setting for this attribute determines the duration of disk outage that ASM will tolerate while still being able to resynchronize after you complete the repair. Note that the tracking mechanism uses one bit for each modified extent and is very efficient.

11. Preferred Read Failure Groups.

In a multisite cluster, with separate storage at each site, preferred read failure groups allow every node in the cluster to read from its local disks resulting in better performance.

With Oracle Database 11g, you can do this by configuring the preferred mirror read using the new initialization parameter, `ASM_PREFERRED_READ_FAILURE_GROUPS`. The disks in the identified failure groups become the preferred read disks. Thus, every node can be configured to read from its local extent copy. This results in higher efficiency and performance, and reduced network traffic. The setting for this parameter is instance specific.

If there is more than one mirrored copy and you have set a value for the `ASM_PREFERRED_READ_FAILURE_GROUPS` parameter, ASM first reads the copy that resides on a preferred read disk. If that read fails, ASM attempts to read from another mirrored copy that might not be on a local preferred read disk.

You can use the `PREFERRED_READ` column in the `V$ASM_DISK` view to determine whether a particular disk belongs to a preferred read failure group.

To identify performance issues with the ASM preferred read failure groups, use the `V$ASM_DISK_IOSTAT` view. This view displays input/output statistics for each ASM client.

12. ASM Disk statistics.

```
1* select sum(read_errs)+sum(write_errs) errors from v$asm_disk
SQL> /
```

ERRORS

FAQ's on Oracle 11g R2 Real Application Cluster

```
-----
0
1 select instname ,g.name diskgroup,sum(reads) reads,sum(writes) writes,sum(BYTES_READ)
BYTES_READ,sum(BYTES_WRITTEN) BYTES_WRITTEN
2 from v$asm_disk_iostat i,v$asm_diskgroup g
3 where i.group_number=g.group_number
4* group by instname,g.name
SQL>
INSTNAME                                DISKGROUP                                READS  WRITES BYTES_READ
BYTES_WRITTEN
-----
+ASM1                                ACFS1                                    0      0      0      0
+ASM1                                CRSDG                                    0      0      0      0
racdb1                                ORAFRA01                                1269    30776 75123200 523048960
racdb1                                ORADATA01                                129563  43366 2865952768 619517952
racdb1                                ORADATA02                                1035     24  8478720   196608
```

[4] Explain key performance and scalability considerations for ASM disk groups

1. Create separate disk groups for data and FRA
2. Disks in a diskgroup should have same size and characteristics
3. Use separate disk groups for each database . This has benefits and drawbacks. Using same diskgroup uses storage efficiently but introduces a single point of failure for all databases

Administering ASM Files, Directories, and Templates

- [1] Use different client tools to access ASM files
- [2] Describe the format of a fully qualified ASM file name
- [3] Explain how ASM files, directories and aliases are created and managed
- [4] Understand and manage disk group templates

Administering ASM Cluster File Systems

- [1] Administer ASM Dynamic Volume Manager
- [2] Manage ASM volumes
- [3] Implement ASM Cluster File System
- [4] Manage ASM Cluster File System (ACFS)
- [5] Use ACFS Snapshots
- [6] Using command line tools to Manage ACFS

FAQ's on Oracle 11g R2 Real Application Cluster

Section 2 - Real Application Clusters

Real Application Clusters Database Installation

- [1] Install the Oracle database software**
- [2] Create a cluster database**
- [3] Perform post-database creation tasks**
- [4] Perform a single instance to RAC conversion**

RAC Database Administration

- [1] Use Enterprise Manager cluster database pages**
- [2] Define redo log files in a RAC environment**
- [3] Define undo tablespaces in a RAC environment**
- [4] Start and stop RAC databases and instances**
- [5] Modify initialization parameters in a RAC environment**

Managing Backup and Recovery for RAC

- [1] Configure the RAC database to use ARCHIVELOG mode and the flash recovery area**
- [2] Recover from media failure and instance failures**
- [3] Tune instance recovery in RAC**
- [4] Configure RMAN for the RAC environment**

