onto the new disk. To minimize the rebalancing I/O, it is more efficient to add multiple disks at the same time.

You can drop a disk from a disk group if it fails or to re-purpose capacity. Use the Oracle ASM disk name to drop a disk, not the discovery string device name. If an error occurs while writing to a disk, then Oracle ASM drops the disk automatically.

> **See Also:**
>
> Altering Disk Groups for more information about altering disk group membership

About Online Storage Reconfigurations and Dynamic Rebalancing

13 Rebalancing a disk group moves data between disks to ensure that every file is evenly spread across all of the disks in a disk group.

When all of the files are evenly dispersed, all of the disks are evenly filled to the same percentage; this ensures load balancing. Rebalancing does not relocate data based on I/O statistics nor is rebalancing started based on I/O statistics. Oracle ASM rebalancing operations are controlled by the size of the disks in a disk group.

13 Oracle ASM automatically initiates a rebalance after storage configuration changes, such as when you add, drop, or resize disks. The power setting parameter determines the speed with which rebalancing operations occur.

You can manually start a rebalance to change the power setting of a running rebalance. A rebalance is automatically restarted if the instance on which the rebalancing is running stops. Databases can remain operational during rebalancing operations.

You can minimize the impact on database performance with the setting of the `ASM_POWER_LIMIT` initialization parameter.

> **See Also:**
>
> - ASM_POWER_LIMIT for more information about the power limit setting
> - Manually Rebalancing Disk Groups for more information about disk rebalancing

Oracle ASM files can coexist with other storage management options such as raw disks and third-party file syste capability simplifies the integration of Oracle ASM into pre-existing environments.

Oracle ASM has easy to use management interfaces such as SQL*Plus, the Oracle ASM Command Line Utility (A command-line interface, and Oracle ASM Configuration Assistant (ASMCA).

See Also:

- Administering Oracle ASM Disk Groups for information about administering disk groups
- Managing Oracle ASM With ASMCA for information about Oracle ASM Configuration Assistant
- Managing Oracle ASM with ASMCMD for information about the ASMCMD command-line interface
- *Oracle Database Administrator's Guide* for information about Oracle Database structure and storage

About Oracle Automatic Storage Management Cluster File System

Oracle Automatic Storage Management Cluster File System (Oracle ACFS) and Oracle ASM Dynamic Volume Mar (Oracle ADVM) extend Oracle ASM functionality.

Oracle Automatic Storage Management Cluster File System (Oracle ACFS) is a multi-platform, scalable file systen storage management technology that extends Oracle Automatic Storage Management (Oracle ASM) functionalit support all customer files. The Oracle ASM Dynamic Volume Manager (Oracle ADVM) provides volume managen services and a standard disk device driver interface to clients.

See Also:

Oracle Automatic Storage Management Cluster File System for more information about Oracle ACFS and Oracle

Understanding Oracle ASM Concepts

The concepts for the key Oracle ASM components are introduced in this topic.

The following topics are discussed:

- About Oracle ASM Instances
- About Oracle ASM Disk Groups
- About Mirroring and Failure Groups
- About Oracle ASM Disks
- About Oracle ASM Allocation Units
- About Oracle ASM Files

See Also:

Exploring Considerations for Oracle ASM Storage for information about preparing your storage environment.

About Oracle ASM Instances

An Oracle ASM instance is built on the same technology as an Oracle Database instance.

13

An Oracle ASM instance has a System Global Area (SGA) and background processes that are similar to those of C Database. However, because Oracle ASM performs fewer tasks than a database, an Oracle ASM SGA is much sm database SGA. In addition, Oracle ASM has a minimal performance effect on a server. Oracle ASM instances mou groups to make Oracle ASM files available to database instances; Oracle ASM instances do not mount databases

Oracle ASM is installed in the Oracle Grid Infrastructure home before Oracle Database is installed in a separate O Oracle ASM and database instances require shared access to the disks in a disk group. Oracle ASM instances ma metadata of the disk group and provide file layout information to the database instances.

Oracle ASM metadata is the information that Oracle ASM uses to control a disk group and the metadata resides disk group. Oracle ASM metadata includes the following information:

- The disks that belong to a disk group
- The amount of space that is available in a disk group
- The file names of the files in a disk group

- The location of disk group data file extents
- A redo log that records information about atomically changing metadata blocks
- Oracle ADVM volume information

Oracle ASM instances can be clustered using Oracle Clusterware; there is one Oracle ASM instance for each clust there are several database instances for different databases on the same node, then the database instances shar single Oracle ASM instance on that node.