RAC DB Monitoring and Tuning

- [1] Determine RAC-specific tuning components**
- [2] Determine RAC-specific wait events, global enqueue, and system statistics**
- [3] Implement the most common RAC tuning tips**
- [4] Use the Cluster Database Performance pages**
- [5] Use the Automatic Workload Repository (AWR) in RAC**
- [6] Use Automatic Database Diagnostic Monitor (ADDM) in RAC**

Services

- [1] Configure and manage services in a RAC environment**
- [2] Use services with client applications**
- [3] Use services with the Database Resource Manager and scheduler**
- [4] Configure services aggregation and tracing**

FAQ's on Oracle 11g R2 Real Application Cluster

High Availability Connections (Appendix-D)

- [1] Configure client-side, connect-time load balancing and connect-time failover
- [2] Configure server-side, connect-time load balancing
- [3] Use the Load Balancing Advisory (LBA)
- [4] Describe the benefits of Fast Application Notification (FAN)
- [5] Configure server-side callouts
- [6] Configure Transparent Application Failover (TAF)

Design for High Availability

- [1] Design a Maximum Availability Architecture in your environment
- [2] Determine the best RAC and Data Guard topologies for your environment
- [3] Configure the Data Guard Broker configuration files in a RAC environment
- [4] Patch your RAC system in a rolling fashion

Appendix

Commands and outputs

SRVCTL

1. To list the virtual ip information on the node (run srvctl from the grid user/clusterware home)
[grid@tslinrac01 ~]\$ srvctl config nodeapps -a
Network exists: 1/192.168.1.0/255.255.255.0/eth1, type static
VIP exists: /tslinrac01-vip/192.168.1.201/192.168.1.0/255.255.255.0/eth1, hosting node tslinrac01
VIP exists: /tslinrac02-vip/192.168.1.202/192.168.1.0/255.255.255.0/eth1, hosting node tslinrac02

CRSCTL

1. Check the state of the cluster resources :
/u01/app/11.2.0/grid/bin/crsctl stat res -t
2. /u01/app/11.2.0/grid/bin/crsctl query css votedisk
Query to list voting disks.
STATE File Universal Id File Name Disk group
-- ----
1. ONLINE 0af83b84fca64f05bf96f027b6fcafc9 (ORCL:SDAVGCRS1) [CRSDG]
2. ONLINE 3492f4ef75924f56bf57d59ed58f7a6d (ORCL:SDBVGCRS1) [CRSDG]
3. ONLINE 9c2f851a0bdf4fd1bfd08b8d7da459aa (ORCL:SDCVGCRS1) [CRSDG]
Located 3 voting disk(s).
3. STOP crs:
[root@tslinrac02 ~]# crsctl stop crs
CRS-2791: Starting shutdown of Oracle High Availability Services-managed resources on 'tslinrac02'