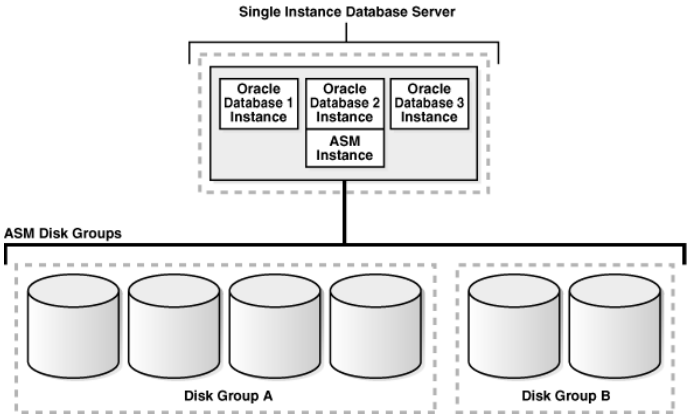
If the Oracle ASM instance on a node in a Standard Oracle ASM cluster fails, then all of the database instances or also fail. However, in an Oracle Flex ASM configuration, Oracle 12c database instances would not fail as they wou to access another Oracle ASM instance remotely on another node.

Unlike a file system driver failure, an Oracle ASM instance failure does not require restarting the operating syster Oracle RAC environment, the Oracle ASM and database instances on the surviving nodes automatically recover f Oracle ASM instance failure on a node.

Figure 1-1 shows a single node configuration with one Oracle ASM instance and multiple database instances. Th ASM instance manages the metadata and provides space allocation for the Oracle ASM files. When a database ir creates or opens an Oracle ASM file, it communicates those requests to the Oracle ASM instance. In response, th ASM instance provides file extent map information to the database instance.

In Figure 1-1, there are two disk groups: one disk group has four disks and the other has two disks. The database access both disk groups. The configuration in Figure 1-1 shows multiple database instances, but only one Oracle instance is needed to serve the multiple database instances.

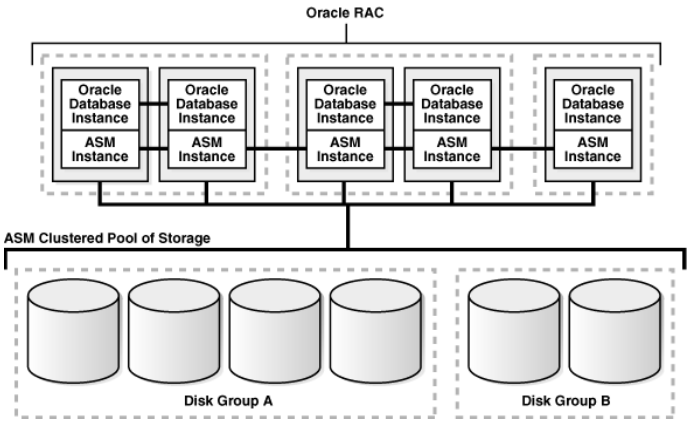
Figure 1-1 Oracle ASM for Single-Instance Oracle Databases



Description of "Figure 1-1 Oracle ASM for Single-Instance Oracle Databases "

Figure 1-2 shows an Oracle ASM cluster in an Oracle RAC environment where Oracle ASM provides a clustered p storage. There is one Oracle ASM instance for each node serving multiple Oracle RAC or single-instance databas cluster. All of the databases are consolidated and share the same two Oracle ASM disk groups.

Figure 1-2 Oracle ASM Cluster Configuration with Oracle RAC



Description of "Figure 1-2 Oracle ASM Cluster Configuration with Oracle RAC"

A clustered storage pool can be shared by multiple single-instance Oracle Databases as shown in Figure 1-3. In t multiple databases share common disk groups. A shared Oracle ASM storage pool is achieved by using Oracle Cl However, in such environments an Oracle RAC license is not required.

To share a disk group among multiple nodes, you must install Oracle Clusterware on all of the nodes, regardless you install Oracle RAC on the nodes. Oracle ASM instances that are on separate nodes do not need to be part of ASM cluster. However, if the Oracle ASM instances are not part of an Oracle ASM cluster, they cannot cor ic each other. Multiple nodes that are not part of an Oracle ASM cluster cannot share a disk group.