FAQ's on Oracle 11g R2 Real Application Cluster

CRS-2673: Attempting to stop 'ora.crsd' on 'tslinrac02'
CRS-2790: Starting shutdown of Cluster Ready Services-managed resources on 'tslinrac02'
CRS-2673: Attempting to stop 'ora.LISTENER.lsnr' on 'tslinrac02'
CRS-2673: Attempting to stop 'ora.racdb.svc_racdb2.svc' on 'tslinrac02'
CRS-2677: Stop of 'ora.racdb.svc_racdb2.svc' on 'tslinrac02' succeeded
CRS-2677: Stop of 'ora.LISTENER.lsnr' on 'tslinrac02' succeeded
CRS-2673: Attempting to stop 'ora.tslinrac02.vip' on 'tslinrac02'
CRS-2677: Stop of 'ora.tslinrac02.vip' on 'tslinrac02' succeeded
CRS-2672: Attempting to start 'ora.tslinrac02.vip' on 'tslinrac01'
CRS-2676: Start of 'ora.tslinrac02.vip' on 'tslinrac01' succeeded
CRS-2672: Attempting to start 'ora.racdb.svc_racdb2.svc' on 'tslinrac01'
CRS-2676: Start of 'ora.racdb.svc_racdb2.svc' on 'tslinrac01' succeeded
CRS-2673: Attempting to stop 'ora.ACFS1.dg' on 'tslinrac02'
CRS-2673: Attempting to stop 'ora.CRSDG.dg' on 'tslinrac02'
CRS-2673: Attempting to stop 'ora.registry.acfs' on 'tslinrac02'
CRS-2673: Attempting to stop 'ora.racdb.db' on 'tslinrac02'
CRS-2677: Stop of 'ora.registry.acfs' on 'tslinrac02' succeeded
CRS-2677: Stop of 'ora.racdb.db' on 'tslinrac02' succeeded
CRS-2673: Attempting to stop 'ora.ORADATA01.dg' on 'tslinrac02'
CRS-2673: Attempting to stop 'ora.ORAFRA01.dg' on 'tslinrac02'
CRS-2677: Stop of 'ora.ACFS1.dg' on 'tslinrac02' succeeded
CRS-2677: Stop of 'ora.ORADATA01.dg' on 'tslinrac02' succeeded
CRS-2677: Stop of 'ora.ORAFRA01.dg' on 'tslinrac02' succeeded
CRS-2677: Stop of 'ora.CRSDG.dg' on 'tslinrac02' succeeded
CRS-2673: Attempting to stop 'ora.asm' on 'tslinrac02'
CRS-2677: Stop of 'ora.asm' on 'tslinrac02' succeeded
CRS-2673: Attempting to stop 'ora.ons' on 'tslinrac02'
CRS-2677: Stop of 'ora.ons' on 'tslinrac02' succeeded
CRS-2673: Attempting to stop 'ora.net1.network' on 'tslinrac02'
CRS-2677: Stop of 'ora.net1.network' on 'tslinrac02' succeeded
CRS-2792: Shutdown of Cluster Ready Services-managed resources on 'tslinrac02' has completed
CRS-2677: Stop of 'ora.crsd' on 'tslinrac02' succeeded
CRS-2673: Attempting to stop 'ora.drivers.acfs' on 'tslinrac02'
CRS-2673: Attempting to stop 'ora.crf' on 'tslinrac02'
CRS-2673: Attempting to stop 'ora.ctssd' on 'tslinrac02'
CRS-2673: Attempting to stop 'ora.evmd' on 'tslinrac02'
CRS-2673: Attempting to stop 'ora.asm' on 'tslinrac02'
CRS-2673: Attempting to stop 'ora.mdnsd' on 'tslinrac02'
CRS-2677: Stop of 'ora.asm' on 'tslinrac02' succeeded
CRS-2673: Attempting to stop 'ora.cluster_interconnect.haip' on 'tslinrac02'
CRS-2677: Stop of 'ora.drivers.acfs' on 'tslinrac02' succeeded

FAQ's on Oracle 11g R2 Real Application Cluster

CRS-2677: Stop of 'ora.mdnsd' on 'tslinrac02' succeeded
CRS-2677: Stop of 'ora.crf' on 'tslinrac02' succeeded
CRS-2677: Stop of 'ora.cluster_interconnect.haip' on 'tslinrac02' succeeded
CRS-2677: Stop of 'ora.evmd' on 'tslinrac02' succeeded
CRS-2677: Stop of 'ora.ctssd' on 'tslinrac02' succeeded
CRS-2673: Attempting to stop 'ora.cssd' on 'tslinrac02'
CRS-2677: Stop of 'ora.cssd' on 'tslinrac02' succeeded
CRS-2673: Attempting to stop 'ora.gipcd' on 'tslinrac02'
CRS-2673: Attempting to stop 'ora.diskmon' on 'tslinrac02'
CRS-2677: Stop of 'ora.diskmon' on 'tslinrac02' succeeded
CRS-2677: Stop of 'ora.gipcd' on 'tslinrac02' succeeded
CRS-2673: Attempting to stop 'ora.gpnpd' on 'tslinrac02'
CRS-2677: Stop of 'ora.gpnpd' on 'tslinrac02' succeeded
CRS-2793: Shutdown of Oracle High Availability Services-managed resources on 'tslinrac02' has completed
CRS-4133: Oracle High Availability Services has been stopped.

4. START crs:

```
[root@tslinrac02 ~]# crsctl start crs
CRS-4123: Oracle High Availability Services has been started.
[root@tslinrac02 ~]# ps -ef |grep grid
root    23166    1  5 05:52 ?        00:00:01 /u01/app/11.2.0/grid/bin/ohasd.bin reboot
grid    23282    1  2 05:53 ?        00:00:00 /u01/app/11.2.0/grid/bin/oraagent.bin
grid    23294    1  0 05:53 ?        00:00:00 /u01/app/11.2.0/grid/bin/mdnsd.bin
grid    23303    1  3 05:53 ?        00:00:00 /u01/app/11.2.0/grid/bin/gpnpd.bin
root    23314    1  2 05:53 ?        00:00:00 /u01/app/11.2.0/grid/bin/orarootagent.bin
grid    23317    1  5 05:53 ?        00:00:00 /u01/app/11.2.0/grid/bin/gipcd.bin
root    23331    1  3 05:53 ?        00:00:00 /u01/app/11.2.0/grid/bin/osysmond.bin
root    23342    1  1 05:53 ?        00:00:00 /u01/app/11.2.0/grid/bin/cssdmonitor
root    23358    1  1 05:53 ?        00:00:00 /u01/app/11.2.0/grid/bin/cssdagent
grid    23360    1  0 05:53 ?        00:00:00 /u01/app/11.2.0/grid/bin/diskmon.bin -d -f
grid    23376    1  5 05:53 ?        00:00:00 /u01/app/11.2.0/grid/bin/ocssd.bin
```

5. DISABLE crs:

6. ENABLE crs:

7. CHECK crs: crsctl check crs

```
[root@tslinrac02 ~]# crsctl check crs
CRS-4638: Oracle High Availability Services is online
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
```

8. CHECK cluster: crsctl check cluster

```
[root@tslinrac02 ~]# crsctl check cluster
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
```

9. Check Cluster registry location:

FAQ's on Oracle 11g R2 Real Application Cluster

- ```
[grid@tslinrac02 ~]$ cat /etc/oracle/ocr.loc
ocrconfig_loc=+CRSDG
local_only=FALSE
```
10. Check cluster registry location: using ocrcheck
- ```
[root@tslinrac02 ~]# ocrcheck
Status of Oracle Cluster Registry is as follows :
  Version            :          3
  Total space (kbytes) :    262120
  Used space (kbytes)  :     3236
  Available space (kbytes) :  258884
  ID                  : 2006039960
  Device/File Name     :    +CRSDG
                        Device/File integrity check succeeded

                        Device/File not configured

                        Device/File not configured

                        Device/File not configured

                        Device/File not configured

Cluster registry integrity check succeeded

Logical corruption check succeeded
```
11. Check CRS version
- ```
[root@tslinrac01 backup_nfs]# crsctl query crs activeversion
Oracle Clusterware active version on the cluster is [11.2.0.2.0]
```
12. Sdf
13. Sdf

### OCRCONFIG

1. Locating OCR automatic backups: ocrconfig -showbackup auto
- ```
[grid@tslinrac02 ~]$ ocrconfig -showbackup auto

tslinrac01  2011/05/04 22:38:44  /u01/app/11.2.0/grid/cdata/tslin-cluster/backup00.ocr
tslinrac01  2011/05/04 18:38:43  /u01/app/11.2.0/grid/cdata/tslin-cluster/backup01.ocr
tslinrac01  2011/05/04 14:38:42  /u01/app/11.2.0/grid/cdata/tslin-cluster/backup02.ocr
tslinrac01  2011/05/03 22:38:38  /u01/app/11.2.0/grid/cdata/tslin-cluster/day.ocr

tslinrac02  2011/04/27 20:33:16  /u01/app/11.2.0/grid/cdata/tslin-cluster/week.ocr
```
2. Change OCR Backup location: ocrconfig -backuploc /backup_nfs/ocr_backup
3. Manual OCR backup and manual logical export of OCR:
- ```
[root@tslinrac01 backup_nfs]# ocrconfig -manualbackup

tslinrac01 2011/05/10 06:14:36 /backup_nfs/ocr_backup/backup_20110510_061436.ocr
```

## FAQ's on Oracle 11g R2 Real Application Cluster

```
[root@tslinrac01 backup_nfs]# ll /backup_nfs/ocr_backup/backup_20110510_061436.ocr
-rw-----+ 1 root root 7565312 May 10 2011 /backup_nfs/ocr_backup/backup_20110510_061436.ocr
[root@tslinrac01 backup_nfs]# ocrconfig -showbackup manual
```

```
tslinrac01 2011/05/10 06:14:36 /backup_nfs/ocr_backup/backup_20110510_061436.ocr
[root@tslinrac01 ocr_backup]# ocrconfig -export /backup_nfs/ocr_backup/ocr.export1
[root@tslinrac01 ocr_backup]# ls -ltr
total 7516
-rw-----+ 1 root root 7565312 May 10 06:16 backup_20110510_061436.ocr
-rw-rw-rw--+ 1 root root 113772 May 10 2011 ocr.export1
```

### ASM Disk operations

1. Create ASM diskgroup

```
CREATE DISKGROUP ORADATA02 NORMAL REDUNDANCY
FAILGROUP FAILG1 DISK
'ORCL:SDAVGDB2' SIZE 51199 M,
'ORCL:SDBGVDB2' SIZE 51199 M
FAILGROUP FAILG2 DISK
'ORCL:SDCVGDB1' SIZE 51199 M,
'ORCL:SDDVGDB2' SIZE 51199 M
ATTRIBUTE 'au_size'='4M',
'compatible.asm' = '11.2',
'compatible.rdbms' = '11.2',
'compatible.advm' = '11.2';
```

2. Extend an existing diskgroup by adding disks and specifying failgroup and without rebalancing

```
ALTER DISKGROUP ORADATA02
ADD FAILGROUP FAILG3 DISK
'ORCL:SDCVGDB2' SIZE 51199 M,
'ORCL:SDDVGDB1' SIZE 51199 M
;
```

3. List ASM disks of a disk group.

```
select
a.GROUP_NUMBER,a.name,b.NAME,b.FAILGROUP,b.OS_MB,b.total_mb,b.free_mb
from v$asm_diskgroup a,v$asm_disk b
where a.GROUP_NUMBER=b.GROUP_NUMBER
and a.group_number=5;
```

4. Rebalance a disk group.

```
ALTER DISKGROUP oradata02 REBALANCE POWER 2 WAIT;
```

5. List the current state of disks in a disk group

```
Select
a.GROUP_NUMBER,a.name,b.NAME,b.FAILGROUP,b.total_mb,b.free_mb,MODE_ST
```



## FAQ's on Oracle 11g R2 Real Application Cluster

ATUS,b.STATEfrom v\$asm\_diskgroup a,v\$asm\_disk bwhere  
a.GROUP\_NUMBER=b.GROUP\_NUMBERand a.group\_number=5

6. List current ASM operations.

```
select * from v$asm_operation;
```

7. Drop all disks from a failure group

```
ALTER DISKGROUP oradata02 drop DISKS IN FAILGROUP FAILG3;
```

### ASMCMD

1. Listing disks.

```
[grid@tslinrac01 ~]$ asmcmd
```

```
ASMCMD> lsdg
```

| State      | Type   | Rebal | Sector | Block | AU      | Total_MB | Free_MB | Req_mir_free_MB | Usable_file_MB | Offline_disks | Voting_files |
|------------|--------|-------|--------|-------|---------|----------|---------|-----------------|----------------|---------------|--------------|
| MOUNTED    | NORMAL | N     | 512    | 4096  | 1048576 | 204796   | 102085  | 25740           | 38172          | 0             | N ACFS1/     |
| MOUNTED    | NORMAL | N     | 512    | 4096  | 1048576 | 6138     | 5212    | 309             | 2451           | 0             | Y CRS DG/    |
| MOUNTED    | NORMAL | N     | 512    | 4096  | 1048576 | 102398   | 10      | 0               | 5              | 0             | N ORADATA01/ |
| MOUNTED    | NORMAL | N     | 512    | 4096  | 4194304 | 307176   | 286256  | 6988            | 139634         | 0             | N            |
| ORADATA02/ |        |       |        |       |         |          |         |                 |                |               |              |
| MOUNTED    | NORMAL | N     | 512    | 4096  | 1048576 | 102398   | 101726  | 0               | 50863          | 0             | N ORAFRA01/  |

```
ASMCMD>
```

2. Listing ASM operations

```
ASMCMD> lsop
```

```
Group_Name Dsk_Num State Power
```

```
ASMCMD>
```